Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Correspondence and Communications

Re: Assessing patient frailty in plastic surgery: A systematic review

Dear Sir,

I read with interest the above article by Gallo and colleagues[1]. The COVID pandemic has caused major disruption to elective plastic surgery procedures, resulting in backlog of patients waiting for surgery. In accordance with the 'Coronavirus action plan' published by the UK government, supporting early discharge from hospital is high on the agenda, as part of the 'mitigation phase'[2]. It has become increasing important to stratify patients according to their pre-morbid functional status, in the hope of alleviating the risk of prolonged hospital stay post-operatively. A growing backlog of care requires a paradigm shift in service planning and reconfiguration of patient pathways. I would like to congratulate the authors on their work, which adds much-needed clarity on the role of pre-operative frailty assessments on peri-operative morbidity and mortality in plastic surgery.

Factoring in the effect of age on plastic surgery outcomes is imperative given the rapidly aging population. There is a general decline in wound healing potential with age, with decreased cellular turnover, skin collagen content and compromised immune functions. Although the plastic surgeon community is familiar with the physiological changes with age, many of us fail to acknowledge the effect of general frailty that could lead to adverse surgical outcomes, due to our limited understanding on how best to conceptualize and assess it objectively. The available evidence suggests that pre-operative frailty is associated with worse outcomes across all levels of operative stress[3]. This systematic review provides a useful summary of standardised tools available for evaluating frailty, while critically evaluated the strength, validity, and reliability of each tool in clinical practice[1]. Gallo and colleagues highlighted the relevance of incorporating frailty assessment in a few key areas, namely predicting postoperative recovery in elective procedures such as melanoma excision, risk stratification to aid in postsurgical arrangements in the context of breast reduction surgery, and decision making in emergency surgery such as replantation[1].

Although the term 'frailty' could encompass a broad spectrum of definitions, the use of a valid and reliable index could provide an objective and reproducible assessment across several key domains such as physical, psychological, and social. Prehabilitation before major surgery could be an integral part of patient pathway, taking into consideration of frailty scores, and aids in patient quicker return to functional baseline. Multimodal interventions, such as improving a patients' physical reserve via nutritional supplement, altering mental status through psychological support and lifestyle interventions such as smoking cessation could help in reducing complications and improve outcomes[4]. Although the concept of frailty assessment is in its relative infancy in plastic surgery, we must continue to learn and adapt to provide the best care for our patients, as we approach the 'new normal' in the post-lockdown period.

Funding

None.

Ethical approval

Not required.

Conflict of Interest

None.

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What depth of surgical excision results in adequate histological deep margin clearance in basal cell carcinoma? A retrospective cohort study of 1126 basal cell carcinomas

Dear Sir,

Introduction

Basal cell carcinoma (BCC) is one of the commonest malignancies worldwide, with a rising incidence. Although BCC's have a low mortality they can cause significant morbidity, especially as they often occur in highly visible areas.[1]

BCC's are commonly managed surgically, with predetermined deep and peripheral margins. Despite the burden of disease that BCC's present there is little international consensus on the appropriate excision margin. In particular, the recommended deep surgical margin is often not defined in global guidelines and in some cases no reference is made to the deep margin at all.[2]

This study aims to make recommendations on what deep surgical margin should be used to achieve adequate histological deep margin clearance.

Method

A multi-center retrospective cohort study was performed of patients presenting with basal cell carcinoma over a three-year period from 03/07/2015 to 19/03/2018. All included patients were managed with surgical excision. Data were collected on patient demographics, tumor characteristics, deep surgical margin depth and histological excision status. Microsoft Excel and IBM SPSS 26 were used for data analysis.

We defined the histological deep margin status as either clear ($\geq$1 mm), close ($\geq$0.1 mm to $<$1 mm) or involved. BCC's with mixed subtypes were categorized into mixed high-risk and mixed low-risk groups. Mixed high-risk subtypes were defined as lesions containing morphoeic, infiltrative, micronodular and basosquamous subtypes.

The documented deep surgical margin was recorded based on the anatomical plane the lesion was excised to, with subcutaneous fat recorded as plane 0, the first anatomical plane 1 and so forth. This is demonstrated in Figure 1.

Results

1126 lesions were identified in 861 patients. 66% of patients were male with a mean age of 75 years. The head and neck was the most frequent anatomical site for BCC occurrence (73%) with nodular being the most common subtype in every site.

90% of lesions had clear deep margins, while 7.1% had close margins and 3% had involved margins. Polypoid BCC's were uncommon and were excluded after descriptive analysis. 20% of the lesions had no documented surgical deep excision margin and were therefore excluded from analysis. The correlation between BCC subtype and deep margin clearance can be seen in Figure 2.

Ordinal regression was performed between deep margin clearance and BCC subtype using lesion diameter and surgical deep margin as covariates to determine the probability of achieving close or involved margins in relation to BCC subtype when compared to nodular BCC. Morphoeic, mixed high-risk, mixed low-risk and superficial subtypes had a significant odds ratio for an involved deep margin compared to nodular BCC (9.982, 6.158, 5.575 and 5.152, respectively).

Discussion

This study shows that certain subtypes are much more likely to result in involved deep margins than others. Interestingly the infiltrative subtype had a relatively low odds ratio for involved deep margins (2.038) compared with a previous study finding a much higher value.[3] Furthermore, the superficial subtype had a much larger odds ratio for involved deep margins than this study identified. We could not identify any further studies assessing the deep surgical margin for BCC excision and further research is needed to clarify exactly how much risk these subtypes pose for involved deep margins. Both mixed high-risk and low-risk BCCs had a higher odds ratio for involved margins than all other subtypes other than morphoeic, suggesting mixed BCC's should be excised deeply with a high degree of suspicion regardless of their histological make up.

The deep surgical margin was often poorly documented in notes especially when compared to the peripheral margin. Where margins are found to be involved this could make planning further treatment more challenging, and surgeons should be encouraged to document the deep margin accurately as standard practice.

Meetings: This work was presented at BAPRAS 75 Free Paper Webinars — Skin Webinar, held on Monday 18th October 2021.

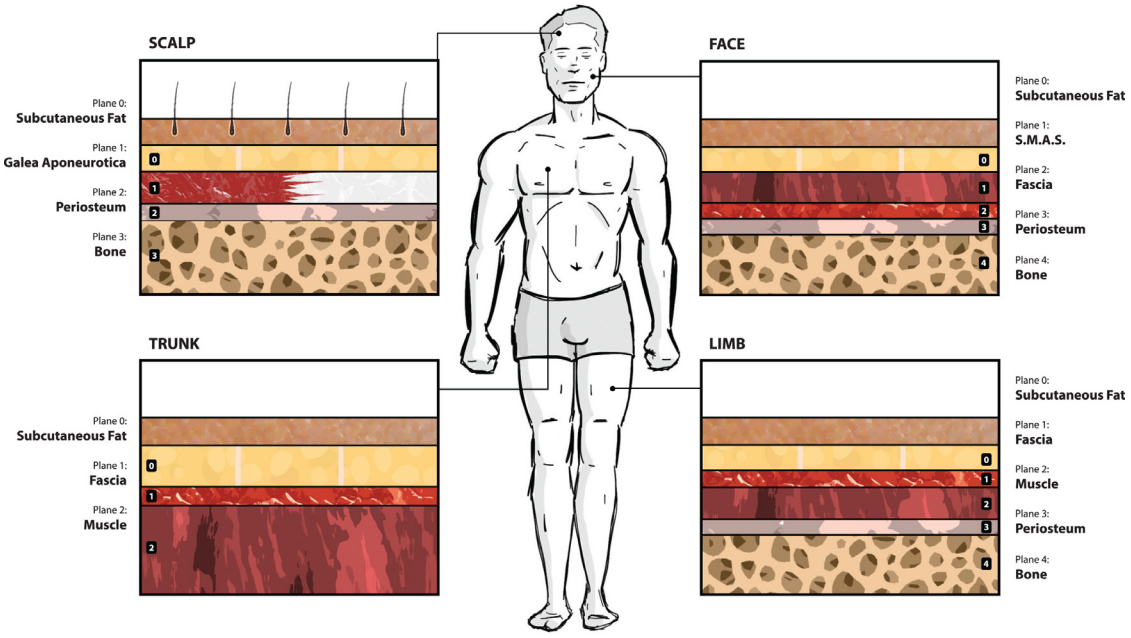

Figure 1 Anatomical planes of excision demonstrated in different sites across the body.

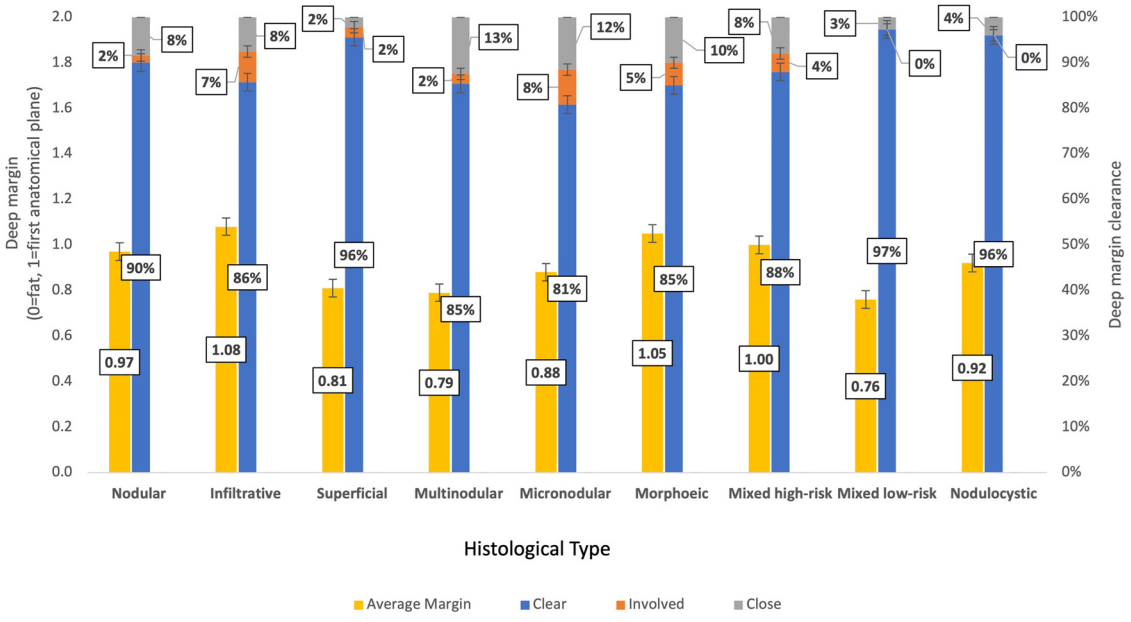

Figure 2 Deep margin clearance compared to deep surgical margin with standard errors.

For nodular, multinodular and nodulocystic subtypes, excision to subcutaneous fat was usually adequate for deep margin clearance. Morphoeic, superficial, mixed high-risk, mixed low-risk, infiltrative and micronodular subtypes often required a deeper level of excision to achieve clear deep margins. Not all lesions fit this pattern, however, and subtype alone cannot be used to accurately predict a safe depth of excision. Anatomical site, subtype, lesion diameter and intraoperative assessment should all be considered when deciding how deeply to excise a BCC.

Limitations to our study included the poor documentation of deep excision margins in the notes resulting in varying terminology and detail between surgeons. Furthermore, the grade of the operating surgeon was not included as a co-variate in our regression model.

Conclusion

Surgeons should be encouraged to document deep surgical margins properly in the operating notes as standard practice. Subtype alone cannot predict a safe depth of excision for clear surgical margins and lesion size, anatomical site and intraoperative assessment should also be considered when deciding how deep to excise a BCC.

Financial support

There was no specific funding for this study.

Institutional ethical approval

None.

Reporting standards

Strengthening the Reporting of Observational studies in Epidemiology (STROBE).

Declaration of Competing Interest

None.

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Reply to: 'The incidence and risk of involved margins in surgically resected basal cell carcinoma – A multi-centre consecutive case series'

Dear Sir,

We read with interest the articles by Ali et al.[1] and Warren et al.[2], which use a large dataset from a tertiary centre to assess the effect of basal cell carcinoma (BCC) histological type on the likelihood of standard excision to achieve clear peripheral and deep margins respectively. They identify that some histological types, here reported as morphoeic, infiltrative, mixed high risk (with subtype including morphoeic, infiltrative, micronodular or basisquamous histology) are associated with incomplete excision. Interestingly they also report that superficial BCC was associated with incomplete deep margins, although other studies demonstrate successful treatment with topical or photodynamic therapy.[3]

The authors highlight the importance of accurate and complete surgical notes, in particular regarding margin documentation. Of the 3203 BCCs excised in their time frame, only 1007 and approximately 900 were available for analysis respectively. Involved deep margins were uncommon, but where they do occur further treatment and monitoring is substantially more problematic than for peripheral margins.

Many different reporting schemes have been reported for BCC histological type, with up to 60 subtypes risking confusion for clinician and patient.[4] Since the study time-period concluded, the Royal College of Pathologists have updated their guidance in reporting BCC histological type. They now advise that there is no clinical value in distinguishing between the infiltrative, sclerosing, morphoeic and micronodular types. These subtypes should all be regarded as histological features indicating high risk, and described as infiltrative.[5] This allows the majority of BCCs to be grouped in to the low-risk (nodular), high-risk (infiltrative) and arguably in situ (superficial) with their relevant treatment, which is consistent with the World Health Organisation. Basosquamous lesions are poorly defined and should probably be regarded separately. Although uncommonly reported, the multinodular BCC type reported by Warren et al. should probably also be in the high-risk group, as it is generally described as plaque-like with a poorly demarcated border.

The authors build on previous work,[6] which appears to have been used in the new BAD guidelines.[7] We would be interested in a further analysis with the types reported as in the updated RCPath guidelines, which might further clarify the BCC types that should be treated with greater caution to inform further guideline updates.

Ethical approval

Not required.

Funding

None.

Declaration of Competing Interest

None.

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Health literacy strategies to improve engagement of Merkel cell carcinoma patients in their care

Dear Sir,

The COVID-19 pandemic has accelerated the rise of online health education tools and telehealth platforms, expanding the reach of providers beyond the constraints of traditional clinical settings.[1] This rapid expansion of digital technology has introduced an unprecedented amount of health information within reach of patients. With convenient access to online health educational materials (HEMs), patients can stay informed about their health conditions and treatment choices. Prior studies have demonstrated that increased patient involvement in their treatment process improves health outcomes, an increasingly important observation for patients with diseases for which early recognition and treatment minimize morbidity and mortality.[2]

Merkel cell carcinoma (MCC) is a highly aggressive neuroendocrine tumor with a five-year survival rate of up to 65%.[3] Similar to other cutaneous tumors, MCC typically presents in patients over age 65.[3] Innovative digital health tools have been designed to optimize skin cancer management and treatment.[1] However, advanced age patients utilize these digital health tools the least among all age groups, despite being those who may benefit the most.[1] Prior studies have recommended the need to bridge this "digital divide" by improving readability and accessibility of health information from electronic sources. To facilitate these efforts, the American Medical Association (AMA) has recommended that health information be presented at no higher than a 6th grade reading level; however, HEMs of various high-risk dermatologic patient populations (e.g. transgender individuals) have failed to satisfy this recommendation.[4] Our primary objective was to evaluate the readability of online HEMs for Merkel cell carcinoma.

We entered the search term "Merkel cell carcinoma" into Google Chrome, performing our query on incognito mode to prevent prior search history from biasing results. We considered that patients typically access webpages from the first page of results and tend not to access academic journals.[4] Therefore, we selected the first 7 websites and webpages within one click of each parent website, and excluded articles published in academic journals. Additional inclusion criteria for HEMs were English language and text greater than 150 words. We converted articles meeting inclusion criteria into plain text and inputted this text into the Automatic Readability Checker from ReadabilityFormulas.com. The calculator evaluates written text and provides a reading grade level using six validated formulas: Gunning Fog Index (GFI), Flesch-Kincaid Grade Level (FKGL), Coleman-Liau Index (CLI), Simple Measure of Gobbledygook (SMOG), Au-

Table 1 Comparison of readability of online patient education materials for Merkel cell carcinoma .

Website	Organization	Number of Articles *41*	Mean Grade Level (SD) 10.9 (1.9)
mayoclinic.org	Mayo Clinic	2	8.5 (0.7)
Skincancer.org	Skin Cancer Foundation	4	10.75 (2.5)
Merkelcell.org	Merkelcell.org	24	11.5 (1.6)
Cancer.gov	NIH National Cancer Institute	1	9
Aad.org	American Academy of Dermatology	5	9.5 (1.1)
Cancer.org	American Cancer Society	3	9 (1.7)
Clevelandclinic.org	Cleveland Clinic	1	10
Dermnetnz.org	DermNet NZ	1	12

Abbreviations: SD: standard deviation.

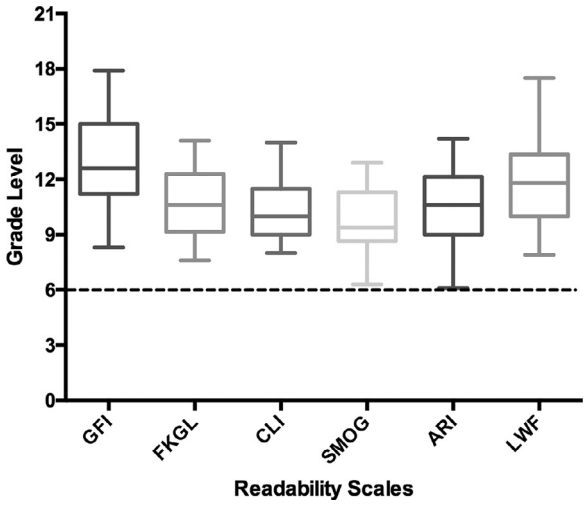

Figure 1 Box and whiskers plot comparing grade reading level scales.
Abbreviations: GFI: Gunning Fog Index; FKGL: Flesch-Kincaid Grade Level; CLI: Coleman-Liau Index; SMOG: Simple Measure of Gobbledygook; ARI: Automated Readability Index; LWF: Linsear Write Formula.
Here, box and whisker plots for each readability scale are depicted. For each box plot, the horizontal line transversing the box represents the median. The first quartile (i.e. median of data points below the true median) is drawn to the third quartile (i.e. median of data points above the true median) to form the box. The whisker that extends vertically downward from the box is the minimum and the whisker that extends upward is the maximum. A dotted line is used as a reference for the recommended readability level (6th grade) provided by the American Medical Association (AMA).

tomated Readability Index (ARI), and Linsear Write Formula (LWF) (Supplemental Table).

Forty-one webpages met inclusion criteria and were analyzed for reading grade levels. Mean readability scores of included articles ranged from 8th to 14th grade (Table 1). The mean scores for each readability test in decreasing order were GFI, 13.0; LWF, 11.9; Flesch-Kincaid Grade Level, 10.7; CLI, 10.5; ARI, 10.5; SMOG, 9.8 (Figure 1). Among the 41 webpages included for analysis, the six most readable webpages scored on average at an eighth-grade reading level.

Our analysis highlights that online HEMs for MCC may contain information that is difficult to comprehend, rendering them less useful for patients. Even the most readable HEMs identified were written at an eighth-grade reading level, still two grade levels higher than that recommended for HEMs by the American Medical Association. Limitations of this study include not evaluating aspects of online HEMs other than readability which may influence patient comprehension, including graphics, font size, and accuracy of the provided information. Additionally, we acknowledge that while websites like DermNet NZ are likely to be accessed by MCC patients, they are geared more toward physicians, which explains their higher reading grade level relative to other HEMs.

The aging population of the U.S. is driving the rise in incidence of MCC.[3] Because of the complexity and highly aggressive nature of the disease, early detection of MCC and optimal management by an interdisciplinary care team (e.g. plastic surgery, medical/surgical/radiation oncology, dermatology) are critical for improved outcomes.[5] Increasing numbers of specialists coordinating care, however, may result in more chances for patient comprehension to fall through the cracks. As MCC presents in older patients who already face disparities in digital health access, it is important that we create online HEMs allowing MCC patients to adequately comprehend their multifaceted disease and treatment. We suggest that authors of MCC HEMs improve readability by using simpler phrases, avoiding medical jargon when possible, and creating bulleted summaries. Optimizing visual presentation (e.g. using aesthetically pleasing font size and style, bolding text, and adding infographics) can supplement written text and support MCC patients in comprehension of their disease process. Providers are already being pressured to transfer patient interaction and engagement towards the digital realm in the wake of the COVID-19 pandemic.[1] To adapt to the ever-changing healthcare landscape, providers should direct patients to websites specifically designed to match patients' literacy levels, as well as implement interventions designed to engage patients of all ages in navigating technological advancements in digital health.

Funding

None

Ethical approval

Not required

Declaration of Competing Interest

None

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.04.064.

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Application of cryopreserved autologous skin replantation in the treatment of degloving injury of limbs☆

Dear Sir,

Degloving injury is a common and intractable type of limb injury. Such patients often suffer from serious wound pollution, bone and tendon exposure and contamination.[2] Primary replantation of the avulsed skin is very difficult. Although auto-graft will needed for subsequent wound repair, the avulsed skin can only be discarded,

Cryopreservation technology has been widely used in long-term preservation of cells and composite tissues.[1] We reported the replantation and survival of cryopreserved fingers in 2020.[5] Now the crypreserved autologous skin was applied to the treatment of degloving injury of limbs, and good results have been achieved.

Materials and methods

Patients

From January 2016 to December 2018, 9 cases of degloving injuries of limbs in our hospital were analyzed retrospectively. There were 6 males and 3 females with an average age of 42.8 years, ranging from 27 to 77 years. The sizes of the frozen skin were 5 cm × 5cm–15 cm × 20 cm, and all of them were replanted in situ when the wound condition improved. Informed consent was provided to patients before the surgery.

Skin preparation and cryopreservation

All patients underwent emergency debridement surgery. The important tissues such as blood vessels, nerves, tendons and bone were repaired at one stage. The avulsed skin without blood supply were cut off. They were cleaned, disinfected with iodophor for 10 min and made into full-thickness skin, then infiltrated into the cryoprotectant solution for 20 min, and transferred to the cryo-laboratory in a sterile bag.

