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Correspondence and Communications

The place of pedicled perforator flaps in humanitarian reconstructive surgery

Dear Sir,

We thank Dr. Falinower and his team for making the point that pedicled perforator flaps (PPF) can be successfully used in humanitarian missions.[1] We share their view that complex reconstructions can be achieved by using PPF, even in less-developed countries where health systems lack the resources or equipment to undertake specialized procedures. However, addressing this question is challenging at two levels: 1) the history of using propeller flaps and microsurgical skills in austere conditions and 2) the need of training of the clinicians in the host nation, as the presented procedures are not deprived from complications.

To our knowledge, the first report of the use of PPF in surgical missions was in 2013 by van Waes et al., who used sural artery perforator flaps for lower limb salvage in Afghanistan.[2] This not only proves that PPF are perfectly feasible in humanitarian but also that they could be a solution even in a more difficult context, such as war zones or armed conflict regions, where working conditions are usually more inappropriate than in a humanitarian mission. Furthermore, Tocco-Tussardi et al. documented the use of free flaps during a surgical mission in Kenya in 2016.[3] Since free flaps are usually employed following the reconstruction ladder, only when loco-regional flaps are no longer available, we can assume that surgeons have all the assets to deal with complex cases in the majority of the developing countries. However, advantages and disadvantages of each flap should be carefully considered and the final reparative choice should be adapted to the requirements of each patient.

Humanitarian aid missions should focus also on education and training of the host nation doctors, allowing locals to provide care after the mission group has ceased its activity. We think that all aspects of a reconstruction by PPF should be taken into account, starting by choosing the right flap, the preoperative design, the surgical technique and the postoperative monitoring. Since Falinower et al. report a 28% rate of complications,[1] we also advise for the PPF reconstructions to be performed at the beginning of the mission in order to maximize the postoperative follow up and deal with an eventual unfavorable outcome. Furthermore, from our experience, we believe that a backup plan is essential, in case of failure of a PPF. Therefore, this could increase the learning curve and it could discourage some of the local surgeons to adopt PPF in their practice. To conclude, we agree that PPF are very effective means for the surgeons to use in reconstructive humanitarian missions and we support that it should be perpetuated.

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Cannulated axial screw potential utility as reliable bony fixation in hand surgery

Dear Sir,

We have carefully read the article entitled "Use of cannulated compression screws for skeletal stabilisation during digital re-vascularisation",[1] published in Journal of Plastic, Reconstructive & Aesthetic Surgery. First, we would like to congratulate the authors for the quality of the published work.

We would like to add that, despite the fact that numerous methods for bony fixation and phalanx osteosynthesis have been described in the literature -such as crossed Kirschner wires, a combination of intraosseus cerclage wires and Kirschner wires, and intramedullary Kirschner wires- those may require a subsequent surgical intervention for osteosynthesis material removal or may hinder –or directly preclude- early rehabilitation process.

We have descripted the utilization of cannulated axial screws for digital replantation surgery,[2] as a way to initiate early active range-of-motion exercises. Also, the use of cannulated screws has been previously described in the literature for both minimally invasive fixation of phalanx fractures and interphalangeal arthrodesis.[3,4]

It seems that cannulated screws utilization for phalanx osteosynthesis -in all procedures previously mentioned- may offer a reliable and stable fixation, which would allow for early motion of the digit without having to wait for complete bony healing. Thus, their potential utility may be currently undervalued. However, more solid evidence is required, by means of comparative studies with large sample size.

