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Correspondence and Communications

American trends in oncoplastic breast surgery for 2006–2015: A retrospective analysis of NSQIP database

Dear Sir,

The practice of partial mastectomy (PM) in patients with breast cancer has gained momentum over total mastectomy since the results of randomized clinical trials that have provided evidence demonstrating equivalent survival.[1] But in recent years there has been a relative decline in PM compared to bilateral mastectomies, which has been attributed to inadequate esthetic outcomes after PM without reconstruction, which ultimately affects patient satisfaction and their health-related quality of life.[2] On the other hand, PM with immediate reconstruction – what we define as oncoplastic breast surgery (OPBS) – has been proven to be a safe and efficacious means of improving both aesthetics outcomes compared to PM alone without affecting oncological outcomes.[3] Despite the benefits of OPBS, its nationwide utilization has never been precisely quantified. To facilitate future efforts to increase its availability to appropriate candidate patients, this study aims to establish the recent rate and temporal trends of national utilization of OPBS.

The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database was reviewed for the period 2006–2015 to identify all women 18 years and older who were diagnosed with invasive breast cancer or carcinoma *in situ*, and underwent PM, as well as identify the subset of women who also underwent any reconstructive procedure during the 30-day postoperative period.

The primary outcome was the overall rate of OPBS for the study period, and the temporal trends from 2006 to 2015. The secondary outcome was the annual trend for each OPBS technique: volume displacement (VD), breast reduction (BR), volume reduction (VR), prosthesis, and mastopexy. All statistical tests were two-sided, and p-value of <0.05 was considered significant. A total 91,129 women underwent PM during the period 2006–2015 of which 4.2% ($n = 3777$) also underwent at least one type of reconstructive breast procedure. The univariate as well as multivariable logistic regression analysis illustrated that young, white, non-diabetic women with lower preoperative morbidity were more likely to have undergone OPBS ($p<0.05$ for all).

Trend analyses revealed an overall rise in OPBS utilization from 2.7% in 2006 to 5.2% in 2015, for an annual growth rate of 9% ($p<0.001$) (Figure 1). When analyzing the proportion of each individual method of oncoplastic reconstruction, VD was the most common form of OPBS (47% overall, 17% annual increase), followed by BR (20% overall, 17% annual increase), VR (17% overall, 12% annual increase), mastopexy (9%, 3% annual decrease), and prosthesis (7%; 0% annual increase) (Table 1).

The current study is the first to establish the national rates and recent trends in incidence of OPBS. Despite an increasing number of women undergoing PM and a growing body of evidence to support improved outcomes associated with OPBS, it is surprising to note that only 4.2% of the women who underwent PM also had an oncoplastic procedure performed. Although an upward trend of OPBS was observed (IRR: 1.9; $p<0.001$), the most recent national utilization rate remains exceedingly low at 5.2%. Our findings clearly reflect an unmet nationwide need of oncoplastic breast reconstruction.

Our multivariate analysis showed that younger women of white race with no history of smoking or diabetes were more likely to undergo OPBS (all $p<0.001$). These predictors are similar to those demonstrated in women undergoing post-mastectomy breast reconstruction including reconstruction methods.[4] Further research endeavors including qualitative analyses of women choosing to undergo OPBS, CPM and post-mastectomy breast reconstruction may help illustrate this topic further to help reduce this surgical disparity.

A multitude of factors can affect the need and choice of OPBS, such as those related to surgeons performing this procedure. These could be lack of special oncoplastic training, access or availability of the trained surgeons or inability of the cancer care team to incorporate OPBS as an option in the shared surgical decision-making. A Canadian study reported that prior to lumpectomy, only 1.6% of total 185 participants had a consultation with a surgeon; 33.1% of the patients mentioned that they would have attended the consult if it had been offered, indicating an unmet need for referral barrier for reconstruction among this population.[5]

Despite a growing body of evidence to support improved outcomes, the recent national utilization rate of OPBS remains low at 5.2%. Fortunately, over the past decade utilization has increased at an annual rate of 9%, and has been driven specifically by increases in VD, BR, and VR proce-

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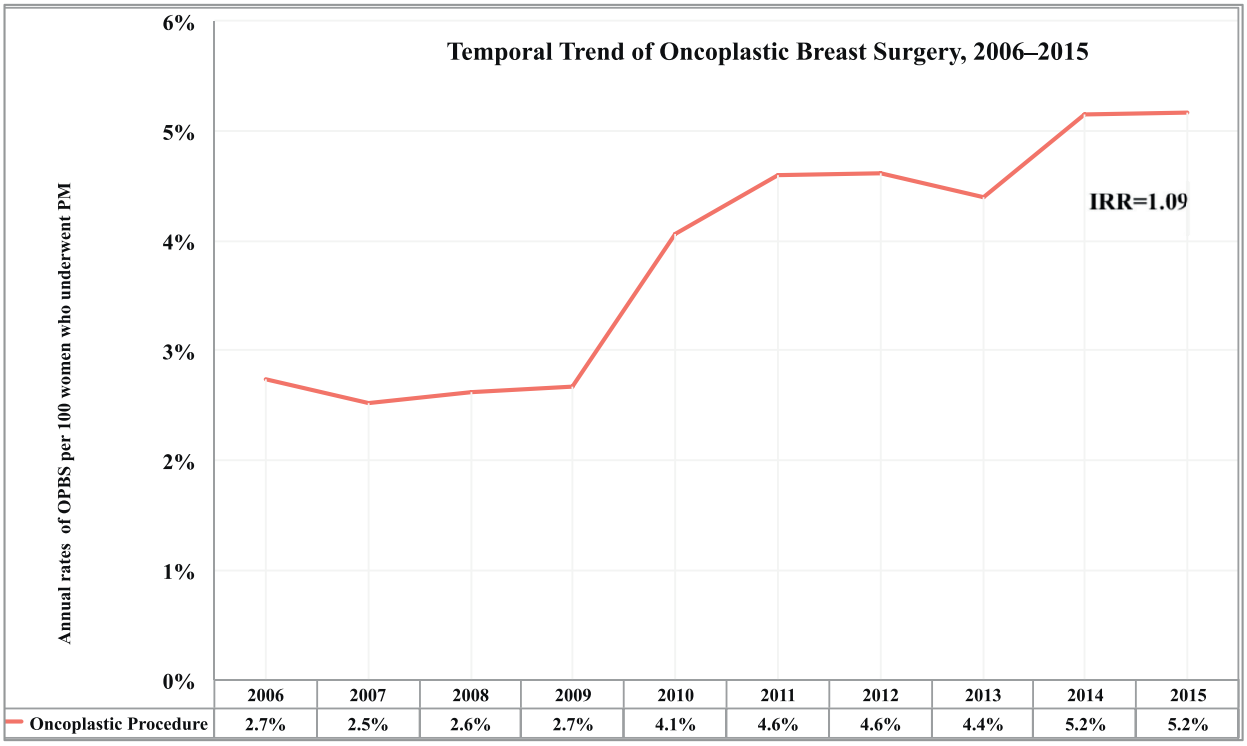

Fig. 1 Temporal trend of oncoplastic breast surgery 2006-2015

Table 1 Temporal trends of oncoplastic breast surgeries by procedure type.

Type of OPBS	N (%)[a]	IRR	95% CI	*P*-value
Volume displacement	1 744 (1.9)	1.17	1.15-1.20	<0.001
Breast surgeon	1 587 (1.7)	1.15	1.13-1.18	<0.001
Plastic surgeon	157 (0.2)	1.44	1.32-1.56	<0.001
Reduction	765 (0.8)	1.17	1.13-1.20	<0.001
Volume replacement	611 (0.7)	1.12	1.09-1.15	<0.001
Prosthesis	485 (0.5)	0.98	0.95-1.01	0.191
Mastopexy	575 (0.6)	0.97	0.94-1.00	0.051
Total	**4 180**[b]	**1.09**	**1.08-1.11**	**<0.001**

[a] % Number of procedure per 100 partial mastectomies,.
[b] The total is greater than $n = 3777$ as more than one procedure was performed in some women; OPBS Oncoplastic Breast Surgery, IRR Incident rate ratio using Poisson regression model, CI Confidence Interval.

dures. Now that the current baseline has been established, a joint effort by the breast surgery and plastic surgery communities can more effectively be undertaken to increase the availability of this beneficial technique to women who are appropriate candidates for partial mastectomy.

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Comparing outcomes of post-mastectomy breast reconstruction between United States and Western Europe☆

Dear Sir,

As advancements in breast cancer treatment has led to increased survival rates, the focus of surgical management has shifted towards an emphasis on reduction in surgical morbidity and improving quality-of-life outcomes. The gradual rise in the rate of breast reconstruction among patients in the United States over the past few decades further suggests that there is an increased demand for a favorable esthetic outcome after mastectomy.[1]

Similar to other surgical procedures, breast reconstruction can be associated with various complications. The United States and Western Europe regularly publish data regarding the outcomes of post-mastectomy breast reconstruction, but comparative outcome studies between the two are quite scarce. Our aim was to compare breast reconstruction choices and post-mastectomy breast reconstruction outcomes between Western Europe and the United States in order to identify techniques lacking universal standardization.

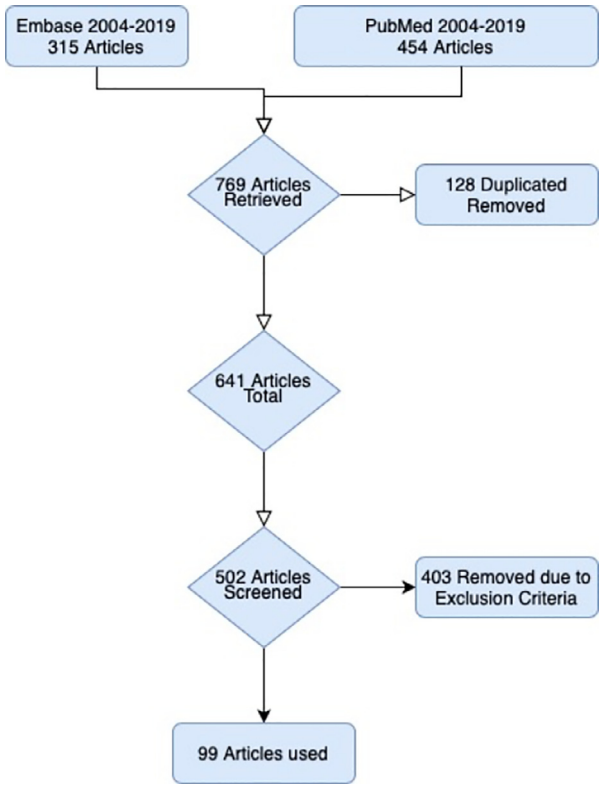

Fig. 1 PRISMA flow diagram illustrating the process utilized for literature review.

We searched the Embase and PubMed database using PRISMA guidelines (Figure 1). From the electronic searches, we looked for retrospective or prospective cohort comparison data regarding complications for post-mastectomy breast reconstructions during 2004–2019. Criteria for inclusion included English language studies and those published in US or Western Europe. After obtaining full text copies and examining 502 articles, 99 articles met inclusion criteria and were included in a pooled database. Weighted proportions were calculated using the Freeman-Tukey transformation under a random-effects model. All analyses were done using MedCalc Statistical Software version 16.4.3 (MedCalc Software bv, Ostend, Belgium; https://www.medcalc.org; 2016.) Statistical significance was defined as non-overlapping confidence intervals. Clinically significant weighted proportions are defined as outcome differences greater than 5%.

For articles including both autologous and implant-based reconstruction, there was a trend toward favoring implant-based reconstruction compared to autologous in both continents. In the US 48456 patients underwent autologous breast reconstruction and 73,051 patients had implant-based breast reconstruction, compared to Western Europe, which included 4618 and 9673 patients respectively. Complication rates between the United States and Western Europe

Table 1 Compiled statistical analysis of coutomes data from PRISMA literature review.

	Random Proportion US (CI)	Random Proportion Western Europe (CI)	Statistical Significance	Clinical Significance
Complications	23.58 (19.27-28.18)	24.82 (16.67-33.99)	N	N
Infection	8.19 (5.53-11.31)	9.00 (5.20-13.71)	N	N
Partial Flap Loss	3.93 (2.0-6.45)	4.23 (3.23-5.36)	N	N
Total Flap Loss	2.80 (1.84-3.96)	1.01 (0.43-1.82)	Y	N
Skin necrosis	5.21 (3.93-6.89)	6.36 (1.23-15.01)	N	N
Implant fail	4.83 (2.71-7.53)	6.89 (5.19-8.81)	N	N
Wound Dehiscence	4.45 (2.16-7.50)	6.29 (3.22-10.30)	N	N
Seroma	5.22 (3.79-6.86)	3.64 (1.99-5.77)	N	N
Hematoma	2.49 (1.79-3.31)	3.69 (2.18-5.58)	N	N
Capsular Contracture	8.87 (4.64-14.29)	7.44 (3.93-11.95)	N	N

were similar with total flap loss being the only statistically significant variable. There was a greater proportion of total flap loss in the United States (2.80, CI 1.84-3.96) compared to Western Europe (1.01, CI 0.43-1.82), however, while statistically significant, this data was not clinically significant given a low absolute difference in flap loss rate (Table 1).

Implant-based reconstruction remains the most commonly performed method of reconstruction in both geographical areas. For this modality of reconstruction, operating time is shorter, and avoids donor site morbidity and concerns with flap perfusion. However, implant-based reconstruction in irradiated tissue carries a greater risk of postoperative infection and capsular contracture. Additionally, patient reported outcome measures have shown autologous reconstruction to have higher scores than implant reconstruction likely due to the decreased long-term complications when compared to implant reconstruction and having one's own tissue rather than a foreign body implant.[2]

In regard to cost, free flap reconstruction, in most cases, is a more expensive option partially due to increased upfront costs associated with operating times and hospital admissions for monitoring. Implant reconstruction carries its own costs including primarily those of the implant, but many procedures are outpatient and avoid significant hospital costs.[3]

The higher long-term complication rates associated with implant-based reconstruction and radiotherapy has led some plastic surgeons to instead choose reconstruction with autologous tissue, including both pedicled and free flaps.[4] Autologous-based reconstruction replaces like-tissue with like and avoids a permanent implant. While this obviates the risk of capsular contracture and implant infection or loss, it raises concerns related to flap malperfusion and loss. Implant failure rate is significantly higher than flap failure rate, 7.3 versus 1.3%, respectively.[5] Additionally, operating room time is much greater for autologous reconstruction, with approximately four hours for pedicled flaps and six hours or greater for free flaps.[8]

Overall, the complications and total failure rates for both continents are comparable and relatively low which has led to a high satisfaction rate in patients who receive breast reconstruction post mastectomy. In Pirro et al., 53.9% of implant based reconstruction reported satisfaction with breasts compared to 69.1% utilizing autologous tissue.[2] Satisfaction with overall outcome was 75.5% in implant-based reconstruction while 91.5% in autologous.[2]

While this study is novel, it is not without limitations. Given a lack of reported techniques for implant reconstruction, we were not able examine prepectoral placement as compared to sub-pectoral. In addition, autologous outcomes were not granular enough to look at different subtypes of pedicled and free flaps. Additionally, many studies were nonspecific with regards to the type of mastectomy performed which may affect results since a skin-sparing mastectomy may provide a better reconstructive form than a nipple-sparing mastectomy with regard to Breast-Q satisfaction with breasts and overall outcome.[2]

The results suggest that there are similar complication rates between the United States and Western Europe for post-mastectomy breast reconstruction. These findings encourage patients to feel equally safe in both continents for these procedures.

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Declaration of Competing Interest

None declared.

Ethical approval

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The myocutaneous long peroneal flap: An anatomical study and its clinical application

Dear Sir,

The knee joint and its surrounding are prone to complications after trauma or elective surgery because of its paucity of pliable soft tissue with higher risk of defects or infections. Despite the well-known different techniques[1] as first line treatment in reconstructive surgery, this area nevertheless remains a challenge. The aim of this study was to develop a solution to close small to medium defects of this area with minimal use of extra needed split skin grafts especially those after failed knee surgery where the gastrocnemius muscle has to be spared for revision endoprosthesis implantation in a setting without microscope or in elderly in poor physical state with already used gastrocnemius muscle flap. We performed primarily cadaver dissections to clarify vascularity and size of the skin island of the mcLPF and secondary to develop a standard operation protocol. First, we marked the anatomical landmarks of the fibula and centered the planned skin island over its proximal half and checked the primary closure with a pinch test. After incision of the skin island, the peroneal compartment was opened distally, identifying the lower part of the long peroneal muscle at the site of the peroneal tendon junction. After carefully dissection of the muscle from distal to proximal the peroneal nerve and its two branches were identified in combination with its most proximal vascular muscle pedicle. This vascular pedicle acts as the pivot point of the whole flap. We then dissected the skin island from lateral to central towards the skin perforators which were almost constantly located on a vertical line in the middle of the muscle. The length of the five cadaveric skin paddles was 19–24 cm (mean 21,2 cm), width was 3,5–4,5 cm (mean 4,1 cm) and the number of skin perforators 3–5 (mean 3,8 cm) (Figure 1).

A – 72 year old diabetic female patient was presented to our unit by the orthopedic department with a chronic knee infection after failed patella tendon reconstruction one year ago. After orthopedic debridement with cartilage resection and cement spacer implantation a lateral patellar defect remained which we covered in the same operation with our mcLPF (Figure 2). We chose the mcLPF as our first choice sparing the gastrocnemius muscle flap for later reconstruction in combination with a revision knee prosthesis. Dissection time was 51 min. Inset of the flap was followed by a small split-thickness skin graft on the muscular pedicle to reduce skin tension at the level of the fibular head. Two days after the intervention the knee became septic again and after orthopedic revision with radical debridement we did an extra lateral gastrocnemius muscle flap for coverage. By persistent infection under iv antibiotics the patient opted for orthopedic knee amputation 3 weeks later.

The area around the knee is prone to defects after traumatic injuries or revision orthopedic surgery due to its paucity of pliable soft tissue. Flaps for covering knee defects in patients in poor physical conditions are limited and rarely described.[2] In patients with multiple revisions surgical options are even more often limited. Because of multiple preexisting incisions free-style perforator propeller flaps have a higher risk to fail[3] in revision surgery. To address this issue, we modified the recently described peroneus longus muscle turn over flap originally described by Wagner[4] into a myocutaneous rotational flap to reduce needed amount of split skin graft and to enhance cosmetic outcome. The advantage of the flap is its deep and therefore save anatomical position of its cranial pedicle which serves as the pivot point. Little has been described about the anatomic blood

Figure 1 Cadaver dissection which shows overall design with its anatomic landmarks, position of the pedicle (in average 4 cm distal of the fibular head), skin perforators and the possible range of motion of the flap (flap size 20 × 4 cm).

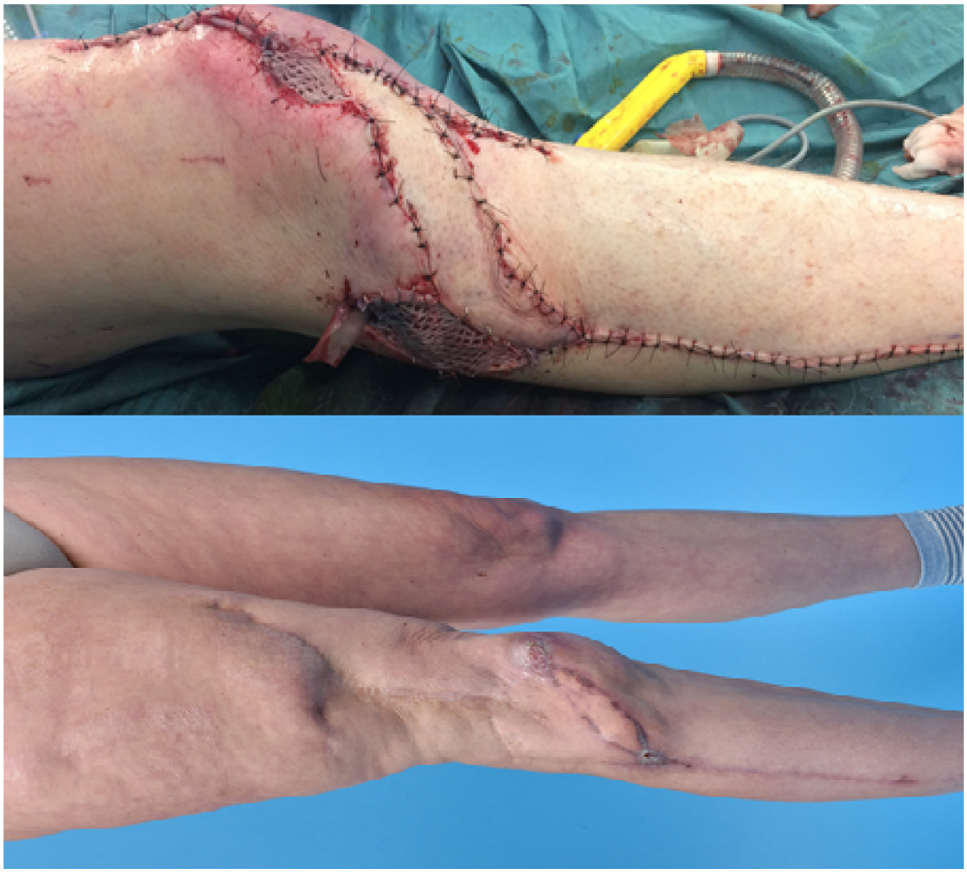

Figure 2 Immediate postop. result in a patient and long term result after 4 months in another patient.

supply of the skin directly adjacent to the long peroneal muscle.[5] We could identify a relative constant line of small myocutaneous perforators in the middle of the long axis piercing the fascia directly overlaying the long peroneal muscle and nourishing the skin. Preparation of these skin island perforators could give an even larger range of rotation. In combination with a medial gastrocnemius muscle flap, mcLPF is a possible option for larger defects in physically limited patients or in settings without microsurgical expertise. This new myocutaneous muscle flap appears to be a relatively simple procedure to close small to medium-sized defects around the knee without or with minimal split skin grafts. With a short dissection time for harvesting and inset, this procedure is fast forward. Loss of function is minimal with low donor-site morbidity, good cosmetically result (Figure 2) and overall a short recovery time. We recommend this method primarily for patients of advanced age, in poor physical condition where the gastrocnemius flap has already been used, or in situations where the gastrocnemius muscle flap should be spared for delayed revision prosthesis reconstruction. Larger series are necessary to further delineate advantages, disadvantages and other indications of the mcLPF.

Declaration of Competing Interest

T. Wagner, Joris Franken, Marijn Hameeteman and DJ Ulrich declare that they have no conflict of interest.

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Ethical approval

For this type of study formal consent from a local ethics committee is not required.

Patient consent

Informed consent was obtained from all individual participants included in the study.

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Optimising venous assessment for free tissue transfer in the lower limb

Dear Sir,

Free flap reconstruction in the lower limb is challenging. A range of aetiologies, patients and ages require microvascular cover for differing complaints: trauma, chronic infections, ulcers and cancer, with a spectrum of co-morbidities, pre-habilitation states and post-operative rehabilitation potential.

Reconstructive microsurgical teams are correspondingly expansive, increasingly challenging boundaries without compromising success; relaxing patient selection criteria such as age, BMI and co-morbidity or anastomosing in the zone of trauma but, what remains a challenge, is the humble vein.[1,2]

Free flap failure is commoner in the lower limb than elsewhere,[1] with venous issues the commonest cause of returns to theatre.[2] The need for venous anastomotic troubleshooting may originate anatomically, with venous disease commonest in the lower limb;[3] physiologically, with dependent flaps disproportionately vulnerable to congestion; aetiologically, since chronic wounds, ulcers, and associated cancers

occur in vasculopaths[1] and due to difficulty reversing factors like smoking or obesity in usually expedited surgery. Most flaps are salvaged but at financial, psychological and physical cost to the health service, surgeon and patient respectively.

Few units use pre-operative venous imaging;[1] current practice generally remains the subjective intra-operative assessment of resistance to flushing with, often, two venous anastomoses performed, with deep and superficial options available (without knowing which is consistently more reliable).[1] Why then, with arterial imaging increasingly standard practice,[1] do we ignore venous strategy?

Conditions increasing venous resistance in the lower limb come in three main forms: valve disease and reflux, phlebosclerosis and deep vein thrombosis (DVT). All three compromise flap outflow, by obstruction or flap afterload, through reflux or reduced venous compliance and capacitance.

Valve disease and reflux is particularly common in patients with chronic peripheral vascular disease. One study reported it in 40% of patients requiring lower limb free flap reconstructions for chronic wounds on venous duplex ($n = 59$, mean age 56 (range 19–80)), 27% in the thigh, 10% in the superficial and 7% in the deep calf systems.[1] Only one patient had reflux in both superficial and deep calf systems.[1]

Phlebosclerosis is the fibrous degeneration of, predominantly, the venous intima after persistent infection, inflammation, or insulin use (causing vessel wall overgrowth and thickening).[3] Segments averaging 2 cm (1–7 cm) were found in 10% of acute or chronic vascular patients' legs on venous duplex ($n = 740$, mean age 49 (18–84)), particularly in older patients with chronic venous hypertension (CVH), regardless of gender.[4] It affects legs more than arms, particularly the short saphenous system, though deep and superficial systems can be involved, independent of thrombosis or reflux.[4]

Subclinical DVTs have been identified in 7% of lower limb chronic wound patients,[1] 11.5% of anti-coagulated lower limb skeletal trauma patients, within three days of admission,[5] and in up to 24% of lower limb CVH patients.[1] DVTs can block free flap outflow and are potentially fatal, exacerbated by a long microvascular operation, where mechanical thromboprophylaxis may not be possible.