In the cryo-laboratory, the skin was rolled up separately on the sterile table, and immersed into a sterile cryogenic bag (CryoMACS Freezing Bag 250, Miltenyi Biotec, Germany) filled with the cryopreservation solution immediately. The bags with the skin incubated at 4 °C for 2 h, then cooled down to −80 °C at a rate of 1 °C/min using a controlled rate freezer (Thermo Scientific 7455, USA). They were plunged into liquid nitrogen and stored in a local cryobank. The time of skin from injury to incubation was 4–12 h, with an average of 7.2 h

☆ The work has not been presented at any meeting

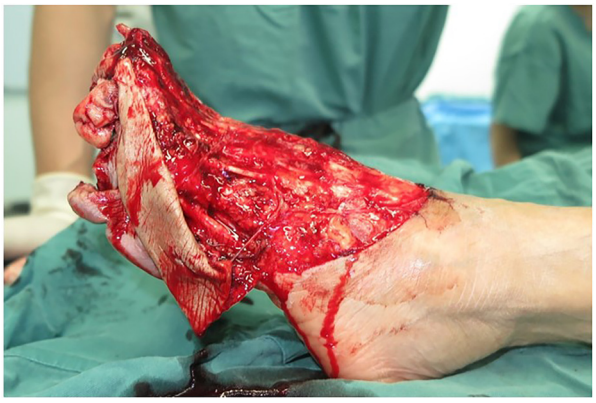

Fig. 1 77-year-old female, left foot degloving injury with the bone and tendon exposure.

With the approval of the government, the cryolaboratory and tissue bank were established in Qilu Hospital of Shandong University in 2015, which can accept legally donated organs and tissues for transplantation. In China, the supervision of tissue bank is very strict. The tissue storage and reuse had been approved by the Ethics Committee of Qilu Hospital of Shandong University (2016,097). All procedures performed in this study involving human participants followed the relevant guidelines and regulations of the Declaration of Helsinki.

The cryopreservation solution contained 10% fetal bovine serum, 10% dimethyl sulphoxide(ME2SO) and 80% RPMI1640 medium. The RPMI 1640 medium without ME2SO was used as rinse solution. The cryoprotectant and rinse solution were frozen storage.

Thawing and replantation

The skin was cryopreserved for 25 −50 days, with an average of 35 days. After multiple debridement surgery until the wound were covered with granulation tissue, the frozen skin was rewarmed and replanted in situ. The frozen skin was thawed in 42 °C water bath within the cryogenic bag for about 5 min until all ice melted. Then released from the cryoprotectant and washed with rinse solution for 3 times. Skin replantation was carried out after wound debridement. Small holes were made on the skin to facilitate drainage.

Results

Most of the survived skin had exfoliation and the color was darker than normal skin. Of the 9 cases, the survival area were excellent (>75%) in 3cases, good (50-75%) in 5 cases and poor (<30%) in 1 case. 3 patients received skin grafting again and recovered well. During the 12 months follow-up, the replanted skin was soft and resilient with the similar texture as normal skin, have varying degree of depigmentation and no hair growth. Skin sensory recovery were S2 in 4 cases and S3 in 5 cases. Typical case was shown in Figs. 1-2 and supplementary figures

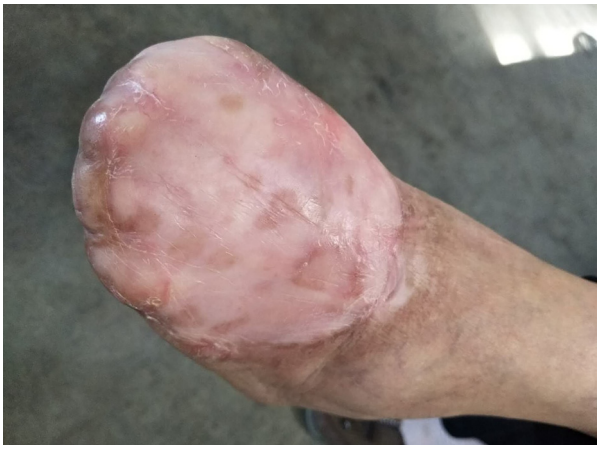

Fig. 2 6 months after the replantation surgery, the cryopreserved skin was survived.

Discussion

With the development of cryomedicine in recent years, cryopreservation of cells and composite tissue have become a hot topic in the cryobiological field.[5] When the metabolic rate of cells reduces with the decrease of temperature, the metabolic activity will close to "life suspension state" under the condition of deep low temperature, which can achieve the purpose of long-term preservation. Cryopreserved viable human skin has proved to be a practical choice for the repair of full skin thickness burns.[3] In our study, the avulsed skin was cryopreserved in liquid nitrogen for 25-50 days, with an average of 35 days and get good survival rate.

Pianigiani reported the skin should be harvested within 2 h and banked within 12 h to keep the higher cell viability.[4] The in vitro time of skin in our group was longer than previously reported. During the rewarming, the tissue damage was reduced by constant temperature water bath and vibration.

By replacing the water in cells and tissues, the cryoprotective solution can promote the formation of cell amorphous state and minimize the damage caused by the formation of ice crystals in the cooling, cryopreservation and rewarming cycle. Our study has some mild skin necrosis, such as varying degree of discoloration and no hair growth on the survived skin. This means the composition and proportion of cryoprotectant still need to be optimized.

This new method may provide an option for repair of large-area degloving injury of limbs. Rather than discarding, we'd better cryopreserve the highly viable, readily available skin and use them effectively, which can minimize the need for subsequent donor site.

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Author contribution statement

Qingjia Xu, Gang Wang, Juntao wang, Lei Zhu wrote the main manuscript text, Junhao Lin, Yantao Pei, Yidong Cui, Ben Liu, Hong Zhang collected the clinical data, Chuanbao Zang, Yuliang Sun, Xiaoyu Yuan followed up the patients and prepared figure. All authors reviewed the manuscript.

Disclosure of Competing Interest

The authors report no conflicts of interest

Ethical approval

This study was approved by the Ethics Committee of Qilu Hospital of Shandong University (2016097). All procedures performed in this study involving human participants followed the relevant guidelines and regulations of the Declaration of Helsinki.

Informed consent

All patients in our study were anonymous. Informed consent was obtained from all individual participants included in the study.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.04.006.

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Paediatric paronychia: A single centre retrospective, microbiological analysis and national survey

Dear Sir,

Paronychia is a common hand infection encountered by hand surgeons. In children, nail biting and digital sucking are contributing factors.[1] Although many cases are managed in primary care with oral antimicrobials, surgical drainage and decompression of the underlying abscess is often indicated, necessitating referral to a paediatric hand surgery service. Current National Institute for Health and Care Excellence (NICE) guidance in the UK recommends flucloxacillin (or clarithromycin if penicillin allergic) as the first-line antimicrobial agent to manage paronychia.[2] These guidelines are not specific for paediatric populations. There is a paucity of published studies assessing causative organisms and antimicrobial prescribing in this setting.

The aims of this study were:

1. To retrospectively investigate the causative bacterial organisms in paediatric paronychia managed in a single, tertiary plastic surgery unit.

Aspects of this work were presented as an oral presentation at the XXIII Congress of the Federation of European Societies for the Surgery of the Hand (FESSH) Copenhagen, 2018.

2. To conduct a prospective, national survey of clinical practice to ascertain prescribing practices and adherence to national guidelines.

Materials/patients and methods

Retrospective case series

Retrospective review of prospectively maintained electronic hospital records was conducted of paediatric paronychia requiring surgical intervention at a single centre (St George's Hospital, London) over a 4-year period (January 2012-June 2016). Ethical waiver was granted from the ethics and research and development committees as part of local audit and service evaluation. Collected data included basic demographics, microbiological and outcome data.

National survey

A national survey was undertaken by contacting all 55 plastic surgery units in the UK over telephone (following verbal consent). The 'first' on-call plastic surgery team member (typically, a senior house officer (SHO)) in each unit was asked the following regarding paediatric paronychia management:

1. What is your first line antimicrobial?
2. What is the main causative organism?
3. Are pus swabs routinely sent to microbiology for culture and sensitivity?
4. Are you aware of any National Guidelines on antimicrobial management of paronychia?

Data analysis was descriptive and was analysed using Microsoft Excel®.

Results

Retrospective case series

84 children with paronychia underwent surgical drainage over the study period. The median age was 5 years (range: 5 months-16 years). The majority had no pre-existing comorbidities ($n = 72/84$; 85.7%).

22.6% ($n = 19/84$) had no microbiology specimens, and there was no growth in 7.7% ($n = 5/65$) of samples cultured. 71.4% ($n = 60/84$) had positive microbiological culture results, of which 90% grew aerobic bacteria only, 10% grew both anaerobes and aerobes, and 0% grew anaerobes alone. 47.7% showed polymicrobial growth, with a range of bacteria identified (Table 1). The most common organism was *Staphylococcus aureus* (58.3%).

Antimicrobial prescribing data existed for 63% ($n = 53/84$). Co-amoxiclav accounted for 62% ($n = 33/53$), flucloxacillin 32% ($n = 17/53$) and other agents 6% ($n = 3/53$). In two patients, antimicrobial resistance was identified including *methicillin resistant S. aureus* (MRSA) ($n = 1$). Complications were encountered in five patients, including osteomyelitis ($n = 1$), unplanned reoperation ($n = 2$) and readmission ($n = 2$).

Table 1 Bacterial isolates from paediatric paronychia pus samples, St George's Hospital, London, 2012–2016.

Bacteria	n	%
Aerobic organisms		
Staphylococcus aureus	35	58
Other *Staphylococcus* spp.	24	40
Beta haemolytic *Streptococcus* spp.	18	30
Other *Streptococcus* spp.	4	7
Haemophilus influenzae	3	5
Corynebacterium spp.	3	5
Enterococcus faecalis	2	3
Pseudomonas aeruginosa	2	3
Bacillus spp.	1	2
Skin flora (i.e. unspeciated Gram positives)	1	2
Klebsiella spp.	1	2
Unspeciated *coliforms*	1	2
Neisseria spp.	1	2
Anaerobic organisms		
Gram positive cocci	2	3
Gram negative rods	1	2
Unclassified anaerobes	3	5

National survey

55 plastic surgery units were contacted (response rate: 75% ($n = 41$)). First line antimicrobial agents prescribed were co-amoxiclav in 66% ($n = 27$) and flucloxacillin 29% ($n = 12$). Suspected main causative organisms included *Staphylococcus aureus* (73%, $n = 30$), *Streptococcus* spp. (17%, $n = 7$) and 10% unknown ($n = 4$). All centres reported routinely sending samples to microbiology for culture and susceptibility testing. None were aware of National Guidelines for antimicrobial management.

Discussion

The reported oral commensal bacterial spectrum differs from skin (aerobic:anaerobic approximately 10:1) with comparisons to human bite patterns of bacterial infection.[3] This may be reflected in our microbiological data (Table 1) where polymicrobial cultures were present in 47.7%, with a predominance of oral commensal flora including streptococcal species (in 37%, such as beta-haemolytic *Streptococcus* spp. and *Streptococcus pyogenes), Haemophilus* spp. and anaerobes. Although polymicrobial infections were common, mixed anaerobic and aerobic growth only represented 10%, with no samples containing anaerobes alone. While, Brook et al. reported mixed anaerobic and aerobic growth in 46% ($n = 33$).[4] Our unit presents results from the largest paediatric paronychia sample size to date. The lower anaerobic rates of infection reported herein contradicts prevalent use of broad spectrum antimicrobials and supports use of flucloxacillin.

There was poor awareness and adherence to NICE guidance nationally. However, *Staphylococcus aureus* was correctly identified by the majority as the main causative organism and was the most common pathogen isolated in our population. Further, the majority of bacteria identified in our study were sensitive to flucloxacillin. Although this was

not the case for anaerobic organisms or some intrinsically resistant aerobes, these infections represent a minority of cases.

In some, cases of paronychial infection do not respond to antimicrobials and develop into established abscesses. Here, it is important to consider early surgical intervention, as per the old adage 'if there is pus there, get it out'. This is also relevant when considering the widely reported unpalatability of flucloxacillin in children. This may lead to compliance issues and poor response to initial treatment.

7.7% of microbiology samples had no growth on culture which may be related to the sampling method (i.e. minimal yield from a swab compared to a pus (fluid) sample). We agree with national guidelines recommending pus (fluid) samples being preferred to maximise culture yield.[5]

Overall complications reported were relatively low (7%), however adverse outcomes such as osteomyelitis can occur.

To our knowledge, this is the largest study reporting paediatric paronychia causative organisms. The majority of infections were staphylococcal (flucloxacillin sensitive) thereby supporting the use of flucloxacillin as first-line therapy. We advocate early surgical intervention, where necessary, in combination with appropriate antimicrobial treatment.

Funding

No research funding was obtained or required for this study.

Ethics

Ethical waiver was granted from the St George's University Hospitals NHS Foundation Trust ethics and research and development committees as part of local audit and service evaluation.

Declaration of Competing Interest

LSPM has consulted for and/or received speaker fees from bioMerieux (2013–2021), Pfizer (2018–2021), Eumedica (2016–2021), Umovis Lab (2020–2021), DNAelectronics (2015–18), Shionogi (2021), and Dairy Crest (2017–2018), received research grants from the National Institute for Health Research (2013–2019), and CW+ Charity (2018–2021). All other authors declare no competing interests.

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Potential palmar danger zones for nerve injury in percutaneous needle fasciotomy

Dear Sir,

Percutaneous needle fasciotomy (PNF) is a low morbidity option to release Dupuytren's contractures.[1] The mini-

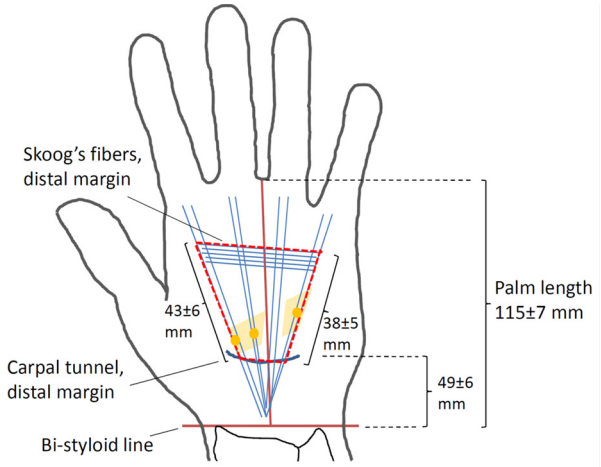

Figure 1 A schematic drawing showing the landmarks used to analyse and compare palm lengths between specimens, and to demarcate the quadrangular area of the palmar aponeurosis (dotted red lines) within which variations in nerve anatomy were analysed. The yellow field highlights the area of increased danger for common digital nerve injury based on average points at which nerves crossed over underlying flexor tendons (yellow dots), with sparing of the fourth ray. Dimensions are shown as mean ± standard deviation.

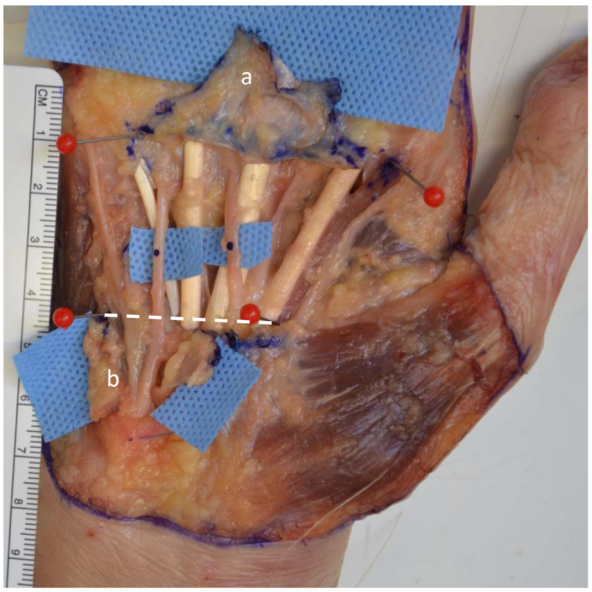

Figure 2 Specimen showing common digital nerves to the 3rd/4th and 4th/5th digits crossing over the flexor tendons to the middle and little fingers. Points of cross over shown as dark blue dots. Distal margin of the carpal tunnel denoted by dotted white line. Corners of the quadrangle of the palmar aponeurosis denoted by red pins. a) palmar aponeurosis, rised on its distal margin; b) Guyon's canal opened.

mally invasive nature notwithstanding, there is a small but recognised risk of nerve damage. Direct nerve injury is often attributed to spiral cords, which displace or entrap proper digital nerves (PDNs), increasing their vulnerability. However, common digital nerves (CDNs) are also vulnerable in the proximal palm, where they emerge from the carpal tunnel and fan out over the flexor tendons, lying directly beneath the pre-tendinous fascial bands in an area where needle cordotomy sites might be positioned.[2]

We conducted an anatomical study on the relationships of digital nerves, flexor tendons and pre-tendinous bands in the proximal palm, with the aim of defining danger zones for nerve damage during PNF.

Sixteen fresh frozen cadaveric specimens were utilised. Two had early signs of Dupuytren's, without any contracture. We opted not to exclude them. A line perpendicular to the bi-styloid line and directed to the third web-space was used as measure of palm length (Figure 1). The palmar skin was excised from the palmar fascia. A quadrangular area of the palmar aponeurosis was identified and its dimensions measured, with margins being the distal margin of the carpal tunnel proximally, the distal extent of Skoog's fibres distally, and the outer margins of the pre-tendinous bands to the index and little fingers.

Nerves and tendons visible outwith the quadrangular area were identified and the position of the pre-tendinous bands relative to the tendons was noted. The aponeurosis was divided at the distal margin of the carpal tunnel, and elevated proximal-to-distal, exposing the flexor tendons and neurovascular bundles. The superficial palmar arch was excised. The CDNs and PDNs were examined to identify where they crossed superficial to the flexor tendons and deep to the pre-tendinous bands. The distances of these intersection points from the distal margin of the carpal tunnel were recorded (Figure 2). All measurements were taken three times by two independent investigators with a digital calliper.

At the proximal border of the quadrangular area, the pre-tendinous bands fan out from the PL tendon more divergently than the flexor tendons - these emerge in a more parallel fashion from a broader width as they exit the carpal tunnel. Distally, at the base of the fingers, the bands are in alignment with the flexor tendons.

In all specimens both PDNs to the thumb emerged from the carpal tunnel at the intersection between the radial margin of the pre-tendinous band of the second ray and the ulnar margin of flexor pollicis brevis. They immediately diverged from the palmar aponeurosis, running alongside and often covered by the ulnar margin of flexor pollicis brevis. The radial digital nerve to the index finger ran along and radial to the pre-tendinous band of the second ray. Similarly the ulnar digital nerve to the little finger was ulnar to the pre-tendinous band of the fifth ray (Figure 2).

The CDN to the index and middle fingers originated from the median nerve within the carpal tunnel. In four out of 16 specimens (25%), in which the median nerve was noted to have a relatively more ulnar position within the carpal tunnel, it crossed the flexor tendons to the middle finger. The crossing point was located at 7 mm +/- 6 mm, [range 3-15 mm] from the distal margin of the carpal tunnel.

The CDN to the middle and ring fingers crossed over the flexor tendons to the middle finger in ten out of 16 (62.5%) specimens, with crossing point at 9 mm +/- 5 mm [range 2-17 mm] from the carpal tunnel.

The CDN to the ring and little fingers, originating from the ulnar nerve, crossed over the flexor tendons of the little finger in 14 of 16 (87.5%) specimens in order to reach the

fourth web-space. This occurred at 15 mm +/- 6 mm [range 4–27 mm] from the carpal tunnel.

This study identifies a less well recognised area of anatomical vulnerability of the digital nerves. A "danger zone", wider on the ulnar side, can be delineated distal to the carpal tunnel in which CDNs might be at risk (Figure 1). Within this area of the mid-palm some CDNs become more superficial and cross over the flexor tendons, immediately under the pretendinous bands. This area is a site not uncommon for PNF cordotomy[2] and we highlight the need for caution with proximal PNF ports along the flexor tendons to the little, middle and index fingers.

Of note, because of the position at the wrist of the median and ulnar nerves, the fourth ray is a natural parting zone between the two territories of the ulnar and median nerves, and in our specimens we identified no nerves crossing the flexor tendons to the ring finger (Figure 1). However, it is worth remembering that variations and communications occur commonly in the territories of the median and ulnar nerves.[3]

Funding

None

Ethical approval

The study was carried out in compliance with the Anatomy Act 1984.

Declaration of Competing Interest

None declared.

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Muscle-penetration method: Cable nerve grafting with well vascularized surrounding tissue and shortest graft length

Dear Sir,

When the facial nerve is resected, nerve grafting is performed. Some factors, represented by the length of the nerve graft and tissue blood flow (transplanted nerve/surrounding tissue blood flow), influence axon regeneration of the transplanted nerve.[1,2] A shorter nerve graft leads to earlier regeneration, and a larger volume of tissue blood flow leads to a higher probability of regeneration. Regarding the length of the nerve graft, a shape that facilitates a straight connection between the proximal and distal stumps is the most efficient, and a cable graft is effective for the facial nerve involving several distal stumps.[3] The early influx of surrounding tissue blood flow into a small-volume nerve graft possibly enabled the resumption of nerve graft blood flow. However, the possibility that a similar mechanism will function is low when the extent of tissue defect is large, with bone cortex exposure to the transplant bed at the site of nerve grafting, or when perioperative radiotherapy is performed.[4] Many studies have reported techniques to transplant a vascularized nerve graft to maintain nerve blood flow in these cases.[5] But the common limitation of these techniques is that the arrangement of the nerve graft is restricted and the length of the graft tend to be longer. A method of covering a non-vascularized nerve graft with transplanted vascularized tissue was examined to achieve both the shorter length of a nerve graft and good tissue blood flow of the graft site in our institution.

The subject of this report was patient in whom all branches of the facial nerve were simultaneously resected during head and neck tumorectomy. Reconstruction using free tissue transfer was performed to fill an extensive facial tissue defect. The muscle contained in the flap was arranged in an area anterior to the facial nerve main trunk stump. And non-vascularized cable nerve grafts were transplanted to a facial nerve defect. As nerve grafting procedures, the stump of the facial nerve main trunk was initially sutured with a nerve graft using 10–0 nylon thread under a microscope. Subsequently, a surgical probe was allowed to penetrate an adequate position of the muscle such that a gap for the nerve to pass through was prepared. The nerve graft was guided using forceps in order to run through the gap. It was lightly pulled to remove deflection and minimize the nerve graft length. After confirming the final arrangement, the nerve graft was sutured with the distal stumps of the facial nerve under a microscope (Figure 1). Consequently a non-vascularized nerve graft is arranged such that it may penetrate the inner area of the vascularized muscle tissue contained in the flap. This method is termed the "muscle-penetration method" in our institution.