Declaration of Competing Interest

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Fat grafting: Early hypoxia, oxidative stress, and inflammation developing prior to injection

Dear Sir,

Autologous fat grafting is widely used during plastic surgery but unpredictable fat retention remains a major concern. Although many studies have explored whether fat harvesting, processing, and injection affect adipocyte viability, the oxygenation and inflammatory status of grafted fat remain unknown. Unlike vascularized tissue transfer, fat grafting is a non-vascular procedure. Fat initially lacks vascular support and receives oxygen and nutrients only via diffusion until neovascularization develops. However, even when fat is re-injected in small aliquots, the oxygen diffusion level may not adequately fulfill the metabolic needs of grafted fat, especially in the first days after injection. Very little is known about tissue damage developing within the first hour after surgery, which is nearly the average time between harvesting and injection in operation theater. For example, no study has yet measured oxygen saturation immediately after fat harvesting; this would aid assessment of fat status prior to injection.

In this experimentation, human adipose tissue was collected via liposuction from the abdomen and flanks of seven patients undergoing routine elective procedures. Tumescence was induced by infiltration of saline and epinephrine 10 min prior to skin incision, followed by power-assisted liposuction (PAL system) using a 4-mm-diameter cannula. Fat was rinsed using the Revolve system with lactate Ringer's solution at 37 °C. Oxygen concentration was measured us-

ing a single-channel oximeter placed within the Revolve system, together with a temperature sensor over 1 h. This time limit corresponds to the average waiting time before injection in the theater. Fat tissue samples were collected after harvest and 1 h later, and O_2 levels were measured. The samples were then snap-frozen in liquid nitrogen and stored at −80 °C prior to analysis. Gene expression assessed via quantitative real-time polymerase chain reaction and total RNA was extracted from 100 mg fat samples using an RNeasy Lipid Tissue Mini Kit (Qiagen). We used an 8-isoprostane ELISA kit (Cayman Chemical) to measure oxidative stress measurement. All statistical analyses were performed with the aid of Statistica software. The normality of data distribution was assessed. Gene expression levels were compared using one-way ANOVA with appropriate post-hoc testing. 8-isoprostane concentrations were compared using the Wilcoxon test. Results are expressed as means ± standard deviation. A *p*value <0.05 was considered to reflect statistical significance.

All samples evidenced rapid oxygen partial pressure falls over 1 h. The mean PO_2 after 1 h was 8.1 ± 4.3 mmHg. We compared the expression levels in fat snap-frozen just after harvest and 1 h later. The 1-h samples exhibited significantly higher levels of the pro-inflammatory cytokines IL-6 ($p<0.05$), IL-1β ($p<0.05$), and MCP-1 ($p<0.05$). The TNF-α and IL-10 levels also increased, but not significantly ($p=0.08$ and $p=0.07$ respectively). The 1-h 8-isoprostane levels were significantly higher than those at harvest (0,82±0,09 vs. 0,67± 0,19 pg/mg) ($p<0.05$).

Fat oxygenation status was measured during the first hour after collection. Previous studies[1,2] have shown that the PO_2 of subcutaneous adipose tissue ranged from 23 to 84 mmHg. In this study, oxygen partial pressure of fat tissue was 8.1 mmHg 1 h after collection. Thus, at the time of injection, the tissue was severely hypoxic, and therefore heavily stressed. Of all adipose tissue cells, adipocytes are the most susceptible to severe ischemia.[3] Adipose-derived stem cells survive for up to 3 days and differentiate into adipocytes in graft zones wherein vascularization and oxygenation are optimal[3]. In contrast, both adipocytes and adipose-derived stem cells die in non-vascularized zones under ischemic conditions, being replaced by cystic oils and fibrosis, seriously compromising fat volume retention.

Gene expression levels were measured to evaluate the effects of fat processing and hypoxia. Within 1 h of harvesting, a significantly higher-level expression of the proinflammatory cytokines IL-6, IL-1-β and MCP-1, and somewhat greater expression of TNF-α and IL-10 was observed (Figure 1(A) and (B)). Such increases have not been reported previously. Tissue damage can be caused by hypoxia and/or liposuction trauma. IL-6, TNF-α, and MCP-1 are known to initiate, maintain, and enhance inflammation, in turn promoting neutrophil-mediated recruitment of both monocytes and M1 macrophages by grafted tissue. Long-term activation of these cells triggers both necrosis and fibrosis. However, some recent studies have shown that M2 macrophage activation facilitates both angiogenesis and graft survival[4]. Although the 'optimal' level of inflammation remains unclear, enhanced inflammation may promote inflammatory cell recruitment and impair fat graft retention.