With warning, venous outflow issues can be mitigated, potentially avoiding costly returns to theatre with congestion, which often only presents once the patient is off the table. Since usually only the superficial or deep system is affected by reflux,[1] the unaffected system can be targeted for at least one anastomosis. Where it is impossible to avoid a pathological vein, extra attention to post-operative flap monitoring could be initiated. Phlebosclerotic veins may necessitate amended surgical approaches, with sutured rather than routinely coupled anastomoses, further adventitiectomy to reduce the wall to lumen ratio or cuts to evert and splay less pliable vessels over the coupler ring. DVTs can be pre-emptively treated, pharmacologically and/or physically, with IVC filters.

Reflux, phlebosclerosis and extremity DVTs can all be identified with venous duplex scanning, which is accurate and cheap, without contrast or irradiation load, in contrast to other venographic techniques. Intra-flap venous dominance also has the potential to be mapped. Can we justify ignoring the chance to 'know our enemy' pre-operatively, particularly in high risk patients? The resistance to routine CT angiography concerned its economic and irradiation costs, though its intra-operative decision making benefit is established.[1] Admittedly, venous anatomy is more complicated than arterial but, with cheap, non-invasive, non-irradiating options to delineate venous structure, why not use them? The issue around venous outflow may be of particular relevance to larger flaps or those with end-to-end rather than end-to side in-flow, requiring more venous drainage; to higher co-morbidity patients for whom a return to theatre may be physiologically costly; or to those at particularly high risk of reflux, phlebosclerosis or an occult DVT.

Venous pathology is a relevant clinical entity that should be considered pre-emptively both technically, and regarding clinical decision-making processes, in microvascular surgery of the lower extremities. Further studies are required to evaluate whether blinded, experienced surgeons can accurately assess venous resistance by intra-operative flushing, correlated to pre-operative venous duplex ultrasound mapping, to inform surgical protocols and further explain cases requiring venous troubleshooting or of flap failure.

Disclosures/Declaration of Competing Interest

None.

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Near infrared spectroscopy; A novel application of INVOS™ for monitoring muscle only free flaps

Dear Sir,

Free microvascular tissue transplantation has become the gold standard for reconstruction in defects ranging from head and neck cancer, breast reconstruction and significant limb injuries. Flap failure rates are below 5% with increased risk of complication and failure in head and neck and lower limb trauma. Complications can still be common including vascular compromise leading to flap necrosis and complete flap loss. Free flaps where vascular compromise is detected and explored early, have good salvage rates with some centres reporting up to 92%.[1] Clinical assessment encompassing capillary refill, turgor, and audible Doppler signal by adequately trained staff, is the gold standard, but this is dependent on considerable experience, and is even more difficult when assessing muscle free flaps. Muscle flaps are a particular problem when it comes to venous congestion and run a higher risk of delay before recognition of a problem.[2]

Near Infrared Spectroscopy (NIRS) has been used in clinical practice for several decades in both surgical and critical care specialties. The advantage of the technology is the capacity for continuous and non-invasive monitoring of microvascular oxygen saturation.[3] Using multiple algorithms, a relative number from 0 to 100 to reflect the adequacy of perfusion is derived, with 100 being the maximum. Whilst there are no tables to describe "adequate" perfusion, the most important indicator is a relative drop of more than 20 points, compared to the baseline readings, in the post-operative period. Declining perfusion normally manifests itself within 5 min of a problem arising. The baseline readings will be taken shortly after the end of an operation. The use of NIRS has been well described for fasciocutaneous free flaps, but we have been able to use it for real time monitoring of muscle only free flaps, in lower limb trauma patients at Cairns Hospital.

Five consecutive cases of lower limb orthopaedic trauma requiring free flap coverage were reconstructed with a gracillis muscle only free flap within 7 days of initial injury. The cases included 3 males and 2 females aged from 27 to 55 years. End to side arterial anastomoses to the posterior tibial arteries and end to end coupled venous anastomoses to the vena comitantes were performed in all cases. A baseline reading using the In-Vivo Spectroscopy (INVOS™ Medtronic, USA) was taken before the patient was taken off the table. In order to be able to place the sensor probe on the muscle flap, a sterile occlusive dressing (Tegaderm™) was placed over the entire flap and the surrounding edge. Another occlusive dressing was placed over the top of the sensor (Figure 1), to ensure the sensor did not move during the monitoring period. Baseline readings were all above 85 and did not fluctuate significantly. The INVOS™ monitor was set to alarm at 20 points below the baseline measurement. No flap failures were observed and all patients recovered uneventfully.

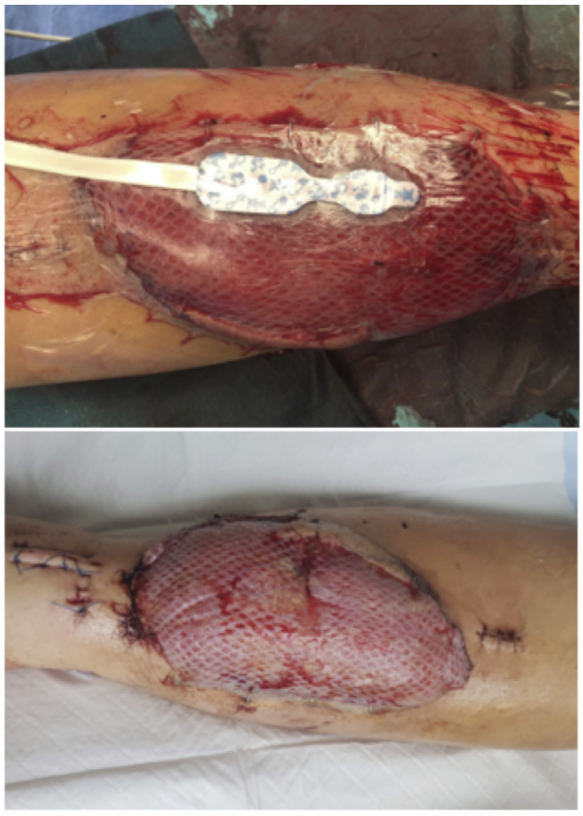

Figure 1 (Top) Dressing configuration, INVOS™ optode pad sandwiched between two occlusive dressings, (bottom) healing free flap.

Multiple methods of free flap assessment have been described, with clinical examination still being the most prevalent but no method offers a panacea. An ideal method of monitoring should be continuous, non-invasive, accurate and quantitative.[3] The INVOS™ monitor offers these methods but is still not perfect. We have discovered that ambient light affects readings and this took place in theatre, recovery and the ward. Keeping light off the senor by means of dressings and/or an infra-red blocking film helped against this. A type of woven gauze dressing, Combine™, affected the readings adversely whereas others did not. These issues were remedied and we continue to use NIRS for our post-operative monitoring for both fasciocutaneous and muscle only free flap patients.

NIRS has many potential advantages for free flap monitoring. Inexperienced nursing staff or junior medical officers who may be called to assess a free flap may appreciate an objective measurement of flap "viability". It offers an earlier diagnosis of compromised microvascular circulation and thus, potentially earlier intervention and flap salvage. It has the potential to be used for remote monitoring via web-portal access and the development of an "app" for monitoring is an exciting potential future prospect.[4] This is a particularly enticing concept in smaller, peripheral units where there may be limited experience amongst nursing staff. The

sensors are also relatively inexpensive and up to four may be utilised at the same time.

Before these benefits can be universally applied in clinical practice, it will need significant and robust validation. Nevertheless, we believe that this is the first description of a real-time, continuous, non-invasive method of monitoring muscle only free flaps and that it has a significant potential to enhance clinical surveillance of free flaps in the immediate post-operative period.[5] Further studies are needed to explore the role of NIRS in free flap monitoring and how it may enhance flap survival success rates.

Declaration of Competing Interest

Dr Sorensen has received honorariums related to product development, the authors have no financial interests in Medtronic.

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Lymphatic anatomy and injection sites for indocyanine green lymphography in the posterior thigh

Dear Sir,

We read the article "Multilymphoscome injection indocyanine green lymphography can detect more lymphatic vessels than lymphoscintigraphy in lymphedematous limbs" by Hara et al.[1] We agree with their conclusive statements of better lymphatic localization with multi-site injection indocyanine green (ICG) lymphography than lymphoscintigraphy. It is important to understand precise lymphatic anatomy of the extremity for the treatment of lymphedema, especially lymphovenous anastomosis (LVA) surgery.[2-5] The lymphatic anatomy in the posterior thigh is yet to be fully clarified. Most previous studies and textbook describe that posterior thigh lymph flows start from the posterior midline to the inguinal lymph nodes through medial or lateral aspect of the thigh; the posteromedial and the posterolateral pathways. However, there is no study showing that the posterior midline is the watershed or borderline between posteromedial and posterolateral thigh lymphatic pathways.

We reviewed ICG lymphography findings of the contralateral lower extremity of 11 unilateral lower extremity lymphedema patients. ICG was injected at 3 points along the midline of the posterior thigh, and fluorescent images were obtained using a near-infrared camera. Linear pattern was marked to evaluate directions of posterior lymph flows. There were 1-4 posteromedial thigh lymphatic pathways on ICG lymphography, but no case showed posterolateral pathways. The results strongly suggest that the borderline of the posterior thigh lymphatic pathways are not at the posterior midline; rather, would be more lateral. As the authors performed in their study, ICG should be injected at the lateral thigh to visualize both posterior and anterior lateral-to-medial lymphatic pathways.

The common recognition of the lymphatic anatomy in the posterior thigh would be wrong; thigh lymph flows from the lateral aspect to the inguinal lymph nodes through the posterior and the anterior posterior-to-medial pathways in addition to medial pathways running along with the greater saphenous vein. Further studies are warranted to confirm the precise anatomy of the thigh lympahtics and optimal injection sites for comprehensive lower extremity ICG lymphography.

Prior presentations

None.

Declaration of Competing Interest

None.

Acknowledgement

None.

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The use of indocyanine green in the management of symptomatic lymphatic leaks following inguinal lymph node surgery

Dear Sir,

A number of techniques have been proposed to prevent seroma formation, such as the use of quilting sutures, barbed sutures, and immobilisation with thromboembolism prophylaxis and compression garments. Nevertheless, around 50% of patients undergoing inguinal lymph node dissection[1] and 1.2% −14.9% of sentinel lymph node biopsy (SLNB) patients[2] develop a seroma. Persistent seroma can lead to delayed wound healing, infection, increased length of hospital stay and re-admission. There is limited evidence within the literature on how to manage chronic, symptomatic seromas and lymphoceles.

We report a novel technique for problematic seroma management using intradermal injection of indocyanine green (ICG), a fluorescent tricarbocyanine dye that binds with high affinity to plasma proteins and has absorbing properties in the infrared region. When injected intradermally, ICG lymphangiography can enable real-time intra-operative visualisation of lymphatic vessels to identify the source of lymphatic leak. Once identified, these vessels can be ligated and oversewn. Here, we describe three patients who underwent ICG lymphangiography for seroma management.

Methods

Three patients, each with a persistent symptomatic seroma following inguinal node surgery for malignant melanoma (patient 1 and 2) and squamous cell carcinoma (patient 3) (Figure 1), underwent intradermal ICG injection to the distal medial thigh of the affected groin, under general anaesthesia. Verdye® Diagnostic Green GmbH 25 mg/ml powder was reconstituted with 5 ml of water for injection. The volume of reconstituted dye injected intradermally varied between 1.5 ml and 2 ml per patient. A hand-held Hamamatsu pde-neo®II infra-red fluorescence imager was utilised in a caudal-to-cranial direction along the thigh to permit detection and transit of the dye to the source of the lym-

This work was presented as a poster at the BAPRAS undergraduate day in Birmingham on 7th March 2020.

Patient	Patient 1	Patient 2	Patient 3
Age	71	57	78
Gender	Female	Male	Male
Background	Naevoid melanoma arising in intradermal naevus in right calf	Malignant melanoma on left lower back	Recurrent squamous cell carcinoma in the left groin with involvement of femoral vessels
Procedure preceding seroma	Wide local excision melanoma scar and sentinel lymph node biopsy of right groin	Wide local excision of melanoma scar and sentinel lymph node biopsy of left axilla and bilateral groins	Left inguinal completion lymphadenectomy, sartorial switch and proximally based fasciocutaneous transposition flap
Adverse reaction to ICG	None	None	None
Identification	Able to identify single source of lymphatic leak	Able to identify two sites of lymphatic leak	Able to identify distal lymphatic leak through fibrosed scar tissue and superficial and deep lymphatic feeding channels
Treatment	Lymphatic fluid leak oversewn with 1:0 silk	Lymphatic leak sites oversewn with 1:0 silk	Channels were excised, and the wound was extended caudally to permit oversewing of the lymphatic channels using 0:0 silk
Lymphatic leak outcome	Resolved	Resolved	Lymphatic leak initially resolved. Further disease progression led to discharge from the groin secondary to fungating tumour.

Figure 1 The table shows an overview of each patient in the study. ICG correctly localised the site of lymphatic leakage in all patients.

phatic leak. This live stream modality allowed precise localisation of the lymphatic leaks with Debakey forceps, facilitating oversewing and ablation of the disrupted lymphatic vessels under direct vision (Figure 2).

Results

ICG lymphangiography precisely identified the source of the groin lymphatic leak in all three patients (Figure 1). In two patients (patients 1 and 2) there was complete resolution of the symptoms with a follow up time of 3 and 6 months, respectively. In the other patient (patient 3), ICG correctly localised the leak and permitted oversewing. Unfortunately, despite this, the patient developed further groin recurrence with metastatic tumour eroding through the local lymphatics.

Discussion

This series demonstrates the utility of ICG lymphangiography to identify the source of lymphatic leak following groin lymph node surgery. The medial thigh was chosen as the intradermal injection site in order to access the lymphatic channels of both the superficial dermal plexus and the deep lymphatics associated with the long saphenous vein. Methylene blue has also been described for this,[3] but may be associated with a number of autonomic, neuropsychological, neuromuscular and GI side effects. Furthermore, methylene blue is a monoamine oxidase inhibitor, so may precipitate serotonin syndrome in patients taking serotonergic drugs. In contrast, ICG is rapidly metabolised by the liver and excreted in bile within 2–4 min, with adverse events, such as anaphylaxis, hypotension and dyspnoea, being rare.[4]

ICG binds to blood lipoproteins, which has important uses in indicating biliary and vascular anatomy in laparoscopic cholecystectomy, colorectal anastomosis, nephrectomy (where there is a high rate of anatomical variation) and kidney autotransplantation. ICG videoangiography has been used successfully to facilitate intraoperative decision making during neurovascular surgery by identifying early arterialised veins in patients with cerebral arteriovenous malformations and aneurysms. It has also been utilised in plastic surgery to check perfusion of free and pedicled flaps and mastectomy skin flaps to aid intra-operative decision making.[5] To our knowledge, ICG lymphangiography, although being used to describe lymphatic mapping, has not previously been utilised to manage problematic seromas following lymph node surgery.

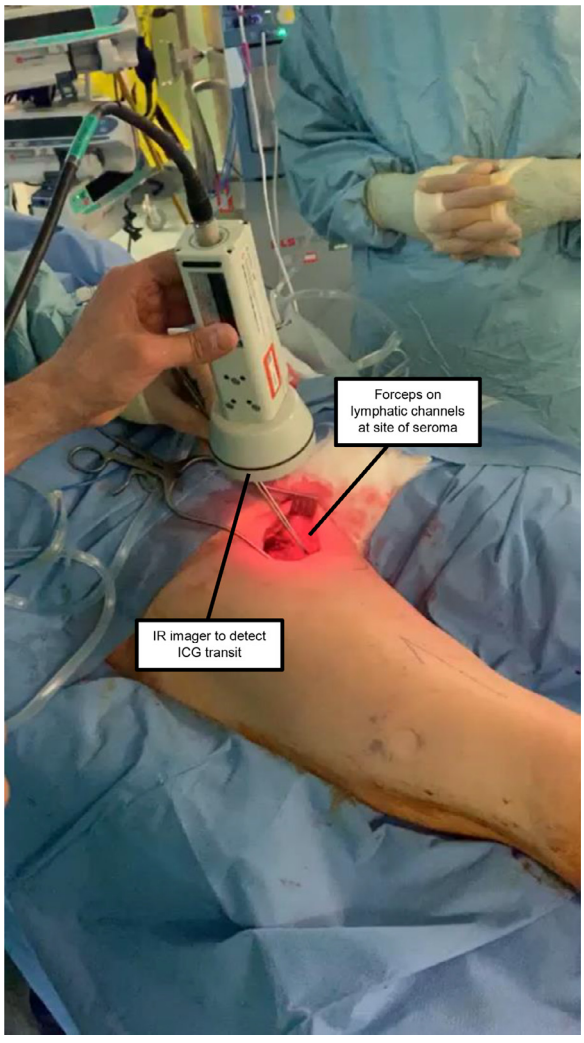

Figure 2 Injection of ICG and use of infra-red (IR) imager.

Figure 2 ICG injected intradermally in the distal medial thigh. The ICG travels in a caudal-to-cranial direction proximally towards the seroma. A hand-held Hamamatsu pde-neo®II infra-red fluorescence imager is used to detect the transit of the dye to the source of the lymphatic leak. The lights are turned off to maximise signal-to-noise ratio and Debakey forceps are applied to the lymphatic vessel. At the site of the defect, the pressure exerted by the forceps will slow/stop leakage of ICG into the seroma cavity. This indicates the point that needs to be oversewn.

Conclusion

ICG lymphangiography is an effective adjunct in identifying persistent lymphatic leak and managing problematic groin lymphocoeles and seromas. The ICG dye is easily administered via intradermal injection and is detected using the hand-held Hamamatsu pde-neo®II infra-red fluorescence imager in a few minutes. It is a valuable technique in the surgical armamentarium when faced with a patient suffering with persistent seroma, and can facilitate identification and ablation of lymphatic leaks leading to seroma resolution.

Declaration of Competing Interest

None

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Response to "Lymphatic anatomy and injection sites for indocyanine green lymphography in the posterior thigh"

Dear Sir,

We read the letter entitled "Lymphatic Anatomy and Injection Sites for Indocyanine Green Lymphography in The

Posterior Thigh" by Sakai et al.[1] with a great interest and would like to write a response.

The watershed of the lymphosomes in the thigh region is still controversial while it is relatively well-discussed in the lower leg. Shinaoka et al. reported that there are 4 lymphatic groups in the leg by injecting indocyanine green (ICG) at 19 points around the foot in human cadavers, though there was little information on the lymphatic territory in the thigh.[2] Suami and Shinaoka demonstrated that there are 2 lymphosomes in the thigh and the watershed is located at the midline of the posterior thigh with ICG lymphography and the microinjection technique.[3] We reported multilymphosome ICG lymphography in which we injected ICG at 3 lymphosomes in the lower limb (the saphenous lymphatics, the lateral calf lymphatics, and the lateral thigh lymphatics).[4,5] We can get more information by injecting ICG in many sites, though we should minimize the number of injection site to reduce the patients' pain in clinical settings. Therefore, establishing the watershed of lymphosome is essential and we agree with the comment by Sakai on this point.

Recently, lymphatic ultrasound is introduced to evaluate the condition of the lymphatic vessels.[6,7] With lymphatic ultrasound, we can detect the dilated lymphatic vessels which are not found with ICG lymphography and also the diagnosis of the dilation or sclerosis of the lymphatic vessels is possible. It is interesting that the lymphatic vessels found in ICG lymphography and lymphatic ultrasound are inconsistent, and ICG lymphography alone is not enough to evaluate the location and the condition of the lymphatic vessels. Besides, the distribution of the lymphatic vessels in cadaver and living body is different, especially in lymphedema cases.[8] It is more complicated in primary lymphedema patients. Further research is necessary to establish the watershed of lymphosome in the thigh region.

Sources of support that require acknowledgement

None.

Prior presentations

None.

Declaration of Competing Interest

None.

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Acrosyndactyly: Are we using the term correctly?

Dear Sir,

Etymologically, the term acrosyndactyly combines *acro-* which can relate to height, such as in acrocephaly, or to a peripheral part, especially of the extremities, such as in acrocyanosis. To the latter is connected *syn-* meaning *together*, and *dactyly-*, relating to the *digits*.

In his article titled "De l'acrocéphalosyndactylie", published in 1906, Eugene Apert first described the syndrome we know by his name today.[1] Five decades later, Bunnell coined the term "acrosyndactyly" to describe the fusion of the distal portion of a digit with unaffected proximal webs.[2] This was also earlier described as terminal, fenestrated or "lattice" syndactyly by various authors.[3]

We have noticed that over the years the term acrosyndactyly has been used interchangeably in the literature to describe both what Patterson classified as constriction ring sequence type 3 in 1961, and the complex syndactyly seen in Apert's syndrome. Both hand differences are similar in how they primarily affect the central digital mass and by

the usual absence of proximal bony synostoses. We nonetheless question the use of the term acrosyndactyly to describe both entities, as they differ in several ways, including their aetiology. As such, the OMT classification describes constriction ring sequence as a deformation and Apert's syndrome as a malformation.[4] Most importantly however, no matter how severe, constriction ring associated acrosyndactyly will always exhibit proximal sinuses, which the acrocephalic hand does not.

We thus suggest that the syndactyly associated with Apert's syndrome be referred to as a complex syndactyly (or complicated if exhibiting rare proximal bony fusions) and subclassified as described by Upton in 1991[1]. On the other hand, to avoid any confusion, distal fusions with proximal web sinuses in association with Constriction ring syndrome should be referred to as fenestrated syndactyly, as described by A.J. Barsky in 1951.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Hepatitis influences the diagnosis of Necrotising soft-tissue infection: A proposed modification to the Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) score from a retrospective study at a single institution

Dear Sir,

Necrotising soft-tissue infection (NSTI) is a life-threatening disease that is difficult to diagnose at early stages. Wong et al. reported that 76% of NSTI cases are misdiagnosed on admission.[1] The early diagnosis and debridement are essential in prognostic improvement. One previous study reported that a delay in surgery of more than 24 h made the mortality rate higher by 9.4 times.[2] The Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) score is a popular tool for the differentiation of NSTI from non-NSTI.[3] However, the sensitivity of the LRINEC score differs from 68.2% to 100%.[4] We hypothesized that NSTI patients with low LRINEC scores should have some comorbidities in common and this retrospective study aimed to specify those comorbidities and improve the LRINEC score.

Of the 1129 patients who had been admitted to our hospital with soft tissue infection between January 2010 and December 2018, the data of 63 patients with NSTI and 831 patients with cellulitis were ultimately included in the study. In our centre, a biopsy of the affected area is performed immediately if NSTI is suspected from clinical findings. A definitive diagnosis of NSTI was made when the biopsy result yielded a positive culture or a pathologic analysis revealed fibrinoid necrosis and fibrin thrombus. A diagnosis of cellulitis was made after the biopsy analysis excluded NSTI or the patient recovered following the administration of antimicrobial drugs in the absence of biopsy. Patients with missing laboratory data, including the C-reactive protein (CRP), white blood count (WBC), haemoglobin (Hb), sodium (Na), creatinine (Cre), and/or glucose plasma measurements within 24 h after admission, were excluded. The original LRINEC scores at admission were calculated. Patients with a LRINEC score of $\geq$6 were classified as high-risk, while those with a score of $\leq$5 were classified as low-risk. The following demographic data at admission were collected for the patients in each group: age, sex and common causes of immunodeficiency, including the presence of diabetes (DM), chronic hepatitis (CH), chronic kidney disease (CKD), malignancy, and/or oral steroid use. These data were

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Table 1 Multivariate analysis of potential associations between necrotising soft-tissue infection (NSTI) and cellulitis.

	NSTI ($n=63$)	Cellulitis ($n=831$)	Odds ratio	95% CI	P value
Age (range)	64.44±14.84 (22-93)	63.00±24.27 (0-101)	1.088	0.534-2.408	0.824
Male sex (%)	43 (68.3)	427 (51.4)	1.920	1.064-3.580	0.030
DM (%)	42 (66.7)	204 (24.5)	5.80	3.23-10.741	<0.0001*
CH (%)	16 (25.4)	19 (2.3)	17.26	7.491-40.183	<0.0001*
CKD (%)	12 (19.0)	68 (8.2)	1.17	0.477-2.605	0.7222
Malignancy (%)	7 (11.1)	66 (7.9)	1.21	0.445-2.875	0.6839
Steroid use (%)	5 (7.9)	63 (7.6)	0.65	0.144-2.023	0.4915

Age is displayed as a mean value ± standard deviation.
CI, confidence interval; DM, diabetes mellitus; CH, chronic hepatitis; CKD, chronic kidney disease.

collected from the medical record. Based on the statistical analyses of these variables, we attempted to improve the LRINEC score. Multivariate logistic regression analyses were performed to assess potential correlations between variables. Pearson's chi-square test was used to analyse categorical variables. A P value <0.01 was considered to indicate statistical significance.

A multivariate analysis of the variables stratified by NSTI and cellulitis group classification identified CH as statistically significant risk factors for NSTI (odds ratio; 17.26, $p<0.0001$) (Table 1). In contrast, a multivariate analysis of each risk factor stratified using a LRINEC score cut-off of 6 revealed that patients with soft-tissue infection and comorbid CH did not tend to be classified as high-risk (odds ratio; 0.92, p value; 0.8279). These results suggested that CH could be a risk factor for both NSTI and low LRINEC scores. We hypothesized that this was because the LRINEC score did not accommodate CH as a risk factor for NSTI.

Therefore, we devised a modified LRINEC score that would include the risk imposed by CH (Table 2). To determine the ideal points that should be added for CH, we calculated the sensitivities and specificities of the receiver operating curves (ROC) generated by the addition of 0 to 6 points. Our analysis indicated that the addition of 3 points maximised the sensitivity and minimised the decrease in specificity. The ROC curves also confirmed that the modified LRINEC score retained a cut-off score of 6.