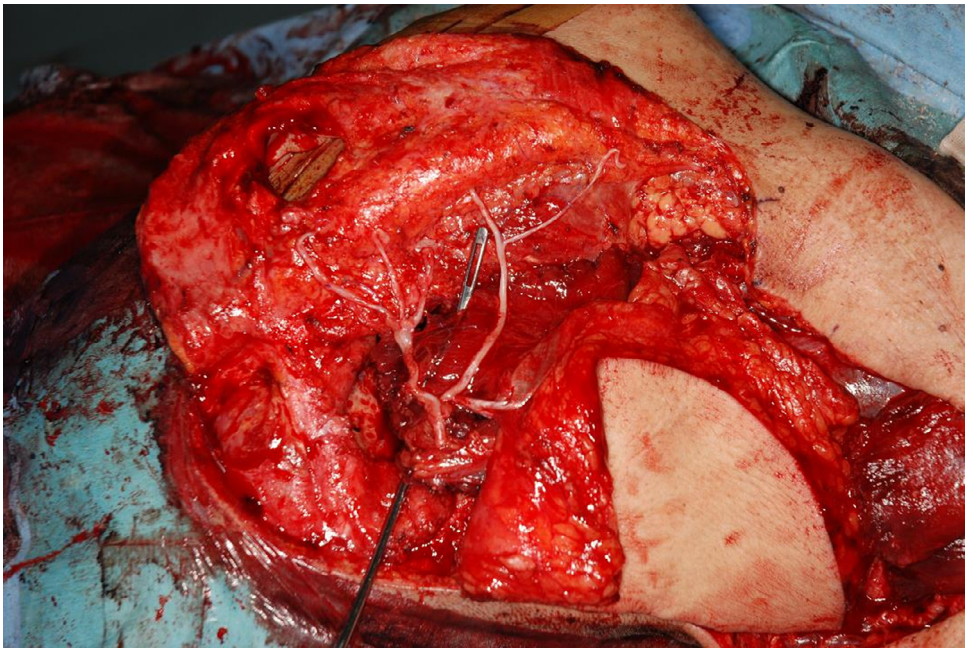

Figure 1 Intraoperative finding. Vastus lateralis muscle was placed in an area anterior to the facial nerve main trunk stump. The nerve graft was sutured with the stump of the facial nerve main trunk and arranged such that it may penetrate the vastus lateralis muscle. A surgical probe was allowed to penetrate the muscle such that a gap for the nerve graft to pass through was prepared.

If the stump of the facial nerve main trunk is linearly connected with its distal stumps in patients with a large tissue defect, the nerve may float. If this site is filled with a tissue graft, there may be no nerve floating. However, if the facial nerve is positioned below the tissue graft, the unilateral surface of the nerve may be adjacent to the tissue with poor blood flow. If it is positioned above the graft, a longer nerve graft may be required. To overcome these problems, we considered an arrangement enabling the nerve to penetrate the transplanted tissue to be the most natural (Figure 2).

A 55-year-old male with parotid gland cancer. Before surgery, there was no facial palsy. Total parotidectomy, simultaneous resection of the facial nerve and the facial skin, partial resection of the temporal bone, and bilateral cervical lymph node dissection were performed. To fill an extensive tissue defect site, reconstruction using antero-lateral thigh flap was performed. While elevating the flap, the motor branch of the femoral nerve was harvested at a maximum length. The vastus lateralis muscle was placed in the temporal bone defect site such that the nerve graft penetrated the muscle. The facial skin defect was reconstructed using the skin paddle of the flap. The tissue defect of buccal region was filled with a dermal fat flap. There were no complications especially associated with the piercing muscle like bleeding or hematoma. After surgery, radiotherapy at 50 Gy was performed as additional treatment. There was no recurrent tumor, and long-term follow-up was possible. Functional assessment by scales for evaluating facial palsy was conducted 3 years after surgery. The Yanagihara (40-point), HB, and SB grading scores were 24, III, and 68, respectively; good facial movement recovery was achieved.

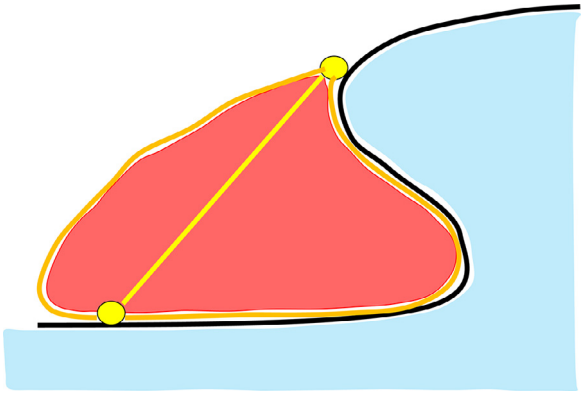

Figure 2 Concept of the “muscle-penetration method”. Blue: Blood-flow-poor tissue (bone cortex, irradiated tissue). Red: Vascularized tissue (transplanted muscle). Yellow circle: Proximal and distal stumps of the nerve. Yellow line: Linear nerve arrangement involving muscle penetration. Orange line: The distance of a nerve graft is elongated or the graft is adjacent to the blood-flow-poor tissue.

The surgical techniques for cable nerve graft to penetrate transplanted muscle were simple and easy-to-do, and the operative durations were not prolonged by performing these techniques. But it is difficult to accurately evaluate how much these surgical techniques contribute to the good postoperative results. In the future, more detailed statistical examination should be conducted on a larger number of patients.

Funding

None

Ethical approval

Not required

Declaration of Competing Interest

None declared

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An easy and reliable way to preoperatively identify the auriculo-temporal nerve in migraine surgery

Dear Sir,

Introduction

The peripheral theory of Migraine Headache (MH) pathogenesis has been widely popularized and recognized as one of the main etiologies of MH. Indeed, chronic compression of terminal branches of craniofacial nerves caused by surrounding structures (e.g., muscles, vessels, and fascial bands) can cause neuronal hyperexcitability and inflammation acting as potential trigger for MH attacks; in this scenario, the surgical treatment of the temporal area described as Site V relies on the peripheral release of sensory auriculotemporal nerve entrapment (Figure 1).[1–5] In this paper, we describe a simple and reliable way to preoperatively localize the auriculotemporal nerve in migraine surgery.

Materials and methods

We designed a method to identify a cutaneous point as a landmark reference to the ATN. This point lands on the intersection of a horizontal line tangent to the uppermost apex of the helix and a vertical line tangent to the radix of the tragus (Figure 2). We measured the correspondence of this cutaneous landmark and the ATN in twelve migraine patients operated at Site V. The study was conducted in compliance with the Declaration of Helsinki and the Guidelines for Good Clinical Practice; all enrolled patients provided written informed consent before their inclusion in the study. The patients (9 females, 3 males, mean age 34 years, range 18–64 years) were subjected to minimally invasive surgery for Site V migraine. All patients previously underwent a full examination by neurologists to confirm the diagnosis of migraine headache in accordance with the guidelines established by the International Headache Society. All participants suffered from chronic refractory migraine and had failed multiple preventative medications.

Results

In all the operated patients, we reported a close relationship between the landmark point obtained as described and the ATN, being 0.2 cm the maximum discrepancy observed (0 cm in 9 patients). Moreover, in ten patients (83.3%) we observed a close interaction (or intertwining) between the ATN and branches of the superficial temporal artery (STA), which may explain why some predisposed patients have MH pulsatile, throbbing attacks, usually localized in the temporal area.

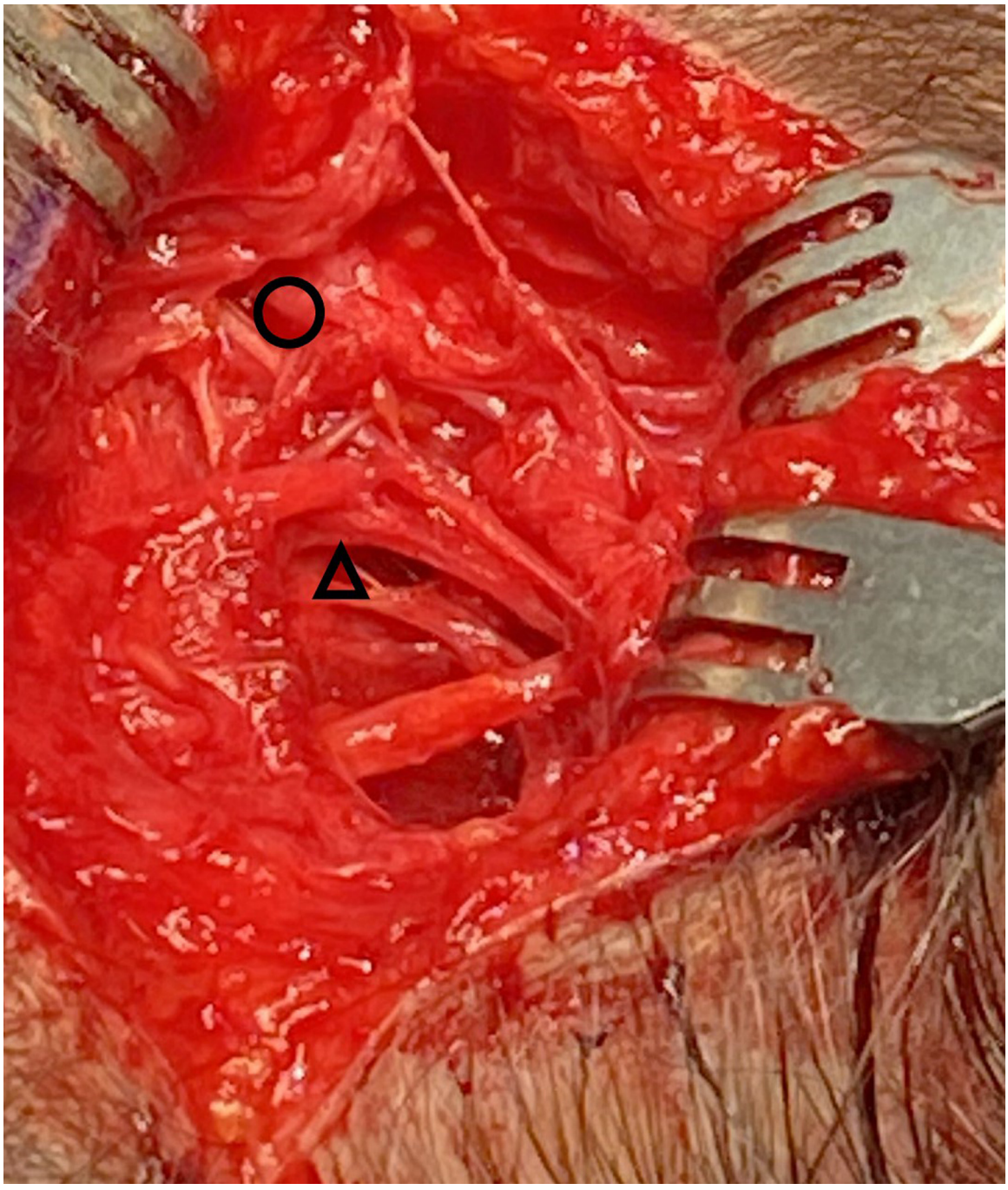

Figure 1 Superficial temporal artery (triangle) in close proximity to the auriculotemporal nerve (circle) identified during migraine surgery of the temporal (site V) trigger site.

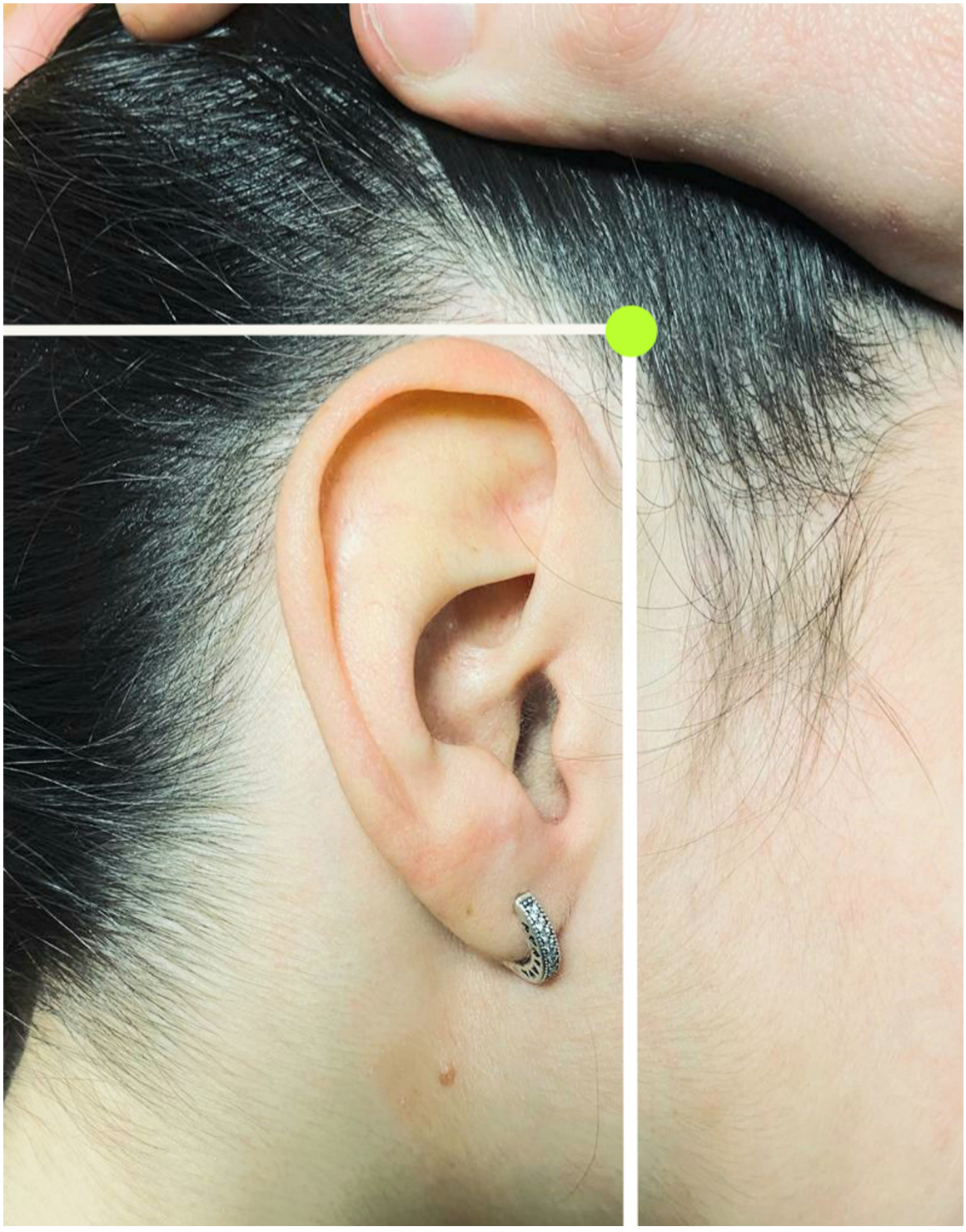

Figure 2 Point (highlighted in yellow), at the intersection of a horizontal line tangent to the uppermost apex of the helix and a vertical line tangent to the radix of the tragus, corresponding to the auriculotemporal nerve.

Discussion

Our findings demonstrated a very high concordance between the described point and the underlying auriculotemporal nerve. This method might be of some utility in the preoperative planning of Site V Migraine surgery, in the strive of reducing the length of cutaneous incision and the invasiveness of the procedure.

Declaration of Competing Interest

None declared

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A scoping literature review of post-traumatic lymphedema: Where are we now?

Dear Sir,

Introduction

The accurate diagnosis of post-traumatic lymphedema presents many challenges due to its multifactorial nature. Proper identification of these patients is critical in order for management and prevention of complications. Research on lymphatic reconstruction has been recently amplified by a coalescence of advances in recognition, imaging, instrumentation, and physiological knowledge.[1] The treatment of lymphedema includes decongestive therapy followed by surgical lymphatic reconstruction or debulking if conservative management is futile. There is no definitive cure, but early diagnosis and management are critical for preventing healing complications, enhancing recovery, and improving long-term quality of life.[2] Because post-traumatic lymphedema is not well understood, a scoping review of the literature was conducted to systematically establish a benchmark for current knowledge, outcomes, ongoing challenges, and areas of future research.

Methods

A systematic scoping review of post-traumatic lymphedema was performed on November 09, 2020 in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols Extension for Scoping Reviews (PRISMA-ScR; Supplemental Figure 1 and Supplemental Methods).

Results

Selected studies were published between 1976 and 2020; the annual number of publications increased significantly over the past decade (1.4 ± 0.7 from 2011 to 2020) compared to years prior (0.2 ± 0.5 between 1976 and 2010). The represented study designs were largely comprised of case reports/series ($N = 11$ studies). Out of 88 patients ($n = 19$ groups), the average age was 46 years ranging from <16 to 62 years ($n = 15$ groups; Table 1). The length of follow-up ranged from 2 weeks to 29 months after initial trauma (Table 1).

Among studies that specified the mechanism of trauma ($n = 37$ patients), the most frequently reported injuries included burns ($n = 12$), motor vehicle accidents/collisions (MVA/MVC; $n = 7$), degloving injuries ($n = 6$), and open tibial fractures ($n = 4$; Figure 1). Overall, 15 ($n = 58$ patients) out of the 19 groups specified the surgical and/or non-operative treatment pursued for post-traumatic lymphedema; 2 of these pursued both categories (Table 1). Among the 9 groups pursuing non-operative therapy ($n = 40$ patients), 8 groups ($n = 39$ patients) utilized compression therapy (Table 1). Among the 8 groups pursuing surgical intervention ($n = 17$ patients), 15 patients underwent free vascularized tissue transfer and 2 patients underwent lymphovenous anastomoses (LVA; Table 1). Among the 13 groups that specified final outcomes, all 49 patients were considered to have been successfully treated based on the descriptions provided in the report.

Discussion

The various etiologies of post-traumatic lymphedema included burns, open and closed fractures, MVA/MVC, and degloving injuries. Less frequently reported mechanisms were

Table 1 Summary of data captured from the literature review. Sixteen publications were selected accounting for a total of 19 entries, because 3 articles included distinguishable, eligible patient groups.

Reference	Study Type	Number of Patients	Age	Mechanism of Trauma/Injury	Surgical Treatment Pursued for Lymphedema	Non-Operative Therapy Utilized for Lymphedema	Follow-Up Period	Final Outcome
Alessi et al. 1986	Case Report	1	59 years	"Post-traumatic"		29 months	NS	
Balakrishnan et al. 2004	Case Report	1	44 years	Circumferential burns by room heater requiring escharotomy and fascial excision with skin grafting		Antibiotics and compression therapy	NS	Edema improved with limited hand function
Balakrishnan et al. 2004*	Case Report	1	28 years	Circumferential burns following a house fire requiring fascial excision and skin grafting		Antibiotics, massage, compression therapy	NS	Edema improved with limited hand function
Becker et al. 2018	Case Report	1	21 years	Bicycle accident without fracture	Extrafascial dermolipectomy with local advancement flaps followed by free flap containing lymph nodes		1 year	Patient returned to university and could play the piano and guitar again
Becker et al. 2018*	Case Report	1	26 years	Burn	Extrafascial dermolipectomy with local advancement flaps followed by free flap containing lymph nodes	Forearm compression by bandage post-op	6 months	Hand quickly ameliorated and was functional, allowing the patient to work again; new LVs at elbow level and normal lymphatic flow
Ciudad et al. 2017	Case Report	1	33 years	"Trauma to inguinal region"	Pedicled omentum flap transposition followed by VLNFT using gastroepiploic flap		15 months	Decrease in overall limb volume and circumference; improved lymphatic drainage

(*continued on next page*)

Table 1 (*continued*)

Reference	Study Type	Number of Patients	Age	Mechanism of Trauma/Injury	Surgical Treatment Pursued for Lymphedema	Non-Operative Therapy Utilized for Lymphedema	Follow-Up Period	Final Outcome
Cohen 2011	Case Report	1	56 years	Slip and fall on ice resulting in displaced fibular fracture		Physical therapy, exercises, compression bandaging (manual lymphatic drainage)	3 months	Reduction in volume/circumference; improved active range of motion
Hammad et al. 2018	Retrospective Cohort	8	NS	Spinal cord injury		Manual lymphatic drainage, compression therapy, exercises	NS	11% reduction of limb volume
Hettrick et al. 2004	Retrospective Cohort	8	57 years (mean)	Circumferential extremity burn (2 scald, 5 flame, 2 contact thermal) requiring fascial excision and skin grafting		6 months		
Ito et al. 2015	Case Report	1	24 years	Injured groin with steering wheel in car accident		NS		
Kasper and Meller 2008	Case Report	1	62 years	Fall onto outstretched hand		Compression, massage, elevation, home exercises; treated with pneumatic compression device	2 weeks	Fracture healed satisfactorily without additional loss of position; function of right hand limited by edema
Lohrmann et al. 2009	Case Series	6	48 years (mean)	Motor vehicle accidents (4), bomb explosion (1), forcible trauma with metal bar to groin (1)	1 underwent lymphatic vessel transplantation (metal bar to groin); 1 underwent lymphovenous anastomosis at the level of lower leg	4 patients received intensive complex decongestive therapy as inpatients	NS	NS

(*continued on next page*)

Table 1 (*continued*)

Reference	Study Type	Number of Patients	Age	Mechanism of Trauma/Injury	Surgical Treatment Pursued for Lymphedema	Non-Operative Therapy Utilized for Lymphedema	Follow-Up Period	Final Outcome
Masman and Conolly 1976	Clinical Trial	22	NS	"Knee injuries"		NS		
Masman and Conolly 1976*	Clinical Trial	20	NS	"Hand injuries"		Double-compartmented, transparent plastic cuff around volar and dorsal compartments	NS	Discomfort and edema were reduced, and hand function was improved in all cases
Mihara et al. 2014	Case Report	1	41 years	Motor vehicle collision	Lymphovenous anastamosis		3 months	Lymphorrhea healed 2 weeks after the operation and had not recurred 3 months afterward; Leg lymphedema improved without compression therapy
Pereira et al. 2019	Case Report	1	41 years	Traffic accident resulting in open degloving injury	SCIP-L free flap to provide "lymphatic bridge"; vessels only without nodes		6 months	Decreased volume calculations; restoration of uptake and passage of lymphatic flow through the flap; elbow function and adequate contour were achieved with stable skin coverage
Pereira et al. 2020	Retrospective Cohort	11	NS	Degloving (5), spider bite (1), necrotizing fasciitis (1), open tibial fractures (4)	Superficial circumflex iliac artery perforator lymphatic vessels free flap		1 year	No detectable lymphedema; stable reconstruction without flap failures; restoration of natural lymphatic flow; improved lymphedema QoL score
Schoenle et al. 2018	Case Report	1	36 years	Severe burn injury from an electric arc (30% TBSA)	Latissimus dorsi flap, split serratus anterior flap, and thoracodorsal lymph node flap		8 weeks	Edema was clearly reduced
Schulte et al. 2013	Randomized Controlled Trial	1	<16 years	Closed fracture of forearm		Secondary cast splitting for the 1 case of lymphedema	4–6 weeks	NS

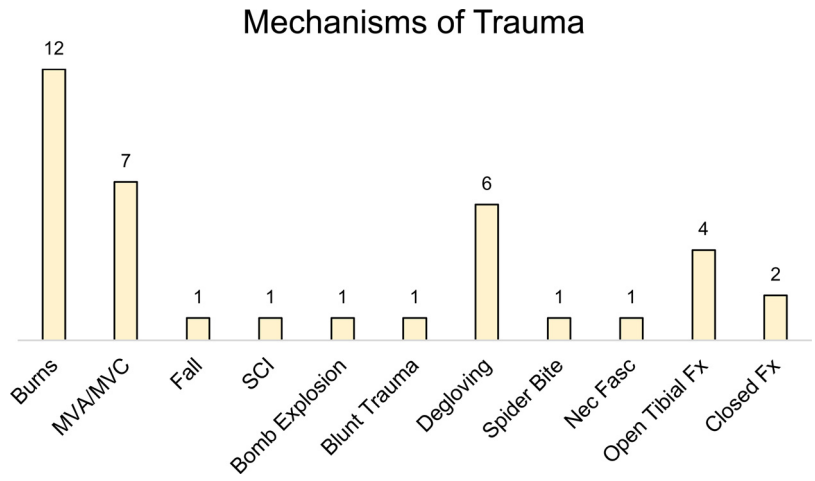

Figure 1 The various mechanisms of trauma reported. Among the 16 selected articles, only 37 patients had distinctly reported mechanisms of trauma (MVA/MVC = motor vehicle accident/collision; SCI = spinal cord injury; Nec Fasc = necrotizing fasciitis; Fx = fracture).

spinal cord injury (SCI), necrotizing fasciitis, a spider bite, and fall on an outstretched hand.

