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Correspondence and Communications

Undergraduate plastic surgery in the United Kingdom: The students' perspective



Dear Sir,

Plastic Surgery is consistently ranked as one of the most competitive specialties for higher surgical training in the United Kingdom (UK).¹ Despite the benefits of early undergraduate exposure, Plastic Surgery still occupies a negligible portion of curricula at many medical schools, with rates of formal Plastic Surgery teaching in UK medical schools falling from 78% in the 1980s to 13% in 2008.² There is a danger that potentially excellent candidates will be deterred from applying for training positions, thus we sought to investigate a cohort of UK medical students with an established interest in Plastic Surgery with regard to the factors that influence their interest in the specialty.

A cross-sectional study design was used with questionnaires distributed to medical students attending the BAPRAS Undergraduate Day in London and Glasgow University Plastics Undergraduate National Conference in 2019. The questionnaire (available online as supplementary material) covered the following domains:

1. Demographic information
2. Attracting and deterring factors for a career in Plastic Surgery
3. Knowledge regarding application requirements for Plastic Surgery Training
4. Undergraduate exposure to Plastic Surgery
5. Suggestions to improve undergraduate experience in Plastic Surgery

Out of 145 conference attendees, 82 (57%) participated in the study. The median medical school year of study across the cohort was year four. A total of 22 UK medical schools were represented between both conference days.

The most common factors attracting students to a career in Plastic Surgery (Figure 1a) were variety (25%), surgical intricacy (15%) and immediate effect on patient quality of life (12%). The most common factors deterring students from a Plastic Surgery career (Figure 1b) were a competitive na-

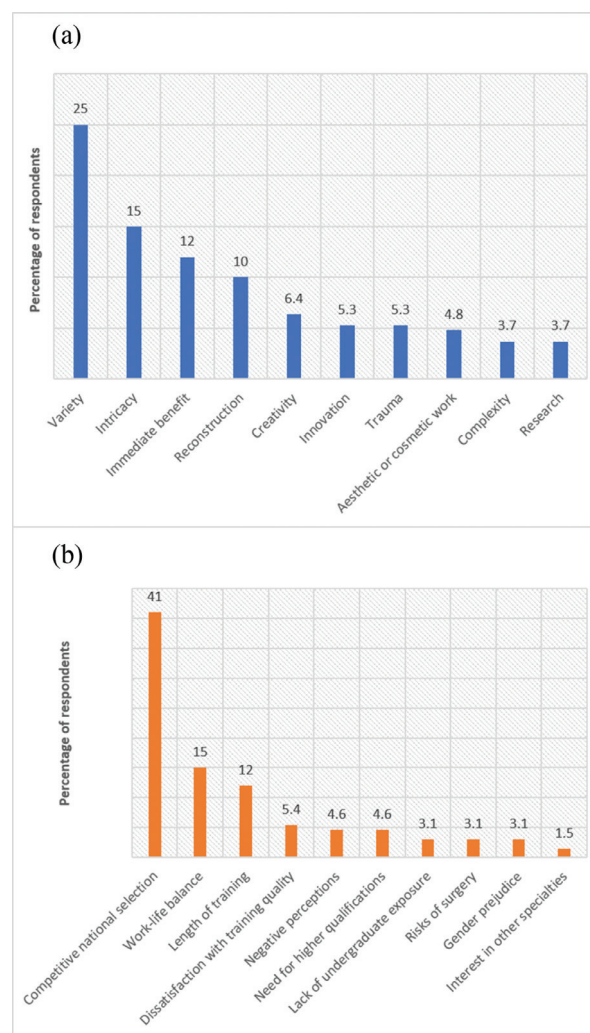


Figure 1 (a) Ten most common attracting factors. (b) Ten most common deterring factors.

tional selection process (41%), work-life balance (15%) and length of training (12%). Of students surveyed, 35% stated that they were aware of the requirements of the Plastic Surgery national selection process. This demonstrates a disconnection between perceptions around fierce competition for entry into Plastic Surgery training and the reality of often not knowing what the application actually involves. This highlights an opportunity for interventions to educate medical students about higher surgical training applications so that they can then prepare more effectively for them