Finally, we compared our modified LRINEC score with the original. After calculating the modified LRINEC scores of all study patients, we generated ROC curves and determined the areas under the curves (AUC). Notably, this addition increased AUC for our modified LRINEC score to 0.827 vs. 0.797 for the original. Our modification exhibited an 11% improvement in sensitivity and 1% decrease specificity, resulting in a decrease in the false-negative rate from 33.3% to 22.2%, which is 30% decrease. We further note that the required hepatitis B surface antigen (HBsAg) or hepatitis C virus antibody (HCVAb) test result and history of CH are collected routinely in emergency rooms. We believe that our modification is meaningful and unique because it includes

Table 2 Modified Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) score.

Variable	Result	Score
CRP (mg/dl)	<15	0
	≥15	4
WBC (/μl)	<15,000	0
	15,000-25,000	1
	>25,000	2
Hb (g/dl)	>13.5	0
	11.0-13.5	1
	<11.0	2
Na (mEq/l)	≥135	0
	<135	2
Cre (mg/dl)	≤1.59	0
	>1.59	2
Glu (mg/dl)	≤180	0
	>180	1
Chronic hepatitis	**HBsAg(+) or HCVAb(+) or past history of chronic hepatitis**	**3**

CRP, C-reactive protein; WBC, white blood cell count; Hb, haemoglobin; Na, sodium; Cre, creatinine; Glu, glucose; HBsAg, hepatitis B surface antigen; HCVAb, hepatitis C virus antibody.

CH based on our observation that the odds ratio of CH as a risk factor for NSTI exceeded 17 in our sample. Moreover, we have optimised the assignment of points for CH in our system.

Our results suggest that patients with CH may receive a low LRINEC score, regardless of their NSTI status. Although it would be dangerous to determine the necessity of debridement based solely on the modified LRINEC score, we suggest the inclusion of CH in a modified LRINEC score, which will decrease the false-negative rate by 30% if adopted comparing to the current LRINEC score, to improve efficient screening of NSTI and enable prompt management.

Authorship

Kiichi Furuse designed the study and wrote the initial draft of the manuscript. Motoi Kato contributed to the analysis and interpretation of the data and assisted in the preparation of the manuscript. All other authors contributed to the collection and interpretation of data and the critical review of the manuscript. All authors approved the final version of the manuscript. All authors agree to be accountable for all aspects of the work and will ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Declaration of Competing Interest

The authors have no relevant conflicts of interest to declare.

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Hidradenitis suppurativa: A review of post-operative outcomes

Dear Sir,

Hidradenitis suppurativa (HS) is a chronic, debilitating disease where even surgery, which is considered the 'gold standard' treatment, often has poor outcomes. With the current COVID-19 pandemic, the authors believe it important to make patients aware of the likely surgical outcomes of non-essential surgery. The authors' aim is to present the complication rates, healing times and risk of recurrence of HS surgery from a London hospital in order to better consent HS patients accurately and offer some comparison with similar studies from other countries.

A retrospective analysis was conducted of the 53 HS patients treated by the Plastic Surgery department in a London teaching hospital over a 24-month period from January 2017 to December 2018. The average age of patients at the time of the study was 36 years old (range 15–69 years old) with

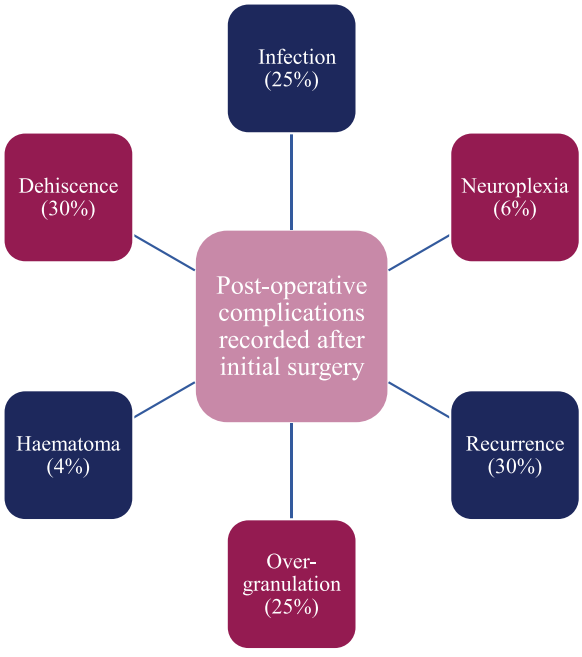

Figure 1 Post-operative outcomes after initial surgery.

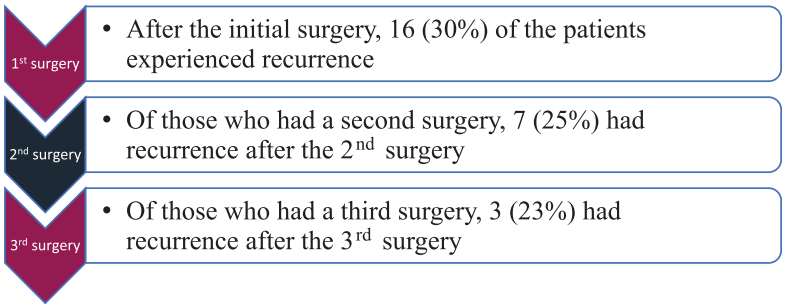

Figure 2 Recurrence rates following first, second and third surgery.

36 of the patients being female and 17 male. The number of sites affected by HS ranged from 1 to 9, with the mean number of sites affected being 3.4. The average number of operations per patient was 2.7.

The most common type of initial operation was excision and primary closure, as seen in 57% (30/53) of the patients. Other types of operation used for the first surgery for HS were excision and local flap (26%; 14/53), excision and VAC (8%; 4/53), excision and skin graft (6%; 3/53), and incision and drainage (4%; 2/53).

Following surgery, only 24 (45%) of the patients proceeded to primary wound healing without complications. The overall average time to wound healing, including time for complications that healed without further surgery, was 8 weeks, with the longest healing time taking up to 4 months. Post-operative complications recorded after initial surgery included wound dehiscence (30%), recurrence (30%), overgranulation (25%), infection (25%), neuropraxia (6%), and haematoma (4%) [Figure 1].

After initial surgery, 28 patients proceeded to have a second operation. Twenty of these second operations were at the same site as the initial procedure. Indications for a second operation at the same site included debridement (8/20), haematoma (2/20), revision (4/20), and recurrence (6/20). After the second operation, 16 (57%) of the patients progressed to wound healing without complications, and the average time for healing was 10 weeks for all who healed without needing an additional surgery at the same site. The recurrence rate was 25% (7/28) after a second operation. Of the 13 patients who had three or more surgeries for HS, 3 (23%) experienced recurrence after their third operation [Figure 2].

Despite the current recurrence rate seeming high at 30% after the initial surgery and 25% after the second surgery, these results are in keeping with similar studies from other countries. A retrospective cohort study in France by Fertitta et al.[1], of 75 patients, found a recurrence rate of 35% across a total of 115 surgeries for HS. A study by Ovadja et al.[2] in The Netherlands, of 107 surgical interventions for HS for 54 patients, found a 32% recurrence rate after a median 30-month follow-up period. The 8 week healing time of the current study is also comparable to the 6 weeks that Ovadja et al.[2] reported and the 3.3 months reported by Fertitta et al.[1] A systematic review by Bouazzi et al.[3] found that, of 54 relevant articles on post-operative HS complications and recurrences, there was an overall mean complication rate of 24% and a mean recurrence rate of 20%. Due to the high rates of post-surgical recurrence for HS in the literature, a retrospective review of surgical treatment of HS[4] concluded that recurrence of HS should be viewed as a feature of the disease that can be anticipated and managed rather than a failure of surgical treatment.

Significant comorbidities have been associated with non-curative surgery for HS[5]. In the current study, of the 19 patients with 3 or more comorbidities, 10 (53%) had more than one surgery, which was equivalent to the overall cohort (where 53% of the patients had more than one surgery). However, of the 19 patients with 3 or more comorbidities, 63% (12/19) experienced complications after their initial surgery, compared to just 55% (29/53) of the overall cohort. The complications experienced by the patients with 3 or more comorbidities after initial surgery included infection (7/19), recurrence (6/19), overgranulation (1/19), haematoma (1/19) and wound dehiscence (1/19). The addition of the data from the current study to these other studies should therefore hopefully allow clinicians to feel more confident in sharing the necessary information for consenting patients for HS surgery.

The authors conclude that more conservative treatment options for HS should be maximised prior to considering surgery and that patients should only consider surgery once non-operative medical treatment options, including antibiotic courses and lifestyle modification, have been exhausted.

Declaration of Competing Interest

None to declare.

Acknowledgements

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Estimating tissue expander volume and skin availability using VECTRA® 3D imaging software

Dear Sir,

Tissue expansion is a valuable tool, particularly for large defects of the scalp to allow transposition of hair-bearing skin.[1] Difficulties may be encountered when choosing the correct expanders, particularly in the estimation of skin availability post-expansion. Traditionally, this was estimated by measuring the circumference of the inflated expander and subtracting the baseplate width. This technique is fairly rudimentary and does not take into account varying soft tissue coverage thickness overlying the expander, or if it is placed in a submuscular plane. Furthermore, when placed on a convex surface such as the scalp or chest, baseplate deformation makes this tissue availability estimation more inaccurate. While various algorithms have been proposed,[1] these appear to be most accurate when expanders are placed in a non-mobile subcutaneous plane.

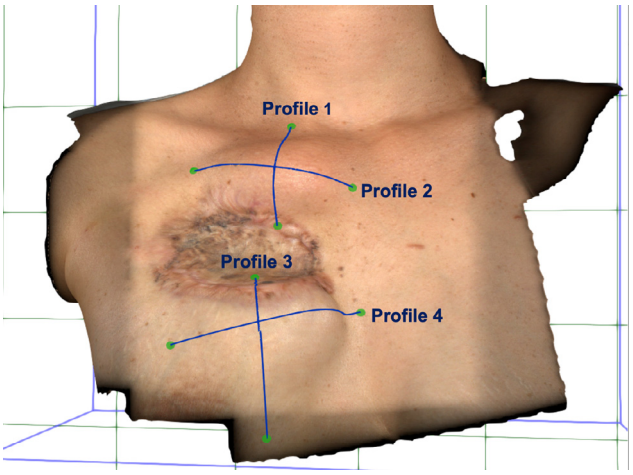

Figure 1 Profiles used for surface distance analysis on VECTRA 3D image. Surface distance equates to distance over the 3D surface akin to using a tape measure over the expander. The elliptical expander lies above the scar, while the crescenteric is below. Both are placed in a submuscular plane.

The VECTRA® 3D imaging system (Canfield Sci, New Jersey, USA) provides a safe, non-invasive, accurate[2] method of three-dimensional surface imaging and volume assessment coupled with high resolution capture.[3] This technology is routinely utilised in facial and craniofacial analysis[4] and to assess breast volume for augmentation and reconstruction.[3] With this in mind, we used VECTRA® imaging technology to assess sequential tissue expander volume, to ascertain whether this represents a viable option to estimate skin availability and to monitor the expansion process.

A 32-year old woman underwent insertion of two tissue expanders to the chest to address a split skin graft scar on the upper breast. A 50 ml elliptical and 200 ml crescenteric with remote ports were placed in a sub-pectoralis major plane (elliptical above scar; crescenteric below scar). Final expansion volumes were 50 ml (elliptical) and 260 ml (crescenteric).

VECTRA® H1 3D photos were taken at sequential expansion appointments. The camera captures stereo images, which may be used to create 3D surface models, allowing accurate measurement between points. Cliniface software (www.cliniface.org) was used to measure the distance over the 3D surface (surface distance), similar to that taken with a measuring tape. To avoid discrepancy in identification of expander margins for analysis, all measurements were taken between two specific points. Data analysis allowed calculation of soft tissue expansion along the profile of the expander and analysis of the differences in 3D surface texture versus time.

VECTRA® software allowed the generation of four profiles (Figure 1); Profiles 1 and 3 (sagittal across expander) were deemed most important for closure of the scar in this patient. Profiles 2 and 4 (expander length) were included for completeness. Profiles 3 (9.8 mm) and 1 (8.9 mm) increased the most, with overall tissue expansion in this sagittal plane being 18.7 mm. Profiles 2 and 4 (expander length) also in-

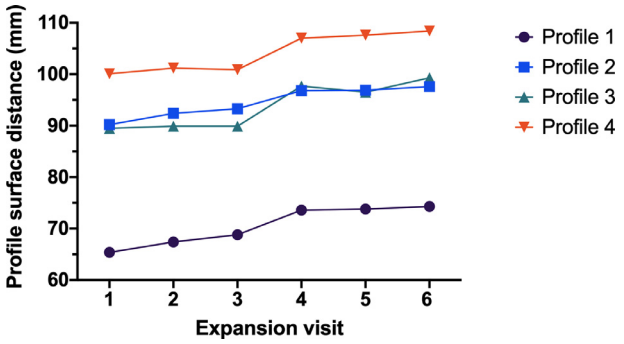

Figure 2 Change in profile surface distance versus sequential expansion. Note that profiles 1 and 3 increased the most over time, in keeping with increasing sagittal circumference of expanders.

creased, in keeping with changes in surface distance over the expander circumference (Figure 2).

The 3D analysis of soft tissue volume is not novel, but we believe it now presents a viable option to monitor tissue expansion to ensure adequacy of soft tissue availability for defect closure, thereby greatly improving surgical planning for complex reconstruction.

The largest change in expander circumference occurred between visits 3 and 4 (Figure 2); this was due to an unscheduled visit for further expansion, during which time VECTRA® images were not taken. A further degree of expansion was seen between visits 5 and 6, during which time no further injection was performed, and the expander capsule was consolidating prior to removal. Given the position of the expanders, chest wall movement impacted on data capture (whether photographed during inspiration or expiration). To account for this, images on visits 3 - 6 were captured during maximum inspiration. This problem has been highlighted before,[5] and standardized protocols for breast 3D scanning have been shown to be helpful.

Overall, we feel the advantage of this 3D method is consistency, as reference points can be established on the patient, thereby allowing reproducible measurements to be made at each clinic visit. Our experience is that clinicians will inadvertently move the measuring position on each visit, leading to discrepancy in the circumference documented. This is the first study to highlight the role of VECTRA® H1 camera analysis for tissue expander evaluation and soft tissue measurement. The repeatability and accuracy offer gains for surgical planning, but further validation is required in terms of accuracy versus standard clinical assessment.

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Declaration of Competing Interest

None.

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Pressure injury: A non-negligible comorbidity for critical Covid-19 patients

Dear Sir,

A multidisciplinary team from Peking Union Medical College Hospital (PUMCH) managed an ICU from Feb 4th to April 12th, in the Sino-French New City Branch of Tongji Hospital, Wuhan, a designated hospital for Covid-19.[1] Among the 109 critically ill patients admitted to the unit, 46 (42.2%) patients (27 male, 19 female) with a median age of 66 years eventually developed various stages of pressure injury (Table 1, Figure S1-4 in the Supplementary Appendix), despite of all the proper management.

All these 46 patients were in critical condition and received mechanical ventilation. The median interval from symptom onset to invasive ventilation was only 18 days. Forty-one (89.1%) of them had at least one of the coexisting disorders when admitted, including hypertension

Table 1 Characteristics of 46 Critical Covid-19 Patients with Pressure Injury.

Characteristic	Total ($N=46$)	Stage I ($N=7$)	Stage II ($N=33$)	Stage III-IV /Unstageable ($N=6$)
General characteristics				
Median age (IQR) — yr	66(60-70)	68(63-72)	65(57-68)	69(66-70)
Male sex — no. (%)	27(58.7)	5(71.4)	18(54.5)	4(66.7)
Female sex — no. (%)	19(41.3)	2(28.6)	15(45.5)	2(33.3)
Median interval from onset to intubation (IQR) — days	18(12-24)	17(13-24)	18(13-21)	20(14-23)
Symptoms — no. (%)				
Fever	40(87.0)	5(71.4)	29(87.9)	6(100.0)
Shortness of breath	38(82.6)	4(57.1)	29(87.9)	5(83.3)
Cough	36(78.3)	5(71.4)	26(78.8)	5(83.3)
Fatigue	20(43.5)	5(71.4)	12(36.4)	3(50.0)
Diarrhea	10(21.7)	1(14.3)	8(24.2)	1(16.7)
Sputum production	10(21.7)	1(14.3)	8(24.2)	1(16.7)
Headache	8(17.4)	2(28.6)	5(15.2)	1(16.7)
Nausea or vomiting	7(15.2)	2(28.6)	4(12.1)	1(16.7)
Myalgia	6(13.0)	1(14.3)	4(12.1)	1(16.7)
Palpitation	4(8.7)	0	4(12.1)	0
Pressure injury-related characteristics				
Median interval from intubation to pressure injury event (IQR) — days	9(6-12)	9(7-12)	9(6-12)	7(6-10)
Location — no. (%)				
Sacrum	41(89.1)	6(85.7)	29(87.9)	6(100.0)
Face	11(23.9)	1(14.3)	8(24.2)	2(33.3)
Heel	10(21.7)	0	6(18.2)	4(66.7)
Hip	4(8.7)	0	3(9.1)	1(16.7)
Elbow	3(6.5)	1(14.3)	2(6.1)	0
Scapula	2(4.3)	0	1(3.0)	1(16.7)
Median size (IQR) — cm^2	47(22-88)	45(23-49)	46(21-68)	106(67-591)
Vasopressor support — no. (%)	35(76.1)	3(42.9)	26(78.8)	6(100.0)
Coexisting acro-ischemia — no. (%)	16(34.8)	1(14.3)	10(30.3)	5(83.3)
Intermittent haemodialysis —no. (%)	11(23.9)	0	9(27.3)	2(33.3)
Wound swab sampling — no. (%)*	23(50.0)	NA	17(51.5)	5(83.3)
Coexisting disorder — no. (%)				
Hypertension	26(56.5)	6(85.7)	15(45.5)	5(83.3)
Diabetes	8(17.4)	2(28.6)	4(12.1)	2(33.3)
Cerebrovascular disease	7(15.2)	1(14.3)	4(12.1)	2(33.3)
Coronary heart disease	7(15.2)	0	6(18.2)	1(16.7)
Cancer†	5(10.9)	0	5(15.2)	0
Chronic obstructive pulmonary disease	4(8.7)	1(14.3)	2(6.1)	1(16.7)
Chronic renal disease	2(4.3)	1(14.3)	0	1(16.7)
Median laboratory values (IQR) ‡				
White-cell count (per mm^3)	10,940(6400-15,380)	13,360(6510-17,120)	10,830(8710-14,350)	12,070(5970-21,840)
Differential count (per mm3)				
Total neutrophils	9820(6270-13,660)	12,490(5540-15,650)	9690(7750-12,550)	9930(5600-19,920)
Total lymphocytes	550(410-780)	660(470-820)	560(440-750)	370(180-630)
Total monocytes	420(280-570)	370(270-780)	430(310-550)	330(140-480)

(*continued on next page*)

Table 1 (*continued*)

Characteristic	Total ($N=46$)	Stage I ($N=7$)	Stage II ($N=33$)	Stage III-IV /Unstageable ($N=6$)
Hemoglobin (g/l)	81(69-92)	92(87-96)	78(68-90)	80(76-85)
Platelet count (per mm^3)	181,000(118,300-243,500)	248,000(205,500-290,500)	180,000(119,000-230,000)	73,000(37,000-205,800)
Albumin (g/l)	23.9(21.5-26.0)	25.2(24.2-36.5)	23.0(21.2-24.8)	25.3(24.0-27.9)
Creatinine (μmol/l)	103(67-127)	96(62-126)	93(60-121)	124(114-133)
Prothrombin time (s)	16.2(15.0-17.4)	15.3(15.2-16.5)	16.2(14.9-17.7)	16.8(15.1-17.1)
Activated partial-thromboplastin time (s)	43.5(41.5-47.7)	44.7(39.5-46.0)	43.0(40.8-48.3)	45.9(44.2-47.6)
Fibrinogen (g/l)	4.3(3.2-5.9)	5.9(5.0-8.4)	4.3(3.1-5.8)	3.7(2.4-4.0)
Fibrin degradation products (mg/l)[§]	53.0(18.9-150.0)	14.2(6.0-19.6)	71.8(27.6-150.0)	94.5(37.3-150.0)
D-dimer (mg/l)[¶]	21(5.5-21.0)	3.9(2.3-4.9)	21.0(13.2-21.0)	11.1(5.2-18.9)
High-sensitivity C-reactive protein (mg/l)	75.6(43.4-140.2)	54.6(21.9-65.9)	99.9(47.0-161.4)	54.7(41.3-109.4)
Prognosis				
Discharged from ICU — no. (%)	16(34.8)	3(42.9)	10(30.3)	3(50.0)
Died in ICU — no. (%)	30(65.2)	4(57.1)	23(69.7)	3(50.0)

* Stage I pressure injury describes intact skin with non-blanchable erythema. No swab sample was obtained in this stage.
† Any type of cancer was included in this category.
‡ All the laboratory values were obtained from laboratory reports before medical intervention.
§ The reference value for the fibrin degradation products level was 150 mg/l or less.
¶ The reference value for the D-dimer level was 21 mg/l or less.

(56.5%), diabetes (17.4%), cerebrovascular disease (15.2%), and coronary heart disease (15.2%). Compared with the general population of Covid-19 patients in China,[2] our patients had a higher incidence of shortness of breath (82.6%) early. Other common symptoms included fever (87.0%), cough (78.3%) and fatigue (43.5%). Gastrointestinal symptoms, such as diarrhea (21.7%) and nausea or vomiting (15.2%) were also not uncommon.

Except mechanical ventilation and coexisting disorders, other risk factors for pressure injury including malnutrition, anemia, vasopressor support, intermittent haemodialysis, and sedation were also commonly seen in our patients (Table 1). It is worth mentioning that 16 (34.8%) patients presented acro-ischemia (Figure S6-9 in the Supplementary Appendix), which is a demonstration of impaired microcirculation of the skin. As one of the indicators of poor prognosis in severe Covid-19 patients,[1,3] abnormal coagulation may also indicate the vulnerability of soft tissues.

The median interval from intubation to the presence of pressure injury was 8 days. Sacrum (89.1%) was the most common location to emerge pressure injury, as might be expected, followed by the face (23.9%) due to the prone position ventilation adopted to optimize oxygenation, heels (21.7%) and hips (8.7%). Swab samples were taken from the pressure wounds of 22 (47.8%) laboratorially confirmed cases (Figure S5 in the Supplementary Appendix). No SARS-CoV-2 virus was found on reverse transcriptase polymerase chain reaction assay.

Sixteen (34.8%) patients successfully detached from ventilators were transferred from ICU to general wards. Although the development of pressure injury is not a direct cause of mortality, it significantly increases morbidity, nursing burden and healthcare costs, and should not be neglected in the treatment of critical Covid-19 patients.

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Declaration of Competing Interest

The authors have no competing interests to declare.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.006.

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Plastic surgical management of skin cancer patients during the COVID-19 pandemic

Dear Sir,

The first confirmed cases of SARS-CoV-2 cornovirus disease (COVID-19) in the UK were on 29th January 2020. On 23rd March, a UK-wide "stay at home" lockdown period commenced, restricting freedom of movement in an effort to mitigate viral spread and protect NHS resources. At the time of writing, the UK has had over 300,000 confirmed cases of COVID-19 with a death toll of over 43,000 people.[1] Many NHS hospitals across the UK are in various stages of lockdown as resources are redirected to the frontline.

Anticipating complete redeployment of our department and the inability to operate, we acted early to prioritise urgent skin cancer cases to ensure they were done.[2] We combined all consultant waiting lists to make sure patients were treated in the most timely manner, prioritising Malignant Melanoma (MM) and Squamous Cell Carcinoma (SCC). Our main theatre and peripheral hospital theatre lists were cancelled but we were able to streamline patients through our Plastic Surgical Treatment Centre (PSTC). This opened in September 2019 as a solution to our growing daycase skin cancer patient waiting list. It comprises two operating theatres, a waiting reception area and a recovery bay.

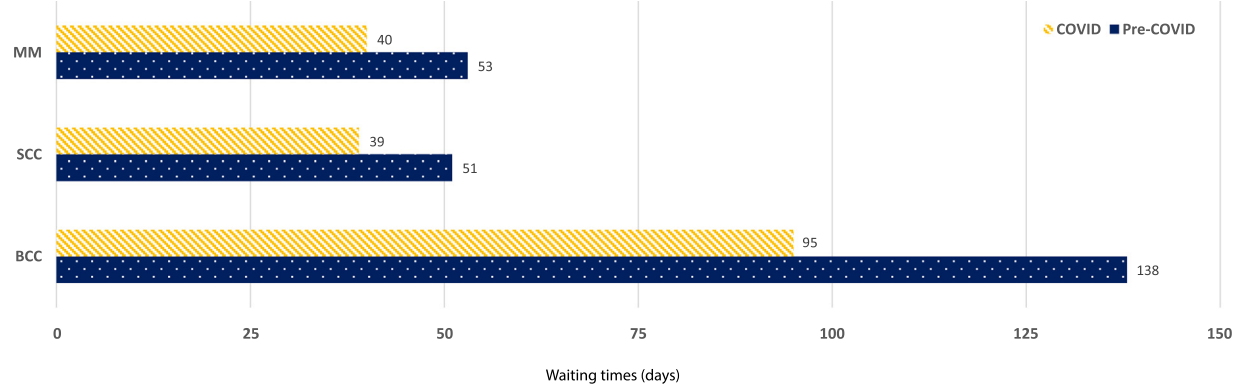
Interestingly, during this global pandemic, skin cancer referrals from General Practice and dermatology have reduced as presumably patients were not prepared to present for treatment. Unfortunately, some referrals that were eventually received were of more advanced disease. A proportion are on immunosuppressants or have significant comorbidities, already shielding in the community, and have been reluctant to attend any skin cancers services based within hospitals.