The oxidative status of adipose tissue was evaluated immediately after harvest and 1 h later. F2-isoprostanes are produced via free-radical peroxidation of arachidonic acid; their levels are directly proportional to the extent of oxidative stress. 8-isoprostanes are the best characterized F2-isoprostanes, and are optimal biomarkers of oxidative injury. The 8-isoprostane level was significantly higher 1 h after fat collection compared to the level immediately after collection. Increased inflammation and enhanced reactive oxygen species production may compromise adipose tissue structure. Some authors consider that injected fat recruits neutrophils within 24 h. These cells then produce reactive oxygen species and trigger inflammation[5]. We found that reactive oxygen species production and inflammatory cytokine upregulation begin very soon after fat collection.

Thus, is fat re-oxygenation appropriate? Harvested fat rapidly becomes severely hypoxic and exhibits early signs of tissue damage; re-oxygenation may be appropriate prior to injection. Oxygenation would obviate reactive oxygen species formation by limiting hypoxia-reperfusion injury. However, as a high oxygen partial pressure is also deleterious, further experiments are needed to optimize any re-oxygenation strategy.

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None declared.

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Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.05.088.

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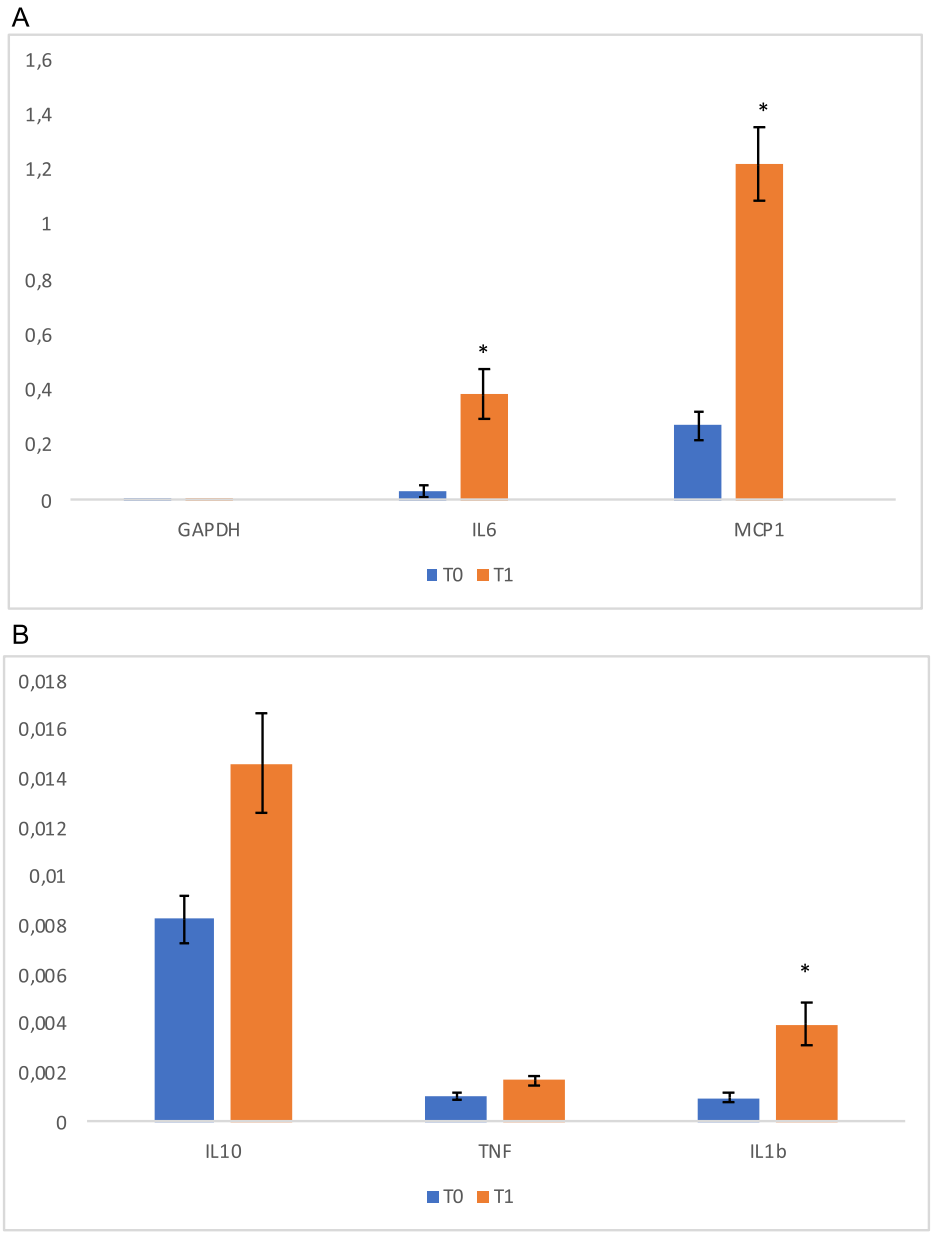