Burns were documented most frequently within our review, comprising 33% of all reported traumatic injuries. Many of the burns required fascial excision with skin grafting. It is possible that this operation causes local disruption of the lymphatic system via infectious seeding of subcutaneous tissues and/or mechanical disruption of lymphatic pathways from injury, thereby predisposing these patients, but more research is needed in this area. Notably, all patients with post-burn lymphedema were treated successfully with either compression therapy ± antibiotics or surgery involving lymph node-containing tissue flaps.

Fractures also comprised a significant proportion of reported injuries. The exact pathogenesis of lymphedema following orthopedic trauma requires further delineation. Our review demonstrated that patients diagnosed with post-fracture lymphedema benefit from decongestive therapy but may also benefit from surgery, which is consistent with a recent review published by Thomas et al.[2] A close association between fractures and significant soft tissue injury confounds the available data, warranting clarification in future studies.

Data regarding compressive/decongestive therapy for post-traumatic lymphedema ($n = 39$) yielded expected positive outcomes as this is still the mainstay for lymphedema treatment.[3] The most frequently reported surgical intervention for post-traumatic lymphedema was free vascularized tissue transfer ± the inclusion of functional lymph nodes. Pereira et al., who have published the largest series of post-traumatic lymphedema extremity reconstruction, rely on the superficial circumflex iliac artery perforator flap without lymph node inclusion as a "lymphatic bridge" flap ($n = 12$). In comparison, vascularized lymph node flaps were utilized in 3 patients in this review, which has been most widely reported in post-oncologic lymphedema lymphatic reconstruction literature.[4] Finally, lymphovenous anastomoses (LVA) were performed in 2 patients. There were no reports of debulking surgeries performed for post-traumatic lymphedema. The surgical treatment modalities for post-traumatic lymphedema diverge from those described for post-oncologic lymphedema, raising the question of whether there are fundamental physiologic differences between these two clinical entities or simply a paucity of recognition and publication.

Conclusions are limited by reporting bias and paucity of literature, highlighting a need for more data. While great strides are being made to clarify best practices for the surgical treatment of lymphedema as outlined by Nguyen et al. of the International Consensus Committee,[5] the data on prevalence and treatment of post-traumatic lymphedema is severely lacking.

Conclusion

This systematic scoping review suggests that patients with post-traumatic lymphedema are largely unrecognized and likely insufficiently treated.

Declaration of Competing Interest

None.

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Ethical approval

Ethical approval was not applicable toward our study because it is a literature review.

Supplementary materials

Supplemental Figure 1. Flowchart describing our scoping literature review.

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.02.059.

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Better protocol of ICG lymphography for evaluation of trunk lymph circulation

Dear Sir,

I interestingly read the article "The Pittsburgh Trunk Lymphedema Staging System (PTLSS) – avalidated staging system for the description of breast cancer-associated trunk lymphedema" by Jordan E. Fishman et al. (J Plast Reconstr Aesthet Surg 2022 Feb 15).[1] I agree that their new trunk lymphedema staging system is fresh and original. indocyanine green (ICG) lymphography is easy to perform and now spreading all over the world, so creating a trunk lymphedema ICG staging system is meaningful. However, there are several questions and hard to understand points about the paper, so I list and advocate them.

Although the author defined ICG injection points as "distal most extent of the axillary drainage territory of each hemi-trunk", they were not specifically described. Generally, watershed of lymphosomes between upper and lower hemi-body it placed on the horizontal line at the level of the umbilicus.[2-4] Based on my experience, lymph flows from the watershed to the inguinal lymph nodes are visualized in most cases with past history of axillary lymph node dissection. However, the authors reported no lymphatic pathways toward the groin in cases where 45% of patients had past history of axillary lymph node dissection. Therefore, ICG injection sites seemed different from the watershed or previously reported studies.[2,3] If the injection sites were on the horizontal line of the umbilicus, the scores would be different from the current data. Another concern is 60 min of waiting time after ICG injection. To appropriately evaluate extension of dermal backflow, it is critical to wait for a plateau phase of ICG distribution.[3-5] Based on previous reports, 2 h is required even under rigorous facilitation maneuver of limb movement to shorten a time for the equilibrium phase.[3-5] Therefore, the scores reported in the study would be worse with the use of appropriate waiting time.

Definitely, it is extremely important to evaluate not only upper extremity lymphedema but trunk lymphedema including breast lymphedema, because there are some patients who suffered with trunk lymphedema without upper extremity lymphedema. Therefore, and it would be precise scaling system if authors would improve the above-mentioned points.

Prior presentations

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Ethical approval

Not Required

Declaration of Competing Interest

None

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Soft tissue defects reconstructions employing Lymphatic Flow-Through (LyFT) flaps for dead space obliteration and lymphatic sequelae prevention

Dear Sir,

Soft tissue defect reconstruction is one of the most common tasks for plastic surgeons. Depending on the affected area, different problems should be considered for a completely satisfactory result. This is particularly relevant when significant damages to the lymphatic network are present. In this context, the postoperative complications might impair the healing process and lead to debilitating conditions. A damage of the lymphatic drainage may cause a lymph stasis with chronic inflammation and fibrosis. In these cases, trying to prevent these complications is of crucial importance. Chronic lymphorrhea, lymphocele, and lymphedema might develop, leading to severe discomfort for the patient with heaviness sensation in the limbs, swelling, pain, erythema, recurrent cellulitis, and even range of motion limitations.[1]

To restore the lymphatic drainage the available options are limited and there is still lack of agreement on which is the most effective procedure. The most validated techniques nowadays are lymphovenous anastomosis (LVA),[2] vascularized lymphnode transfer (VLNT),[3] and lymphatic tissue transfer.[4] LVA consists of diverting the lymph flow into the venous circulation upstream of the damage, offering the lymph an alternative draining route. It is performed by means of microsurgical or supermicrosurgical anastomoses between one or more functioning lymphatic vessels and a nearby reflux-free vein. This is an essential point since to obtain optimal lymph drainage and to prevent a backflow. Lymphatic tissue transfer, instead, is a modern and fascinating treatment that relies on neolymphangiogenesis process between donor and recipient vessels, stimulated by the transfer of healthy tissue.[5]

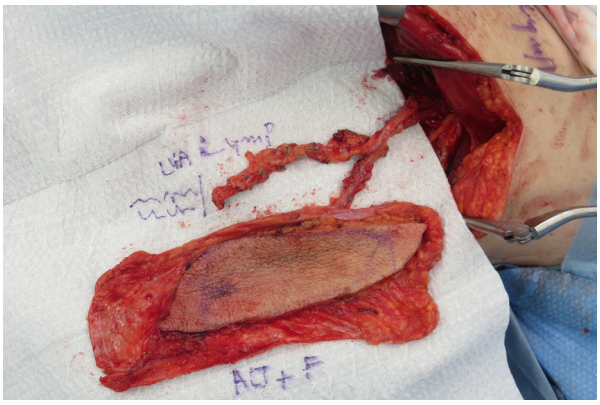

Figure 1 Intraoperative picture of pedicled ALT flap harvest with its pedicle and an additional long vein suitable of LVA.

In the present work, we would like to share our experience with the concept of lymphatic flow-through (LyFT) flaps. This procedure combines the necessity of soft tissue transfer for volume restoration with the opportunity to prevent lymphatics sequelae. It consists in using healthy veins coming from the transferred flap to perform one or more LVAs in the affected area (Figure 1). Further advantage, especially when we resort to SCIP or DIEP, is the opportunity of transferring lymphatic rich tissues that may stimulate neolymphangiogenesis as previously described. From the technical point of view, the location of the chosen veins is crucial, since they must match the location of the leaking lymphatic vessels. In our experience we always performed single LVAs in an end-to-end fashion with nylon 12–0 stitches (Figure 2).

Eight patients presenting a soft tissue defect and a damaged lymphatic drainage pathway were included in the present work. The median age was 62 years old (range 42–82 years old) and the cause of the defect was various: surgical tumor excision in 6 cases (5 because of sarcoma and 1 because of squamous cell carcinoma), while in 2 cases the defect was due to trauma (SDC1, Table). The defect was localized as follows: 3 in the abdomen and groin, 1 in the groin and adductor compartment, 2 in the medial thigh, 1 in the lower leg, and 1 in the upper extremity. Different types of flaps were employed, either pedicled and free. In 2 cases we resorted to a free superficial circumflex iliac artery perforator (SCIP) flap, in 2 to a pedicled SCIP flap, in 2 to a pedicled deep inferior epigastric perforator (DIEP) flap, and

Table 1 Patients' demographics and case characteristics.

Patient	Gender	Age	Etiology / Location	Comorbidities	Flap	Recipient Vein for LVA	Number LVA	Complications	Follow-up (months)	Functional Outcomes
1	F	65	Sarcoma / Upper Extremity	None	Free SCIP	Superficial Flap Vein	1	None	6	Full ROM
2	M	67	Sarcoma / Intra-abdominal - Groin	None	Pedicled ALT	Pedicle Vein	3	None	6	Full ROM
3	M	82	Sarcoma / Intra-abdominal -Groin	HTN	Pedicled ALT + VLM	Pedicle Vein	3	None	6	Full ROM
4	F	76	Sarcoma / Groin	None	Pedicled DIEP	Superficial Flap Vein	3	Infected Seroma	7	Full ROM
5	M	63	Trauma / Medial Thigh	DM	Pedicled DIEP	Superficial Flap Vein	3	None	9	Full ROM
6	F	42	Sarcoma / Groin + Adductor Compartment	None	Pedicled SCIP	Superficial Flap Vein	1	None	6	Full ROM
7	F	56	Trauma / Lower Extremity	HTN	Free SCIP	Deep Branch Pedicle Vein	2	None	9	Full ROM
8	M	45	SCC / Medial Thigh	None	Pedicled SCIP	Superficial Flap Vein	2	None	6	Full ROM

DM: diabetes mellitus; HTN: hypertension; SCIP: superficial circumflex iliac artery perforator; DIEP: deep inferior epigastric artery perforator; ALT: anterolateral thigh flap; VLM: vastus lateralis muscle; LVA: lymph venous anastomosis; ROM: range of motion.

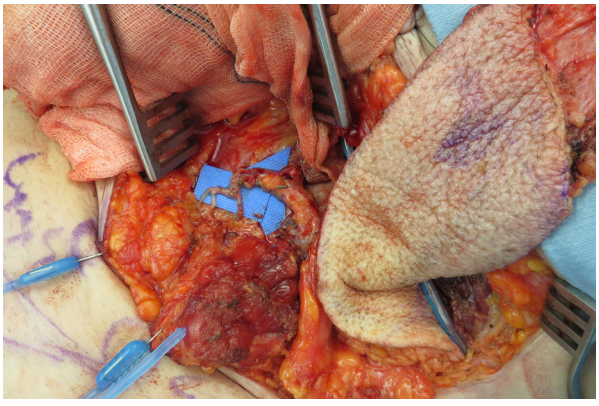

Figure 2 Flap inset with lymphovenous anastomoses performed between 2 superficial and 1 deep lymphatic vessels with 3 branches of the pedicle vein.

in 2 to an anterolateral thigh (ALT) flap. The number of lymphovenous anastomoses performed with flap's veins ranged between 1 and 3 (median 2.5). We always performed single LVAs in an end-to-end fashion with nylon 12-0 stitches (Figure 2). All the patients were successfully treated, reaching a good esthetic and functional result with full volume and range of motion restoration. The median follow-up period was 14 months (ranging from 12 to 16 months). During this period, 7 patients showed no complications while 1 patient developed an infected seroma, which was conservatively treated. No signs of lymphocele nor lymphedema were observed in any of the cases. Lymphoscintigraphy has been routinely performed 6 months after surgery, confirming a sufficient lymphatic flow. In all cases no secondary procedures were required. Table 1.

In conclusion, lymphatic sequelae are complex issues that might develop either immediately after surgery or after many years. The use of lymphatic flow-through (LyFT) flaps is an interesting and modern concept that tries to combine both these treatments. It not only provides healthy tissue for defect reconstruction, but it also allows exploitation of the collateral veins of the flap for the LVA. This approach is particularly helpful when no suitable vessels can be found near the defect, such as after radical debulking procedures combined with radiotherapy or after a severe trauma.

Declaration of Competing Interest

None declared.

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Ethic approval

Not required.

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"Internal mammary artery perforator flap for anterior thoracic and upper abdominal wall reconstruction: 16 case series"

Dear Sir,

Defects of the anterior thoracic and upper anterior abdominal wall represent a challenge in reconstructive surgery. Growing clinical and experimental evidences have shown that fasciocutaneous perforator flaps are as effective as muscle flaps in reconstruction of these anatomical areas, while reducing the morbidity of the donor site.[1-3] The internal mammary artery perforator (IMAP) flap is defined as a fasciocutaneous flap supplied by one muscle perforator arising from the internal mammary vessels.[4] In this paper we report our experience with the use of IMAP flap in a variety of reconstruction of anterior thoracic and upper anterior abdominal wall soft tissue even in presence of osteomyelitis. Sixteen IMAP flaps were performed in fifteen patients, in one case IMAP was performed bilaterally. Chest wall radionecrosis was the most common etiology (Figure 1), followed by osteomyelitis with cutaneous fistula, diastasis of surgical wounds after heart surgery procedure, primary chest wall malignant cancer and chest wall metastasis of breast cancer. Among patients with radionecrosis, IMAP flap was performed also as a rescue surgery after one case of failed latissimus dorsi flap and after two cases of failed pectoralis major flap. Double internal mammary artery perforator flap was performed in one patient for osteoradionecrosis of the head of the right clavicle due to thyroid cancer treatment. Preoperative evaluation included angio-CT scan and 13 Mhz probe color doppler US. The receiving site was prepared with debridement or tumor excision, according to the etiology, in some case the resection was extended to include the ribs. The skin incision of the flap was performed along the preoperative markings. The dissection proceeded in a subfascial plane; once the chosen perforator was reached, further skeletonization, including an intramuscular dissection, was performed in order to achieve the highest degree of flap mobility, decreasing the risk of kinking and tension. The flap was then inset, with a variable arc of rotation, to repair the defect, obliterating any cavity. Before final sutures, we performed ICG angiography in order to check the flap perfusion. In all cases, the donor site was closed by directly. The maximum reported size of the flap was 25 cm × 11 cm and the arc of rotation varied between 90° and 180° with an average of 130°. In most cases the chosen perforator of internal mammary artery was the one at the second intercostal space. No flap failure was observed in any case. Surgical revision occurred in two patients in order to correct a recurrence of chest wall fistula due to inadequate debridement. No further complications or relapses were observed during follow up, ranged between 6 and 18 months (Figure 2). Perforator flaps represent a totally new concept since their introduction in reconstructive surgery.[5] The perforasomes, nourished by perforator vessels, allow minimally invasive flap harvesting, sparing the main vessel axis. In this study, even in patients with large defects and with osteomyelitis, IMAP flaps were perfectly suited for a satisfactory reconstruction, without the need of a free flaps. The key points in successfully treating osteomyelitis is the extent, and thus, the radicality of excision of the malacic tissue, therefore the type of reconstructive option is not so influential, in terms of outcome, as long as vital tissue is used to cover the defect. Main advantages to the IMAP flap are good arc of rotation and considerable dimensions of its perforasome (Figure 2). In some cases, the pedicle of the flap may be lengthened by inclusion of part of the internal mammary vessels, but in our experience, it was not performed because the inclusion of the internal mammary vessels precludes their use for cardiac bypass procedures. Other advantages of IMAP flap are the absence of functional donor-site morbidity preserving respiratory mechanics, the possibility to close the donor site directly and good esthetic results, achieving symmetry between breasts without distortion of nipple areolar complex. In our series, functional recovery of recipient site was possible too: recoveries of arm movements and of cervical extension were possible thanks to reduction of scar contracture. The reconstructive versatility of IMAP flap, characterized by good arc of rotation and dimensions, along with its harvest reliability, makes the choice of this flap the possible gold standard in the treatment of soft tissue defects of the anterior chest wall and upper anterior abdominal wall.

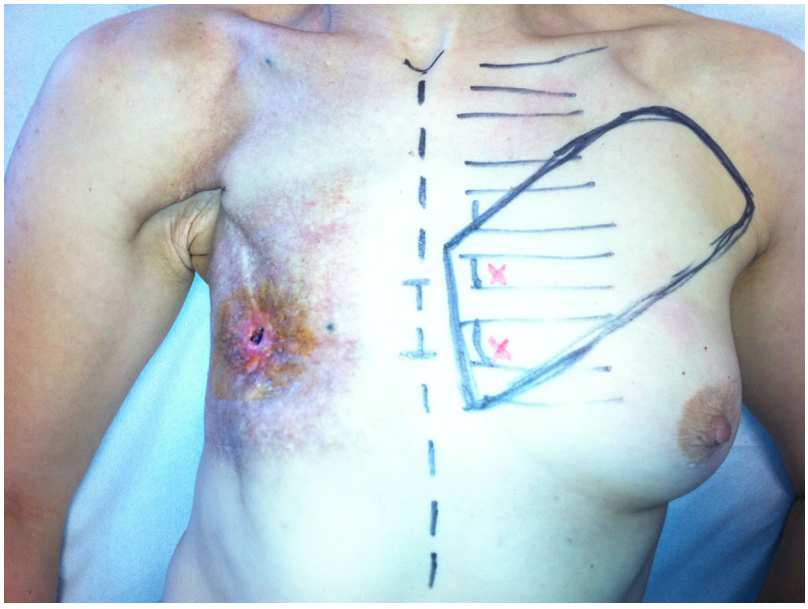

Figure 1 55 years old woman with radionecrosis of the chest wall associated with rib fracture and osteomyelitis after breast cancer treatment. Third intercostal perforator of internal mammary artery was chosen as pedicle of the flap. Flap dimension: 22 cm × 11 cm, flap rotation: 180°: preoperative skin and perforator markings.

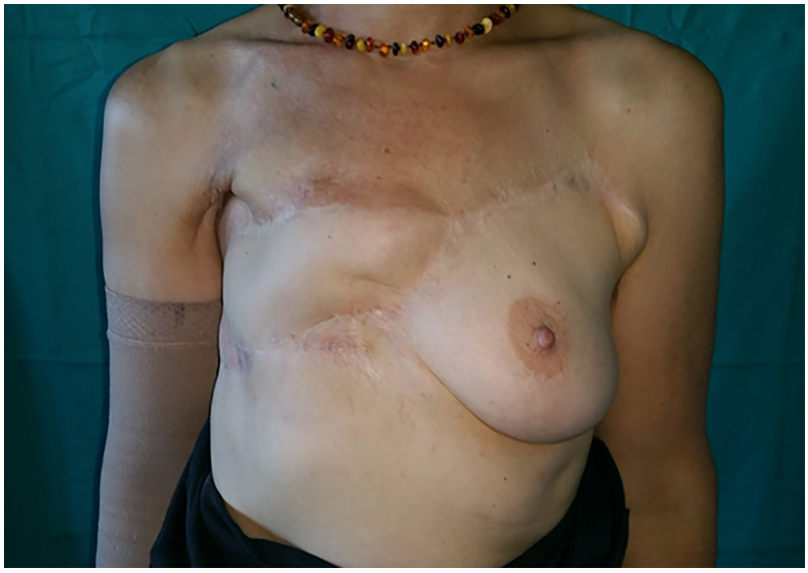

Figure 2 Follow up at 12 months of patient of Figure 1. In the picture is shown how IMAP flap can reach the contralateral midaxillary line.

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Ethical approval

Not required

Declaration of Competing Interest

None.

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A proven perioperative protocol for free flap surgery in a patient with heparin-induced thrombocytopenia

Dear Sir,

Heparin-induced thrombocytopaenia (HIT) is an immune-mediated syndrome that occurs in 0.5–5% of patients treated with heparin. HIT manifests between 5 and 14 days after exposure to heparin, or earlier if the patient has had prior heparin exposure. HIT causes a pro-thrombotic state due to the binding of platelet factor 4 (PF4) with the heparin complex. This provokes platelet consumption and predisposes patients to developing arterial and/or venous thromboses. HIT is a recognized cause of free flap failure with a salvage rate of <25%.[1]

The current literature on HIT in free flap patients consists of level 4 evidence: case reports and literature reviews that summarise case reports. The most recent literature review by Aldekhayel et al. from 2015 includes 6 studies with a total of 9 patients and 13 flaps (3 pedicled and 10 free). Out of these 13 flaps, 10 were lost, 1 was partially lost and 2 were salvaged.[2] Since 2015, three further case reviews on HIT patients undergoing free flap surgery have been published.[3–5] To date, there are 9 studies with a total of 14 patients. 12/14 patients were diagnosed with HIT after free flap surgery[1–4] and only 3/14 patients had a successful free flap that did not require salvage[4,5]. In the 10/14 patients whose flaps failed or required salvage, rates of arterial and venous compromise were equivalent.[1–4]

Significantly, the two patients diagnosed with HIT preoperatively (both from previous hospital admissions) had successful free flaps. In the case described by Stimac et al., the patient was managed with fondaparinux, an indirect factor Xa inhibitor, perioperatively.[4] In the case of Macias et al., argatroban, a direct thrombin inhibitor, was diluted to a concentration of 0.5 mg/mL with normal saline and used as a substitute for heparinized saline intraoperatively. The patient was also treated with daily 81 mg aspirin for two weeks post-operatively.[5] In both cases, the patients had HIT diagnoses from previous admissions. That is, free flap surgery was not required during the same admission as the initial diagnosis of HIT.