We designed consultant-led virtual clinics for new "urgent suspected cancer" (USC) patients. These patients were asked to submit photogaphs of their lesions to be available for the plastic surgeon when called. This meant patients were consulted very soon after their USC referral was received, often on the same day, and allowed informed discussion and booking of operations all without them having to leave their homes. We encourage all means of communication for prompt sharing of information during this time, including commercial mobile applications and personal email where there is no practical alternative. This is fully endorsed by NHS Digital, the National Data Guardian and the Information Commissioner's Office.[3] Depending on the diagnosis, patients booked for PSTC would have a clinical examination of their lymph node basins on presentation for surgery.

Patients must arrive to the PSTC at a designated time, alone, wearing appropriate Personal Protective Equipment (PPE) – typically a surgical face mask. They are pre-warned about COVID-19 symptoms beforehand and instructed to call

Cancer type	Pre-COVID (1st Jan – 29th Feb)	COVID (1st Mar – 30th Apr)
Basal Cell Carcinomas	204	86↓
Squamous Cell Carcinomas	116	100↓
Malignant Melanomas	51	82↑

Figure 1 Number of skin cancer operations performed during pre-COVID (1st January – 29th February 2020) and peak COVID (1st March – 30th April 2020).



Cancer type	Pre-COVID (1st Jan – 29th Feb)	COVID (1st Mar – 30th Apr)
Basal Cell Carcinomas	138	95↓
Squamous Cell Carcinomas	51	39↓
Malignant Melanomas	53	40↓

Figure 2 Mean average waiting time (in days) between receipt of urgent skin cancer referral and operation date during pre-COVID (1st January – 29th February 2020) and peak COVID (1st March – 30th April 2020).

and cancel should any develop. All surgical patients are treated as COVID-19 positive. Any potentially aerosilising procedures or surgeries on the head and neck require full PPE as advised by Public Health England. In fact, to protect patients and staff members, we avoided harvesting split-thickness skin grafts using powered dermatomes, an aerosol generating procedure (AGP), and opted for full-thickness skin grafting or local flaps where direct closure was not possible. The minimum number of staff are present inside the PSTC for it to run safely and efficiently. It is located close to an entrance at the rear of the hospital avoiding high footfall within main corridors. There are two morning and afternoon operating lists in two separate treatment rooms, typically allowing between 10–14 cases to be completed each working day. Patients can be kept 2 metres apart and the morning patients are discharged before the afternoon patients ar-

rive. Postoperatively prior to discharge, patients are taught how to remove their own dressings (where absorbable sutures were used) or instructed to see their local GP practice nurse for suture removal and wound care to reduce returns to hospital. A small number of patients still need to attend our Plastic Surgery Dressing Clinic. When histology is available, consultants would write letters to patients and arrange appropriate follow up virtually, either by telephone or video platform.

In January and February this year prior to the COVID-19 lockdown, we performed 371 surgical procedures for skin cancers under local anaesthetic comprising 204 BCCs, 116 SCCs and 51 MMs. The average waiting times from referral to operation were 138, 51, and 53 days respectively. In March and April, during the peak of the COVID-19 pandemic, we still managed to perform 268 surgical procedures for skin cancers under local anaesthetic through our PSTC service. This comprised 86 urgent BCCs, 100 SCCs and 82 MMs with average waiting times from referral to operation reducing to 95, 39, and 40 days respectively (Figures 1 and 2). We successfully achieved a 72% caseload during the peak COVID months of March and April with respect to the previous January and February case totals; and there was a 28% overall reduction in mean average waiting times from receipt of referral to date of operation. Trauma patients were also treated through the PSTC when it was available to avoid any theatre slots going unfilled.

Whilst we are seeing falling numbers of newly diagnosed urgent skin cancer referrals as anticipated, telemedicine consultation and utilisation of an independent treatment centre for skin cancer surgery has improved service efficiency and the care we deliver to our patients. These adaptations, together with the practical steps in theatre management and minimising footfall, have allowed us to successfully continue working in a COVID-19 world. These are lessons we hope to take forward for the future delivery of our cancer services in the post-COVID era.

Declaration of Competing Interest

None.

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Ethical Approval

N/A.

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Characterising non-melanoma skin cancer undergoing surgical management during the COVID-19 pandemic

Dear Sir,

Throughout the COVID-19 pandemic, plastic surgery departments have strived to keep oncological services running despite significant operational pressures. Access to healthcare generally declined in all but the most urgent circumstances, and departments have already identified a reduction in referrals and diagnoses of skin malignancies.[1]

We investigated differences in patients presenting to our service for excision of non-melanoma skin cancer (NMSC) during the height of COVID-19 restrictions, in comparison to those presenting at the same time in 2019. We undertook a retrospective, single-centre case control study comparing 102 patients undergoing operative treatment for NMSC during the COVID-19 pandemic in 2020 to results from 127 patients undergoing treatment for NMSC in the same period in 2019. Data was collected from electronic operating lists and the electronic patient record. Dichotomous data was compared using Chi-squared tests and contiguous data using unpaired t-tests. A p-value of <0.05 was taken to be statistically significant.

Table 1 Summary of results. **indicates a statistically significant difference.

	2019 (n (lesions) = 127)	2020 (n (lesions) = 102)	$p =$
Age (Mean (SD))	75.67 (11.35)	74.6 (12.17)	0.17
Sex (n)			-
Males	56	54	
Females	36	36	
Pre-op Diagnosis (n)			0.03**
BCC	86	51	
SCC	37	48	
Other	2	3	
Mean time to procedure - All lesions (days)	109	115	0.77
Mean time to procedure - Suspected SCC (days)	43.7	41.9	0.84
Body Site (%)			0.20
Head & Neck	75.8	85.3	
Trunk	11.7	6.9	
Upper Limb	4.7	1.0	
Lower Limb	7.8	6.9	
Head and Neck Subtype (%)			0.43
Scalp	8.2	17.2	
Peri-ocular, temple, forehead, eyebrow	41.2	36.8	
Cheek/Chin	19.6	18.4	
Ear	9.3	12.6	
Nose or Lips	17.5	12.6	
Neck	4.1	2.3	
Senior Operator Grade (%)			0.57
Consultant	47.1	43.1	
specialty Registrar	47.9	53.9	
Senior house officer/Core Trainee	5.0	2.9	
Histological Diagnosis (n)			<0.01**
BCC	67	37	
SCC	16	30	
Actinic Keratosis	14	14	
Bowen's Disease	3	2	
Benign	23	14	
Other	1	5	
Largest Tumour diameter in mm (mean (SD))	11.4 (7.8)	14.8 (9.8)	<0.01**
Reconstruction (%)			0.04**
Direct Closure	67.7	55.9	
SSG	5.5	13.7	
FTSG	14.1	13.7	
Local Flap	11.7	7.8	
Incomplete - All lesions (%)	7.0	15.7	0.06
Incomplete - BCC (%)	9.0	21.6	0.07
Incomplete - SCC (%)	6.3	13.3	0.46

Cases and controls were well matched in terms of patient demographics, lesion location, and operator training grade. Results are summarised in Table 1. We identified a significant increase in the number of squamous cell carcinomas (SCC) excised relative to those excised in 2019, and a significant decrease in the number of basal cell carcinomas (BCC). Tumours removed in 2020 were significantly larger (14.8 mm vs 11.4 mm, $p < 0.01$). These larger lesions required more complex reconstruction (i.e. skin flap or graft), with fewer lesions amenable to direct closure (55.9% vs 67.6%, $p = 0.04$). The overall incidence of incomplete excision rates was higher in 2020 than in 2019, although this did not reach statistical significance (15% vs 7%, $p = 0.06$).

In our study, we found no difference in the time from initial referral to definitive treatment between groups. This provides reassurance that although under operational pressure, with staff redeployed and operating theatres closed, the service continued to treat malignancy in a timely manner.

Our findings show that throughout the height of the COVID-19 pandemic our department saw significantly larger NMSC lesions, with a higher proportion of these being SCCs that required more complex reconstruction following excision. Reasons for this are likely to be multi-factorial. It is documented that patients have had delayed presentation to healthcare services throughout the pandemic.[2] Reduction in face-to-face appointments in primary care and potential

hesitancy in the use of usual referral pathways to secondary care may also play a part.

The increase in incomplete excision rate seen in 2020 is clinically significant, and higher than an estimated 10% global rate found in a systematic review in press.[3] Larger, more invasive lesions may be likely to result in an increase in incomplete excision margins. Timely diagnosis of these NMSC lesions and treatment with clear margins is important, as 31–41% of lesions without clear margins will recur.[4] An increase in patients with incomplete excision margins will often lead to further surgical intervention and ultimately an increase in patient morbidity. In our study, since patients were well matched demographically and in terms of seniority of surgeon, this increase was likely to be related to lesion factors rather than surgical factors, or an as yet unexplored confounding factor.

Despite prioritisation of oncological services throughout the pandemic thus far, our findings show substantial differences in the patients accessing skin oncology services in our centre. It appears that current delays to definitive surgical treatment of smaller, less aggressive BCCs may mean patients are missing the opportunity to benefit from early excision of these lesions. There is a risk that should this trend continue, a large cohort of patients with these ostensibly less aggressive tumours may experience a delay in their treatment, requiring yet more complex reconstructive surgery as seen in this study. Further work is needed to streamline referral pathways and maintain access to services for patients, in the increasingly likely event of restrictions on elective services due to a second wave.

Declaration of Competing Interest

N/A.

Ethical approval

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Funding

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Major fall in urgent skin cancer referrals during the COVID-19 outbreak

Dear Sir,

The SARS-CoV-2 cornovirus disease (COVID-19) pandemic has had a significant impact on the National Health Service (NHS) in the UK. NHS services have had to continually adapt and reorganise to meet the rising numbers of unwell patients being admitted through emergency departments and requiring prolonged periods of intensive care. In the meantime, only essential care has been continued where possible to minimise the burden on hospital resources and protect patients and healthcare workers.[1]

Urgent referral pathways for suspected cancers have seen a dramatic decline according to latest reports. Cancer Research UK has estimated a 60% fall in urgent cancer referrals in England alone; 79,573 referrals were made in April this year, compared with 199,217 in April 2019.[2] Patients are also having to wait longer for their first definitive treatments. Many people with symptoms, including those shielding due to existing comorbidities, are avoiding consultations with their doctors due to fears and uncertainty surrounding coronavirus transmission and reluctance to add to the pressures their local services are already facing.

Wales has the highest incidences of melanoma and non-melanoma skin cancer (NMSC) in the UK with European age-standardised rates of 27.3 (25.9, UK) and 316.5 (245.1, UK) per 100,000 of the population in 2017 respectively.[3] Early diagnosis and treatment is key for maximising survival outcomes. We looked at how urgent skin cancer referrals to our plastic surgery service had been affected by COVID-19.

We see a linear progression of increasing urgent skin cancer referrals with each year (April to April) from 2014/15 to present. The predicted total number of urgent skin cancer referrals for 2019/20 was 1250, 95% CI [1053, 1448] com-

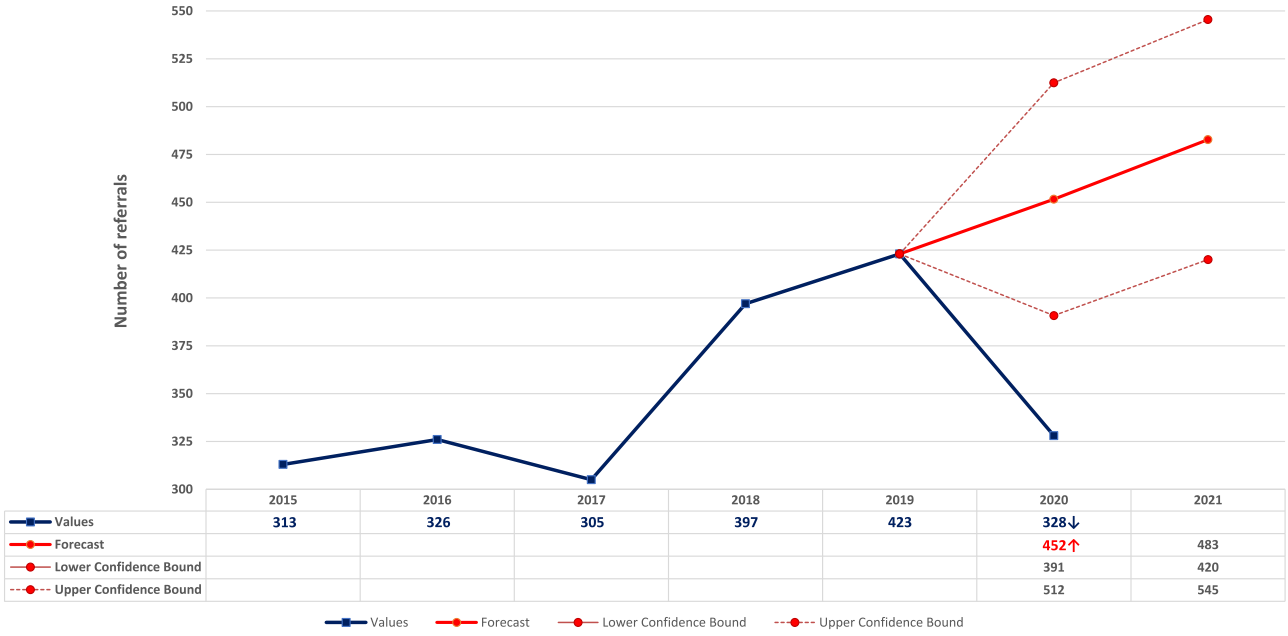

Figure 1 Number of urgent suspected cancer referrals and forecast, adjusted to include only the first 5 months of the COVID-19 period (January to May), by year from 2015 to 2021.

pared to the actual total we have received of 985, 21% less than predicted. The statistical forecast for 2020/21 predicts a 12% increase in the total number of referrals compared to 2019/20, not accounting for any effect of COVID-19, to 1399, 95% CI [1198, 1601]. Adjusting for seasonality, only urgent cancer referrals between the months of January and May from 2015 to 2020 were selected for further analysis. The predicted total for January to May in 2020 was 452, 95% CI [391, 512] compared with only 328 actually received. This year's actual total is a 23% reduction on the previous year for the same period and 27% less than predicted for 2020.

Delay in referral of urgent skin cancers may result in patients presenting later with significantly advanced disease, requiring more extensive surgery and receiving worse outcomes overall.[4] During the COVID-19 pandemic, our plastic surgery service has received 27% (95% CI [16%,36%]) less than predicted urgent skin cancer referrals for the first 5 months of 2020. We expect a surge in the number of referred skin cancers as we enter a post-COVID recovery phase, in addition to a forecasted 12% increase for 2020/21. Services must review their own data and anticipate greater numbers of patients presenting with potentially more advanced disease in the months to follow. We stress the importance of preparedness with extra staffing, clinics and theatre operating lists to tackle higher demand and to avoid exceeding service capacity (Figure 1).

Ethical approval

Not required

Declaration of Competing Interest

None declared

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Communication: A safe skin cancer surgery set-up during the COVID-19 crisis

Dear Sir,

After its emergence in December 2019, the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2 or COVID-19) has resulted in a global pandemic.[1] Transmission of the virus is thought to be mainly airborne during close human-to-human contact.[2] The average incubation period has been reported to be between 3.0 and 6.4 days.[3] Asymptomatic disease may represent a large number of cases, which with pre-symptomatic transmission, may explain the rapid spread of this infection.[3,4]

Redirection of healthcare resources required to deal with the COVID-19 pandemic inadvertently paralysed the delivery of the majority of surgical care. Especially regarding oncological surgery, one must consider the collateral damage that will follow if time-critical procedures are delayed or aborted. The morbidity and mortality resulting from the COVID-19 pandemic, is not only a result from the disease itself, but includes those whose prognosis may have been affected by not receiving timely care.[1]

By initiating dedicated local anaesthetic skin cancer operating lists in an affiliated private hospital, our tertiary plastic surgery unit provided continuation of care for this patient population throughout the pandemic. This correspondence presents the set-up and successful precautions taken to prevent transmission of the Coronavirus between patients and healthcare workers.

Between March 24th and April 14th 2020, fifty patients underwent surgery under local anaesthetics for localised skin cancer. Admission staff screened everyone for signs of COVID-19. Crowding was avoided by staggered admission times and only allowing patients into the hospital. On arrival for surgery, the patients' temperature was checked and they were placed into a separate bay or room. During the admission and consent process healthcare workers would distance from the patient as much as possible, whilst using basic personal protective equipment (PPE - surgical mask, protective visor and gloves). Patients were also offered a mask to wear throughout the surgical procedure, unless this interfered with field sterility. Staffing levels in the operating theatre consisted of 1 or 2 surgeons, a scrub nurse and 1 or 2 runners. All present healthcare personnel wore a mask (FFP3 or normal surgical mask, hat and visor, whilst in addition the surgeons and scrub nurse were fully gowned as per normal for a sterile procedure.

Care was taken to choose surgical options minimising the need for further hospital visits. Telephone follow-up by a Plastic Dressing Clinic nurse was arranged the week after surgery, and the histopathology result and further plan conveyed by a medical member of the Plastic Surgery department, after discussion in our virtual skin multidisciplinary team (MDT) meeting.

All fifty patients were contacted by telephone to evaluate if they had developed COVID-19 symptoms, as per questionnaire in Figure 1. Their procedure had been a minimum of 3 weeks earlier, thereby having completed the maximum incubation period of 2 weeks at the time of evaluation.

The average age of the patients was 62 years, with a preponderance of males (56%). The most common malignancy excised was melanoma (58%), with Basal and Squamous Cell carcinomas representing almost equal shares of the remaining operations. The most common area treated was the head and neck (42%), followed by the torso (26%), lower limb (18%) and the upper limb (14%) (Table 1).

None of the contacted fifty patients developed any symptoms of COVID-19 in the 3–6 weeks following their surgical procedure. It speaks to the efficiency of PPE and physical distancing that we did not detect any evidence of COVID-19 transmission.

The guideline published by NHS in April 2020, advises Plastic Surgery services to continue to offer surgical treatment within one month for the following skin cancers: melanoma; poorly differentiated tumours; nodal disease; compromise of vital structures, including the eye, nose and ear.[5] In line with above national guidelines, over half of patients treated in the reviewed three-week period had melanoma and 42% of tumours were located in the head and neck region.

Asymptomatic and pre-symptomatic healthcare workers are an under-appreciated potential source of infection, to both co-workers and patients.[4] Over the last month, the

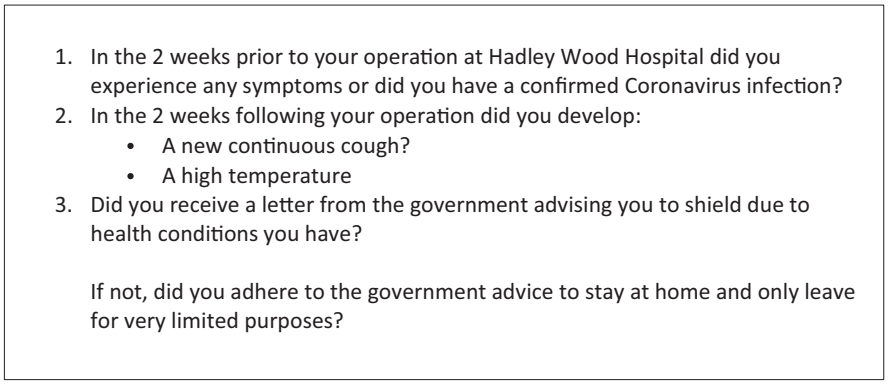

Figure 1 Questions used in skin cancer surgery and COVID-19 evaluation.

Table 1 Patient and tumour characteristics.

Mean Age (±SD)	62 years (±13.5)	
Male Sex	$n = 28$	56%
Type of Skin Cancer	Melanoma $n = 29$	58%
	SCC $n = 10$	20%
	BCC $n = 9$	18%
	Melanoma in situ $n = 2$	4%
Treated Area	Head and Neck $n = 21$	42%
	Torso $n = 13$	26%
	Lower Limb $n = 9$	18%
	Upper Limb $n = 7$	14%
Vulnerable Patients	$n = 19$	38%

SD = Standard Deviation.
SCC = Squamous Cell Carcinoma; BCC = Basal Cell Carcinoma.

UK government has expanded testing capacity, but currently still only symptomatic health care workers are offered testing. Availability of screening tests for staff would be a desirable adjunct to our current measures to reduce disease transmission. Continuing to use COVID-free locations for elective surgery other than the primary NHS hospitals, is likely to be important going forward as we expect COVID-19 will continue to affect life for the considerable future. The results of this communication can be used when discussing the oncological risk of delaying surgery vs the COVID-19 transmission risk for patients undergoing a procedure under local anaesthesia.

By putting all of the above safety measures in place, we believe we can provide a safe environment where patients and staff can feel confident in proceeding with elective surgery under local anaesthesia.

Declaration of Competing Interest

The authors have no conflict of interest to declare.

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Feasibility of cleft lip and palate repair in personal protective equipment (PPE)

Dear Sir,

Elective surgery during the evolving COVID-19 pandemic presents unprecedented logistical challenges to surgical teams. Cleft surgery may be considered an aerosol generating procedure (AGP), which may lead to small-droplet transmission of virions. Strict adherence to personal protective equipment (PPE) policy is used with the hope of preventing transmission of the virus between patients and operating theatre staff.

The World Health Organisation (WHO) guidance for infection prevention and control during health care when COVID-19 is suspected recommends that healthcare workers performing AGPs should use a half-face particulate respirator at least as protective as a European Union (EU) standard Filtering Face Piece 2 (FFP2) respirator or equivalent.[1]

Figure 1 The combination of FFP3 respirator and elasticated sports goggles was compatible with the operating microscope, when trialled in the surgical skills lab.

Public Health England have published extensive guidance on PPE and the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS) has provided interpretation of this for plastic surgeons.[2] Recently published safety recommendations for ear, nose and throat surgery (ENT) also provide useful guidance for plastic surgeons who perform AGPs.[3] The most common types of respirators in healthcare are filtering facepiece (FFP) respirators and powered air purifying respirators (PAPRs). A PAPR is a battery-powered, air-purifying respirator that uses a pump to force air through filter cartridges and into the breathing zone of the wearer within a loose fitting hood.[4] PAPRs provide a higher assigned protection factor to the wearer than a FFP respirator. We sought to investigate compatibility of FFP3 respirators and PAPRs with surgical loupes and the operating microscope, as well as to examine the logistics of performing cleft surgery under these conditions.

A group of cleft surgeons, head and neck surgeons and paediatric dentists attended a PPE workshop at The National Surgical and Clinical Skills Centre (NSCSC) in the Royal College of Surgeons in Ireland on 23 April 2020. Participants had the opportunity to try FFP3 respirators (Biztex Portwest, Westport, Mayo, Ireland) and PAPRs (3 M Scott, Monroe, North Carolina, USA). Participants brought their own loupes and performed tasks in the surgical skills lab, before joining anaesthetic and nursing colleagues in a simulated operating room for a tracheostomy insertion, cleft palate repair and dental examination under general

Figure 2 Operators wearing full-hood PAPRs, facemasks and spectacles or 2.7X loupes during simulation of cleft palate repair under general anaesthetic. Note that PAPRs do not filter the discharged air and therefore a regular surgical masque is also required in order to prevent droplet transmission *from* the user.

anaesthesia. A brief summary of observations is presented below.

The workshop was run as part of an ongoing study into the use of PAPRs for AGPs in all surgical specialties, initiated by the UCD Centre for Precision Surgery, University College Dublin, Ireland. This wider study looked at multiple factors relating PAPRs usability in laparoscopic procedures as well as the head and neck procedures described here and a more detailed report of the combined data will be presented elsewhere in due course.

FFP3 respirator:

- FFP3 respirators tended to cause more facial discomfort than PAPRs.
- Only one type of FFP3 respirator was available on the day and not all participants could achieve an adequate seal with this model. This highlighted the need for a variety of brands/models/sizes to be available in operating theatres. Fit-testing and training in seal-checking for all staff members by an appropriately trained fitter will be required on an ongoing basis in hospitals (it is a requirement of EU regulation of these devices that users be fit-tested annually).
- FFP3 respirators tended to sit higher on the nose than regular surgical masks, which interfered with correct positioning of loupes for some participants.
- The combination of FFP3 respirator and elasticated sports goggles was comfortable when using an operating microscope (Figure 1).

PAPR:

- PAPRs were not compatible with the operating microscope.
- Spectacles, standard 2.5–3.0X loupes and prism-amplified loupes were comfortable when worn in combination with PAPRs (Figure 2). Spectacles and loupes necessitated using a full hood PAPR to maintain an adequate seal around the temple of the glasses.
- Expanded field telescope loupe designs were not compatible with the PAPR as the telescope tips touched against the visor, impeding correct positioning of the bridge/nose pads of the loupes.
- It was felt that switching between FFP3 respirator/goggles/microscope to PAPR/facemask/loupes during a case (e.g. for oral layer suturing following palate muscle dissection) would be cumbersome and time consuming.
- While fit-testing is not necessary for PAPRs, training in donning/doffing is essential, as well as adequate space and assistance in theatre prep rooms to carry out these processes safely.

Operating room simulation in PAPRs:

- Hearing and verbal communication were significantly hindered by full-hood PAPRs.
- There was no difficulty in positioning the patient head down, inserting the gag or performing the manoeuvres of a palate repair while both surgeon and assistant were wearing full-hood PAPRs (Figure 2).

While public health and institutional guidelines will be the basis for decision-making in PPE use, it is important that surgeons have options available to them that are compatible with their subspecialty needs. We have explored several options for comfortably performing cleft surgery in PPE. Surgeons can anticipate a learning curve when starting to operate in PPE and this needs to be accounted for in planning our return to elective activity. The opportunity to test equipment in a simulated environment was beneficial.

Ethical approval

Not required.

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Declaration of Competing Interest

None declared.