Figure 1A and 1B: Gene expression levels measured at T0 (end of the fat collection) and T1(1 h after the end of the collection). Over the 7 samples, the 1-h samples exhibited significantly higher levels of the proinflammatory cytokines IL-6, IL-1β, and MCP-1.

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Intraoperative hemodynamic changes in the arterial blood flow measured by transit time flowmetry (TTFM) during breast reconstruction with free diep flap

Dear Sir,

We would like to present a study in which hemodynamic changes that occur during free DIEP flap procedure were intraoperatively assessed using the transit-time flowmetry (TTFM).

The TTFM has been used in cardiothoracic surgery for many years, especially for intraoperative bypass assessment, and it has proven to be accurate and reliable and to have few sources of technical errors.[1,2] The TTFM principle is based on transmitting two wide ultrasound beams through the blood vessel in both the upstream and downstream direction. Volume flow is measured in ml/min by calculating the difference between propagation time of both beams in the blood vessel and it is visualized in real-time.

The inclusion criteria for this study were patients who underwent a breast reconstruction using unilateral free DIEP flap anastomosed to the internal mammary artery (IMA) in our hospital. The exclusion criteria were smoking, hypertension, diabetes mellitus or bilateral DIEP flap reconstruction.

The blood flow of the deep inferior epigastric artery (DIEA) and the IMA were intraoperatively assessed using a flowmeter system (Medistim MiraQTM, Medistim ASA, Oslo, Norway) with the 2 mm probe. The blood flow measurement in the DIEA was performed once the flap was harvested and the pedicle was completely dissected. The blood flow in the IMA was measured twice, after its complete dissection and after performing the anastomosis.

In total, 14 patients were included. The mean age was 51.9 years (range, 39-66) and the mean BMI was 27.9 (range, 21.1-34.7). The mean ischemia time of the flap was 54.7 min (range, 48-67).

The results showed a blood flow of 6±3 ml/min in the DIEA and 28.5±9 ml/min in the IMA. After the anastomosis, the arterial flow was 9±4 ml/min. All the anastomoses were end-to end.