We present the first case of a patient with newly diagnosed HIT undergoing a successful free flap and our perioperative protocol. A 57-year-old female presented following a motor vehicle accident with a left Gustilo IIIb open tibia/fibula fracture and a right calcaneus fracture. She was incidentally diagnosed with pulmonary emboli on her trauma CT and commenced on an intravenous heparin infusion on day 2 of her admission. She was a non-smoker and denied any personal or family history of clotting disorders. She was planned for definitive fixation and free flap coverage for day 14 of her admission. As shown in Figure 1, her platelet count was normal on admission. However, on day 10, her platelet count dropped from 430×10^9/L to 162×10^9/L, finally reaching a nadir of 72×10^9/L on day 12. Haematology was consulted, and a provisional diagnosis of HIT was made with a 4T score of 6. The diagnosis was confirmed later with anti-heparin/PF4 antibodies detected by immunoassay and a positive serotonin release assay.

The heparin infusion was ceased and an intravenous bivalirudin infusion was commenced. Bivalirudin is a direct thrombin inhibitor and has an elimination half-life of 30 min. It was commenced at a rate of 0.15 mg/kg/hour with an APTT target of 55–75 s and withheld four hours before free flap surgery. The patient underwent surgery on day 15, 72 h after her HIT diagnosis, when her platelet level was back within normal range. Ideally, anticoagulation should not be interrupted 72 h after a new HIT diagnosis. However, due to the urgent nature of the procedure, we used a normal platelet count as a marker of resolving platelet hyperactivity and proceeded with her surgery: open reduction internal fixation of tibia fracture and gracilis free flap reconstruction.

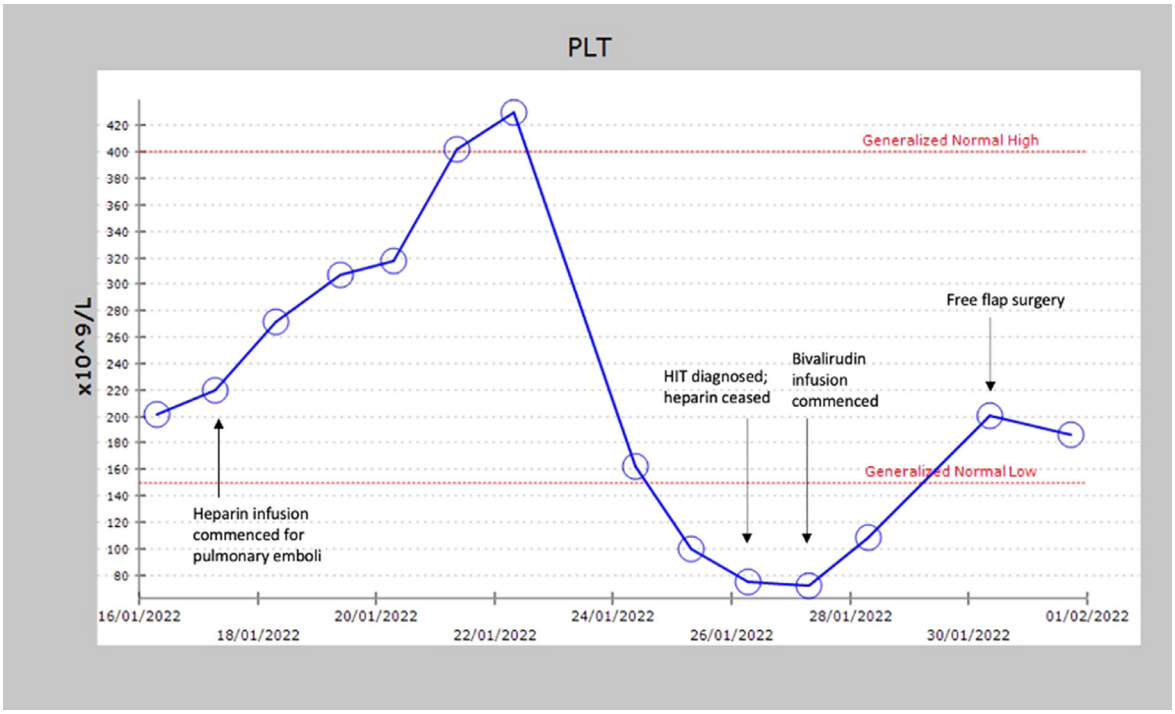

Figure 1 Platelet count from admission to free flap surgery. Note that the level of platelet dropped below normal levels 10 days post commencement of heparin infusion. Successful free flap surgery was carried out the same day that platelet levels returned to normal range.

Haematology was again consulted about an intraoperative alternative to heparinized saline for flushing the microsurgery anastomosis. Danaparoid, a low-molecular-weight heparinoid that works via inhibition of Factor Xa and Factor IIa was recommended as a substitute. Danaparoid contains different protein binding properties and is commonly used as a treatment for HIT. Intraoperatively, diluted danaparoid (3750 units in 500 ml of normal saline) was used for flushing the anastomosis vessels. A bilivarudin infusion was recommenced immediately post-operatively, while the patient was in recovery. This perioperative anticoagulation protocol enabled a successful free flap reconstruction in a patient newly diagnosed with HIT.

The following week, a second free flap reconstruction was required for coverage of the patient's fractured right calcaneus. The same peri-operative protocol was followed and the patient underwent a successful radial forearm free flap reconstruction.

In conclusion, a high index of suspicion should be maintained for HIT in free flap patients. If only recognized post-operatively, rates of free flap success are 7.1% (1/14 patients) in the current literature.[1–5] However, we have demonstrated how pre-operative diagnosis of HIT and institution of a HIT-specific anticoagulation protocol may facilitate two successful free flaps in a patient newly diagnosed with HIT.

Financial disclosure

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Ethical approval

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Conflict of Interest

None.

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Using a ChatBot to support clinical decision-making in free flap monitoring

Dear Sir,

Diligent and accurate post-operative monitoring of free flaps is critical to success in microvascular surgery. [1] Disruption to arterial inflow or venous outflow result in partial or complete flap loss. Timely recognition of a change in flap perfusion is required to enable an intervention that may salvage the situation.[2] Delays in recognition reduce the effectiveness of any intervention, increase the re-perfusion injury and therefore the likelihood of a no-flow phenomenon and flap loss.

Clinical evaluation is considered the gold standard for free flap perfusion assessment. Specifically the colour, temperature, turgor and capillary refill time are serially monitored. This requires no specialised equipment, but does rely heavily on the experience of the evaluator. Even with the most experienced assessors clinical monitoring can be difficult and imperfect. Furthermore, decision making as to what to do with the clinical findings can also be challenging, especially for more inexperienced members of the team. Flap monitoring charts and escalation protocols are ubiquitous amongst microsurgical departments and can facilitate converting flap observations into flap monitoring decisions and potentially salvage a compromised free flap.

A systematic review by Johnston et al. investigated factors affecting failure to escalate care and rescue a situation in surgery.[3] Key areas identified were recognition that there is a problem and communicating this effectively to the team. Furthermore, the hierarchical structure of medical teams and communication issues within this structure were also identified as a major cause of failure to escalate. Digitally transforming paper-based pathways may therefore break down the recognition-communication barrier, help facilitate better team communication and ultimately lead to improve patient outcomes.

ELIZA, developed in 1966 by Joseph Weizenbaum, is the first known example of a computer programme capable of conversation between human and machine.[4] ELIZA used early natural language processing (NLP) to return open-ended questions to users, simulating person-centred psychotherapy. Many years later in 1994, the term "ChatterBot" was coined by Michael Mauldin, creator of the first verbal-robot for Windows and the internet, to describe these conversational programs.[5] The term has now been shortened to ChatBot, a word that many people are now familiar with.

A ChatBot can be defined as ‘a computer program designed to simulate conversation with human users’. They are designed to convincingly simulate the way a human would behave as a conversational partner, but are not traditionally deemed to be full artificial intelligence. Whilst ChatBot’s are commonplace in fin-tech, sales, customer relationship management and retail, use within the field of healthcare is relatively new.[6] We describe the early adoption and case use of a ChatBot to support clinical decision-making support for free flap monitoring – the ‘FlapBot’.

We developed our NLP conversational chat agent, the FlapBot, using the Dialogflow ES Application Programme Interface (API) (Google, Palo Alto, California, United States) based on guidelines developed at our institution. Since the Dialogflow ES API does not have its own chat interface, Google Cloud Platform Console was used to integrate Dialogflow with Kommunicate (Kommunicate Intentive Technologies, Middletown, Delaware, United States). Kommunicate is a chatbot service that allows the integration of a chat widget into a website. The FlapBot was designed using questions and replies relevant to flap monitoring, with videos depicting different types of flap perfusion and audio samples representing different types of vascular inflow. This enables the FlapBot to be able to guide a user through the assessment and decision making on free flap assessment. The FlapBot was then trained to provide appropriate responses based on context, events, training phrases, action and parameters (link to video). We then deployed the Kommunicate widget containing the FlapBot user-interface to a webpage (Figure 1).

There are multiple advantages of the FlapBot, in conjunction with clinical assessment, compared to traditional paper-based pathways of flap monitoring and escalation. Built-in smart rich messaging with elements such as suggested replies, lists, carousels, and buttons enhances interactivity which we believe facilitates clinical escalation in a compromised flap. Integrating clinically relevant JPEG, GIF, MP3 and MP4 files into ChatBot responses provides the assessing clinician with direct visual and audio comparison of flap parameters such as colour, capillary refill time and doppler waveforms (Video 1). The ability to track who is using your chatbot and what their concerns are is also very powerful. Access to past conversations is possible using Kommunicate so that thematical analysis of common concerns can be addressed educationally. We provide free access to the baseJ JavaScript Object Notation (JSON)code of the FlapBot which can be deployed to any institution’s website, staff intranet page, WhatsApp business

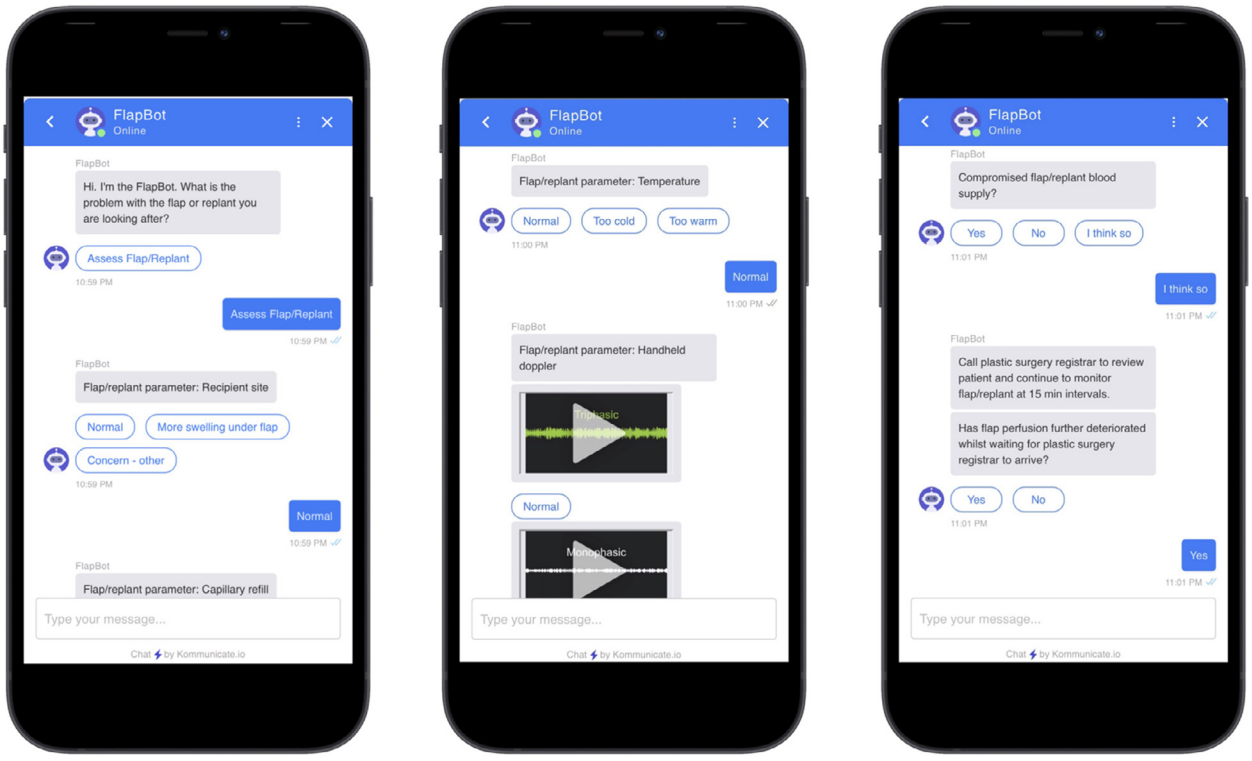

Figure 1 FlapBot user-interface display using the Kommunicate widget.

account, smartphone or tablet application (https://github.com/SteveRA89/FlapBot). Future work around the safety, acceptability and effectiveness of the FlapBot compared to traditional methods of free flap monitoring and escalation are required to determine the true value of this technology.

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Authorship

All listed authors contributed to; 1) Conception and design, acquisition of data, 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 published; 4) agreement to be accountable for all aspects of the work.

Ethical approval

Not required.

Declaration of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.04.072.

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Two-stage procedure of free abdominal flap with ptotic skin paddle for unilateral breast reconstruction

Dear Sir,

Ptotic breast could be reconstructed with a skin paddle by a free abdominal flap.[1] To reconstruct a more aesthetically pleasing breast without patchwork-like scar, a two-stage procedure was done using a tissue expander (TE).[2] When the nipple-areolar complex (NAC) was resected, although a two-stage procedure was performed, it was difficult to get enough expansion around the center of the breast. Around the inframammary fold (IMF) of a ptotic breast, an invisible part confirmed from patient's front exists. After two-stage procedure, if a skin paddle could be made in this part, ptotic breast reconstruction could be performed without a visible patchwork-like scar. This method was described as "ptotic skin paddle procedure." The purpose of this study was to introduce this technique and compare its results with those of the single-stage reconstruction.

A total of 38 female patients who underwent ptotic breast reconstruction with an abdominal free flap were enrolled in this study. These patients underwent total mastectomy and no patients underwent nipple-sparing mastectomy.[3] Moreover, they did not intend to undergo mastopexy or breast reduction of the contralateral breast.[4] Because enough skin expansion could not be obtained, the ptotic skin paddle procedure was not indicated for patients with a prior radiation.

A group of patients who underwent the "ptotic skin paddle procedure" was compared to a group of patients who underwent the single-stage reconstruction. Basic patient characteristics (age, BMI, operation time, blood loss, laterality of breast cancer, smoking status, history of laparotomy, prior radiation, and immediate reconstruction rate), inserted flap weight, flap fat necrosis rate, the rate of chest wound healing delay, and the rate of visible skin paddle are compared.

In the first stage of the "ptotic skin paddle procedure", TE was placed under the pectoralis major and serratus anterior muscles. The caudal margin of the pocket was caudal to the IMF of the healthy contralateral side. TE used 133 SX or MX styles (Allergan) because this procedure needed a high projection. In the second stage, the abdominal fat flap on the ipsilateral pedicle side was dissected as wide as possible. The pectoralis major muscle was dissected away from the mastectomy skin flap and the abdominal flap was inserted in this space. The proximal and distal sides of the inserted flap corresponded to Zones 3 and 2, respectively. The region of the ptotic skin paddle corresponded to the side proximal to Zone 2. After deep inferior epigastric artery/vein and internal mammary artery/vein anastomoses, the patient was let in a sitting position. The IMF that was not visible from the patient's front was incised. Then, the ptotic skin paddle invisible from the patient's front was exposed. The IMF was sutured to the periosteum using a 3-0 nylon (Figure 1 and 2).

Twenty-one patients underwent the single-stage reconstruction. The ptotic skin paddle group consisted of 17 patients. In the ptotic skin paddle group, the immediate reconstruction rate was significantly lower than that in the single-stage group (0% vs. 61.9%, respectively; $P < 0.001$). All patients in the single-stage group needed a visible skin paddle for ptotic breast reconstruction. In the ptotic skin paddle group, two patients (11.8%) could not be concealed in the invisible part around the IMF. However, there was a significantly lower rate in the ptotic skin paddle group than in the single-stage group ($P < 0.001$). No significant differences were found between the two groups with respect to the other characteristics. The median vertical width of the ptotic skin paddle was 3.1 cm (range: 1.4-4.1 cm).

The extension direction of TE assumes the shape of an arch. The chest skin is needed the most around the center of the breast. When the quantity of native skin is little, the enough expansion of TE is difficult. Considering these factors, although a two-stage procedure was performed, it was difficult to reconstruct the breast ptosis without the skin paddle. The purpose of exposing the ptotic skin paddle was not only improving these factors but also in covering the abdominal skin that was sacrificed for harvesting abdominal flaps (Figure 1).

In immediate reconstructions with most of mastectomy flaps preserved, when NAC reconstruction could be performed on the skin paddle, all skin paddles could be concealed finally. In these cases, it could be reconstructed a breast without patchwork-like scar finally. In the "ptotic skin paddle procedure", although the ptotic skin paddle could be concealed at the time of breast reconstruction, this skin paddle could slide down gradually and became visible from the patient's front, especially for heavy flaps. However, in most patients, ptotic breast reconstruction could be performed without a visible patchwork-like scar using this procedure.

This study has a limitation. The average breast size of Asian women is not as large and ptotic as that of Caucasians[5]. Therefore, this study could be applied to a limited number of cases.

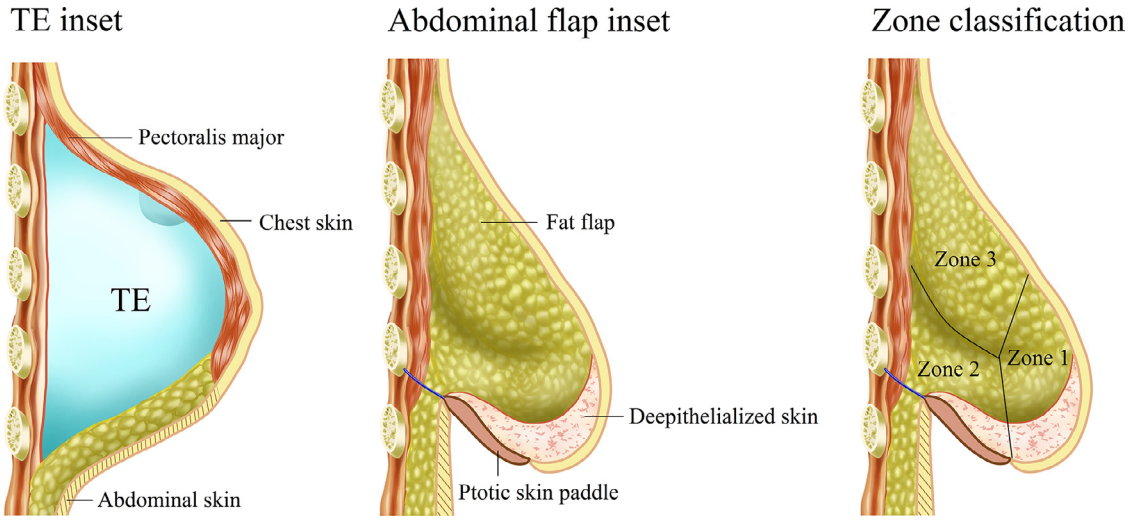

Fig. 1 Two-stage procedure with ptotic skin paddle The region of the ptotic skin paddle corresponded to the side proximal to Zone 2. The IMF that was not visible from the patient's front was incised. The IMF was sutured to the periosteum using a 3-0 nylon. TE, tissue expander IMF, inframammary fold. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

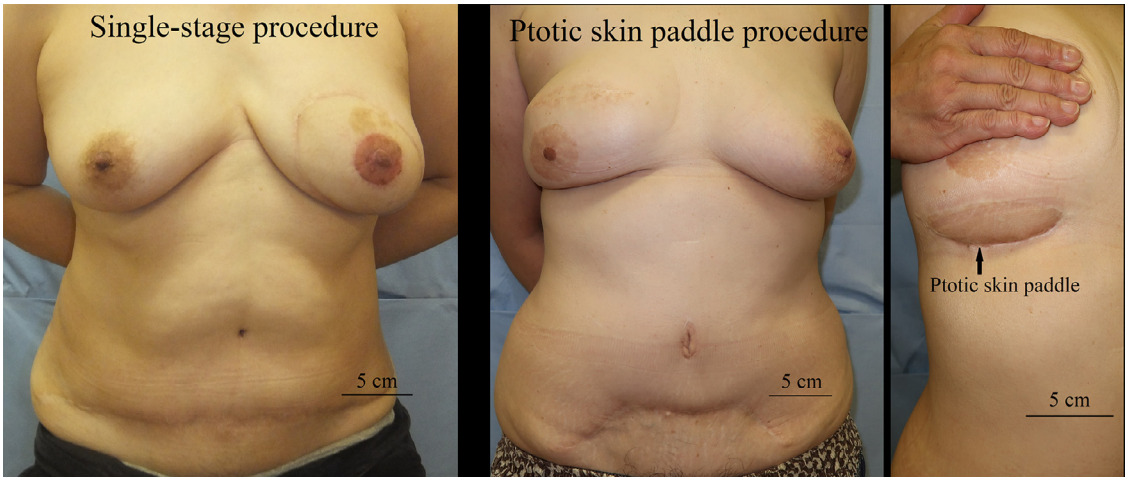

Fig. 2 Single-stage procedure and the ptotic skin paddle procedure without visible skin paddle The ptotic skin paddle could be concealed from the patient's front.

Funding

None

Ethics

Not required

Declaration of Competing Interest

None

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Long-term health status and systemic complaints following implant-based, autologous, or tertiary breast reconstruction

Dear Sir,

Introduction

Breast reconstruction rates have increased over the past years. It helps restore body image and improve Quality of Life (QoL).[1] However, there are concerns about the potential association between silicone breast implants and systemic symptoms.[2] Literature on breast implant illness (BII) among reconstructive patients is scarce, while it is essential for these women to know whether any health risks are associated with each reconstructive method. Therefore, the aim of our study was to compare systemic symptoms and health-related QoL of IBBR patients with autologous breast reconstruction (ABR) patients, to assess whether there is an association between the type of breast reconstruction and health complaints.