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Creating a 'safe haven' for the most vulnerable; early reports of management strategies for breast cancer patients in the UK during the COVID-19 pandemic times

Dear Sir,

The pandemic infection due to the new COVID-19 (coronavirus disease 2019) has led to drastic changes in the delivery of standard of healthcare in the UK and worldwide. The unprecedented nature of this virus has led to development of new pathways and new ways of delivering care. The UK government guidelines stipulate protection of those most at risk of severe illness from COVID-19 and suggest that these vulnerable groups follow strict social distancing guidelines to mitigate the risk of acquiring the infection.

The National Health Service has identified different categories of individuals to be considered "clinically extremely vulnerable":

- any person above the age of 70
- any patient affected by hypertension or diabetes mellitus
- cancer patients undergoing chemotherapy or immunotherapy
- patients under immunosuppressive treatment.[1] Standard cancer surgical and chemotherapy treatment requiring hospitalization or daily visit had to be suspended to reduce the exposure of these vulnerable patients to the possible infection.[2]

The management of breast cancer invariably involves surgical intervention with a curative intent in early breast cancer, as well as for local control in more advance cancer stages in an effort to improve quality of life. This thus creates a conundrum in the management of this cohort of patient in the COVID-19 era, as one must aim to prevent compromise to the standard of care while sensibly employing strategies to mitigate the acquisition of the COVID-19 virus in this highly vulnerable group. Breast cancer patients may be further subcategorized into high priority (life threatening, clinically unstable), medium priority (non critical but delay > 6–8 weeks could affect outcomes), or low priority (stable condition allowing for delay of care) based on several factors such as type of cancer and comorbidities.[3] The Association of Breast Surgery has provided guidance recommending prioritizing patients based on the aforementioned criteria as well as recommending the use of more oncoplastic techniques where clinically applicable. This in part due to the discouragement of more traditional forms of breast reconstruction using autologous or implant based techniques in an effort to minimize complications and the need for return to hospital in this vulnerable group.[4]

In an effort to maintain the standard of care and prevent progression of disease in this cohort while reduce the mortality and morbidity, our institution created a 'safe haven'. Our institution, a regional centre for Breast reconstruction, Plastic Surgery, Burns and Hands employed emergency protocols to reorganize staff and workforce to facilitate the surgical management of breast cancer for the entire southeast and southwest regions of England. This included an extended invitation to all breast cancer units in south England to utilize our hospital to deliver surgical care to breast cancer patients by Breast & Oncoplastic led Consultants. Our facility's reorganization strategies involved creating a "COVID-19 free" centre by employing rigorous screening protocols of all patients undergoing surgery as well as development of virtual teams.[5] All patients were deemed "fit for surgery" upon satisfying 3 screening areas: 1. The establishment that patient was symptom free for a minimum of 14 days, 2. A negative COVID-19 PCR testing within 48 – 72 h prior to presentation and 3. Self-isolation for minimum of 14 days or the use of a CT chest scan for any patient that did meet all of the above criteria or where the patient warranted surgery on the aerodigestive tract

Social distancing was maintained between staff and patients with the use of PPE such as facemask for both staff and patients when interacting. The use of full PPE including full body gowns, FFP3 masks and visors where worn at the times of intubation, while minimizing staff presence throughout theatre. The vast majority of surgeries ranged from wide local excisions and mastectomies with sentinel lymph biopsy or complete axillary lymph node clearance. Oncoplastic techniques with volume displacement including a wide range of mammoplasty were used in order to reduce the rate of mastectomy when oncologically safe. Common oncoplastic procedures employed included therapeutic mammoplasties such as Benelli mammoplasty, inferior pedicle wise pattern technique, comma shaped mammoplasty and the Grisotti flap.

All patients were maintained at social distance throughout the recovery period. Early results between the periods of March 1, 2020 to May 31, 2020 yielded the surgical treat-

ment of one hundred patients with breast cancer, with age ranging from 30 to 88 years old. There have been no known deaths to date, with 3 patients developing a haematoma, which were successfully managed within 24 h of their primary surgery.

The establishment of a COVID-19 free environment has allowed for the maintenance of the high standard of care in breast cancer patients, a highly vulnerable group[1]. To date we have treated up to 120 highly vulnerable patients with success and thereby reducing the burden of disease. We believe that standard care of breast cancer can be upheld even in units that were not primarily a cancer led service. This however needs rigid protocols with support of innovative leaders and an adaptable team. This strategy demonstrate early success and may be employed by other NHS Trust or utilized by developing countries to deliver optimal standard treatment to the 'most vulnerable groups' while mitigating the effects of the devastating wave of the COVID-19 pandemic.

Declaration of Competing Interest

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Breast reconstruction and coronavirus pandemic

Dear Sir,

For breast cancer, partial and total breast reconstruction reduce patient's sensation of mutilation, improving their quality of life. On the other hand, the pandemic of the COVID-19 resulted in the implementation of social distancing measures, with a negative effect on the management of different diseases. We read the article of Di Pace et al. entitled "Breast reconstruction and the COVID-19 pandemic: A viewpoint[1]". We agree that risk-reducing surgeries, contralateral operation and revisional procedures should be postponed. However, as the authors pointed out, "avoiding all IBR will lead to long waiting lists and have a negative psychological impact, particularly among younger patients". We believe that immediate breast reconstruction (IBR) should be recommended, especially with implants or tissue expanders, considering local conditions during the pandemic.

In Brazil, there was an increase in the proportion of patients undergoing breast reconstruction between 2008 and 2014, but the rates are still low (29%)[2]: there are a considerable number of patients waiting for delayed breast reconstructions. After the pandemic outbreak, most of IBR has been deferred in accordance with guidelines elaborated by experts.[3] This may have impacted IBR rates in Brazil. We evaluated the opinion of the Brazilian breast surgeons from the Brazilian Society of Mastology (SBM),[4] through an electronic survey carried out during April and May this year: we created questions regarding breast cancer treatment,

including breast reconstruction, partial or total, and prophylactic surgery.

After approval of the SBM's internal review board, the questionnaire was sent to 1462 Brazilian surgeons. 503 mastologists returned the questionnaire. Overall, 319 (64%) of respondents would recommend IBR, while 36% would contraindicate it. Among those who recommended IBR, direct to implant techniques would be the preferred method (55%), while 40% would recommend temporary tissue expander. Only 3% of surgeons would recommend myocutaneous flaps. For partial reconstruction after breast-conserving surgery, 75% would recommend minor procedures, however 54% would contraindicate mammoplasty techniques. Finally, 15% of respondents would recommend risk-reducing surgery for patients with BRCA deleterious mutations.

These data may provide further information on breast reconstruction surgery in Brazil during the pandemic: although most respondents suggested opting for IBR, about 1/3 of the mastologists would not recommend it, and half of the respondents would not recommend mammoplasty. If this behavior obtained through this survey reflected the real treatment of patients during the pandemic, we will possibly have greater pressure on the Brazilian public health system (SUS) in the near future. We will need to design strategies to minimize the waiting list for reconstructive breast surgeries in Brazil.

Ethical approval

N/A.

Declaration of Competing Interest

The authors declare no conflict of interests.

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Breast reconstruction and the COVID-19 pandemic: Adapting practice

Dear Sir,

We thank Dr Cavalcante and colleagues for their constructive comments in response to our viewpoint on breast reconstruction during the COVID-19 pandemic.[1] We welcome discussion of this time-sensitive issue within the context of a different healthcare system which they base on an electronic survey of Brazilian surgeons over a two-month period.

A common concern is the backlog of patients, who will eventually require reconstruction, and the psychological impact of delayed reconstructive procedures – whether for partial or whole breast restitution. Restrictions imposed at the start of the pandemic are being gradually eased but re-introduction of breast reconstruction is a challenge for healthcare providers at the present time, especially with fears of a second wave of infection and other-site cancers still awaiting curative surgery.

Furthermore, resumption of 'normal' practice is arguably more difficult in those units where rates of immediate breast reconstruction (IBR) pre-COVID-19 were high; it is noteworthy that overall rates of breast reconstruction in Brazil were 29% before the pandemic, a figure that is higher

than recorded in the UK National Mastectomy and Breast Reconstruction Audit (21%).[2] Issuance of COVID-19 specific guidelines by the Association of Breast Surgery[3] in the UK had a dramatic effect on IBR with only 30% of units reporting continuation of this practice during the pandemic (ABS National Audit – preliminary data).

The questionnaire sent out to 1462 Brazilian surgeons about reconstructive practice during the pandemic had a response rate of just over one-third; it is unclear whether this questionnaire addressed intentional or actual reconstructive practice during the pandemic with two-thirds (64%) of surgeons supporting IBR using predominantly implant-based techniques (permanent or temporary tissue expanders). It is reassuring that only 3% of surgeons would advocate complex flap-based reconstructive procedures during the active phase of the pandemic and this concurs with our viewpoint.

Of interest, just over half of Brazilian surgeons were opposed to therapeutic mammoplasty; this procedure can avoid complete mastectomy in some patients with larger breasts and hence negate any requirement for IBR. Furthermore, the contralateral side could be done at a later date – perhaps after breast irradiation as this can disrupt initial symmetry from a simultaneous balancing procedure. We agree with our Brazilian colleagues that reconstructive procedures should be undertaken on a discretionary basis related to individual patient needs/preferences, local circumstances (and critically operative capacity) together with the phase of the pandemic.

We are now witnessing a resurgence of infection in some parts of the world and this will affect reconstructive practice if operative capacity becomes restricted once again. We would argue that implant-based reconstruction should largely be dependent on operative capacity rather than concerns about potential complications, prolonged hospital stays and re-admission. Reconstruction with tissue flaps (myocutaneous or otherwise) might be acceptable during the recovery phase if resources are adequate in terms of staff and facilities. Standard operating procedures should be adopted to streamline patient care and pre-emptively document management plans for any complications.

Remarkably there is no indication of pandemic stage at the time of this electronic survey; South America has lagged behind Europe by approximately 1–2 months for phase of disease. Moreover, the response rate might have been higher with use of the Total Design Method permitting a more representative cross-sectional sample.[4] Nonetheless, more than 500 surgeons belonging to the Brazilian Society of Mastology submitted responses and presumably these were a mixture of plastic and breast oncological surgeons.

We agree with Cavalcante and colleagues that carefully designed strategies are required as we move into the next phase of the COVID-19 pandemic. These must minimise the strain on healthcare systems, maximise patient safety and provide optimum cancer care. Surgical practice must be dynamic and adapt to changing circumstances with close co-operation between breast and plastic surgeons working synergistically within a multidisciplinary team. Resumption of reconstructive practice should closely mirror national guidelines and exercise due caution to minimise risks of complications whilst addressing clinical need and patient expectations. The latter must be realistic with appropriate selection of patients and adherence to a fully informed consent process that reflects the additional risks associated with COVID-19.

Declaration of Competing Interest

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Impact of the COVID -19 pandemic on the organisation of breast reconstruction in France

Dear Sir,

Introduction

Since the beginning of the COVID-19 pandemic, the health emergency has justified giving priority to the carcinologic management of breast cancer patients at the expense of breast reconstruction (BR). BR activity was abruptly threatened or even interrupted, generating a waiting list of patients.

National and international guidelines of surgical societies are to postpone delayed BR (DBR) and to give preference to implants in case of immediate BR (IBR).[1-3] Due to the uncertainty about the duration of the COVID-19 pandemic, we worried about a possible decrease in the number of immediate or DBR procedures by giving up care.

We conducted a national survey, the objective of which was to assess the impact of the COVID-19 pandemic on BR practises.

Methods

On 14 May 2020, at the end of national confinement, we posted an anonymous online survey to the French Breast Cancer Intergroup Unicancer (UCBG, 280 surgeons) (supplementary file A).

Regarding the COVID-19 outbreak, French departments were classified as 'under tension' (red zones) or 'less affected' (green zones) (supplementary file B). The qualitative results of two groups were compared using chi-square tests. The significance threshold was set at a two-sided alpha level of 0.05.

Results

Most of the 55 breast surgeons who responded (participation rate 20%) declared working in high volume centres performing >100 breast cancer and BR procedures per centre/year (94% and 62% respectively). The low participation rate could be explained by a single response per team and per centre.

At the time of the survey, 37% of the surgeons practised in a red zone area and 63% in a green zone, 38% in a cancer centre, 31% in a private clinic, 31% in a public hospital and/or university hospital.

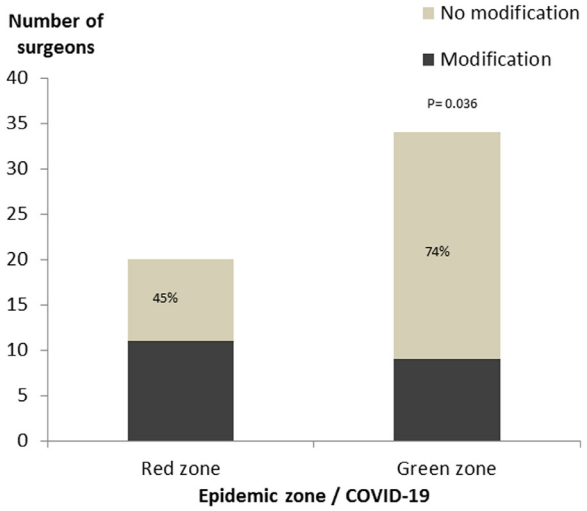

Figure 1 Modifications of immediate breast reconstruction indications after confinement according to the epidemic zone of COVID-19.
Red zone: under tension
Green zone: less affected.

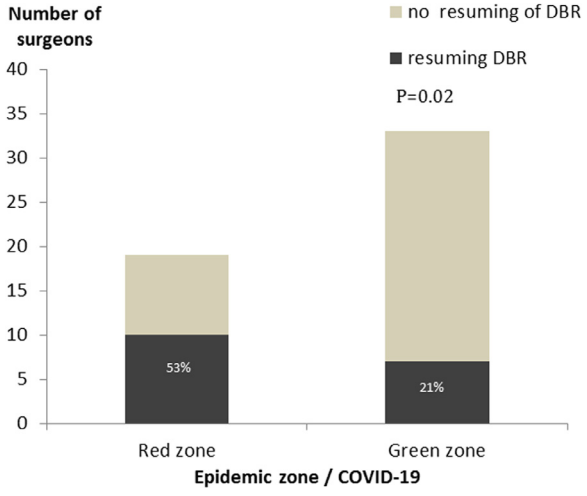

Figure 2 Comparison of resuming delayed breast reconstruction after confinement according to the epidemic zone of COVID-19.
DBR: delayed breast reconstruction
Red zone: under tension
Green zone: less affected.

Variation in breast reconstruction activity

All surveyed surgeons completely stopped DBR activity during confinement. Overall 42% of surgeons reported not changing their indications for IBR during, and 63% after completion of confinement (Figure 1). Overall, 32% of surgeons reported resuming DBR activity, with a higher proportion in red zones than in green zones (Figure 2). The fear of a sec-

ond wave of the pandemic in areas initially less affected by COVID-19 may explain this paradoxical result.

The impact of the pandemic on prophylactic breast surgery activity was variable, with 54% of practitioners reporting that they had discontinued prophylactic breast surgery.

Factors influencing surgical practice

The main reported reason limiting the resumption of BR activity was a reduction in operative theatre access (65%). 85% of surgeons reported that patients asked to postpone the BR procedure until after the end of the pandemic mainly due to fear of COVID-19 infection. Eighty per cent of surgeons referred to the guidelines to organise the resumption of activity. However, 51% and 18% of them declared using pedicled and free flaps, respectively.

Seventy-one percent of the surgeons have set up multidisciplinary meetings with other surgeons and anaesthetists to collegially validate the BR indications on a case-by-case basis.

Discussion

The COVID-19 pandemic poses a severe and long-lasting threat to patients' access to BR. The surgical societies recommended to postpone delayed BR at the end of the pandemic and in case of IBR, to focus on implant-based reconstruction. In our study, as the virus was still circulating, 32% of surgeons reported resuming DBR activity and still performed flap BR if they found those techniques to be more appropriate to the patient.

The recovery of surgical activity after the confinement due to COVID-19 has been a challenge largely discussed in the recent literature in many non-urgent fields, such as orthopaedic or metabolic surgery due to restricted access to the operating theatre. However, because of their life changing implications, these surgeries are not optional.[4] In order to cope with these ethical choices to prioritise and organise BR activity, 71% of surgeons relied on local multidisciplinary collegial discussion taking into account patients' requests, local intra-hospital constraints and personalised risk–benefits balance.

We also identified that the fear expressed by patients to perform a DBR procedure in this pandemic context was a factor moderating the resumption of activity. Amongst the most penalised are older patients considered more vulnerable to COVID-19 for whom access to BR is already poor, and who will probably not benefit from DBR if their surgical project is deferred.[5]

As a limitation of our study, as the survey was anonymous, we were not able to describe more precisely the participating surgeons and their institutions. However, responders appear representative of expert centres.

Conclusion

In case of a pandemic, all care givers are convinced that non-urgent activity should be stopped during the infection peak. Recent events have helped us to understand that the severity of the sanitary crisis was not homogenously distributed and that it should be considered that multidisciplinary teams discuss and promote non-urgent surgeries to prevent the most vulnerable patients from renouncing care.

Declaration of Competing Interest

None.

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Ethical approval

N/A

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.114.

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COVID-19 microsurgical breast reconstruction national practise survey: A survey of BAPRAS members and proposal of COVID-19 specific perioperative and ERAS pathways

Dear Sir,

Breast reconstruction is one of the largest subspecialties within plastic surgery. The 'Clinical Guide to Surgical Prioritisation During the Coronavirus Pandemic' published by the Federation of Surgical specialty Associations during the COVID-19 pandemic defines breast reconstruction as a non-urgent priority 4 (surgery that can be delayed $>$ 3 months) procedure. As such, breast reconstructive services have largely ceased. Recovery strategies have now been implemented to mitigate COVID-19 risk with both British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS) and the Association of Breast Surgery producing guidance on recommencing breast reconstruction services.[1-3] These guidelines advocate breast reconstruction, whilst highlighting existing issues to be addressed, challenges and potential opportunities. However practical advice on adapting referral pathways or enhanced recovery after surgery (ERAS) pathways during COVID-19 have not been addressed. Whilst existing ERAS pathways have been shown to reduce complication rates and shorten hospital stay for patients, they clearly need modification during the recovery from the pandemic but also in light of a potential second wave.[4,5]

We sought to obtain national consensus regarding microsurgical breast reconstruction, recovery strategies and future adaptations of services with the aim of generating a robust perioperative pathway for immediate microsurgical breast reconstruction. An electronic survey was designed using Google Forms and distributed to all members of the BAPRAS Breast Special Interest Group (SIG). Response rate in relation to absolute number of UK plastic surgery units was assessed.

21 responses were received representing a response rate of 33% ($n = 20$). Results indicate that all units ceased microsurgical breast reconstruction due to the pandemic with the majority (24%, $n = 5$) stopping on March 18th 2020. Only 14% ($n = 3$) had resumed operating at the time of responding. 57% ($n = 12$) of units are currently offering immediate microsurgical breast reconstruction whereas only 33% ($n = 7$) are offering delayed microsurgical reconstruction. The mean number of autologous microsurgical breast reconstructions performed annually by respondents was 102 (10-355). Extrapolating this data and assuming that all units in the UK perform microsurgical breast reconstruction, there were 1743 missed autologous microsurgical breast reconstructions nationally, at the time of survey completion. 76% ($n = 16$) of units are holding face to face breast clinics but 81% ($n = 17$) signalled that these have been reduced, with 48% ($n = 10$) and 86% ($n = 18$) of units conducting virtual clinics for new and follow-up patients respectively. 71% ($n = 15$) of units have a full-time breast reconstruction clinical nurse specialist (CNS), but despite 91% ($n = 19$) regarding a breast reconstruction CNS as an essential component to their service, 61% ($n = 11$) of units had their breast reconstruction CNS re-deployed during COVID-19. 29% ($n = 6$) of units have had to relocate their service due to resource pressures. 52% ($n = 11$) had a 'cold' COVID-19 operating facility where this was undertaken. 38% ($n = 8$) had capacity in the private sector to offer microsurgical breast reconstruction for NHS patients. 43% ($n = 9$) were operating on priority level 3 patients (surgery that can be delayed for up to 3 months), whilst 48% ($n = 10$) were operating on priority level 3 and 4 patients and 10% ($n = 2$) were not operating on either priority. All units had adapted their perioperative pathway in view of COVID-19. All respondents recommended self-isolation pre-operatively, with 95% ($n = 20$) recommending a period of 14 days. The mean time to undertake pre-operative testing for COVID-19, or intention to undertake for those units not currently operating, was 3 (1-14) days. 81% ($n = 17$) were using a viral based test, 14% ($n = 3$) an antibody test and 5% ($n = 1$) did not know which test was employed pre-operatively. 95% ($n = 20$) specifically addressed COVID-19 associated risks in their consent process. 81% ($n = 17$) routinely use CT angiogram prior to carrying out microsurgical breast reconstruction but only 11% ($n = 2$) currently, or plan to, undertake a pre-operative CT thorax at the same time as the CT angiogram for purposes of COVID-19 detection in asymptomatic, isolated and tested patient. Participants were asked to record key changes in their referral and peri-operative pathways as free text. Results were thematically analysed and included virtual consultations, pre-operative SARS-CoV-2 testing, perioperative self-isolation and a modified ERAS pathway. The details of these individual components were distilled into a referral and perioperative pathway (Figure 1), and ERAS pathway (Figure 2) that we suggest for immediate microsurgical breast reconstruction.

As breast reconstruction services are re-established, COVID-19 risk needs to be mitigated. National consensus should be taken to avoid inequalities in reconstructive services provided, and avoidance of a cohort of patients with functional, aesthetic and psychological sequalae as a result of missed microsurgical breast reconstruction. Results of this survey identify a way forward for microsurgical breast

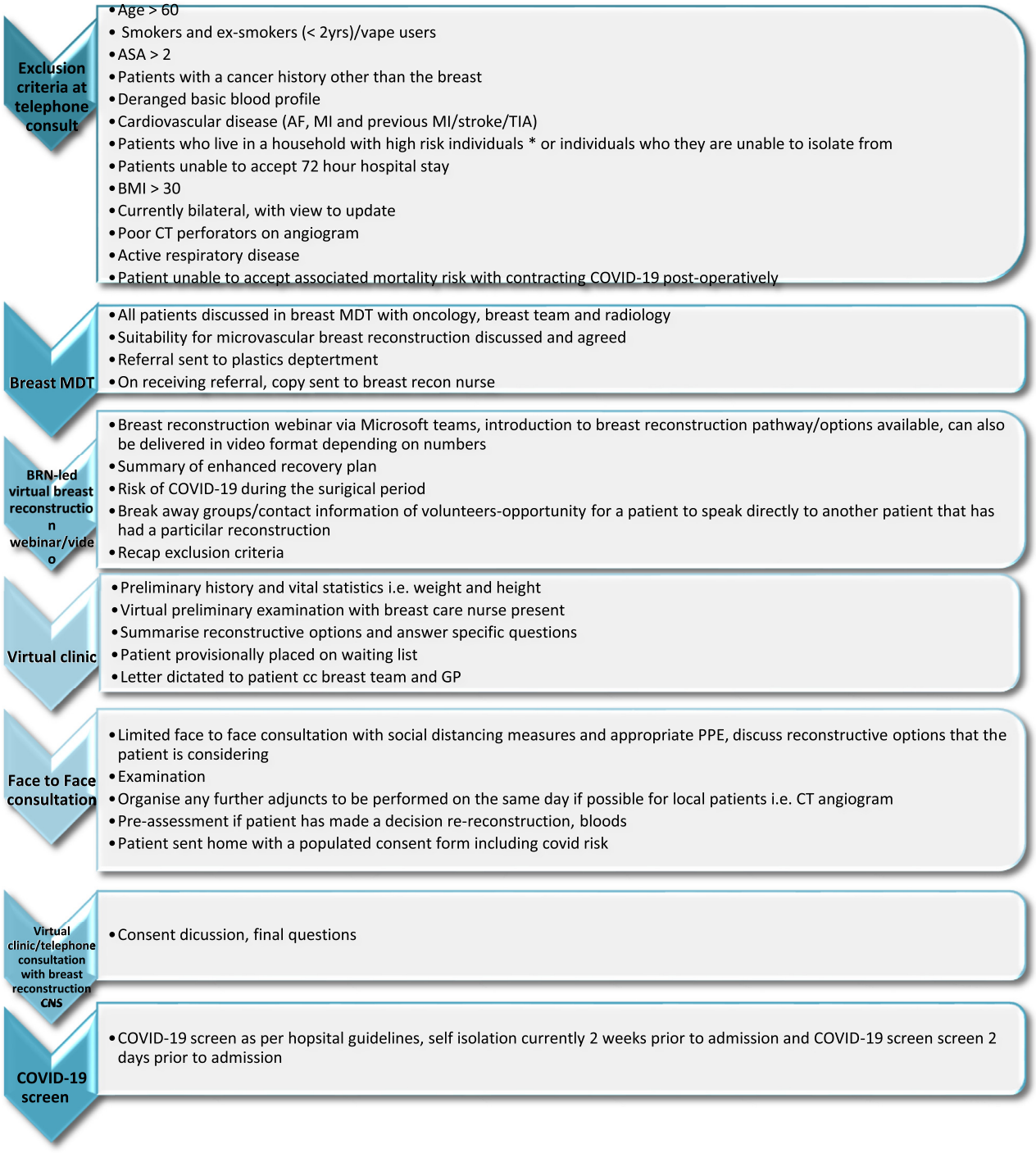

Figure 1 Referral and perioperative pathway for immediate microsurgical breast reconstruction.
*High risk as defined as: organ transplant, chemotherapy or immunotherapy, radical radiotherapy, targeted cancer treatment, leukaemia, lymphoma, myeloma, bone marrow or stem cell transplant within 6 months, immunosuppressant medication, severe lung disease i.e. COPD, severe asthma, cystic fibrosis, sickle cell disease, serious heart disease, pregnancy.