The blood flow in the IMA was considerably higher and more variable than in the DIEA. However, independently of the previous IMA values, the blood flow decreased after the anastomosis to be similar to the DIEA flow in the donor site. These blood flow values were similar to those found in the TRAM flap by Lorenzetti et al.[3] Those authors suggested that the intake of blood in a free flap does not depend on the recipient artery flow but on the tissue components of the flap; the free muscle flaps tend to have higher flow compared with an adipose flap.[3,4]

Our results confirmed that, although the previous blood flow of the IMA was 4.7-fold higher, after the anastomosis the blood flow adapted to the flap and decreased until a similar level of the original blood flow of the DIEA in the donor site, but it was slightly higher. It would explain why the perfusion of the DIEP flap could improve soon after the anastomosis in some patients, as we have shown in a previous study,[5] but not as much as would be expected considering the difference of the original blood flow of the IMA and the DIEA.

Declaration of Competing Interest

none.

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Letter to the editor regarding: "The use of surgical site drains in breast reconstruction: A systematic review"

Dear Sir,

We read with great interest the recent publication by Scomacao et al., entitled ***"The use of surgical site drains in breast reconstruction: A systematic review"***.[1] The authors performed a systematic review of twenty-one studies focused on breast reconstruction. They found that most studies recommend removing closed-suction drains when their output is less than 30cc/24 h. They also noted that there is significant data heterogeneity in the published literature, making it difficult to achieve significant conclusions.

We have previously published two studies which may significantly enhance the reader's understanding of this topic. The first[2] was a systematic review of seventy-five level I and II studies, which analyzed various methods to reduce the risk of seroma, including in breast reconstruction. Most of the studies included in that systematic review were high-quality randomized-controlled trials. We found that interventions that reduce the risk of seroma include using closed-suction drains, keeping drains until their output is below 20 to 50cc/24 h and maintaining a high pressure gradient across the drain. Of particular interest for breast surgery, we also found that using ultrasonic dissection rather than cautery (particularly for axillary lymph node dissection) results in a lower risk of seroma. For autologous breast reconstruction, we found that ligating blood vessels with sutures or clips rather than cautery, using quilting or progressive tension sutures, using fibrin or thrombin, and immobilizing the surgical-site postoperatively reduce the risk of postoperative seroma formation.

To elucidate more thoroughly the proper use of drains and how to maintain a high pressure gradient across the drain, we conducted an experimental study examining the effect of various parameters on drain efficacy.[3] We found that, in order to maximize drain performance, the length of the tubing outside the patient should be minimized, the diameter of the tubing should be maximized (within reason), the drain tubing should be stripped frequently, and the drain bulb should be squeezed side-to-side (rather than "bottom-up") and emptied whenever 25% full. We also found that perforated drains perform better than fluted drains.

Overall, Scomacao et al. are correct in their conclusion that drains should not be removed until their output is less than 30cc/24 h. However, as noted above, there are additional important nuances that should be taken into account in order to maximize drain performance and minimize the risk of seroma formation.

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Effectiveness of subspinal Le Fort I osteotomy in preventing postoperative nasal deformation

Dear Sir,

We have read with great interest the article entitled "Effectiveness of subspinal Le Fort I osteotomy in preventing postoperative nasal deformation" by Yamashsita Y et al.[1] in a recent issue of the journal. The author conduct a comparison between the conventional Le Fort I osteotomy (CLFIO) and subspinal Le Fort I osteotomy (SLFIO) in controlling undesirable nasal changes. We are appreciated that the authors provide us the worthy clinical results, especially the effective surgical techniques to minimize nasal profile changes. In this communication, we would like to propose some opinions to the authors.

First, we notice that maxillary movements at different landmarks were assessed in the coordinate system. However, it did not refer how the coordinate system set up. Numerous reports set up the reference plane as follows[2]: the horizontal reference plane was the Frankfort horizontal (FH) plane or sella-nasion (SN) plane rotated clockwise at 7°, and the vertical reference plane was a plane perpendicular to the horizontal reference plane passing through sella or nasion. We wondered how the author's reference plane set up so as to well understand the movements of landmarks.