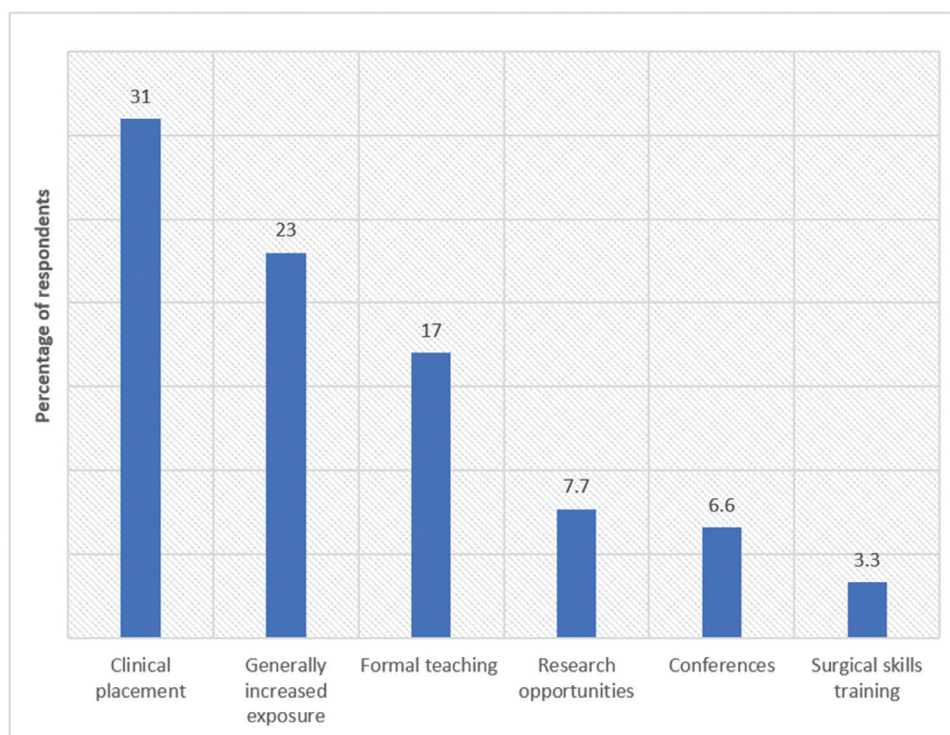


Figure 2 Five most common suggestions for improvements to undergraduate plastic surgery training.

in advance, which may reduce the chance that excellent candidates are unnecessarily dissuaded from selecting the career.

A small majority (53%) reported receiving undergraduate teaching in Plastic Surgery, either in the form of lectures or integrated clinical placements. Almost as many (45%) had experienced Plastic Surgery outside of university, either through setting up external experiences with Plastic Surgeons at their university, abroad via a medical elective or at surgical course or educational evening set up by surgical society. These results demonstrate that many medical students will not experience Plastic Surgery during their undergraduate education and so their perceptions of the specialty will be likely be influenced from external sources, such as television and other media.³ These perceptions are often negative, propagating the fallacy that Plastic Surgery is mostly concerned with cosmetic surgery and private practice, which were deterring factors for the students we surveyed. If students do not meet Plastic Surgeons, they will miss out on positive role models, who play an integral role in mentoring and developing successful careers.^{4,3} This is especially important for female medical students, as positive female role models are one of the most influential factors for female students interested in surgery.⁴

When asked what students believed would improve their undergraduate Plastic Surgery experience, the most common response was for more clinical exposure to the speciality in the undergraduate setting and formalised teaching (Figure 2). Ideally we would advocate the implementation of Plastic Surgery placements into undergraduate curricula of UK medical schools but appreciate the difficulties associated with this and as an alternative, short courses and workshops can provide time and cost-efficient

methods of improving exposure to the specialty.⁵ Currently, university surgical societies often fill this role, but this has ramifications in terms of equity of access and would be more appropriately provided by educational or professional institutions.