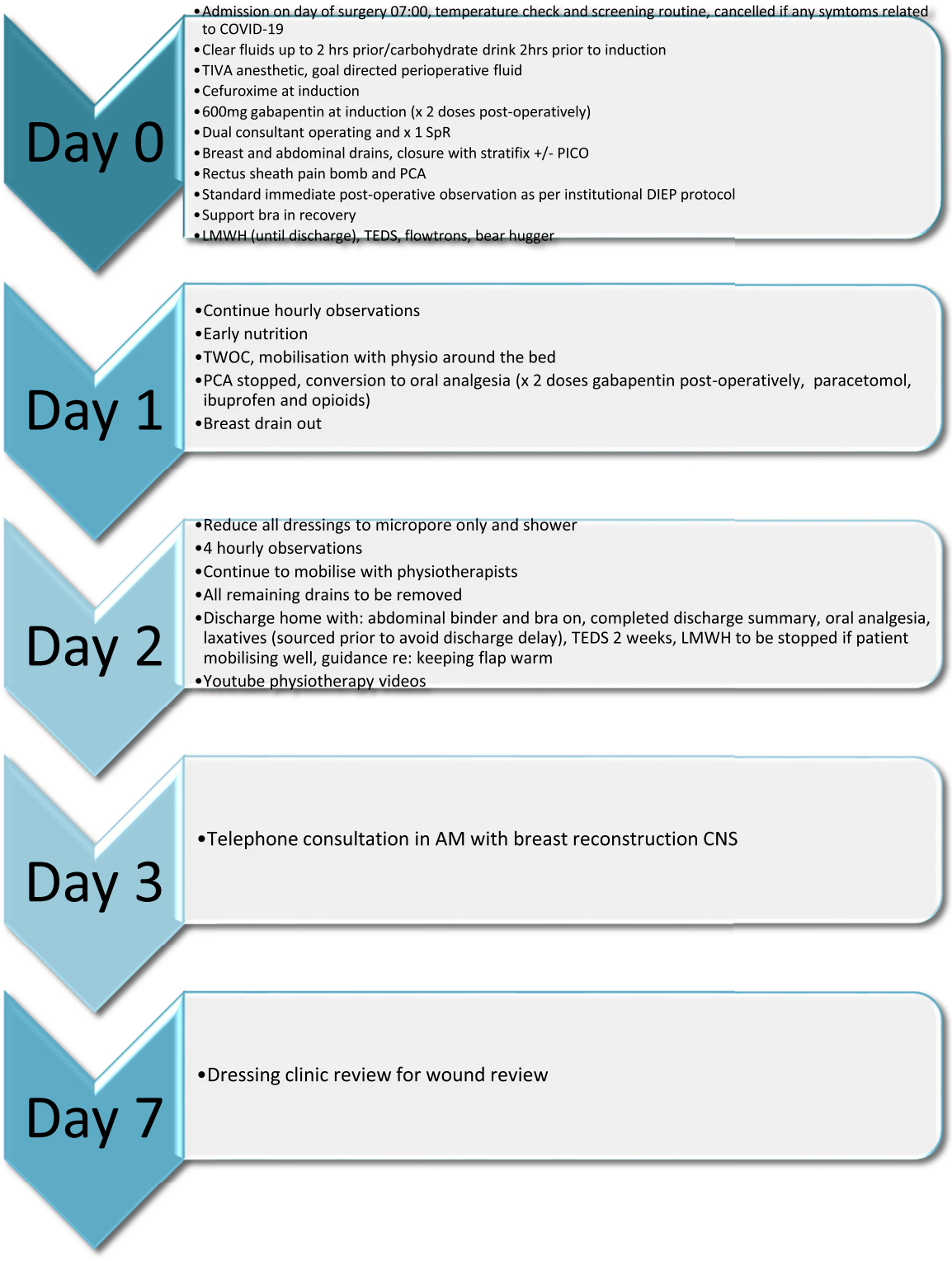

Figure 2 ERAS pathway.

reconstruction during the COVID-19 era and offers a unique opportunity to re-evaluate the pre-COVID-19 service and offer an ERAS pathway. Adaptation and enhancing services from lessons learnt will be paramount to future practice in the event of a second wave or future pandemic.

Declaration of Competing Interest

None.

Acknowledgements

Thank you to the BAPRAS Breast SIG members who have shared their unit's referral, perioperative and ERAS pathways that contributed to Figures 1 and 2.

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Ethical Approval

N/A

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Restitution of the NHS breast reconstruction service during the recovery phase of the Covid 19 pandemic

Dear Sir,

We read with interest the article by Masud et al. in August 2020.[1] The authors layout the problems faced due to the cessation of elective breast reconstruction surgery as a result of the initial phase of the COVID-19 response, and their algorithm for recommencing their service. Our service noted as the recovery restitution phase from the coronavirus pandemic continues, a particular challenge is faced by breast reconstruction teams. Multiple institutions around the UK continue to struggle with approval to restart this essential service, worsening the acknowledged postcode lottery that exists in the management of breast cancer and reconstruction.

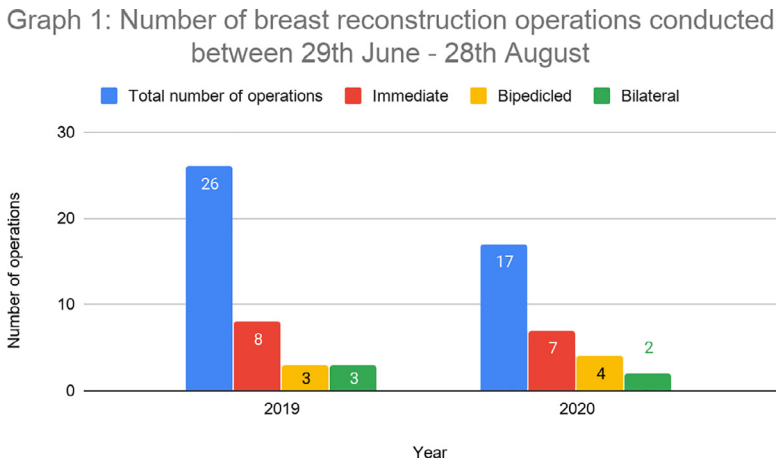
A standard approach to autologous free flap breast reconstruction will require at least 1.5–2 sessions in most institutions and ideally should be supported by a team of expert scrub and anaesthetic staff. Patients should then be monitored by experienced plastic surgery nurses and most will follow an Enhanced Recovery After Surgery (ERAS) protocol.

Although immediate reconstructions have been recategorised as priority 2 by the Royal College of Surgeons,[2] many teams are struggling with access to appropriately staffed lists. This is a dual problem related to staffing with many members of our teams continuing to shield, and theatre capacity, where hospitals are creating green 'COVID-lite' pathways. In fact, challenges related to theatre capacity from the hand trauma perspective have been described.[3]

Our experience

In Bristol we have a large catchment area and before the pandemic halted elective operating, there was a waiting list of approximately 70 patients including immediate, delayed, and risk reducing cases. Fortunately we were able to complete the outstanding immediate reconstructions prior to cessation of elective operating, but during the peak of the pandemic all non-urgent (i.e. P3/4) surgery ceased, along with the screening programme for breast cancer. As we emerge from the crisis and limited capacity elective lists have been reinstated, we identified an early opportunity to restart with immediate unilateral reconstruction and describe below our experience thus far.

We have prospectively collected information on patients operated on as we restore our breast reconstruction ser-



Graph 1 Graph showing the number of breast reconstruction operations conducted in the years 2019 and 2020, between 29th June and 28th August.

vices. We have modified our approach to these cases, and now operate a 2-consultant system for each procedure to reduce surgical time. Post-operatively our patients go to a 'COVID-lite' green ward which is not our usual plastic surgery ward. Although the nurses on this ward are gathering experience, we arranged for a plastics-trained nurse to cover for the first night. All patients have a COVID swab 72 h pre-operatively after shielding for 2 weeks (these recommendations are changing in line with NICE guidance).[4]

Results

Our first case was performed on 29th June and in the 8 weeks since then we have undertaken 19 free flaps (17 patients). Two patients had bilateral reconstruction and four had bipedicled flaps. Seven were immediate reconstructions. In the same time period in 2019 we performed 26 reconstructions (1 TDAP, 2 TUG, 23 DIEPs) with three bilateral cases, three bipedicled flaps and eight immediate reconstructions. The average length of stay (LOS) in 2019 was 3.27 and in 2020 is 3.12 days. There have been no significant complications since restarting, no patients have displayed symptoms of coronavirus peri- or post-operatively and there have been no deaths.

We are working on the principle of minimising patient contact by reviewing patients once post-discharge. We also recommend that they shield for at least 2 weeks post-operatively. This is reinforced by the ERAS protocol and patients are supported remotely wherever possible. Although the learning curve for free flap monitoring and ward care has been steep we are seeing increasing confidence among the nursing staff who are caring for these patients. We continue to support them with educational sessions and overnight support from the medical team. Graph 1

Looking to the future

This data supports the principle that autologous breast reconstruction is safe to be conducted during this phase of the coronavirus pandemic, providing appropriate safeguards are put in place. The tenet that the NHS provides standardised care opportunities to patients is essential to prevent some centres becoming overwhelmed and we therefore strongly support our colleagues in restarting their services. As more data emerges from the UK National Flap Registry we expect there will be growing pressure to provide this service at all units. Logistical challenges continue to affect our service and we are functioning at approximately 65% of the capacity compared with last year. This is likely related to the restrictions that have been put in place to ensure patient (and staff) safety, such as shielding pre-operatively, but has resulted in difficulties populating available theatre lists.

Going forwards we anticipate significant challenges with the usual winter pressures exacerbated by coronavirus. We are optimistic that the Nightingale Hospitals will take some of the pressure off the bed base to avoid another full stop to elective surgery, in addition to the green 'COVID-lite' pathways. However, we expect the rate limiting step to be related to availability of theatre staff and anaesthetic team members, both of which are beyond our control.

Declaration of Competing Interest

None.

Funding

None.

Ethical approval

N/A

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Breast reconstruction with immediate autologous free tissue transfer in a peri-operative COVID-19 positive patient: A case report illustrating feasibility of aftercare

Dear Sir,

Globally, there has been a measured response to rationalise elective operating during the coronavirus disease 2019 (COVID-19) pandemic[1]. This has affected the delivery of autologous free tissue transfer for breast reconstruction. A primary concern is the increased mortality risk to patients whom undergo elective surgery and develop COVID-19. Other challenges include the delivery of post-operative management.

In early March 2020, prior to the COVID-19 operating restrictions, we performed a bilateral breast reconstruction with a deep inferior epigastric perforator flap (DIEP) and a superficial inferior epigastric perforator flap. The patient tested positive in the immediate post-operative period. The aim of this report is to describe how care after free tissue transfer can be delivered to COVID-19 positive patients.

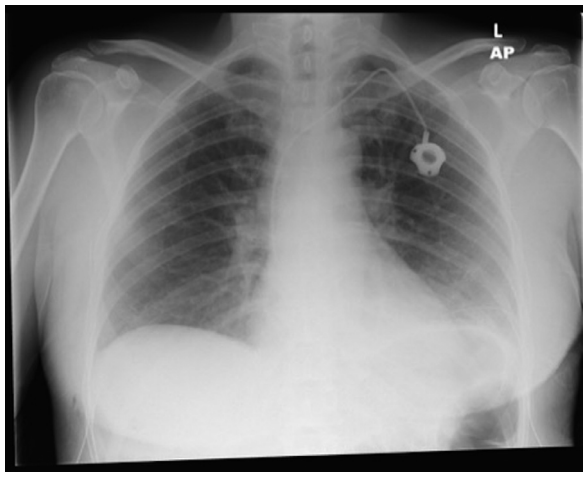

Fig. 1 Chest radiograph performed on day one post operatively showing mild left basal atelectasis. Drains are in place with a small area of right sided surgical emphysema. A left Port-A-Cath is in situ from the patient's pre-operative chemotherapy. No additional chest imaging has been performed.

Our patient was a 56-year-old who presented with recurrent left sided breast cancer. She had a body mass index of 24 and no co-morbidities. The patient underwent pre-operative chemotherapy. Operative management consisted of bilateral mastectomies and axillary node clearances, right-sided DIEP and left-sided superficial inferior epigastric perforator flap reconstructions. No unexpected intra- operative events were noted. Microsurgical anastomoses with a rib sparing approach consisted of superficial inferior epigastric artery and vein to left internal mammary vessels with a 9-0 S&T and 2 mm venous coupler device, respectively. The deep inferior epigastric artery and vein were anastomosed to a perforator of the right internal mammary vessels with 10-0 S&T and 2 mm venous coupler device. All had good flow at first attempt.

On the first day post- operatively, the patient's daughter visited from London. The same day, the patient had a temperature and pleuritic chest pain. Two litres of oxygen per minute were required during the first 24 h to maintain oxygen saturations >94%. A chest radiograph was performed as shown in Figure 1.

On day two post-operatively, the patient's physiologic observations were normal, with no oxygen requirement. On day three, the patient had reached the standard clinical and physiotherapy goals for discharge. It was noted the patient developed a cough, sore throat and a temperature. In view of the patient feeling well with normal cardiovascular observations, discharge planning continued. A COVID-19 test was sent and the patient was advised to self-isolate. The left breast drain was removed prior to discharge after draining less than 50mls over 24 h. The right breast and abdominal drains remained.

The patient was subsequently found to be COVID-19 positive and continued to have fever (38.5–39 °C) at home for two weeks. There was no shortness of breath. The patient was monitored with telephone consultations and photographs almost daily for two weeks.

Table 1 Clinical manifestations COVID-19 in the peri-operative autologous free tissue transfer patient.

Body system	Reported COVID-19 signs and symptoms	Our patient
Respiratory	• Pleuritic chest pain • Dry or productive cough • dyspnea • Hemoptysis • Acute Respiratory Distress Syndrome	• No oxygen requirement or pleuritic chest pain beyond day one. • The expected post-operative pain from bilateral reconstruction may have had a masking effect on chest pain. • The sore throat may have initially incorrectly been attributed to discomfort from intubation.
Heamatological	• Lymphopenia • anemia • Thrombocytopenia	• Lymphopenia seen. • Haemoglobin drop in keeping with intra-operative blood loss. • Typical drain output volumes. • Breast seroma development (common after axillary node clearance). • No microvascular anastomoses complications.
Cardiovascular	• Myocardial oxygen supply/demand mismatch	• No hypotension or tachycardia. • Flap was well perfused throughout.
Gastrointestinal	• Nausea • Vomiting • diarrhea	• Nil
Renal	• Acute kidney injury • Acute renal failure	• Nil

Multiple factors were taken into consideration with the patient's post-operative care. These included limited availability of personal protective equipment and the risk of infection to staff. Additionally, the patient did not feel comfortable attending the hospital under the circumstances. We provided drain removal and wound management advice using emails, telephones and photographs. Two weeks following the operation a seroma of the right breast was diagnosed. As this was symptomatic, the seroma was drained in the COVID-19 positive area within the Emergency Department. The patient's partner collected dressings in the hospital car park to limit hospital exposure. The patient visited the dressing clinic twice in total and healed after three weeks.

This case was at the start of the UK pandemic. Since the average incubation period of the virus is 5.2 days, the patient was most likely an asymptomatic carrier prior to admission[2]. Of note, the medical staff whom managed the patient did not develop symptoms. Clinically and physiologically, we did not see any significant difference to that of a normal post-operative bilateral DIEP patient, as demonstrated in Table 1[3,4].

This case demonstrated the possibility of managing patients using virtual technology. As a result of this experience, and COVID-19 more broadly, we have transitioned to telemedicine based consultations wherever feasible.

Despite the uneventful recovery of our patient, we appreciate we were likely to have been fortunate with our outcome. We have significantly modified our breast reconstruction protocol. We select low risk patients, fully informed of the risk of COVID-19. and have two senior surgeons operating synchronously to maximise efficiency. Patients are not permitted visitors and are discharged on day two.

As the epidemiology of COVID-19 and resultant impact on hospital resources changes over time, we will continue to adapt our pathway. If COVID-19 is contracted perioperatively, this report aims to illustrate that high-quality patient care can still be delivered. Although COVID-19 can complicate, or even be fatal in the perioperative course, our patient thankfully suffered no discernible negative outcome.

Ethical approval

N/A

Funding

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Declaration of Competing Interest

None

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Dupuytren's disease treatment during the second wave of COVID-19 pandemic

Dear Sir,

I have read with interest the article entitled "Percutaneous needle fasciotomy for Dupuytren's disease: A one-stop approach incidentally suited to the era of COVID-19" by Patel and Patel.[1] In Europe we are within the "second pandemic wave" and we will be unable to comply with the patients' requests for elective surgery.[2] I am gradually adapting to the percutaneous needle fasciotomy, as suggested by Patel and Patel.[1] However, by practicing it, I noticed that it is not always that simple, requiring specific technical skills, especially at the inter-phalangeal joint. Furthermore, needle fasciotomy is not devoid of any complications and is associated with recurrence.[3] Considering that there is still no definitive solution today for Dupuytren's disease, in this moment more than ever, I would prefer to use collagenase injections, a safe and useful technique in which I confide.[4] Many patients are asking me for collagenase injections now more than ever, asking for an outpatient surgery treatment. Many of them prefer collagenase injections to other techniques, considering their previous successful experiences. Unfortunately, Collagenase from *Clostridium Histoliticum* is no longer available in Europe, due to the withdrawal of the drug from the European market. Collagenase was a valid option from which both patients and surgeons could choose, based on their personal experiences. The current situation requires us to adapt to percutaneous needle fasciotomy. Nevertheless, the need for mini-invasive therapies, resulting from the current situation, stresses the importance of collagenase as a precious drug, not just in the context of hand disease. Both patients and surgeons cannot be deprived of it. I hope in the re-release of collagenase into the market and/or to succeed in finding a new permanent non purely surgical solution for Dupuytren's disease, according to Hueston's dream: "I have a dream that one day Dupuytren's disease will be treated without surgery".[5]

Declaration of Competing Interest

No conflict of interest or funding.

Ethical Approval

None.

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The COVID-19 Pandemic: The effect on hand trauma in Europe's busiest major trauma centre

Dear Sir,

The World Health Organisation (WHO) declared the COVID-19 outbreak as a global emergency on the 30th January 2020.[1] Healthcare systems have had to rapidly expand their intensive care capacity to meet the demands for

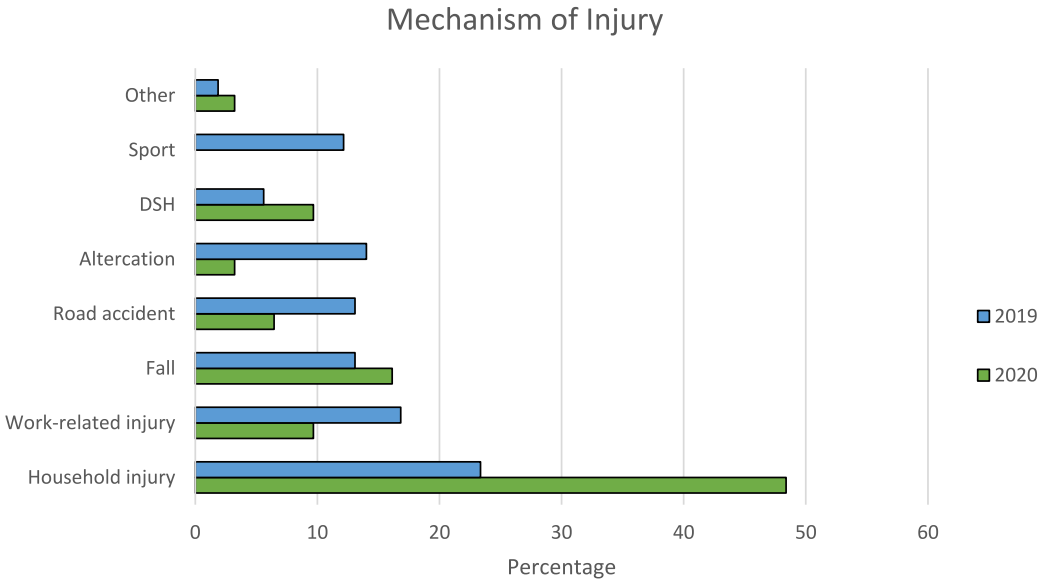

Figure 1 Mechanism of injury by patient cohort.

ventilatory support. By mid-April, London had expanded its ICU capacity by over one-third.[2] Treatment of non-COVID-19 related conditions, including hand surgery, has had to adapt to conserve health resources and protect both healthcare professional and patient from nosocomial virus exposure. All elective surgery has been cancelled and the management of hand trauma has had to become more streamlined to still provide a service to urgent cases despite a reduction in facilities and staffing.

We report our experiences of managing hand trauma during the COVID-19 pandemic in a London major trauma centre (MTC), the highest tier of trauma care within the regional network and the busiest centre in Europe.[3]

We performed a retrospective study of hand trauma patients presenting to our MTC during the first four weeks of lockdown. Patient data was collected for the same dates in 2019 to provide a control group. All adult patients that presented to the hospital between 24th March and 19th April 2020, with trauma to the hand or forearm requiring operative intervention, were included.

50% of plastic surgery clinicians were redeployed to ICU at the start of lockdown, elective surgeries were postponed and hand trauma moved to the private sector. Clinics were rationalised, with the majority of elective and follow-up cases reviewed virtually.

We observed a 62% reduction in ED presentations from 24th March to 19th April 2020 compared to the equivalent time frame in 2019. Plastics referrals were similarly reduced by 63%. 23% of patients referred during lockdown required operative intervention, compared with 31% in 2019.

Injuries sustained were similar between cohorts and included fractures, tendon, nerve or vessel injury, infections and fingertip insults. The 2019 cohort had a variety of injury mechanisms, whereas the majority of the lockdown cohort occurred from household incidences (Figure 1). The location of injury was significantly different between cohorts (at home versus outside the home), 24% of the 2019 cohort occurred at home, compared with 67% of the lockdown cohort ($p<0.05$, Fisher's exact test).

All included patients underwent an operation in a theatre environment. Time to surgery (from presentation) and first hand therapy appointment (from surgery) varied according to condition (Table 1). We identified a significant reduction in the time to fracture operations during lockdown ($p=0.022$, MWU test) and a non-significant reduction for tendon repairs. There was also a significant reduction in the time to hand therapy (tendons $p=0.0012$ and fractures $p=0.0003$, MWU test).

Our unit saw a significant drop in ED attendances and hand trauma presentations during lockdown, likely resulting from fewer people partaking in higher risk activities (construction work, sport, driving) and fewer people on the streets (altercations, assaults). This is in concordance with Metropolitan Police data, who report a 13% reduction in total offences and a 6.2% decrease in violent offences across London in March 2020 compared with March 2019.[4] We have noticed an increase in the proportion of injuries taking place at home, likely as a result of individuals taking up DIY, gardening or cooking-related activities. BAPRAS predicted this and a social media campaign was carried out to encourage people to avoid such injuries.[5] Our results suggest that this campaign has been beneficial: although the proportion of household injuries has increased, the frequency has reduced.

The reduction in hand trauma presentations combined with the halting of elective surgeries has allowed us to deliver a more efficient service. We have noticed a significant decrease in the time to surgery and to hand therapy. The improvement is likely as a result of the move to private sector operating, where theatres are booked according to trauma workload on a day-to-day basis. The shift to one-stop assessment and treatment clinics has also been beneficial. The delay to hand therapy in 2019 is of concern and is a result

Table 1 Breakdown of most common injuries sustained, time to surgery and hand therapy for each condition (average, measured in days).

Injury	2019			2020		
	Frequency	Time to surgery (days)	Time to hand therapy (days)	Frequency	Time to surgery (days)	Time to hand therapy (days)
Extensor Tendon	14	4.2	16	5	3.6	4.3
Flexor Tendon	12	3.7	7.2	8	3.4	4.4
Digital Nerve	12	4.5	10	5	3.4	4.6
Fingertip injury	7	5.4		2	4.5	
Infection	11	1.3	6.5	1	1	
Closed fracture	41	6.27	18.3	5	4.4	6.7

of prolonged underfunding and short-staffing levels in the therapy department. Interestingly, despite the loss of further therapists during the pandemic, delays have improved as a result of virtual clinics and the cancellation of elective cases.

There are many lessons to learn in hand surgery following COVID-19. It is imperative that trusts continue to foster the energy, enthusiasm and resultant innovation that has been so prevalent amongst all healthcare staff during this terrible global pandemic.

Our unit will be retaining the following improvements:

1. Same day trauma clinic assessments and operations for cases likely requiring surgery.
2. The use of virtual clinics for routine assessments and hand therapy follow ups.
3. Use of WALANT or regional anaesthesia where possible.
4. One-stop follow up clinics with combined hand surgery and therapy assessment post operatively.

Funding

None.

Ethics approval

Not required.

Declaration of Competing Interest

None.

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Plastic surgery emergency surgical care during the COVID-19 lockdown at a Mexico City academic center

Dear Sir,

Even though reopening has begun in several European and Asian nations, Latinamerican countries still show an increase in COVID-19 cases.[1] Plastic surgeons and training programs have been severely affected due to the cancelation of elective procedures in this scenario. Recent reports have shown an important decline in elective procedures during lockdown, with slow uptake after reopening.[2]

Hospitals have turned their attention towards the management of COVID-19 patients, however several institutions continue to provide specialized care for emergency situations such as hand trauma, burns, facial fractures, or chronic wound management. Information about plastic surgery-related emergency procedures during lockdown is scarce. We aimed to compare our productivity before and during lockdown at a plastic surgery referral center in Mexico City.

A retrospective review was performed including patients treated by a plastic surgeon at our institution's emergency department during the fourteen-week lockdown period in Mexico City (March 23rd to June 28th 2020), and compared those results with the same date period from the previous year.