In addition, a general decrease of the nasofrontal angle, representing the upward rotation of the nasal tip, was seen in all patients. Although the difference did not reach statistical significance in changes of nasal tip angle between the two operations ($P = 0.19$), there was an inconsistent variation trend. In contrast to an increase of 1.25° following CLFIO, there was a decrease of 0.08° following SLFIO. The reason why the nasal tip angle decreased while the nasal tip upturning following SLFIO should further clarify.

What is more, the age of patients undergoing the bilateral sagittal split ramus osteotomy and Le Fort I osteotomy ranges from 16 to 49 in the review. However, mandibular sagittal split surgery is generally confined to the nongrowing patient and done after Radius union at the age of 18–20 years[3]. Relapses may occur when craniofacial growth is not completed at the time of the surgery. In our view, age should be taken into consideration and patients without congenital deformity are recommended for orthognathic surgery more than 18 years old, which not only improves skeletal deformities, functional aspects and esthetic appeal, but also avoids the relapse.

In conclusion, it is meaningful that the authors have provided us with such a novel idea focus on a better choice of surgery to prevent nasal deformation. Although leaving us some questions to explore, they provided us with valuable guidance for carrying out clinical work. We look forward to more supplementary data for more information in the future.

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Reply to comment on "Treatment of finger degloving injury with acellular dermal matrices: Functional and aesthetic results"

Dear Sir,

First, we would like to thank Giovannini et al.[1] for their interest in our paper.[2]

We agree with the authors that the acellular dermal matrices available on the market have shown different behaviors in vitro, arguably according to the various composition and structure.

However, it is not easy to translate this evidence into clinical practice, where the complexity of the clinical context makes it difficult to objectively demonstrate differences within the different biological scaffolds. Specifically, hand trauma injuries represent a complex field of applica-

tion[3,4] and a limited number of pertinent articles are available in literature.

As the authors, we mentioned the paper by Taras et al.,[5] who reported their experience with the use of Integra® for hand trauma, including digital injuries where extensive bone and joint exposures occurred.

We deliberately excluded those kinds of traumas in order to avoid elements that could invalidate the final functional evaluation. We reserve to extend our study in the future to patients with concomitant bone or tendon lesions. Moreover, contrary to Taras et al., spontaneous healing without the use of dermo-epidermal graft was also possible for a part of patient. Our biopsy confirmed the formation of new vascularized tissue; thus, it was sufficient to allow progressive healing, making it also possible an early mobilization and contributing to an excellent functional result.

The ultrasound images are the most explanatory in showing the lack of scar contraction-retraction and the tendon sliding, that is the most difficult functional result to achieve.

In the end, our aim was not to make any comparison or assess the superiority of one dermal matrix over another. We concluded that it is essential, in cases of hand reconstruction, to coordinate any reconstructive technique with an early mobilization.

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Letter comments on the Nerve decompression according to A.L. Dellon in Morton’s neuroma - A retrospective analysis

Dear Sir,

Having read with interest the article Nerve decompression according to A.L. Dellon in Morton’s neuroma - A retrospective analysis,[1] expertly written by Madeleine Mischitz, Stefan Zeitlinger, Johannes Mischlinger and Matthias Rab I wish to congratulate the authors on an excellent paper which gives pertinent recommendations for the operating surgeon. However, I would like to raise a point regarding the pathomechanics of Morton’s neuroma. The authors state that "Since it was found that the pathophysiological reason for the occurrence of Morton’s neuroma is the entrapment of the digital nerves by the deep transverse intermetatarsal ligament, it seems appropriate to treat neuroma by interrupting its pathomechanism". They further cite four papers to bolster this assertion. However, neither the current paper nor the supporting citations offer any convincing evidence in favour of the pathomechanics theory of nerve entrapment by the deep transverse intermetatarsal ligament. Whilst they all make reference to this theory they offer no data or compelling argument with which to bolster it. Conversely, the anatomical study by Kim et al.[2] throws considerable doubt on this proposed mechanism of action as they establish that the neuroma in question consistently sits anatomically distal to the aforementioned ligament. Whilst there will be little argument that resection of the ligament will create a greater intermetatarsal space and therefore potentially less irritation of the neuroma, it does not follow that the irritation of the nerve comes from the ligament. It is at least equally likely that the metatarsal head is the offending structure, especially given the findings of Kim et al. Whilst one can still recommend resection of the ligament as the surgical intervention of choice, given the cited outcomes, one must hold back from making the leap that the ligament should be considered the causative agent in the formation of the neuroma until such time as this is equivocally established.