Patients and methods

We performed a multicenter, cross-sectional study in Maastricht University Medical Center and Zuyderland Medical Center in November and December 2020. Women who underwent IBBR or ABR between 2015 and 2018 were invited to an online questionnaire (paper version available), containing items on demographics, medical/surgical history, health complaints, and health-related QoL (SF-36). More detailed medical information, e.g. tumor staging, was obtained from medical records. IBBR involved two-stage reconstruction with subpectoral placement of a tissue expander followed by the definitive prosthesis. ABR included free flap reconstruction, e.g. DIEP flap or LTP flap. Full reconstruction by autologous fat transfer was excluded. Mean differences in SF36-scores were adjusted for potential confounders with multivariable linear regression analysis. Multivariable logistic regression was performed to compute differences in symptom prevalence adjusted for potential confounding variables, and to identify independent predictors of health complaints.

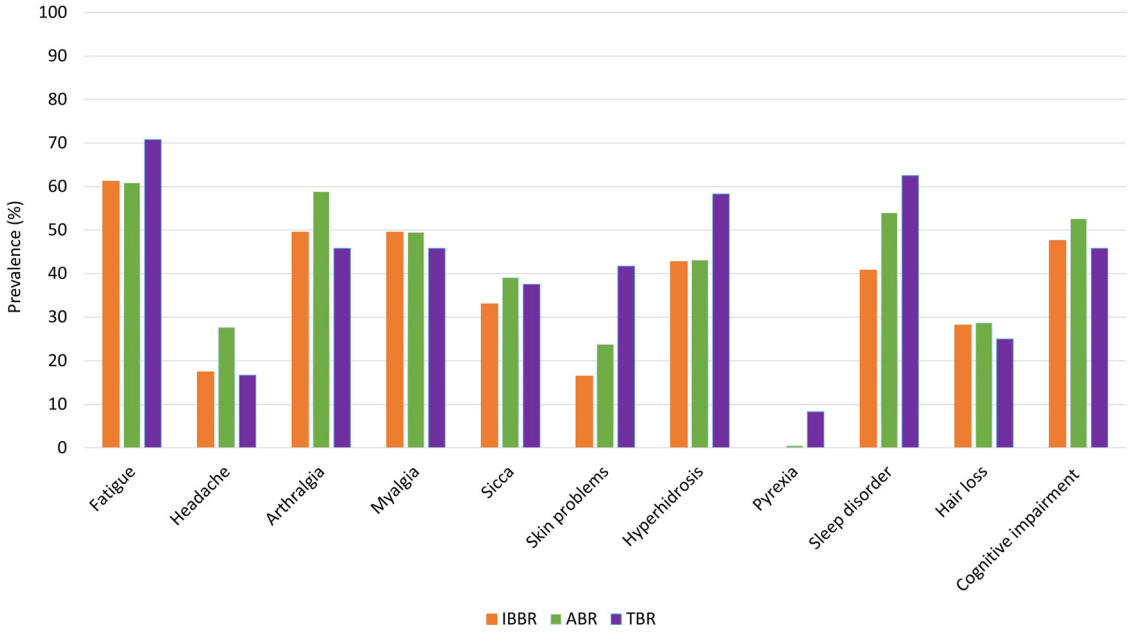

Fig. 1 Prevalence of self-reported health complaints in IBBR, ABR, and TBR patients.
The prevalence of systemic complaints was expressed as the percentage of patients who reported a score >2 (more than rarely).

Results

Fifty percent of the 887 women alive responded, but after excluding non-eligible patients or inadequate responses we were able to analyze 329 responses (103 IBBR; 202 ABR; 24 tertiary ABR). The mean follow-up duration after reconstruction was 46.6 ± 15.1 months. Participants had a mean age of 55.5 ± 9.9 years and a mean BMI of 25.7 ± 4.1. Women after ABR had a higher BMI ($p < 0.001$) than women after IBBR and were more often non-smokers ($p < 0.001$). They were found to have a relatively higher lymph node (N) stage ($p = 0.001$) and underwent more often radiotherapy ($p < 0.001$), hormone therapy ($p = 0.040$), and delayed reconstruction ($p < 0.001$). The complication rate was similar between IBBR and ABR (*Supplement 1*).

Twenty-four women underwent tertiary autologous breast reconstruction (TBR) after failed IBBR for the following reasons: capsular contracture (24%), pain (24%), aesthetically disappointing outcome (17%), physical complaints/BII (12%), infection (9%), implant rupture (9%), and implant extrusion (3%).

Systemic health complaints occurred equally following IBBR, ABR, and TBR. The most common complaint per group was fatigue (61, 61, and 71%, respectively). No significant differences in adjusted symptom prevalence were found between IBR and ABR, nor between ABR and TBR (Fig. 1). The severity of almost all symptoms ranged from 1 (never) to 5 (always) in all groups and was distributed equally across all groups, with the exception of skin problems (*Supplement 2*).

Logistic regression showed that, in particular, age, BMI and chemotherapy were independent predictors of common systemic symptoms, but the type of reconstruction was not (*Supplement 3*). Adjusted for possible confounders, no significant differences in mean SF-36 scores were found between IBBR and ABR, nor between ABR and TBR.

Discussion

This study showed no significant difference in the prevalence of self-reported health complaints, nor in health-related QoL in women 2–5 years after IBBR or (tertiary) ABR.

While ABR has been repeatedly shown to result in better breast-related QoL compared to IBBR, it does not automatically result in superior physical outcomes.[1] ABR requires more extensive surgery and is associated with higher complication rates. Yet, IBBR has a higher rate of reconstruction failure.[3] In addition, BII is increasingly an indication for explantation which may lead to improvement of complaints in about 75% of the cases.[4] Selection bias and confounding factors, however, distort the results in research into BII. Age, menopause and fibromyalgia, among others, may play a role in the development of complaints.[2] In reconstructive cases, the side-effects of cancer treatment might be confused with implant-related complaints. ABR is considered a good alternative to failed implant reconstruction.[5] Therefore, we included tertiary ABR in the analyses, as these may be the cases with the most severe physical complaints. Nevertheless, our results suggest that either complaints within this subgroup are not more frequent or that they improve after tertiary reconstruction.

Table 1 Unadjusted and adjusted differences in mean SF-36 scores between IBBR, ABR, and TBR patients.

Dependent variable	IBBR ($n = 103$)	ABR ($n = 205$)	TBR ($n = 24$)	Unadjusted difference IBBR-ABR (95% CI)	*P* value	Adjusted difference IBBR-ABR (95% CI)	*P* value	Unadjusted difference ABR-TBR (95% CI)	*P* value	Adjusted difference ABR-TBR (95% CI)	*P* value
Physical functioning	81.2 ± 20.7	80.9 ± 19.4	82.0 ± 22.0	-0.2 (-4.9-4.5)	0.935	0.3 (-6.2-6.7)	0.926	1.0 (-7.4-9.4)	0.809	5.0 (-5.5-15.5)	0.349
Role physical	73.9 ± 39.1	72.5 ± 38.7	77.1 ± 35.3	-1.3 (-10.6-7.9)	0.776	-0.7 (-14.4-12.9)	0.916	4.6 (-11.8-20.9)	0.583	10.6 (-11.7-32.8)	0.350
Role emotional	88.2 ± 27.7	81.5 ± 35.2	87.5 ± 30.8	-6.7 (-14.5-1.2)	0.095	-8.8 (-20.5-2.9)	0.139	6.0 (-8.8-20.8)	0.426	6.3 (-14.2-26.6)	0.546
Vitality	65.4 ± 19.1	60.6 ± 20.3	61.7 ± 14.1	-4.8 (-9.5-0.0)	**0.048**	-4.2 (-10.7-2.3)	0.204	1.1 (-7.3-9.5)	0.800	3.4 (-7.3-14.2)	0.527
Mental health	76.0 ± 16.2	76.1 ± 15.7	72.3 ± 10.9	-0.1 (-3.-3.9)	0.979	0.7 (-4.4-5.8)	0.794	-3.8 (-10.3-2.7)	0.255	-4.2 (-12.6-4.1)	0.319
Social functioning	83.1 ± 20.5	79.8 ± 22.5	76.6 ± 25.6	-3.4 (-8.6-1.8)	0.204	-3.8 (-11.2-3.6)	0.310	-3.2 (-12.9-6.5)	0.517	-4.7 (-17.6-8.2)	0.474
Bodily pain	72.6 ± 23.1	73.4 ± 22.7	69.2 ± 23.7	0.8 (-4.6-6.2)	0.771	0.9 (-6.9-8.8)	0.813	-4.2 (-13.9-5.5)	0.392	-0.6 (-12.9-11.7)	0.918
General health	68.1 ± 19.6	67.0 ± 22.2	63.5 ± 18.9	-1.1 (-6.2-4.0)	0.671	-1.3 (-8.2-5.6)	0.717	-3.5 (-12.8-5.9)	0.466	-4.2 (-15.8-7.5)	0.480

Independent variables computed in this model: BMI, smoking, tumor classification (N stage), chemotherapy, radiotherapy, hormone therapy, reconstruction type, reconstruction timing, follow-up duration after reconstruction.

We are aware that our study was limited by the cross-sectional design, the limited number of patients included and the potential selection bias that occurred. More confounding variables may be involved, which we did not control for. Participants may have been exceptionally satisfied or dissatisfied with their result and therefore the outcomes of this study should be appraised carefully.

Conclusion

Long-term health-related QoL after IBBR and after ABR is similar. In this study, no association was found between IBBR and an increased risk of systemic complaints. However, known predictors of physical symptoms in breast cancer survivors play a role in both Table 1 groups.

Funding

None.

Ethical approval

The study was approved by the local Ethical Committee of both participating centers (METC2020-2232; METCZ20200113).

Declaration of Competing Interest

None declared.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.04.003.

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Free flap breast reconstruction using a novel robotic microscope

Dear Sir,

Introduction

In recent years a series of novel robotic systems customized towards microsurgery are being developed.[1] One such system is the RoboticScope® by BHS Technologies, utilizing a high-definition camera system connected to an augmented reality headset. A clear image with high magnification is being projected in front of the surgeon's eyes. Motion tracking translates the surgeon's head movements onto the camera system via a multi-axis robotic arm.

All authors listed above have contributed in the creation of this article by performance of surgical procedures, data analysis or writing the article. The first and last author contributed in creation of the final manuscript and supervision of this project.

Table 1 Times (min) for comparable surgical steps of the vascular anastomosis in comparison.

	I	II	III	IV	V
Arterial Anastomosis	27,22	22	22	15	14
Venous Anastomosis	6,8	4	6	4	4
Overall Time for Anastomosis	42,09	38	29	26	26
Flap ischemia	68	63	59	46	46

We report our team's findings of the world's first series of autologous free flap breast reconstructions using this novel robotic microscope. Data analysis was approved by the ethical committee under protocol number 2022-020-f-S.

Methods

Ten autologous breast reconstructions via free tissue transfer with DIEP or PAP flap were performed by utilizing the robotic microscope. These reconstructions were matched against five reconstructions using a conventional operating microscope (Zeiss Opmi,Vario). After completion of surgery, operating staff reported about the handling of the robotic microscope. Times of each surgical step during vessel anastomosis performed with or without the robotic microscope were analyzed, including ischaemia times and times for arterial and venous anastomosis(Table 1). Statistical analysis was performed using the comparative students *t*-test.

Results

Average time after induction of anesthesia and surgical preparations such as sterile draping of all instruments and the patientś placement in the operating room was 32 min (+/- 13 min) in the standard group and 41minutes (+/- 2 min, $p = 0.26$) in the robotic group. Time for arterial anastomosis was 21 min (+/- 4 min) in the robotic group and 17 min (+/- 6 min, $p = 0.39$) in the control group. Time for venous anastomosis via coupler device was 5 min (+/- 1 min) in the robotic group and 4 min (+/- 3 min, $p = 0.51$) in the control group. Overall time for anastomosis was 31 min (+/- 7 min) and 25 min (+/- 7 min, $p = 0.30$), respectively. Flap ischaemia was 54 min (+/- 8 min) in the robotic group and 52 min (+/- 22 min, $p = 0.87$) in the control group. Surgeons

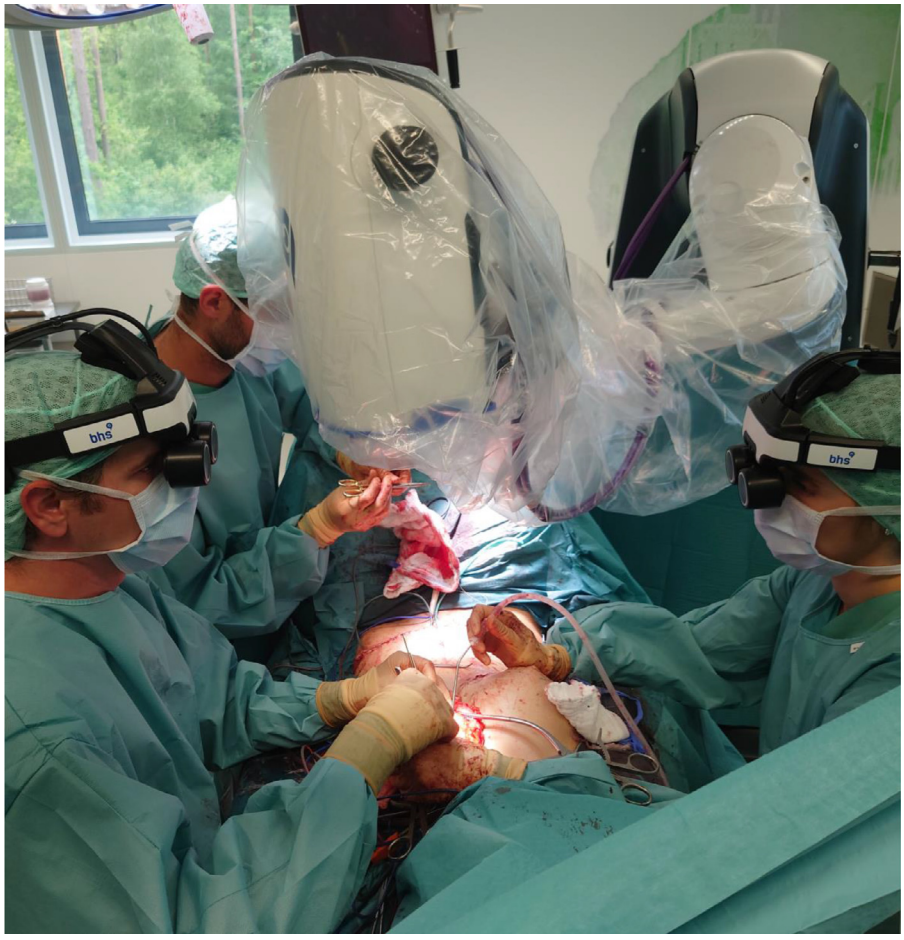

Figure 1 Surgeons operate the robotic microscope via head movements that are recorded by an augmented reality headset, a foot pedal activates the menu. The surgeon navigates through the menu via head movements. While navigating, movements are not being translated into movements of the robotic microscope. We have consent to publish the image for Figure 1 and declare no privacy breach or copywright infringemend if the image is published.

reported a reduced flexion in the neck and a straight position of the spine. Surgical staff reported easy handling of the microscope and little difference in terms of preparation or adjustment before surgery.

No complications occurred during surgery in either patient group. Patients were discharged from the hospital after a mean of 7 days (+/- 3 days) in the robotic group and 6 days (+/- 1 days, $p = 0.24$) in the control group.

Discussion

All surgeries performed using the robotic microscope were performed successfully and safely. Data analysis showed an experienced learning curve while performing surgery with the novel robotic microscope. This was visible in the times of vessel anastomosis and reduction of flap ischaemia. Similar learning curves have been described and can be explained by the need for adjustment to a novel operating system and techniques.[2]

During surgery the surgeons were able to position themselves more ergonomically with a straight spine and relaxed neck/cervical region, due to the flexibility of the augmented reality headset and the ability to sit independently from the cameraś angle of adjustment (Figure 1). While currently up to 80% of surgeons report of pain during surgery of which 27% describe the use of an operating microscope as the trigger,[4] the use of a robotic microscope may aid in reducing occurrence of back illness and physical stress.[3] Other robotic systems, such as the da Vinci Surgical System, have already shown the "side effect" of better ergonomic posture of surgeons during procedures.

Flexibility to choose different angles during pedicle preparation was achieved through the head motion-controlled system to the robotic arm. Therefore, all adjustments to the focus, angle and magnification were performed in a hands-free manner while being able to proceed with the surgery. The system only operates when activating a food pedal. This aspect may ultimately increase safety and improve complication management.

Additional weight e.g. of a virtual reality headset during procedures can presumably cause stress and tension in the cervical region. Whereas members of our team did not experience discomfort or neck pain after wearing the virtual reality headset for an average of 60 min and we expect the more physiological upright sitting position to be beneficial.

Due to the hands-free navigation, intraoperative imaging and continuous filming can be performed during important steps such as control of the vesselś back wall or patency tests of the anastomosis from different angels.

Notably, a disequilibrium between visualized or experienced movement and postural positioning while using an augmented or virtual reality headset can be the cause of motion sickness or "cybersickness",[5] which was not observed by our operating surgeons. Limitations of our study consist of a retrospective analysis of a small patient cohort and procedures performed by different surgeons.

Ultimately, these results are promising and show the possibilities of new robotically assisted surgical systems. More procedures need to be performed to push the learning curve and utilize the system's full potential.

Financial disclosure statement

The authors received no funding for performing this study.

Ethical approval

Ethical approval was acquired for retrospective data analysis of all aforementioned procedures.

Declaration of Competing Interest

The authors have no conflict of interest regarding this study.

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Rhinoplasty in adult patients with isolated ala nasi cleft

Dear Sir,

Introduction

Tessier facial clefts number 1, 2, and 3 are lateral nasal clefts located at the junction between the products of the median and lateral nasal processes.[1] The ala nasi cleft only involves the lateral nasal wall, inferior and lateral to the nasal bone and consists less than 1% of all craniofacial clefts. It is a full-thickness defect including skin and nasal cartilage, sparing the nasal bone and septum[2].

Among the few articles about the reconstruction of congenital isolated alar defects, only a small number reported adult cases (overall 14 cases).[1-4] The final goal of the various reported surgical techniques was to provide esthetic reconstruction of the nasal cleft. In these reports, reconstructive rhinoplasty with multi-layer restoration has not been generally utilized. However, adult patients with alar nasi clefts and other nasal deformities seek complete nasal refinement with reconstructive rhinoplasty. Herein, we present a new surgical technique for reconstructing the alar cleft in combination with rhinoplasty with remarkable results in terms of aesthetics and functionality.

Patients and methods

A retrospective medical and photographic record analysis was performed in rhinoplasty patients between April 2011 and December 2019. Four patients having isolated ala nasi cleft were identified out of 2036 patients. A complete questionnaire including medical and family history and psychologic assessment was filled for each patient. CT scan of face was ordered for evaluation of regional tissues and concomitant anomalies (Supplementary material 1). All patients had the standard pre-, intra-, and post-operation photos.

Surgical technique

The senior surgeon (AAS) used the external rhinoplasty approach with inverted V trans-columellar incision under general anesthesia in all cases. In the cleft side, a full-thickness incision was extended from the deepest point of the cleft through the alar crease to the superior part of the nasolabial fold (Figure 1 and 2). Dissection proceeded in a standard open rhinoplasty fashion. The lower lateral cartilage was severely hypoplastic in one case, and there was agenesis in the others on the cleft side (Supplementary material 2). The malformed alar cartilage was separated from the opposite side in the midline, and septal flaps were elevated bilaterally. A rectangular cartilaginous graft from the septal cartilage was harvested and fixed to the side of the septum as a caudal septal extension graft (Figure 1). The surgeon preferred the modified seagull wing technique, using a conchal

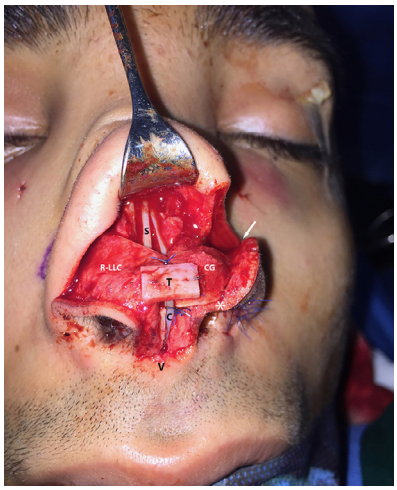

Fig. 1 The intra-operative photo of reconstructive rhinoplasty in a 22-year-old male patient with left side isolated ala nasi cleft. The nasal skin was degloved using the external rhinoplasty approach with inverted V trans-columellar incision (V). In the cleft side the incision extended from the deepest point of the cleft (*) through the alar crease to the superior part of the nasolabial fold (white arrow). The septal caudal extension graft (C) was placed on the left side of the deviated septum (S). The left side agenetic alar cartilage was rebuilt using conchal cartilage graft (CG). The left side reconstructed alar cartilage and the non-cleft side lower lateral cartilage (R-LLC) were secured to the septal caudal extension graft using the tongue-in-groove technique. Tip graft (T) was placed to treat the residual asymmetries and contour deformities. (Pre- and post-operation photos of this patient are shown in Supplementary material 7).

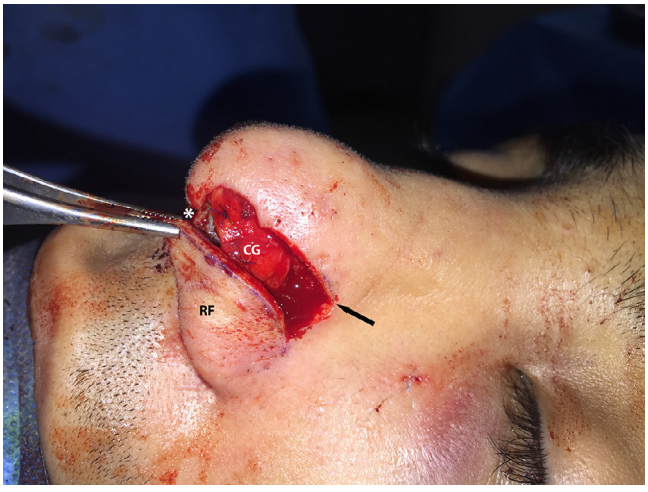

Fig. 2 The intra-operative photos of reconstructive rhinoplasty in a patient with left side isolated ala nasi cleft. In the cleft side, a full-thickness incision was extended from the deepest point of the cleft (*) through the alar crease to the superior part of the nasolabial fold (black arrow). After completing the cartilaginous reconstruction (CG), a posteriorly based rotation flap (RF) of the ala was released entirely. This flap was rotated down and medially to meet the anterior edge of the defect.

cartilage to rebuild the alar cartilage on the cleft side[5]. The conchal cartilage graft was fashioned as a lower lateral cartilage (Supplementary material 3). This graft was secured to the remnant lower lateral cartilage and/or vestibular skin (Figure 1). The medial portion of this graft and the medial crus of the alar cartilage on the non-cleft side were secured to the septal caudal extension graft for good tip support using the tongue-in-groove technique. Interdomal and deflaring sutures were then placed for further tip refinement. Residual asymmetries and contour deformities were treated with shield or cap grafts. After completing the cartilaginous reconstruction, a posteriorly based rotation flap of the ala was released entirely. This flap of the ala was rotated down and medially to meet the anterior edge of the defect and was then fixed (Figure 2 and Supplementary material 3). In this stage, a crescent-shaped composite graft was harvested from the auricle (Supplementary material 4) and used to fill the gap in the alar crease after redraping the nasal skin (Supplementary material 5). The graft was fixed in place by 6–0 nylon sutures. The trans-columellar and rim incisions were closed, the dorsum of the nose was taped, and a dorsal thermoplastic splint was placed.