In 2019, 1114 patients were treated, while only 393 cases were seen in 2020. Upper extremity trauma was the most common type of injury (712 cases in 2019 and 228 in 2020), followed by facial trauma (348 cases in 2019 vs 131 in 2020). The distribution of minor injuries requiring repair under local anesthesia did not differ much (75.3% in 2019 and 73.3% in 2020), however the proportion of procedures requiring admission to the operating room rose from 3.11% in 2019 to 8.11% in 2020. Interestingly, during the lockdown period consultations for pressures sores rose from 0.1% to 1% of the total consultations.

Emergency surgical productivity showed a 65% reduction during the COVID-19 lockdown. When compared to other series, such as the one by Wang et al.,[2] we had an even deeper decrease in productivity (53% vs 65%). This reduction in the need for surgical attention can be partially explained by the overall diminished economical activity, leading to less work-related accidents, as well as a reduction in outdoor physical activities and motor vehicle accidents. Another factor could be that the largest public hospitals in Mexico City were turned into COVID-19 attention centers, driving people with emergency needs away from them.

These results further complicate the scenario for practicing plastic surgeons and residents in training, adding to the decrease in elective surgery and non-invasive procedures. It has been shown that a decline in elective and emergent surgical exposure negatively impacts resident's abilities and confidence[3]; meanwhile, such a severe reduction in trauma call damages one of the last sources of income for practicing surgeons.[4]

During this difficult time education programs should promote learning by adopting new telecommunication and simulation technologies. As reopening is implemented the need for emergency surgical procedures will surely rise, and plastic surgeons in Mexico and abroad should be ready to meet the demand, while following national and international safety guidelines[5] (Table 1).

Table 1 Summarization of Emergency Cases in PRS Department during the COVID-19 Pandemic.

	2019	2020
Gender, n (%)		
Male	743 (66.7%)	275 (70.6%)
Female	369 (33.2%)	114 (29.3%)
Area, n (%)		
Face	348 (31.3%)	131 (33.3%)
Arms	712 (63.9%)	228 (58%)
Legs	42 (3.8%)	22 (5.6%)
Other	12 (1.1%)	12 (3.1%)
Surgical type		
Minor	839 (75.3%)	287 (73.3%)
Major	35 (3.1%)	32 (8.1%)

Declaration of Competing Interest

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An outbreak of Covid-19 in a Burn Unit: The impact on the health system and management strategies for infected patients

Dear Sir,

The coronavirus pandemic that started in Asia probably arrived in Brazil in February 2020. Isolation and quarantine strategies positively influenced transmission control. However, the increasing of the ethyl alcohol storage at home during quarantine seems to increase the chances of domestic accidents such as burns, for example.[1] Health professionals are on the front line, exposing themselves to infectious cases. The direct contact with burned patients is prolonged by the need for daily dressing changes for burns with silver sulfadiazine cream 1%.[2,3]

In this report, we describe an outbreak of Covid-19 in a burn treatment unit, from an initially asymptomatic patient, its transmission to health professionals, the management measures adopted to control the infectious event, and its impact on the health system.

We reviewed the electronic medical record of the burned patient infected with Covid-19, as well as an interview with the health professionals who attended the Burn Unit of the Hospital das Clínicas, Ribeirão Preto Medical School, University of São Paulo, Brazil.

The initial patient was a 52-year-old man, a victim of a second and third-degree burn due to direct flame, totaling 12% of the body surface area. After 11 days of hospitalization, he started with fever, odynophagia, and runny nose. Due to the pandemic context, he was transferred to an isolation room and collected respiratory secretion using a swab, which was positive for the RT PCR test for Covid-19.

To minimize the time of contact with the patient after the diagnosis of Covid-19, the use of long-term dressings was adopted to treat the areas of residual burns and the maintenance of dressings with negative pressure device for the areas already grafted. We decided to use polyurethane and silicone sheets with impregnated silver ions (Mepilex Ag™) to the injured regions, which allowed dressing changes to happen only once a week. This alternative considerably minimized the contact time between health professionals and patients, when compared to the most used dressing in our burn unit, silver sulfadiazine cream 1%, which requires daily changes.

The use of long-term dressings is already well established, as advocated by Silverstein et al. in 2011, who found relevant efficacy of them in comparison with 1% silver sulfadiazine.[2,3] Currently, in the context of a pandemic, another opportune possibility arises for its utilization. In areas of deep burns treated with a split-thickness skin graft, the use of a negative pressure dressing (Avelle™) was maintained, which also allowed less contact time between the infected patient and employees, to be changed in five to seven days. The use of negative pressure dressings on skin grafting ar-

Table 1 Epidemiological data of the patient and professionals during the outbreak of Covid-19 in the Burn Unit, Hospital das Clínicas, Ribeirão Preto Medical School, University of São Paulo, Brazil.

	Age(y)/ Gender	Profession	Comorbidities	Symptoms	Serology IgG/IgM	Medications
Patient	52/M	Unemployed	No	Cough, nasal discharge	-	Dipyrone
Worker #1	61/F	Licensed practical nurse	Anxiety	Loss of smell/taste, cough, myalgia, nasal discharge	-	-
Worker #2	61/F	Administrative officer	No	Loss of smell/taste, cough, myalgia, nasal discharge	-	Levofloxacin
Worker #3	66/F	Nurse	No	Loss of smell/taste, cough, myalgia, nasal discharge, fever, dyspnea	-	Dipyrone
Worker #4	54/F	Licensed practical nurse	Glaucoma	Loss of smell/taste, cough, myalgia, nasal discharge, fever	IgM positive IgG negative	Ketoprofen Dipyrone
Worker #5	68/M	Licensed practical nurse	Asthma	Asymptomatic	-	-
Worker #6	31/F	Resident medical doctor	No	Loss of smell/taste, cough, myalgia	IgM positive IgG negative	Naproxen
Worker #7	41/F	Licensed practical nurse	No	Loss of smell/taste, cough, myalgia, nasal discharge	-	Paracetamol

eas showed 96.7% integration with a pressure of 80 mmHg, according to Petkar et al. and could be a valid alternative for a pandemic context.[4]

Our burn unit has 34 health professionals in their routine of assisting inpatients who work in relay shifts. After extensive testing of all health professionals in our Burn Unit, seven individuals were found to be contaminated (Table 1), which represents approximately 20% of them. For the employees who were able to work, the continuous use of personal protective equipment (PPE) was reinforced during the entire period of their care routines in the health service. In agree with this, Canova et al. found a low risk of Covid-19 transmission for health workers who were strict adherence to basic standard hygiene and facemasks were included, once it offers considerable protection during short periods of contact with symptomatic Covid-19 patients.[5]

The decrease in the number of health workers generated the need to close two hospital beds due to the lack of specialized labor. The outbreak in a Burn Unit is of great concern because it is an important public health resource. The removal of employees contaminated by Covid-19 directly affects the quantity and quality of care to be offered to the population dependent on the public health system in a period that could see an increase in burn accidents due to the greater availability of ethyl alcohol in Brazilian households.[1]

The high transmissibility of Covid-19 demands for strong measures to control outbreaks within Burn Units. Priority should be given to the identification of patients and employees possibly infected through high clinical suspicion and laboratory testing to avoid further impacts on the provision of specialized services in the health system. These outbreaks may make it impossible to maintain the original number of beds available due to the lack of specialized labor. Long-term dressings are interesting strategies to be considered in the treatment of burned patients infected by the new coronavirus, because they reduce the time of exposure of health professionals to these patients, and consequently reduce the risk or the magnitude of an outbreak in the Burn Units.

Declaration of Competing Interest

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A Moroccan plastic surgery department approach during COVID-19 pandemic

Dear Sir,

Introduction

COVID-19 is a severe acute respiratory syndrome coronavirus (SARS-CoV-2). Originally identified in the city of Wuhan, in the Hubei province of central China, in December 2019, the virus has since spread rapidly across the world, on March 11, 2020, pandemic status was confirmed by the World Health Organization[1] new infections are rising exponentially as of MAY 15, 2020, there are over 4 621 414 confirmed cases worldwide (whose 6 652 in Morocco), with over 282 388 deaths attributed to the COVID-19 virus[2]. The strict lockdown and social distancing and restricted mobility started by March 20 in Morocco. A full reorganization of the health system was initiated countrywide, creating regional admission centers, specific testing depart-

ments within a COVID-19 pathway, and specialty hubs for continuous medical service. In this paper, we share our experience in managing plastic surgery patients during the COVID-19 pandemic at the Mohamed VI university hospital in Marrakech.

Organization

Early during the outbreak of the pandemic, the Marrakech-Safi region (4.5 million people) turned out to be one of the 3 most affected regions. As soon as the national lockdown was in force, extensive measures and departments remodeling was needed: Scheduled activity was stopped, and special COVID-19 pathways were created. Most departments were converted into COVID-19 facilities. Ibn tofail hospital, considered as an off-site hospital, was assigned to manage all non-COVID patients with urgent surgical pathology.

Concerning our plastic surgery department, it's a tertiary center managing acute infections, trauma, tumors and burns, as well as elective reconstructive procedures and research, it had to prioritize emergency work over elective work like recommended by The American College of Surgeons[3], and be prepared to continue with a reduced workforce. The focus on COVID-19 must not adversely affect the acute response needed to deal with plastic surgery emergencies. The staff is composed of 10 doctors and 16 nurses. Since the last week of March, we have modified the calls and the team has been split into two independent units: COVID-19 positive unit circuit with 5 doctors (50% of our team) and 6 nurses to assist the fight against COVID-19 and a non-COVID unit with 5 doctors and 10 nurses. Personal protective equipment (PPE) is provided by the hospital including N95 masks every 06 h with a medical cap, a disposable overcoat, glasses, and overshoe.

Admission profiles and measures

Patients were either admitted directly or referred from regional hospitals (indirect admission). Before admission, patients residency is asked to see if it's a cluster or not, undergo medical history checking to look for any cough, shortness of breath, chills, sore throat, new loss of taste or smell and fever testing was a systematic procedure and if the patient had one of these criteria a CT-SCAN was made and the coordinator is called to make PCR test. Fortunately, we never had this situation. Telemedicine, clinical imaging, and symptom help us to carry out the operating program.

Circuit for patient management

Admission was limited to a maximum of 2 patients per room, each room has 4 beds and we have a total of 8 beds dedicated to plastic surgery. Patient movement around the hospital is restricted. To reduce the length of stay by 30% from an average of 13 days last year to 10 days in this period, patients were admitted 24 to 48 h before surgery. During hospitalization, only 1 visitor per day per patient was allowed for one-hour maximum. All wore surgical masks provided by the hospital (2 per day). During this period, 70% wore tumors (12 patients), 18% infections (3 patients), and 12% loss of substance (2 patients). The number of patients has decreased 50% compared to last year's data of the same period but the part of each type has been the same. The majority of tumors 57% wore head and neck surgery (25% the face, 19% the scalp, and 13% the Neck). The discharge was made early, and patients followed up over telemedicine to keep contact with our team. When necessary, the patient's consultation is realized with a doctor in the treatment room with all protective required equipment.

Intraoperative care

The COVID-19 Pandemic forces us to change operation room protocols. While achieving a reduced surgical load (6 surgeries a week) because of sharing the operation room with Ear, Nose and Throat (ENT) department. The operative team has been reduced. These cases are performed with three surgeons (one attending and two residents) which allows us to decrease the protective equipment used during a case.

Conclusion

Several changes in our clinical practice were made due to the COVID-19 pandemic, plastic surgery teams must adapt quickly because this pandemic is far from over, the sustainability of this system may be questionable for the long term, it has proven to be efficient in preserving the non-COVID status of the hospital so far, but for how long with exhausted teams.

Many cases cannot be postponed and some patients don't come to the hospital because they are scared to get infected in the hospital, we need to encourage and persuaded patients to consult and ensure providing safety precautions.

Declaration of Competing Interest

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COVID-19: A unique opportunity to upgrade medical conferences

Dear Sir,

The COVID-19 worldwide pandemic has had a profound impact on the delivery of care, education and training within healthcare. These unprecedented times have enabled opportunity for innovation in the provision of each of the above and has also seen the development of novel industry collaborations with healthcare institutions, both in terms of medical devices and changes to supply chains. Stemming from established concepts of business process transformation, technology has been at the heart of change. Within the field of plastic surgery, innovations have ranged from redesigning service provision[1] and virtual delivery of clinical care, to adaptations in the delivery of teaching.[2] These new innovations look set to redefine the future landscape of healthcare and we propose considering a new approach to medical conferences.

Often delivered on an annual basis, medical conferences provide an opportunity to disseminate knowledge, nurture collaborations, and develop presentation skills for junior attendees. The value of the academic content and the skills gained through presentation have been recognised by many higher training bodies who have incorporated both attendance and presentation at conferences as part of their scoring criteria. However, there have been discussions about the potential negative implications of medical conferences with some suggesting that they are of limited value.[3]

The authors feel that there are three key issues that remain contentious being costs, engagement and the practicalities of attending conferences.

Costs represent a necessity but also a point of contention regarding the potential profit generation. The overheads, costs of venue and catering must of course be covered, however, this then poses a potential barrier to entry. Furthermore, many conferences are often held abroad which compounds the financial impact with flights, transport, accommodation, child-care, and organizational costs of arranging cover.

Whilst the benefits of conferences are alluded to above, many conferences are structured so that sessions are run in parallel and as such, there are often opportunity costs of attending one session over the other. Furthermore, the vast quantity of information can lead to issues of engagement which are further compounded by issues such as jet lag in the case of international conferences. The result of this is a potential restriction in the academic value of such conferences.

The practical elements of attending conferences include the impact of attending these conferences both on a micro and macro level. The costs, jet lag and absence of doctors from the hospital are described above, however, on a macro level, there are environmental considerations, particularly with between 4000 and 10,779 tonnes of carbon dioxide emitted by attendees of a single medical conference.[4]

With current social distancing measures likely to be present for the near future, we propose that technology could support and potentially address the issues of medical conferences described above and provide a contemporary, viable solution. The recording of presentations similar to the format of the PLASTA and BAPRAS webinars in combination with listing posters which can be viewed at the e-attendees leisure.

Conversely, there are limitations to virtual conferences, in particular the lack of opportunity to build interpersonal relationships and have conversations within smaller groups with colleagues and collaborators from other disciplines, as well as the more personal element of travelling to different countries and regions and embracing other cultures. In addition, important considerations such as security of the platform are amplified in the setting of virtual medical conferences, where due to the ability to host many more participant, the associated risks with breaches in security are much greater. Engagement in breakout sessions can be challenging, with technical glitches commonplace, inadequate bandwidth and challenges to traditional ways of networking.

On balance, virtual conferences offer clear and tangible training benefits, as well as scope to reach greater audiences, but are limited by the lack of opportunity to build important interpersonal relationships within the profession. They are likely to represent an important addition to dissemination of research and training, alongside existing conferences once social distancing measures are relaxed. Whilst there would still be costs associated with organising and hosting virtual conferences, they would be substantially less than existing conferences, and offer greater accessi-

bility. The way forward will likely involve a hybrid format, leveraging the benefits of technology for convenience, cost and accessibility, whilst allowining the benefits of face-to-face conferencing. Further work could explore the potential role of virtual conferences alongside conventional conferences to assess both the educational value and participant perceptions.

Authorship

All authors have made substantial contributions to all of the following:

(1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data
(2) drafting the article or revising it critically for important intellectual content
(3) final approval of the version to be submitted.

Declaration of Competing Interest

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Impact of COVID-19 pandemic on microsurgery fellowships

Dear Sir,

The COVID-19 pandemic, has had an unprecedented effect on the NHS, but also across global healthcare systems. This level of disruption and redesigning of plastic surgery services has only been compared to major historical events, such as world wars and other disasters.[1] Microsurgery services have had to carry on being available for lower limb injuries and head and neck cancers, even during the peak of the disease.[2] At the same time, outpatient clinics and elective operating lists were reduced dramatically, due to hospital staff reassignments and to minimise the risk of patient exposure to the virus. Elective surgery, including immediate breast reconstructions, were held back and the guidance from world surgical societies was to delay reconstructive procedures.[3] As we enter a long recovery phase in June 2020, the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS) published guidance on how to safely resume breast reconstruction services.[4] One of the main highlighted issues, has been the impact on training after this long period of surgical inactivity. This will potentially be aggravated by the policy of strict consultant delivered services during the recovery period. The aim of this study was to quantify the impact of the pandemic on microsurgery fellowships and potentially offer advice on mitigating some of its adverse effects.

We developed a questionnaire that was distributed amongst 5 plastic surgery units in London, known for offering microsurgery fellowship programmes: Royal Marsden, Charing Cross, St Thomas', Broomfield and Queen Victoria Hospitals. The information was provided by a Consultant Microsurgeon in each case (Figure 1).

All units were affected by the pandemic. The number of fellows employed by each hospital was between 2 and 6. In two units, the microsurgical fellows were relocated to assist with breast and colorectal oncology procedures. In all participating units, breast reconstruction services ceased in March, ranging from the 16th to the 23rd and the recovery plans have not been homogeneous. The Royal Marsden and

Covid 19 Impact on Microsurgery Fellowships

1. Hospital/Unit name

2. Has microsurgery service in your hospital been affected by Covid 19?

- ◯ Yes
- ◯ No

3. How many microsurgery fellows do you have in your unit?

4. Was there a need for the fellows to be relocated during Covid-19? If Yes for how long and how their duties were amended?

5. When was the date that Breast Reconstruction service was stopped and when is going to restart?

6. In your opinion are the fellows going to reach the expected targets by the end of the fellowship?

- ◯ Very likely
- ◯ Likely
- ◯ Neither likely nor unlikely
- ◯ Unlikely
- ◯ Very unlikely

7. Do you think you fellows are going to extend their programme? If yes for how long ?

8. How teaching was changed during the Covid-19 pandemic?

9. Are there any plans to migitate the Covid 19 impact in training once service will resume?

Figure 1 Survey questionnaire.

Charing Cross Hospitals, have slowly restarted offering immediate breast reconstructions in the beginning of June, St Thomas' and Broomfield hospitals by the end of June and Queen Victoria hospital by July. This reflects the different impacts the pandemic has had in the individual hospitals, which needs to be evaluated prior to elective procedures recommencing. The majority of the consultants felt that the fellows were unlikely to achieve their individual goals in microsurgery and programme extensions had been offered. A pleasant surprise during this period of crisis, was the upgrade of teaching reported in all units. As found in the recent literature, lockdown gave rise to virtual teaching which provided an accessible source of highly effective learning.[5] Finally, when asked how the negative impact on training could be mitigated, the answer was a combination of programme extensions and more structured webinar teaching opportunities.

In conclusion, the impact of COVID-19 pandemic has been significant in microsurgical training. This study highlights the extent of the problem but demonstrates that supervising consultants are aware of this new reality. As microsurgery services resume globally, programme extensions and increased teaching, seem as the best way to compensate for the lost training opportunities.

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Surgical training during the COVID-19 pandemic: Challenges and opportunities for junior trainees

Dear Sir,

The SARS-CoV-2 (COVID-19) pandemic has resulted in an unprecedented disruption of surgical services and training around the world.[1] However, faced with significant pressure and evolving challenges, many surgeons have united in an impressive, proactive response leading to the rapid reorganisation of services and significant innovation.[2] Junior doctors embarking on surgical training in August face uncertainty, a markedly different training landscape, and justifiable concerns about their ongoing professional development. Current core surgical trainees have lost almost four months of training time due to redeployment and may feel poorly equipped to transition into their chosen specialties next year. However, this article highlights the many excellent training opportunities that still exist that should adequately bridge the gap until a more recognisable model of training resumes.

Core surgical trainees starting in August, and those returning to their posts after redeployment, face new rota patterns and the ever-present concern of a 'second wave' causing further disruption to training. Furthermore,

there is restricted access to theatre due to PPE shortages, consultant-driven operating, and staffing limitations imposed on general anaesthetic lists. Undoubtedly, the current climate is putting significant pressure on a cohort that has already been under considerable strain in recent months. In addition to changes in working practises, trainees have seen exams, conferences, courses and teaching programmes cancelled across the United Kingdom. Furthermore, disruption to laboratories and clinical trials may limit progress for trainees looking to pursue an integrated academic pathway in the future.

However, although the surgical training landscape has changed, seemingly overnight, many excellent training opportunities exist that will be invaluable to any surgical trainee interested in a career in Plastic Surgery. Also, as trainees reflect on their experiences of redeployment, many will have gained skills that will serve them well in their future careers.

The majority of non-urgent Plastic Surgery elective work has been suspended for the foreseeable future. This includes microsurgical breast reconstruction, which will likely have a detrimental effect on competency attainment for senior trainees approaching completion of training. However, there is still a substantial throughput of burns, trauma and skin cancer operating, all of which form the essential foundation of any successful registrar application.[3] Much of the trauma and skin cancer work is performed under local anaesthetic, often away from main theatres and, as such, fewer restrictions apply. Now, more than ever, trainees must work together to share ward commitments and on-call bleeps in order to maximise opportunities to attend these invaluable lists, and engage with trainers to set specific learning objectives for each case. Trainees and consultants should convene regularly, to continually improve departmental training opportunities. Furthermore, with a greater consultant presence in theatre, there are opportunities for trainees to obtain one-to-one training on index procedures that may not have been possible previously.

In addition to maximising exposure in theatre, there are a number of innovative ways to learn outside of the workplace. Low-cost tendon repair simulation on pigs' trotters, home microsurgery training platforms, and freely available simulation programmes (e.g. Touch Surgery™) can all help to develop essential skills in Plastic Surgery.[4] In addition, courses such as the Duke and Penn Flap courses, are being run virtually and free-of-charge; an opportunity to learn from internationally-renowned trainers without the substantial cost of attending in person. Many departments are moving their teaching online, with a huge expansion of reconstructive webinars released since lockdown began.[5] Although many of these are pitched to higher level trainees, there are also resources that are ideal for core surgical trainees aiming to get to grips with the speciality, including the excellent 'Plastic Surgery Covered' series from the Plastic Surgery Trainees Association (PLASTA). Rapid reorganisation of surgical services has created many new pathways that are ideal for audit, quality improvement and research projects. Conferences have also moved to virtual platforms which will reduce the cost of attending, and thus remove barriers to presenting work and learning from others. Many deaneries now support study leave requests to attend virtual conferences and courses.

Redeployment in itself can also be a time of personal and professional development. The trainee redeployed to the emergency department may gain increased independence in basic wound care and the assessment and management of hand injuries, bites and other minor trauma. In addition, the non-technical skills required to adapt quickly to an unfamiliar environment, remain up-to-date in a rapidly changing clinical crisis, communicate effectively with a new team, and navigate fraught interactions with patients and their relatives will serve any future surgeon well.

Aside from surgical training, trainee morale is justifiably low at present. However, for current and future core surgical trainees, there are numerous possibilities for professional development, training and innovation. Despite considerable challenges, COVID-19 has brought with it an inventive and flexible approach to training; we hope this will continue as attention returns to training safe and confident surgeons of the future.

Declaration of Competing Interest

None

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Impact of COVID-19 on a plastic surgery residency education program: Outcomes of a survey

Dear Sir,

The COVID-19 pandemic has impacted plastic surgery residency education worldwide. The current situation demands a critical evaluation of the traditional plastic surgery residency education model, as well as the need for alternative learning methods that will help deliver high-quality education for residents while maintaining their safety. Numerous strategies have been implemented to optimize education and well-being: team restructuring, clinical reassignment, reduced hospital visits and creation of virtual curriculums.[1-5]

In May-June 2020, we surveyed residents and attendings in the Division of Plastic Surgery at Mayo Clinic Rochester regarding the impact of COVID-19 on their training/career and personal lives and their satisfaction with our virtual curriculum. Twenty-one responses from 13 residents and 8 attendings (72.4% response rate) were collected, Figure 1.

Clinical service structure

Our division implemented a small-team approach during the pandemic which consisted of three teams, each composed of a PGY 2–6 resident and a consultant. The aim was to limit unnecessary exposure and interaction with other personnel and patients while assuring coverage of the entire service. Each team worked one week at the hospital followed by two weeks at home engaging in virtual educational activities. Overall, 38.1% of respondents experienced challenges during in-person patient encounters as a result of pandemic-related changes; 57.1% reported successful telehealth encounters.