Declaration of Competing Interest

None.

Funding

None.

References

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Response to the comments on 'Effectiveness of subspinal Le Fort I osteotomy in preventing postoperative nasal deformation'

Dear Sir,

We appreciate the interest in our study[1] and wish to describe some aspects raised in the letter.

The reference planes were defined. The horizontal plane was passing through the right and left orbitale and the midpoint of bilateral porions, i.e., the Frankfurt horizontal (FH) plane. The mid-sagittal plane was passing through nasion and basion, and perpendicular to the FH plane. The coronal plane was perpendicular to the midsagittal plane and FH plane.

Although there were an increase of 1.25° following CLFIO and a decrease of 0.08° following SLFIO in nasal tip angle, this study showed that there was no statistical significance between two groups (CLFIO and SLFIO) in change of nasal tip angle. However, further study including many patients may provide significant difference of nasal tip angle between two groups.

Orthognathic surgery should be performed for non-growing patients. In our study, we performed orthognathic surgery, because growing of 16-year-old female had stopped. The patient had no relapse after orthognathic surgery.

We thank the editor for the opportunity to respond.

Declaration of Competing Interest

None.

References

[1]. Yamashsita Y., Iwai T., Honda K., et al. Effectiveness of subspinal Le Fort I osteotomy in preventing postoperative nasal deformation. J Plast Reconstr Aesthet Surg 2020

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Evaluating trends and analyses in plastic surgery research

Dear Sir,

We read with interest the correspondence by Taylor et al., which supports our concern for the underrepresentation of plastic surgery in the curriculum. We are further grateful for their comments regarding the competition ratio, and our description of the decrease in competition ratios in plastic surgery reflects and acknowledges the trend that has been observed over the past decade, with the Royal College of Surgeons describing a competition ratio of 14.80:1 in 2010,[1] which compares to the last published data (2019) which states the ratio as 3.92:1. This demonstrates a 74% reduction, compared to Taylor et al's description which only includes data from 2016 to 2019. Of note, from the data Taylor et al. reference, there is a decrease in competition ratios between 2018 (4.19) and 2019 (3.92), which further highlights how variability and fluctuation in data can lead to differing interpretations of trends.

Table 1 Competition ratios for applications to Plastic Surgery ST3.

Year	Competition Ratio
2007	18.11
2008	n/a*
2009	16.11
2010	14.80
2011	9.83
2012	16.60
2013	n/a*
2014	3.00
2015	n/a*
2016	2.78
2017	3.73
2018	4.19
2019	3.92

* HEE contacted but data not available.

This raises an interesting question of what cut offs should be used when describing trends. The competition ratios were 9.83:1 in 2011 and 16.60:1 in 2012,[2] whereas between 2016 and 2019 they ranged between 2.78 and 4.19. The total range for the period of 2016–2019 quoted is 1.41 but for the decade it is 13.33,.. If one were to consider the provision of more recent data as more reflective of contemporaneous trends then that would need to be specified, however, this may be subject to potential outliers and statistical aberrations as illustrated in the change between 2018 and 2019. Table 1 demonstrates available data obtained through a search of available literature.

Increased representation of plastic surgery within the undergraduate curriculum has been significantly associated with career interest in medical students[3] and positively contributes towards ensuring that students receive a more holistic educational experience. Furthermore, we hope that this letter can promote discourse within the community regarding both the decreasing competition ratio within our speciality and the challenges posed when describing trends.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.03.020.

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