Result

Patients (1 female, 3 males) had uneventful primary healing with no notching. In one patient, there was a mild hypertrophic scar (Supplementary material 6) which was managed with repeated intralesional injection of corticosteroids. The follow-up ranged from 9 months to 3 years, with no significant complaints regarding the shape of the nose and the scar (Supplementary material 7).

Discussion

In contrast to our technique, soft tissue restoration was the only aim of the reported procedures for isolated ala nasi cleft management[1-4]. Almost in all these methods, the alar cartilage was not restored, which is important for the reconstruction of the external and internal nasal valves. Additionally in adult cases, concomitant nasal deformities were not addressed with a complete septorhinoplasty operation in these reports. Alar notching, graft color mismatch and necrosis, significant discrepancies between the two nostrils and using a secondary flap with additional incision lines to fill the created defect were some of their drawbacks for suboptimal cosmetic results.[3-4]

The limitations of this study are the small number of cases and short duration of follow-up. Additionally, we did not use a scale to assess patients' satisfaction after the operation.

Authorship contribution

Sazgar AA: Development of the surgical technique, study concept and design and revision of the manuscript.

Jafari M: Drafting and revision of the manuscript and study concept.

Sazgar AK: Acquisition, analysis and interpretation of data, preparation of photos and table, revision of the manuscript.

Level of evidence

4

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Ethical approval no

IR.TUMS.VCR.REC.1397.650

Patient consent for photo publication

Written consent received.

Declaration of Competing Interest

None

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.04.062.

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Patient expectations of cosmetic appearance after complex facial surgery in a low-income country

Dear Sir

Introduction

In October 2018, the Facing Africa surgical charity, which primarily manages maxillofacial disorders, performed reconstructive facial surgery on twenty-one patients in Ethiopia. The primary pathology treated was noma (cancrum oris) (Table 1). Whilst the primary endpoint for this surgery was most often functional correction there was often at least some degree of change in the patient's facial appearance.

Managing cosmetic expectations for patients post facial operations can be challenging. The preoperative utilisation of patient photographs depicting pre and postoperative appearance can help facial surgery patients have more realistic expectations.

By showing patients pre and postoperative photographs of patients who had similar operations, the goal of this study was to align patient expectations with actual postoperative appearance.

Methods

This study involved twenty-one patients who underwent facial surgery at the Nordic Medical Centre in Addis Ababa, Ethiopia. As part of preoperative counselling, the patients were shown pre and postoperative photographs of previous patients of Facing Africa who had similar procedures. After their operations, the patients were given the opportunity to see themselves in a mirror on day one postoperatively. On the day of discharge, patients were privately interviewed via interpreter. The following questions were asked:

1. How did you feel after seeing the before and after surgery photographs of people who had similar surgery?
2. Is what you saw in the after surgery photographs what you expected to see?
3. How did you feel when you first saw yourself after the operation?
4. Did you look how you thought you would when you first saw yourself after the operation?

The Plutchik model of emotions was used and translated into Amharic and Omoro, the two most common languages that the patients spoke.[1] This gave the patients 32 emotions to choose from to answer the above questions.

Table 1 Pathology of the patient cohort.

Pathology	Number of patients affected
Noma (cancrum oris)	13
Facial trauma	3
Neurofibroma	2
Leishmaniasis involving the nose	1
Odontogenic tumour	1
Fibrous dysplasia/fibroma	1

Results

Eleven of the patients were new patients and ten of the patients were returning patients from previous surgical trips. The ten returning patients did not see pre and postoperative photographs in their preceding admissions.

Admiration ($n = 8$, 38.1%), followed by trust ($n = 6$, 28.6%) were the most common emotions expressed by patients after seeing the pre and postoperative clinical photographs. Thirteen patients (61.9%) stated that the postoperative images were not what they expected to see. Joy ($n = 9$, 42.9%) and admiration ($n = 9$, 42.9%) were most commonly felt by the patients after seeing their appearance postoperatively. Sixteen patients (76.2%) stated that their postoperative appearance was different to what they were expecting.

Discussion

Most of the patients felt admiration or trust after seeing the photographs of patients who had undergone similar procedures. It is hoped that this strengthened the therapeutic relationship between patient and surgeons before their own operations. All patients who had previously been operated on stated that the post surgery photographs were what they would expect. This is likely due to their previous exposure to facial surgery- both from their own personal experience and that of other patients admitted previously with them.

Concerning the patients' personal experiences, most patients felt either joy or admiration when they first saw themselves after their operation.

Although many patients postoperatively had facial features that deviated from a normal appearance, this did not seem to significantly impact on their positive perception of themselves. This has been seen elsewhere in the literature, where patient satisfaction regarding their appearance affects their mental health more than the actual severity of their facial abnormality.[2]

Sixteen of the twenty-one patients did not expect their actual postoperative appearance. Despite seemingly adequate communication, one patient expected that the scarring from Leishmaniasis on her cheeks to be surgically re-

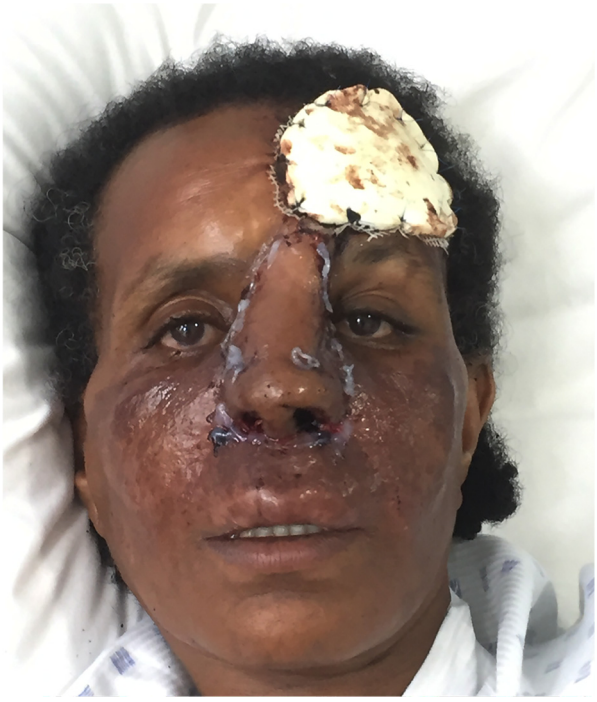

Figure 1 Patient with Leishmaniasis who underwent total nasal reconstruction. Published with the patient's consent.

moved, despite the fact that her primary surgical concern was complete nasal loss necessitating a total nasal reconstruction (Figure 1). This highlights the fact that patient goals may be different to that of the surgical team, whose objective is primarily for functional improvement. Unintended miscommunication, which was probably worsened by language differences, may have reduced the likelihood of similar expectations of both the patient and surgical team.

There are several limitations to this study. Patients may have framed their interview answers in a positive light as to not offend the surgical team. It may be more beneficial to have an outside party perform this research to try to negate this effect. As language is a fundamental component of emotion, translation of emotive descriptors from English to another language may cause errors.[3] The returning patients may have had a more realistic expectation of the change to their facial appearance after this current surgery. Future studies should focus on patients who are naïve to facial surgery for a better understanding of patients' preoperative perceptions and the utility of preoperative education.

Conclusion

The importance of preoperative counselling in patients undergoing complex facial surgery is paramount, especially in low-income countries. Utilisation of pre and postoperative photographs of patients who underwent similar procedures should help prospective patients prepare for often what is quite a dramatic change to their appearance.

Acknowledgments

None.

Ethical approval

None.

Funding

None.

Patient consent for photo publication

Obtained.

Declaration of Competing Interest

None.

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Chest masculinization surgery: Patients top questions validated by machine learning analysis

Dear Sir,

Treating gender dysphoria by performing gender-affirming surgery is a medical necessity that is associated with a better quality of life and lower rates of morbidity and mortality in transgender patients.[1] While the number of gender confirmation surgeries performed by board certi-

Table 1 Pre-Operative and Post-Operative Categories.

Pre or PostOp	Primary Category	#Q
PreOp	Breast Reduction Question	7
	Contraindication to Surgery	11
	Cost/Insurance Coverage	21
	General Transgender Question	9
	Pre-Op Requirements	11
	Recommended Surgical Technique	17
	Surgeon Availability	12
	Surgical Techniques and Logistics	33
PreOp Total		121
PostOp	Dissatisfied with Result	4
	Post-Op Breast Cancer Screening	1
	Post-Op Complication/Symptom	39
	Revision	24
PostOp Total		68
Grand Total		**189**

fied plastic surgeons has continued to rise at a steady rate[2], patients still experience significant barriers to care and are frequently exposed to low quality, biased information about the procedures.[3] One current information resource is Realself.com - a website that features high quality information on plastic surgery procedures and includes a section where users can ask questions and receive answers from verified board certified plastic surgeons. As chest masculinization is the most commonly performed procedure[4], we stratified and analyzed the associated posted questions to better inform plastic surgeons about the questions that are most important to patients seeking to undergo this procedure.

187 questions posted by Realself.com users under the topic of "FTM chest masculinization surgery" were collected using Scrapy, an open-source automated web crawling tool. Each question was then categorized as pre-operative or post-operative, then assigned an additional category developed by the authors based on the question topics (Table 1). A machine learning workflow described in Tseng et al. was then applied to determine the 3 most common preoperative and postoperative patient questions about chest masculinization based on our crowdsourced data (Figure 1).[5]

The majority of questions, 64%, related to pre-operative topics. Patients primarily asked about recommendations for the optimal surgical technique to fit their unique physical features as well as inquiring about additional information regarding various surgical techniques and logistics. Questions about cost, insurance coverage, and surgeon availability were prevalent. The majority of post-operative questions related to complications and symptoms being experienced by patients with 18 asking about nipple graft issues, 8 about surgical site swelling, 6 about sensation changes, 3 about scarring, 3 about bleeding, and 1 about general skin appearance. 4 patients expressed general dissatisfaction with their surgical result while 24 specifically asked about a revision, including questions about whether they specifically need a revision and if a revision would be possible given the details they provided in their post.

Machine learning analysis further validated these priorities, as it confirmed that patients in the preoperative stage were concerned about best approaches to achieve their desired appearance, while post-operative patients were more focused on potential problems with their final results. Furthermore, two preoperative questions were more related to breast reduction surgery rather than chest masculinization, indicating that patients may not have a solid understanding about the difference between the procedures, which could lead to delays in receiving the desired procedure. Highlight-

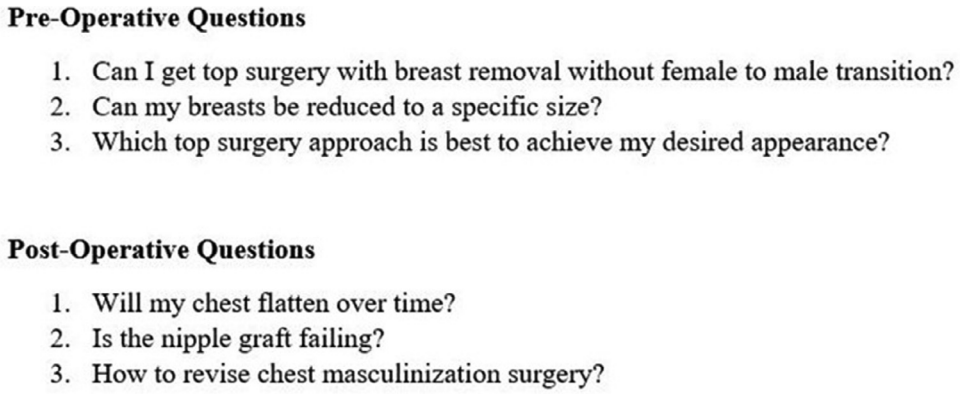

Fig. 1 Top 3 Most Common Pre-Operative and Post-Operative Questions.

ing the differences between these two procedures is especially important for non-binary individuals who may desire a breast reduction to address their gender dysphoria, rather than undergoing surgery to achieve a fully masculine chest.

These 3 most common preoperative and postoperative questions can be utilized in a patient education handout by plastic surgeons and highlighted on a practice's website to ensure patients can easily find the information that they are most likely seeking. This would assist surgeons to better anticipate and address patient concerns and proactively manage their expectations about chest masculinization surgery.

Funding

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Ethical approval

Not required

Declaration of Competing Interest

N/A

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Urethral reconstruction with peritoneal graft in phalloplasty for male transgender

Dear Sir,

Background

One of the goals of penile reconstruction is standing urination. Variations for it have been described since the first total phalloplasty with optional urethral reconstruction using an inlaid skin graft was performed in 1936.[1] The development of urethral reconstruction has been parallel to penile reconstruction. To date, urethral reconstruction in phalloplasty is one of the most challenging procedures. Several techniques have been used for it.

Tube-in-tube technique has been used by surgeons for one-stage total phalloplasty, including abdominal flap phalloplasty, free radial forearm flap, ulnar forearm flap, lateral arm flap, and pedicled anterolateral thigh flap.

A full-thickness skin graft was used for urethral reconstruction with a radial forearm flap as a one-stage phalloplasty and free fibula osteocutaneous flap. Prefabricated urethral reconstruction with a full-thickness skin graft was used in the free lateral arm flap.

Other methods have been used for urethral reconstruction, including bladder mucosal graft, ileum mucosal graft, and double flap technique using free radial forearm flap combined with pedicled anterolateral thigh flap, and mucosal graft.[2]

This study describes urethral reconstruction in anterolateral thigh phalloplasty using a peritoneal graft in the laparoscopic method.

Case

A 33-year-old female was diagnosed gender dysphoria and referred to our clinic for male genital reconstruction and desired anterolateral thigh phalloplasty. The patient's body mass index (BMI) was 25, with no history of smoking or underlying disease. The patient had been receiving testosterone therapy for 3 years and met the criteria for genital

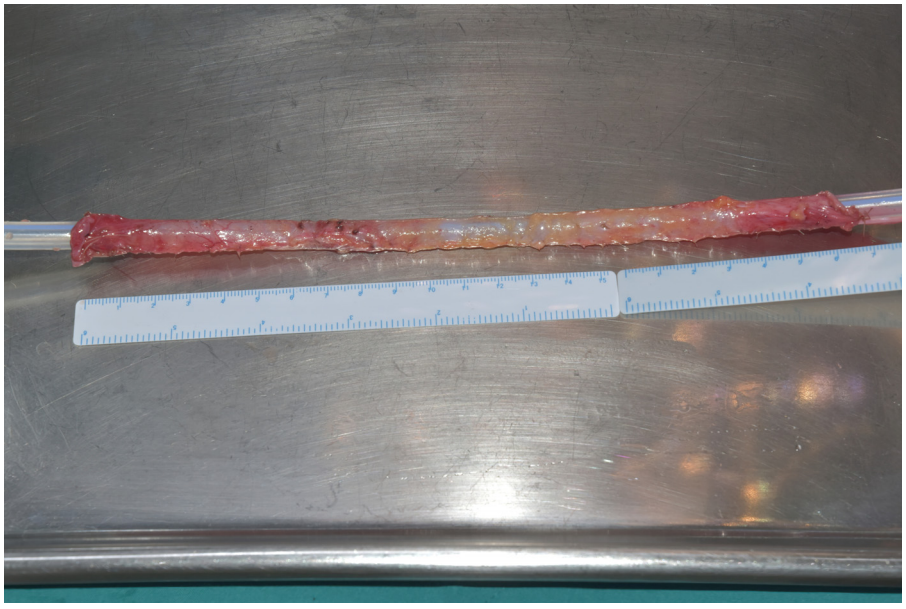

Figure 1 The peritoneal graft is wrapped around the silicone catheter.

surgery for transgender according to the World Professional Association for Transgender Health (WPATH). Hysterectomy and oophorectomy had been performed 4 months earlier. After the patient was informed of the details of the surgical procedure including the options for neourethral reconstruction, the peritoneal graft was selected by the patient's preference.

The non-dominant left thigh was used as the donor. Skinfold thickness at the mid anterolateral thigh was measured as approximately 1.5 cm. The perforator vessels were located using a handheld Doppler device. The position of the prefabricated urethra was marked on the skin. Vaginectomy and urethral lengthening for pars fixa urethral reconstruction with an anterior vaginal flap were performed. Simultaneously, a three-port laparoscopic procedure was performed to harvest a 3 × 15-cm graft from the peritoneum. Then, the graft was sutured inside-out around the silicone Foley catheter number 24 Fr (French). The peritoneal graft was inserted subcutaneously through the pre-tunnel beneath the marking line. A short-leg splint was used for 5 days postoperatively. The Foley catheter was kept in place for 14 days and removed and replaced on alternate days for 6 months (Figures 1, 2).

In the second stage, a 13 × 13-cm anterolateral thigh flap was marked on the skin. The lateral femoral cutaneous nerve was first located and included in the flap. The descending branch of the lateral femoral circumflex artery was identified, and a subfascial anterolateral thigh flap was raised. The pedicled anterolateral thigh flap was relocated to the genital area through the tunnel beneath the adductor muscles. The donor site was covered with a split-thickness skin graft. The pars pendulans were anastomosed to the pars fixa with a silicone Foley catheter number 20 Fr. The lateral femoral cutaneous nerve was anastomosed to the nerves of the clitoris. The urinary catheter was retained for 3 weeks postoperatively.[4] The patient urinated without any complications of fistula. To prevent urethral stricture, the patient was informed to keep the urethral stent for 12 months.

Discussion

Complications of urethral reconstruction in phalloplasty are found to varying degrees in all the techniques. Urethral strictures and fistulas are relatively common in patients undergoing phalloplasty. Thus, several surgeons offer urethral reconstruction as an optional procedure in another stage.[3, 4]

The ideal source for urethral reconstruction should be mucosal in origin. It is well accepted that mucosal grafts are more effective than skin grafts. Buccal mucosa has been used with successful results, but the donor intraoral scar is the drawback. Based on the authors' observation, the area of the 3 × 15 cm oral mucosa segment was too large, and the patient did not agree to use the oral mucosa. The mucosa was described as an alternative method but without generalized agreement.[1]

The double flap technique of the anterolateral thigh combined with radial forearm flap is used currently; however, urethral complications and flap failure were the limitations of this method.[2] Surgeons have performed skin graft urethral reconstruction in either one stage or prefabricated urethra; nevertheless, the rate of urethral complications remains high.[5]

The tube-in-tube technique is used in radial forearm flap phalloplasty and other flaps including ulnar forearm flap, lateral arm flap, and anterolateral thigh flap. The limitation of this technique is the lack of individual arm and forearm circumference. Thick thigh skin is an obstacle.[2]

The peritoneal neourethra is hairless, non-sebum, and less prone to strictures. The laparoscopic method is better for harvesting the peritoneum and is generally used.

Even though surgeons have performed a one-stage phalloplasty simultaneously with urethral reconstruction with

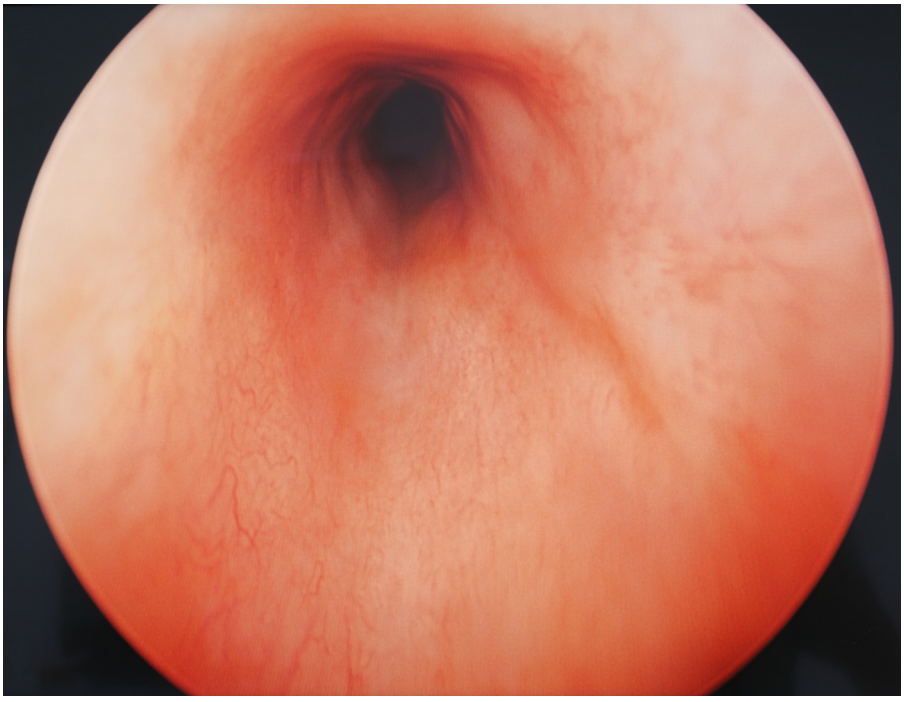

Figure 2 The photo of the endoscopic view of the peritoneal prefabricating urethra at 6 months postoperative.

acceptable urethral complication rates. The authors believe that wound healing of the graft on flaps obtains less reliability than stages surgery. Thus, prefabricated urethral reconstruction should achieve better results with respect to wound healing and is more successful than a one-stage procedure. No intraoperative or postoperative complications were found at the 1-year follow-up in this report. However, the study required long-term follow-up and a greater number of patients. The peritoneum is an alternative for reconstructing the neourethra in male transgenders.

Conflicts of interest

The author has nothing to disclose.

Patient consent

The patients provided written consent for the use of their images.

Ethical approval

The study design and the procedures were approved by the institutional ethics review board.

Funding

None.