Virtual learning

With the implementation of social distancing measures, in-person educational conferences were suspended. Our edu-

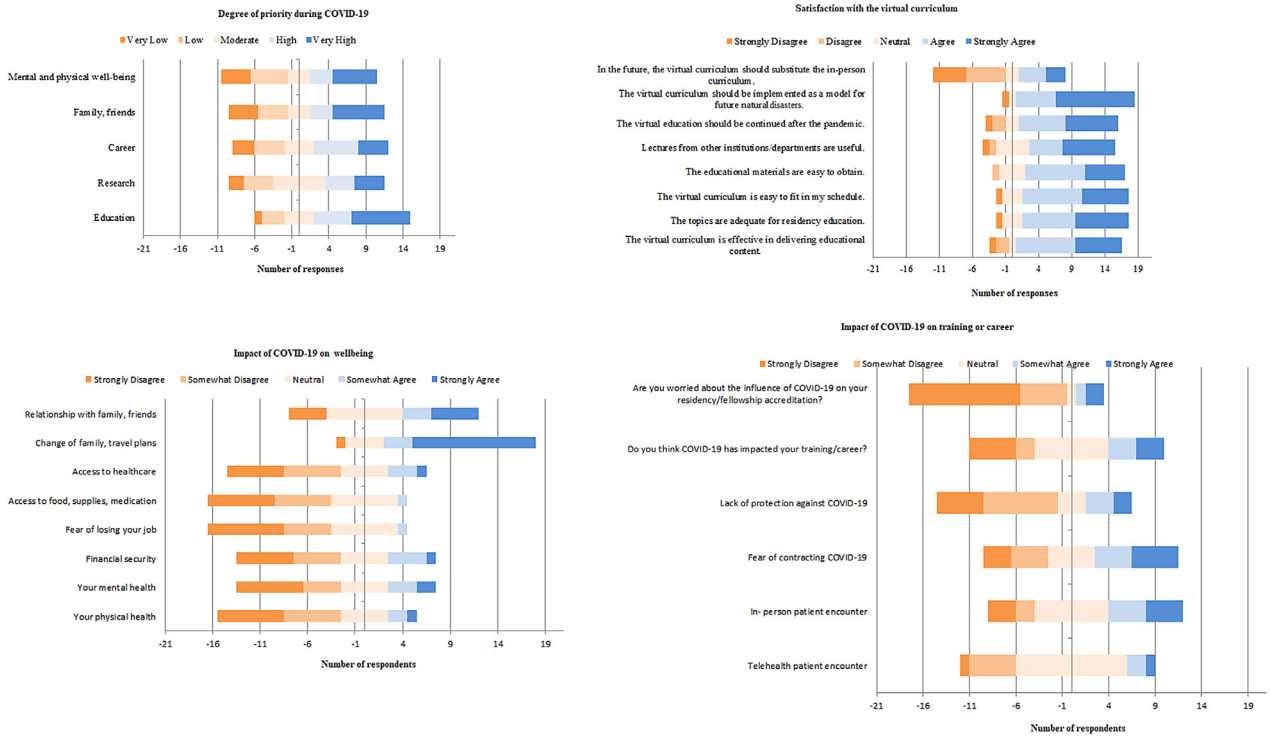

Figure 1 Survey results.

Table 1 Sample weekly schedule of our virtual curriculum during COVID-19.

Date	Time	Conference	Topic
20-Apr	7-7:50 am	Hand Education	Finger Arthritis: Evaluation & Management (DIP, PIP, MCP Joints)
20-Apr	11-12 pm	ASPS Virtual Grand Rounds	Why/How Social Media is Transforming Plastic Surgery - Don't Blink
20-Apr	2-3 pm	Visiting Professor Presentation	Quick Recovery Breast Augmentation & Essentials in Rhinoplasty
20-Apr	6-7 pm	Journal Club	Selected articles
21-Apr	12-1 pm	Virtual Anatomy Online Session	Vasculatures of the Face and Respective Danger Zones
21-Apr	2-3:30 pm	Journal Club - PRS	Selected articles
22-Apr	10-11 am	AO CMF Virtual Grand Rounds	Pediatric Trauma
22-Apr	11-12 pm	ASPS Virtual Grand Rounds	Upper Extremity Nerve Transfers
22-Apr	2-3 pm	Chapter & Case Discussions	Volume 4, Chapter 18 Acute Management of burn and electrical trauma and Chapter 21 Burn reconstruction
23-Apr	2-3:30 pm	Core Curriculum	Gynecomastia
23-Apr	7-8 pm	AO Hand Virtual Grand Rounds	Distal Tendon Avulsions: Mallet & Jersey Fingers/VY Flap & Moberg Flap
24-Apr	7-7:50 am	Orthopedics Hand Conference	PIP Arthrodesis vs Arthroplasty
24-Apr	11-12 pm	ASJ Virtual Grand Rounds	Patient Safety & VTE

ASPS: American Society of Plastic Surgeons; PRS: Plastic and Reconstructive Surgery; AO CMF: AO cranio-maxillofacial; ASJ: Aesthetic Surgery Journal.

cational program transitioned to a virtual curriculum that consisted of both Virtual Grand Rounds Series organized by plastic surgery societies and our institution's specific conferences, with options for group-based and independent learning. Each week was organized around one theme and a resident team was in charge of organizing cases, journal articles, research discussions and questions/basic science lecture for the core curriculum. In addition, virtual sessions for promotion of mental and physical well-being were also available. In a matter of four weeks, 64 virtual sessions were included in our curriculum which consisted of 24 Virtual Grand Rounds, 8 hand conferences, 7chapter and case discussions, 4 core curriculums, 3 journal clubs, 2 M&M conferences, and 2 visiting professor lectures, Table 1. Attendance at these virtual conferences was higher than normal, with positive reviews from faculty and attendees.

In our survey, respondents ranked education as their top priority during the pandemic, followed by family/ friends, career, mental/physical wellbeing and research. A high percentage of participants suggested that virtual meetings should be continued after the pandemic and used for clinical cases discussion, research discussions, research conferences and surgical technique education. Having a structured curriculum is helpful since the majority of residents follow the residency conference didactics schedule. Even though the virtual curriculum was implemented for continuation of residency education during COVID-19, it has changed the future of residency training. Virtual learning will enhance the residency education and complement the traditional in-person format. Improved technology will allow for higher quality virtual meetings, simulation-based training, virtual reality, and virtual patient consultations using telemedicine. A high percentage of participants in our study believed that the virtual curriculum should be implemented as a model for future natural disasters. With the help of leaders, a well-structured and flexible educational model that is readily available in case of future emergencies should be implemented.

Physical and mental wellbeing

The impact of COVID-19 on mental health is undeniable.[1,4] The uncertainty and novelty of this situation creates anxiety and stress that affects trainees' daily lives and those of their family and friends. Thus, activities to promote physical and mental wellbeing are paramount. Deployment creates additional stress and burn-out, and staff working from home might not be as productive as in the hospital. Leaders should be mindful of the impact on wellbeing and provide time for residents and faculty to adapt to this unprecedented situation. In our study, one third of participants agreed that COVID-19 impacted their training/career and their relationship with family/friends, 76.2% changed their family or travel plans. However, 61.9% disagreed that COVID-19 affected their physical health, or mental health (52.4%). Some of the reasons that could explain the lesser impact on wellbeing of our staff compared to other reports during COVID-19 could be that our program implemented early changes to adapt to the pandemic, that residents were not deployed, and that early and continuous communication was maintained between leaders and residents. We also organized trivia nights that allowed residents to connect with each other during this crisis. In addition, our institution prepared several virtual meetings to address wellbeing during the pandemic.

We hope to provide insight to our personal educational model that has shown to have high rates of satisfaction. We believe that this model allows for a continuation of residency education while allowing professional, social and personal growth during unexpected circumstances such as COVID-19. As the battle against COVID-19 continues, residency programs must develop an education model that assures high-quality education delivery while keeping our personnel safe.

Author contributions

All authors contributed in the study conception and design, acquisition of data, analysis and interpretation of data, drafting of manuscript and critical revision.

Disclosure statement

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article.

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Ethical approval

N/A.

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Short-term surgical missions to resource-limited settings in the wake of the COVID-19 pandemic

Dear Sir,

The significant impact of the SARS-CoV-2 (COVID-19) pandemic has been reported in almost every country around the world.[1,2] After months of imposed lockdown, many countries are now beginning to cautiously ease their restrictions. In the absence of a vaccine, we face a 'new normal' living alongside COVID-19 for an unknown period of time, with the real possibility of a second wave in the months to come.

As the dust settles on what has been an incredible international collaborative effort in the acute phase response to COVID-19, we are just starting to look beyond our own borders at the impending humanitarian crisis that will undoubtably face many low- and middle-income countries in the wake of the pandemic. The knock-on effects of the worst financial down-turn in decades coupled with restricted access to humanitarian aid will undoubtably lead to increased poverty, malnutrition and resurgences in preventable diseases.

For many Surgeons, annual short-term surgical missions to resource-limited settings give an opportunity to teach and learn from local surgeons and help address some of the major surgical inequalities detailed in the Lancet 2030 commission.[3] Events in recent months will make almost all surgical mission trips dealing with elective cases unlikely for the foreseeable future. Short-term barriers to running future missions include travel restrictions, enforced quarantine of up to 14 days on arrival in new countries, significant risks to patients and volunteers, challenges in obtaining valid in-

demnity cover, reallocation of equipment and PPE, and a lack of ITU beds. Diverting staff, equipment and hospital beds away from patients and local health care workers in urgent need is clearly unethical at the present time. Now, more than ever, collaboration and innovation, and adapting to a new way of helping those most in need is required.

Our experience of short-term surgical missions has been treating children and adults with complex facial disfigurement in Ethiopia, through the charity Project Harar. The Ethiopian government, which has been proactive in its response to coronavirus, has called upon all NGOs to back their response and have been requesting excess supplies and PPE.[4] Many NGOs and their volunteers, from all backgrounds, are now fundraising for water barrels, soap and PPE in a concerted effort to help.

Many medical charities will, for the first time, find themselves unable to perform face-to-face patient follow-up in the months or years that follow. Over the past two years we have successfully implemented a remote follow-up programme, employing low cost smart phone technology to take photographs and ask simple triage questions to patients in their rural villages. During our 2018 pilot we were able to follow-up 79% of patients selected, and identified six patients that had complications requiring further management. Importantly the remaining patients were discharged and did not require to travel back to Addis Ababa for unnecessary follow-up. We hope this technique will be useful in the current climate for many surgical NGOs facing access restrictions and follow-up limitations.

Finally, one of the major elements of any surgical mission is education and training. We are pleased to see many of our colleagues from around the world, including Addis Ababa, during the new era of excellent international educational webinars.[5] It is our intention, even if we cannot run our 2021 surgical mission to Addis Ababa, that we will still run our third annual head and neck conference remotely, using now tried and tested virtual platforms.

The future of medical missions is currently in doubt. However, fundraising efforts to support colleagues in resource-limited settings and a longer-term commitment to careful patient follow-up, development of remote education opportunities, and ensuring relationships are developed not lost, will build a sustainable platform for future missions after COVID-19 is over.

Ethical approval

N/a.

Declaration of Competing Interest

None.

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Reply to: "Evaluating the effectiveness of plastic surgery simulation training for undergraduate medical students"

Dear Sir,

We read with great interest a report by Zargaran et al., entitled "Evaluating the effectiveness of plastic surgery simulation training for undergraduate medical students". We concur with their emphasis on the relative paucity in medical students' experience and exposure to the great scope of work encompassing plastic and reconstructive surgery. Additionally, to combat common misconceptions amongst medical students regarding the important role of plastic surgeons in reconstructive surgery, the authors of the present study wanted to understand whether a one-day simulation session in reconstructive microsurgery may positively influence students' perception of plastic surgery.

A BAPRAS-accredited one-day symposium on reconstructive microsurgery was held at the University of Cambridge, School of Clinical Medicine in November 2019 which was advertised to all undergraduate medical students via social media and the BAPRAS website. The symposium began with interactive talks relating to an introduction to reconstructive surgery, a focus on microsurgical reconstruction, as well as plastic surgery career pathways. Importantly, an afternoon of practical simulation rotations was organised including local flap design, ureteric anastomosis and microsurgical vessel anastomosis held in the departmental microsurgery lab, fitted with bench microscopes. Pre- and post-session questionnaires were administered to delegates, which assessed the student's main motivation for attendance as well as knowledge of and interest in plastic surgery as a career. In addition, delegates were asked to score confidence in their suturing-ability as well as their past experience in microsurgery techniques.

Our pre-session questionnaire revealed that delegates' main motivation to attend was to achieve more 'hands-on' surgical experience (83%, $n=10$), followed closely by having a general interest in surgery (75%, $n=9$) with a majority wanting to specifically learn more about plastic surgery (67%, $n=8$). Delegates also indicated they had little previous experience in microsurgery when asked self-score with a mean rating of 2 out of 5.

On evaluation of the post-session survey, we found that the symposium was very well received by delegates with all respondents (100%, $n=11$) stating that they had gained valuable practical skills. Indeed, on paired comparison of responses, seven students indicated that their confidence in suturing ability, measured on a scale of 1 to 5, had improved. Importantly, paired *t*-test analysis showed overall improvement from pre-session suturing confidence ($M=3.09$, SD=0.51) to post-session confidence ($M=3.91$, SD=0.51) which was statistically significant ($p<0.05$). Furthermore, participants' self-scoring of their knowledge regarding a career in plastic surgery also showed statistically significant improvement from pre-session mean of 3.00 to 4.09 at the course end ($p<0.05$). Notably, all respondents stated that they would recommend this symposium to their peers with 73% ($n=8$) expressing a strong interest in attending further surgical taster-days or practical workshop, although indeed this may have been confounded by students' self-selection for the course[2].

Our data supports that of Zargaran et al. in finding an unmet need in undergraduate medical teaching relating to plastic surgery principles and skills. Further, we too find a discernible and statistically significant increase in undergraduate medical students' knowledge of plastic surgery as well as confidence in suturing ability following high-fidelity simulation training in microsurgical techniques. As such, we feel our data may justify a more wide-reaching intervention, targetting a larger cohort of medical students[2].

Although the authors of the present study acknowledge that plastic surgery cases may contribute to a small number of all surgical presentations nationally (as suggested by Hospital Episode Statistics data[1]), the principles of the reconstructive ladder and versatility of techniques at the disposal of plastic surgeons are increasingly being embraced by other surgical specialties[3]. This, in combination with the apparent lack of high-fidelity simulation training for reconstructive microsurgery[4] may call for further training initiatives in reconstructive principles which may prove to be very valuable experiential learning for both medical students and plastic surgery trainees.

Declaration of Competing Interest

None.

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We would like to acknowledge the Medical Defence Union and Wesleyan for sponsoring the symposium.

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Response to – 'Managing hand trauma during the COVID-19 pandemic using a one-stop clinic'

Dear Sir,

The experience of the hand trauma service at Leeds Teaching Hospitals NHS Trust (LTHT) echoes that of Sadr et al.[1] LTHT is a tertiary plastic surgery unit, and during the pandemic we have experienced a 50% reduction in the number of patients requiring surgery for hand trauma.

We have redesigned our hand trauma pathway, also moving to a one-stop clinic for all patients referred with open injuries. (Figure 1) All paediatric cases or any adult patients deemed to require hospital admission were accepted to the base hospital (Leeds General Infirmary (LGI)) for assessment and management in acute theatres. Otherwise, ambulatory cases with open hand trauma were advised to attend a one stop clinic at Chapel Allerton Hospital (hospital within the trust usually used for adult elective work), where they were assessed by the hand surgical team with surgery being performed on the same day if required. Prior to the COVID pandemic all referrals from surrounding minor injury units, St James' hospital and Harrogate district general hospital were accepted to the LGI for assessment, returning on a subsequent day for definitive treatment. The One-stop clinic enabled a reduction in the number of hospital attendances for each patient. Thus, reducing unnecessary foot fall at the main site, reduced staff contact, and avoidance of unnecessary waiting in a hospital environment, ultimately minimising the patients' risk of COVID-19 exposure.

The closed hand fracture pathway continued to function as normally, prior to the pandemic. All closed hand trauma referrals being triaged by an Extended Scope Practitioner on the basis of history, x-ray appearances, and clinical history and examination documented by the Emergency department or minor injury unit.

To date during the Pandemic, 140 injuries have been managed at the Chapel Allerton site of which 62% were one-stop clinic cases. The other 38% presented to the LGI Emergency Department initially and were therefore reviewed by plastics on presentation on-site to see if it was possible to be treated immediately in the department. The One-stop clinic also provided same day access to physiotherapist and occupational therapies allowing for patients managed non-operatively to access treatments straight away. Operations were performed under either local anaesthetic or brachial plexus block. Brachial plexus block continues to be our preferred method over wide awake local anaesthesia no tourniquet (WALANT), due to the speed of implementation by our

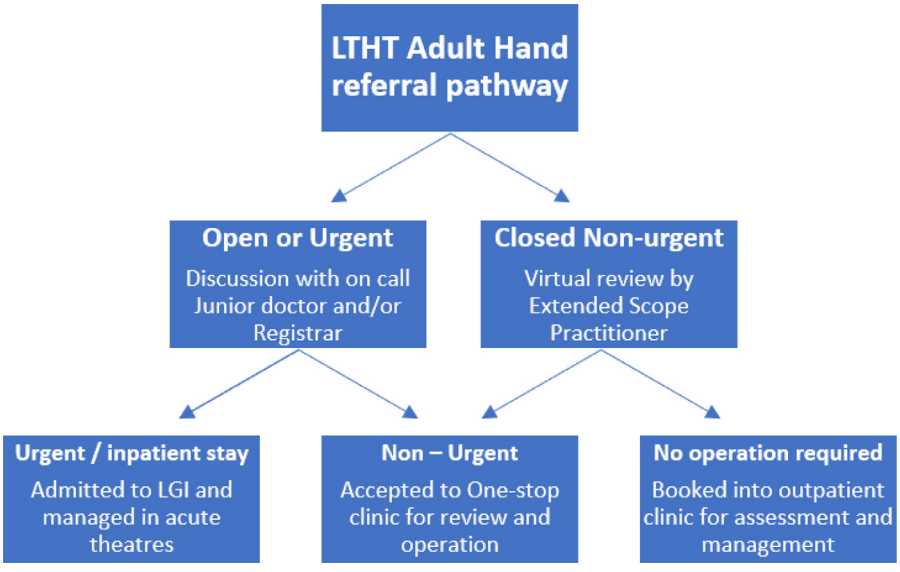

Figure 1 LTHT Adult Hand referral pathway.

anaesthetic colleagues and the long acting regional analgesic benefits. WALANT is only used where there is clinical indication over a brachial plexus block.

The overall patient pathway has been far more streamlined during the pandemic. We had been exploring using such a model prior to the pandemic, although given the sheer patient volumes we usually manage we had not had the opportunity to implement it.

Now the Trust is reverting to a more normal mode of operation, the hand trauma unit will be relocating back to the LGI. We plan to continue to use this one-stop clinic to improve the patient experience, reduce stresses on our busy Emergency Department and reduce unnecessary additional hospital attendances. We are also in the process of investigating an online referral service to reduce the on-call demand on our juniors, allowing them to focus on more valuable training opportunities which have been underutilised previously.

As lockdown is being lifted, services are all slowly returning to their original structures. We would encourage all Trusts to take the positives from their experience during this period to improve their services long-term, incorporating what has worked well in improving the quality and efficiency of their service, whilst maintain those tried and tested processes from before. The new adaptations within the hand trauma service at LTHT, made as a consequence of the pandemic, have improved the patient experience and training opportunities of our junior doctors.

Declaration of Competing Interest

The authors would like to confirm that there are no conflicts of interest.

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Comments on "Anatomical study of the extraocular check ligament system"

Dear Sir,

These comments refer to a paper recently published in JPRAS (Zhuang et al., 2017).[1]

I read the paper with interest. However, I have some remaining questions that I was not able to find answers for based on the authors' descriptions.

In this cadaveric study, the authors discovered that not only do check ligaments of the eye exist between the levator and superior rectus, but all 4 extraocular recti possess their respective check ligaments. The authors named the entirety of this fascial sheath surrounding the circumocular muscle the "extraocular check ligament system (ECLS)." Using α-SMA and h-caldesmon, authors verified the presence of smooth muscle cells among the fascial structures. In a coronal section of the periorbital area (Figures 13 and 14) the localization of the fasciae containing smooth muscle cells are shown in blue by trichrome staining.[1]

Regarding the smooth muscle fibers around the eyeball, Hesser investigated the peri-bulbar musculature using serial microscopic sections, and found that smooth muscle fibers extended around the anterior half of the globe in a nearly continuous but very thin layer, from 3 to 7 mm.[2] This layer was wide in its antero-posterior extent, but broken on the lateral side, and he termed this structure the "musculus capsulo-palpebralis." Anteriorly, it extended into the eyelids, constituting the palpebral involuntary muscle (of Müller), and named by him the "pars superior" and "pars inferior," respectively. These are the only parts of the musculature that form definite isolated lamellae, with the pars medialis being an extension of the pars inferior (Figure 1). Posteriorly, behind the conjunctival fornix, this structure is quite indefinite. This was reconfirmed in Rousseau's PhD thesis,[3] and later in Whitnall's book.[4]

Because the localization of the smooth muscle fibers in the figures of Dr. Hesser and Dr. Rousseau is very similar to that in Figure 14 of Zhuang et al., I would like to know whether Zhuang's ECLS designates the same structure that Hesser and Dr. Rousseau termed the "musculus capsulo-palpebralis."

Zhuang et al. stated their belief that the ECLS plays a restricting and checking role in the movement of the eyeball.

Because these smooth muscle fibers are innervated by the sympathetic system (from the cavernous plexus through the ciliary ganglion and long ciliary nerves), the contraction of this unstriped musculature can compress the eyeball and raise the intra-ocular pressure, as confirmed by Adler.[5]

I would also like to know whether Zhuang et al. consider the function of ECLS as only involving a checking role in the movement of the eyeball, despite the distribution of smooth muscle cells inside of it.

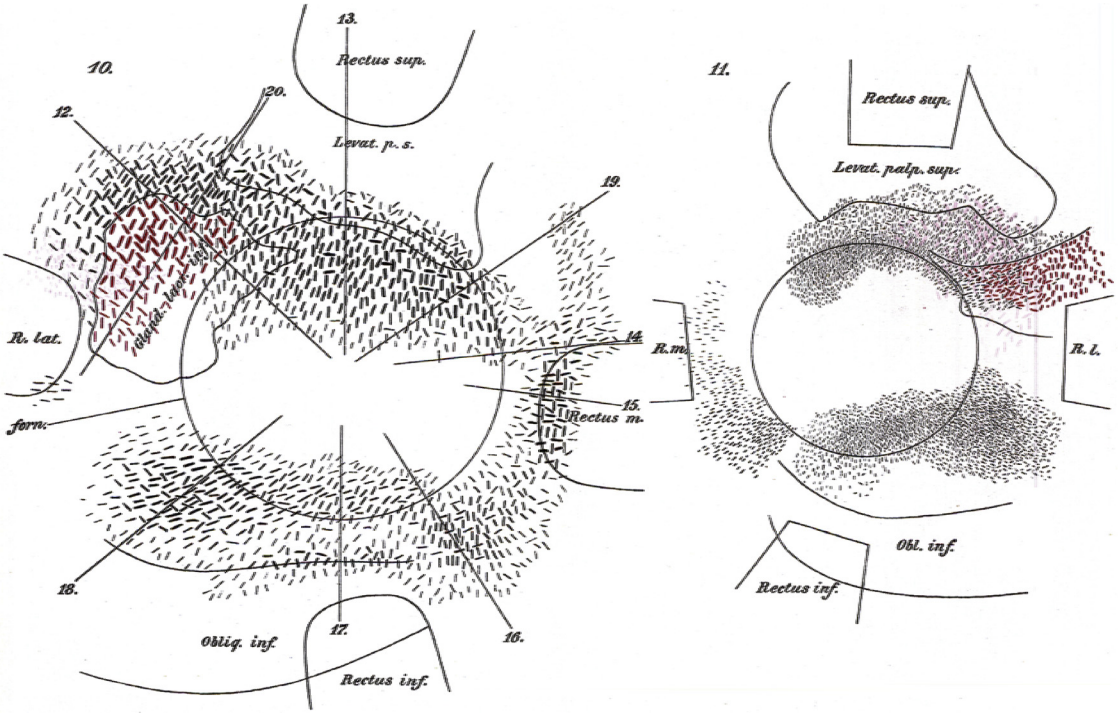

Figure 1 Diagram showing the position of the smooth muscle fibers in the fascia around the eyeball (musculus capsulo-palpebralis). From Figures 10 and 11 of Hesser (1913).[2] Left: Reconstruction in approximately 4 times magnification of the smooth muscles around the right eyeball in adults. The dashed field indicates the smooth musculature. The red oaks denote the muscular bulbar direction of the inferior lacrimal gland. Lines 12, 13, 14, 15, 16, 17, 18, 19 and 20 denote the positions where the microtome sections are. 12, 13, 14, 15, 16, 17, 18, 19 and 20 are removed. The lines denoting the straight eye muscles indicate the position of the front end of the muscle flesh. Right: Same reconstruction image as left, from left orbit of a fetus.

Declaration of Competing Interest

The author has no conflict of interest to declare.

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Response to: "A survey of current burns knowledge in UK undergraduate medical students"

Dear Sir,

As medical students in the United Kingdom with a keen interest in burns management, it is with great interest that we read the article by Moorby et al.[1] "A survey of current burns knowledge in UK undergraduate medical students".

We commend the authors' efforts to highlight the lack of knowledge of medical students in burns management: a topic which remains important in the role of a junior doctor. However we have some concerns with the methodology of the survey and the conclusions drawn thereof.

Given that burns management is an important part of clinical medicine, we feel the inclusion of preclinical medical students as respondents of this survey was not justified. In a previous similar study, only final year students were included for participation as authors attempted to ascertain the confidence of soon-to-be junior doctors with burns management.[2]

We are informed that respondents included 96 students from year 1 to year 5 of the MBBS curriculum but we are not informed of the exact proportions from each year nor are we informed of the methods used to select respondents. It is likely that some students, particularly in the earlier years, have not come across the teaching organised by the medical school in relation to burns management and their inclusion only serves to skew the results towards displaying a lack of knowledge amongst the sample. In keeping with this, students on average agreeing they have an interest in attending a seminar to find out more about the specialty only further creates doubt around the year groups of respondents.

The authors do inform us that there is a statistically significant correlation with increasing year group and confidence in the learning points, however specific data by year group is not shared.

It would have been useful to know in what year of study burns education is formally taught as part of the curriculum, if at all, in order to better contextualise the responses by year group and accurately evaluate the effectiveness of educational interventions, if any, at the said medical school.

For the future, we would encourage the authors to exclude students that have not received the burns education organised by the medical school in order to highlight the level of knowledge of students who have received the relevant teaching. This type of data would be more valuable to educators as it would highlight the effectiveness of the current curriculum around burns management.

Every year around 125,000 patients are seen with burns in accident and emergency departments all over the United Kingdom.[3] We strongly believe it is important that more emphasis is placed on teaching initial burns management to medical students, however we equally believe it is important that novel educational interventions to address this problem are based on robust data.

Declaration of Competing Interest

None.

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