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"Pyoderma gangrenosum – a lifelong chronic disease. A 10 year clinical follow up of a pyoderma patient"☆

Dear Sir,

Referring to our article "Reconstructive microsurgical approach for the treatment of pyoderma gangrenosum" published in this journal[1], we provide updated data on long term follow up of one of the originally reported patients – patient 4[1]. He had undergone surgery for pyoderma gangrenosum (PG) initially in 2013. At that time, after intensified immunosuppressive therapy with infliximab (3 mg/kg) had induced an inflammatory remission of PG, residual open wound areas on his left lower leg were closed with a free gracilis muscle flap to cover the exposed Achilles tendon. The post-interventional outcome was excellent, inducing a fast healing and wound closure that has remained stable for eight years

In May 2021, the meanwhile 75-year-old man was readmitted to our hospital because of a painful large ulcer with violaceous undermined border and a purulent base on his right and left lower leg that, according to the patient, had developed within a few weeks (Figure 1).

Considering his comorbidities and despite several findings indicating, to some extent, a contributive role, comprehensive blood testing, histopathology and imaging studies ruled out potential differential diagnoses which, including hypertensive ulcer, peripheral arterial disease, calciphylaxis and livedo racemosa, as a leading cause.

Our treatment regimen comprised an advanced immunomodulation with oral corticosteroids, infliximab and mycophenolate mofentil to induce an inflammatory remission. In addition, vasodilatation with infusions of Prostaglandin E1 (PGE1), rheological therapy with rivaroxaban and antibiogram-guided systemic antimicrobial therapy were established to optimize local wound healing.

Concurrently, treatment with hyperbaric oxygen and several topical wound dressings were applied to foster granulation and removal of eschar as well as to control microbial burden and avoid septic spread and complications. Limited effectiveness of these topical treatment modalities prompted us to perform extensive surgical debridements followed by negative pressure wound therapy to boost wound cleaning and promote the formation of granulation tissue. After accurate conditioning of the wound bed, skin lesions were covered by splitthickness skin grafts, resulting in complete healing within one month after surgery (Figure 2).

The clinical course of recurrent Pyoderma Gangrenosum illustrates the chronicity and complexity of this disease, especially in the multimorbid elderly. Multidisciplinary treatment and forced surgical debridement under adequate immunosuppressive therapy proved to be essential to accurately address this lifelong chronic disease.

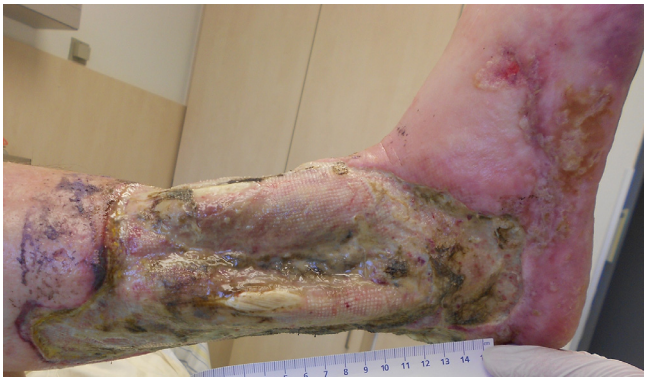

Figure 1 The patient recived already dermatosurgical debridement and local wound therapy.

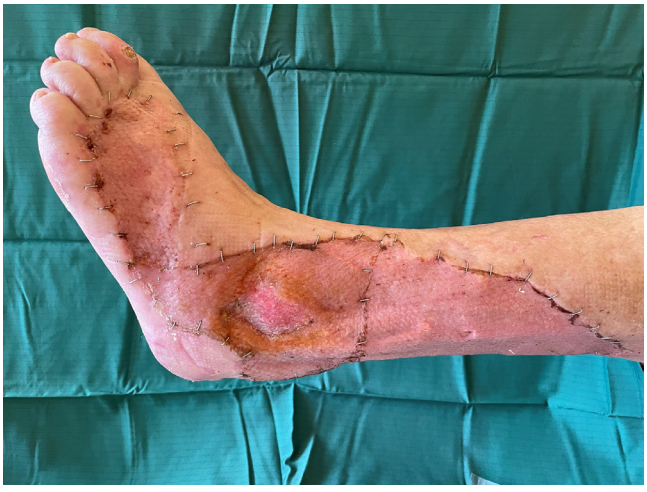

Figure 2 New split-skin cover of the entire lower extremity.

Funding

No funding was received for this work.

Ethical approval

Not required.

Declaration of Competing Interest

The authors have no financial or personal relationships with other people or organizations that could inappropriately influence this work. The authors declare that they have no conflict of interest.

☆ Correspondence to the article: "Reconstructive microsurgical approach for the treatment of pyoderma gangrenosum" by Schwaiger et al., Published in JPRAS

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Effectiveness of custom-made brim-type polyethylene implant for cranioplasty

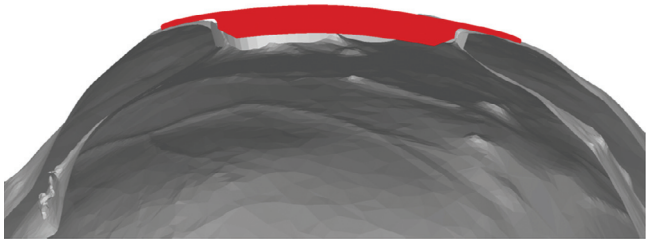

Figure 1 Three-dimensional (3D) images of the PE implant with brim (red). Note that the inlay part was fit into the bone defect, and the brim part was 0.3 mm thick and 10.0 mm wide.

Dear Sir,

Cranioplasty is a surgical procedure involving use of autologous or alloplastic materials to restore skull integrity. This procedure is recommended for all cases of skull fractures and defects after brain tumour removal.

Alloplastic materials, including titanium, hydroxyapatite, and polyethylene, are preferable for large defects. The advantages of alloplastic materials include good cosmetic outcomes, without donor site morbidities.[1] These materials can be broadly divided into two types: Onlay and inlay. The titanium implant is a thin onlay type, and the plate is usually designed to be larger than the expected skull defect; therefore, the edge does not sense a step. However, the titanium implant creates a dead space between the plate and the dura, thereby increasing the risk of infection and dead space.[2] On the other hand, although inlay materials like hydroxyapatite and polyethylene (PE) do not create a dead space, linear depressions between the bone and bone graft are sometimes observed.[3]

To solve these problems, it is necessary to design a new-concept implant that merges the advantages of both inlay and onlay materials. Consequently, a PE implant with a brim was created. The implant has been already used commercially, and this study was approved by the institutional research ethics board of Keio University hospital (approval number: 20190287).

Before the operation, computed tomography (CT) data consisting of $<$1.0 mm slice images were obtained for each patient. Skeletal bone information was generated from the data using a DICOM manager. Precise inlay models were customized for each patient based on the skull defect. Subsequently, a brim with the required width and thickness was added using computer-aided design and machinery. From these data, a custom-made PE implant with a brim (Craniofit; HOYA Co. Ltd., Tokyo, Japan) was created. The inlay part that fit into the bone defect was created according to the thickness of the surrounding bone, and the brim part was created with 0.3 mm thickness and 10.0 mm width (Figure 1). The brim part was the onlay part on the cranium; therefore, the screws were inserted through the brim. The implants could be fixed directly without fixing the plates.

The operation was performed under general anaesthesia. An incision was made using the previous surgical scar, the bone defect was dissected on the dura mater, and the area around the defect where the implant artificial bone would be fixed was dissected thoroughly. The prepared implant was inserted, and fixation was performed through the brim with self-drilling screws (Figure 2).

We performed cranioplasty using the custom-made brim-type PE implant in five patients aged 59–73 (mean 66.6 $\pm$ 5.0) years. Of these five patients, three had brain tumour removal-related infection, and two had decompressive craniectomy-related infection.

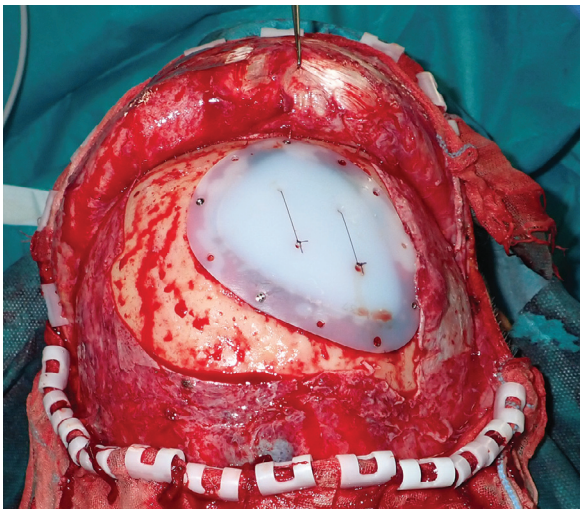

Figure 2 Intraoperative view of clinical usage of custom-made PE impant with brim. Note the PE implant with brim was put on a bone defect, and fixed with screws on the brim.

Good cosmetic results were obtained in all patients, without any linear depression. In addition, no postoperative complications, such as infection, were observed.

The advantages of brim-type PE implants include negligible aesthetic problems, and easy surgical fixation. Furthermore, finite element analyses revealed that the brim-type PE implant had a high withstand load with rigid fixation.[4]

A disadvantage of this implant may be that it is radiolucent on CT. Although it is useful for neurosurgeons to evaluate the brain without artefacts, it is difficult for craniofacial surgeons to evaluate the cranial shape. Improvement is necessary to reduce the radiolucency without creating artefacts.

In conclusion, brim-type PE implants possess the advantages of both inlay and onlay types. This method may minimise dead space and steps with easy fixation.

Funding

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Ethical approval

Ethical Committee of Keio University School of Medicine N0:20190287

Declaration of Competing Interest

None declared.

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Re: Mastering microsurgery: A novel benchmarking tool for microsurgical training

Dear Sir,

The learning curve in microsurgery is not for the faint hearted and simulation training is almost certainly the starting point. Recent work by Kim and colleagues[1] sought to provide some much-needed quantitative data in simulation training for the development of microsurgical competencies. Much effort was invested to study, through video recordings of anastomoses, the correlation between hand motion analysis (HMA) and a validated global rating scale (GRS)[2]. This involved a cohort of more than 100 participants of varying levels of clinical experience across a period of four years. The biggest limitation however, was alluded to by the authors themselves - "*This study did not evaluate whether our novel feedback system does indeed allow improvement of microvascular anastomoses in the clinical setting*". In reality, it would most certainly be nigh impossible to track all participants for the next five to ten years (or more) to determine their clinical progress in microsurgery.

While we do not downplay the efforts of our colleagues, we believe that there needs to be a fundamental change in concept with regard to simulation training in microsurgery. Firstly, a standard microsurgery course of 5 days' duration is but a "one-off" event, as evidenced by a certificate of attendance, not competence. It may very well be a few years, or never, before one has the chance to put these skills into practice. It is therefore no surprise that there will be some element of performance anxiety when the opportunity finally comes along. Unfortunately, this oftentimes leads to a vicious cycle of self-doubt and lack of confidence when trainers find trainees "not ready". Secondly, while the assumption of improved economy of movement based on HMA appears sound, the duration of assessment again, is limited to 5 days at best. For sure, focus, repeated practice within a short span of time would undoubtedly lead to improved HMA scores but would this result in the "muscle memory" required for true dexterity under the microscope down the line? Finally, the numbers quoted by the authors for a trainee to be able to perform an anastomosis with a supervisor trainer scrubbed (31–40) and independently (>56) are presumably based on the International Microsurgical Simulation Society (IMSS) consensus statement[3]. If at the end of such a 5-day course, participants have only performed 11–15 anastomoses, how should the shortfall be addressed subsequently given the ever-increasing cost of attending such workshops, or the not inconsiderable expense of purchasing and assembling a home set-up?

Given the above, we would like to bring attention to a recently described home DIY training model with 3D printed clamps by Ng et al.[4] that incorporates the same elements of video recording (using a smartphone) and validated assessment tools for individualised feedback. The main difference though, is the use of the Konjac noodle model which is readily available from any grocery store (£2 per pack) and would allow on-demand practice (for up to 14 days after opening before it goes bad) provided one has a basic set of microsurgical instruments and sutures. Preliminary data from our course conducted back in October 2021 suggest that the newly acquired microsurgical skills are retained, based on a similar GRS (University of Western Ontario Microsurgical Skills Assessment), at up to 14 days post-course (not published). It is not unimaginable then that this training model of ours can be used to bridge the anastomosis numbers required (as mentioned by the authors), develop the requisite "muscle memory" over time so that trainees are more likely to be "ready" when clinical opportunity comes along, and eventually achieve true competence and mastery of microsurgery, all in a cost-efficient manner. We look forward to learning about further work from Kim et al. in our common pursuit of microsurgical excellence.

Conflict of Interest: None

Funding: None

Ethical Approval: Not required

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Evaluation of the credibility and credentials of social media reconstructive plastic surgery influencers on Twitter

Dear Sir,

Few industries are immune to the effects of social media influence, and medicine is no exception. Social media serves as a voice for individuals, communities, consumers and corporations, ultimately pooling like-minded groups and organizations.[1] As certain individuals gain popularity as a result of their social media content, they become what is now known as an *influencer* and is seen as a reliable source of information within a specific industry.

Medicine is an industry in which social media influencers can exist and shape opinion, using their clinical and practical knowledge to appeal to thousands or even millions of

Table 1 Influencer Geographic Distribution.

United States ($n=40$)		International ($n=10$)	
California	13	UK	5
Illinois	7	Australia	2
Texas	2	Saudi Arabia	1
Washington DC	2	Spain	1
Massachusetts	2	South Africa	1
North Carolina	2		
Arizona	2		
New York	3		
Virginia	1		
South Dakota	1		
Wisconsin	1		
Georgia	1		
Florida	2		
Indiana	1		

followers. The rates of physicians participating in social media has been rising for the past decade, and will continue to do so, establishing social media as an integral component of medical practice.[2,3] Social media's role and benefit to Plastic Surgery has been well documented in recent years.

The distribution of medical content on social media platforms is steadily increasing. Social media influencers possess large audiences and are frequently viewed as authority; however, their credibility is often unchecked. Here, we analyze and compare the most and least influential accounts on Twitter within the field of reconstructive plastic surgery.

Methods & results

Twitter influence scores for accounts associated with reconstructive plastic surgery were collected using the web based platform Cronycle (https://www.cronycle.com, London, UK). The accounts associated with the top and bottom quartile accounts were linked to individual names, and

Table 2 Social Influencer Demographics.

Characteristic	All Social Influencers ($n=50$) No (%)	Top Quartile Social Influencers ($n=26$) No (%)	Bottom Quartile Social Influencers ($n=24$) No (%)	P-Value
Gender (male)	30 (60%)	15 (57.7%)	15 (62.5%)	0.36
Advance Degree				0.02*
MPH	0	0	0	
MBA	3 (6%)	3 (11.5%)	0	
PhD	2 (4%)	2 (7.7%)	0	
Occupation				
Surgeon	41 (82%)	22 (84.6%)	19 (79.2%)	0.62
Organization	9 (18%)	4 (15.4%)	5 (20.8%)	
Location				0.12
International	10 (20%)	3 (11.5%)	7 (29.2%)	
Domestic	40 (80%)	23 (88.5%)	17 (70.8%)	
Race				0.69
African American	2 (4%)	1 (3.8%)	1 (4%)	
Caucasian	23 (46%)	12 (46%)	11 (45.8%)	
Hispanic	4 (8%)	2 (7.7%)	2 (8.3%)	
Asian	11 (22%)	8 (30.8%)	3 (12.5%)	
Years on Twitter	9 ± 3	10 ± 3	9 ± 2.5	0.4
Practice Setting				0.03*
Private	27 (54%)	9 (34.6%)	18 (75%)	
Academic	12 (24%)	8 (30.8%)	4 (16.7%)	
Academic/Private	6 (12%)	5 (19.2%)	1 (4.2%)	
Fellowship Trained	25 (50%)	16 (61.5%)	9 (37.5%)	0.29
Faculty Position				0.64
Resident	1 (2%)	1 (3.8%)	0	
Full Professor	6 (12%)	4 (15.4%)	2 (8.3%)	
Associate	3 (6%)	2 (7.7%)	1 (4.2%)	
Assistant	4 (8%)	4 (15%)	0	
Chair	1 (2%)	1 (3.8%)	0	
Industry funding (dollars)	$8407.75 \pm 13,383.87$	$9553.72 \pm 15,293.71$	6115.81 ± 8733.25	0.85
NIH funding (dollars)	$35,524.36 \pm 140,493.78$	$42,003.25 \pm 138,581.26$	$29,585.38 \pm 144,938.15$	0.55
H-Index	15 ± 15	17 ± 15	12 ± 16	0.06

NIH; National Institute of Health.
** Statistically Significant.

crossed-checked for advanced degrees, specialty, occupation, practice setting, location, practice type, gender, race, h-index, number of publications, number of citations, NIH funding, industry funding, fellowship, years on Twitter, and faculty position.

We analyzed a total 107 Twitter users (top =26 and bottom=24 quartile). Overall, the majority were US based (see Table 1) male surgeons. Sixty-two percent of all social influencers were plastic and reconstructive trained surgeons. Other surgical physicians made up another 26%. The remaining 12% influencers were non-physicians, such as organizations. Compared to the bottom cohort, top influencers were statistically significantly more likely to have an advanced degree and work in an academic setting (see Table 2). There were no statistical differences between cohorts regarding gender, occupation, location, race, years on Twitter, fellowship training, faculty position, *h*-index, industry funding, and NIH funding. All physician influencers were board certified.

Discussion

Plastic Surgery is being transformed by social media, and surgeons are in a society where these platform-based communication are becoming more important aspects of their career, regardless of training. In a recent survey of public respondents, social media platforms ranked highest in the most influential factors for choosing a surgeon, while 96% of them reported not knowing the appropriate credentialing a plastic surgeon should have.[4] As the trend in social media dramatically increase, so follows the role of the influencer. As influencers these accounts are viewed as a reliable source of information regarding plastic surgery, yet in one 2017 study of the top 100 Plastic Surgery influencers on Twitter found 23% of these influencers were non-physicians (13%) or other medical doctors (10%).[2] As the public grows increasingly reliant on the Internet for medical information, the academic credentials of social media-active specialty physicians must be cross-checked with their online influence.

When used effectively, social media can offer educational benefits to the prospective reconstruction surgery patient. The presence of responsible subject-expert influencers will likely improve the reliability and trustworthiness of information available to patients via social media regarding reconstructive plastic surgery. Although Twitter content regarding plastic surgery is more likely to originate from board-certified plastic surgeons and be educational in nature than content posted to other social media platforms, the majority of tweets continue to contain inaccurate information, and plastic surgeon influencers constitute only a minority of the overall conversation.[5]

Multiple distinguishing characteristics exist between the most and least influential reconstructive plastic surgery Twitter accounts. Top reconstructive surgery influencers trended towards higher metrics of academic success. As social media continues to expand as a source of information for patients, subject-expert influencers must continue to embrace their role as educators and disseminators of high merit content. They should also consider expanding their online presence to social media platforms where patients are more likely to seek information regarding reconstruction surgery and engage with relevant content.

Ethical approval

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Declaration of Competing Interest

None

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Reply to "Optimizing intraoral surgery video recording for residents' training during the COVID-19 pandemic: Comparison of 3 point of views using a GoPro"

Dear Sir,

We would like to acknowledge Navia et al. for their insightful viewpoint on device selection for intraoperative videography to improve residents' education[1]. Plastic and maxillofacial surgery operations are particularly difficult to record as the anatomy is often confined to a narrow surgical field with limited sightlines. While their description of the GoPro Hero 7 Black (GPH7B) provides a novel means of intraoperative video recording, Navia et al. provide relatively few information regarding the benefits of using a smartphone to produce high-quality surgical videos, which we argue may supersede alternative video recording systems.

First, the authors report GPH7B's increasing popularity in residents' training, garnered by its ability to offer point-of-view (POV) high-quality video recording up to 4K with 60 frames per second (FPS). However, the GPH7B also has significant drawbacks, including its cost, fish lens distortion, and loss of detail in recording fine-scale anatomical structures. Newer smartphones offer similar video recording capabilities of up to 4K with 60 FPS, but generally perform better than the GPH7B in low-light conditions. The latest iPhone models (X, 11, 12 13) have lenses with a wider aperture compared to the GPH7B, allowing more light to hit the camera's sensor.

It has been reported that smartphones are incompatible with light-emitting diode operative room lights, resulting in a commonly reported flickering phenomenon as light pulses from overhead operating lights do not align with the smartphone camera's frame rate[2]. However, slowing the smartphone camera's shutter speed using free smartphone applications is a simple means to completely remove this strobe effect. Alternatively, the exposure (brightness) may be manually adjusted using the native camera application on most recent smartphone models. Specifically, the latest iPhone models utilize an exposure compensation value control, which allows users to set and lock the focus and exposure of video recordings, thereby eliminating the risk of overexposure and evading the need of a filter or manual adjustment of shutter speed. These simple means of mitigating artifact in smartphone videography do not add to the already minimal cost and are not cumbersome to implement after a brief tutorial.

The smartphone is highly capable of providing point-of-view (POV) recording. We previously described two simple and low-cost means of achieving POV intraoperative video recording with a smartphone in facial plastic surgery operations. We demonstrated that POV smartphone recording using a head mount provided excellent image quality compared to other commercially available camera systems[3]. Nevertheless, it is important to note that most head mounted video systems are subject to intense motion artifact due to the natural movements of the surgeon's head[4]. The latest iPhone models have improved image stabilization technology, using both Optical Image Stabilization (OIS) and Electronic Stabilization, to stabilize shaky video recordings. Alternatively, we found that fastening the smartphone to a gooseneck clamp affixed to an intravenous pole provides more stable POV video recording, similar to the gimbal stabilization described by Navia et al.[5]. Moreover, Navia et al. report that the head mounted smartphone assembly has a weight of 300 g, which could increase strain during long procedures[1]. However, this is not of significant concern in shorter surgical procedures, and the video recording assembly itself may be best utilized to highlight specific surgical techniques as opposed to the entire procedure.

The wireless transmissibility, high-quality optical zoom, and ubiquity of smartphones, which are limitations of the GPH7B, cannot be understated. The ability to mirror the smartphone's screen onto operating room monitors or laptops is critical to ensure the camera is capturing an appropriate frame and may improve trainees' ability to follow surgical steps in an otherwise crowded surgical field. The latest smartphones offer powerful improvements to optical zoom systems, like the iPhone 13, which has a 6x optical zoom range (3x optical zoom in, 2x optical zoom out) with minimal loss in video quality. Finally, the ubiquity of smartphones makes its use convenient and inexpensive relative to other video recording equipment.

The continued evolution of smartphone camera technology has made the smartphone an attractive tool for high-definition intraoperative videography. Therefore, while Navia et al. demonstrate an alternate means of intraoperative video recording, we hope the information provided in this letter will help readers better understand the advantages of smartphones in surgical recording.

Declaration of Competing Interest

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