In summary, UK Medical students are interested in careers in Plastic Surgery and have a good understanding of what the career entails. Whilst the main deterring factor stated was the competition to obtain a training position, the majority of students were unable to correctly state the requirements for this competitive process. The reason for this is likely multifactorial, linked to a lack of clinical exposure and formal teaching in the undergraduate medical curriculum. Universities should collaborate with local Plastic Surgery departments and national professional bodies to meet the needs of medical students for Plastic Surgery exposure through mentorship, workshops, taster days and clinical placements.

Declaration of Competing Interest

The authors declare no conflict of interest. No funding was received for this study.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2020.08.086](https://doi.org/10.1016/j.bjps.2020.08.086).

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Percutaneous needle fasciotomy for Dupuytren's disease: A one-stop approach incidentally suited to the era of COVID-19[☆]



Dear Sir,

The era of COVID-19 has and continues to present a unique challenge to the provision of healthcare across the

National Health Service. The redeployment of many theatre personnel and anaesthetists to areas of high Covid-burden has seen surgical practice drastically condensed. Here we describe an example whereby percutaneous needle fasciotomy (PNF), delivered as the treatment of choice for Dupuytren's, facilitated continued service provision at an unaffected standard for patients presenting to our unit.

Upon the announcement of 'lockdown' and with the redeployment of many anaesthetists and theatre personnel to 'Covid-red areas', plastic surgery staff at our unit were reorganised into three main teams providing service in cancer, urgent electives and trauma. All elective lists were subsequently deferred, effective on March 17th in line with national guidelines. The majority of theatres across the Trust were stripped of ventilators and other equipment. Such restrictions to service, though undoubtedly needed, have compounded excess morbidity and mortality as an indirect consequence of the pandemic, estimates of which are difficult to evaluate and may inevitably have an enduring impact.

As the expected load of Covid patients was mercifully not seen in our region, limited resourcing for outpatient procedures was maintained such that less resource intensive procedures including PNF for Dupuytren's contracture could be carried out in a one-stop approach. In this method, patients are COVID-tested and those patients proven COVID-negative are offered to attend for PNF, which is carried out in procedure rooms by a surgeon and a single assistant, without the requirement for an anaesthetist or ventilator. Following fasciotomy, patients directly see hand physiotherapy for fitting of a thermoplastic splint which they are able to remove for short periods as required. Patients are not required to have nurse follow-up at seven days post-operatively (as per usual protocol) but are given details of the plastic surgery ward to contact if required, limiting avoidable exposure to both staff and patients. Additionally, patients are followed up via telemedicine at three months to evaluate the outcome of the procedure. Though this precludes physical examination, patients are typically asked questions such as 'How are you finding the use of your hand today?', 'How straight is your finger now?', 'Is the sensation to your finger as before the procedure?' and 'Would you have the procedure again if necessary?' in order to assess outcomes and patient satisfaction.

Though an established technique with documented safety in several large series studies including that by Therkelsen et al.,¹ there is a relative paucity in the literature regarding the provision of 'office-based' PNF which has also shown to be effective without compromise to patient safety.² The increased uptake of such practices may be vital in conserving theatre space, a resource which is likely to remain limited for the foreseeable future, enabling greater capacity for more demanding procedures and cases with greater need and/or complexity. As the demand for elective hand surgery continues to rise³ against the expected backdrop of economic recession and rationed healthcare, it may be essential to increase the provision of more sustainable and cost-effective approaches to treating surgical hand disease. In the era of COVID-19, when anaesthetists, ventilators and other resources are a scarcity, we found that PNF facilitated a one-stop treatment approach to treatment of Dupuytren's disease and as such is ideally

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suiting to continue service provision in this time of extreme resource limitation.

Declaration of Competing Interest

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Ultrasound guided liposuction for superficialization of difficult to access arteriovenous fistulas



Dear Sir,

Arteriovenous fistulas (AVF) remains the preferred method of vascular access for hemodialysis due to favorable patency rates, low infection rates, and fewer

complications.¹ In order for an AVF to be used, it requires adequate maturation and should be easily cannulated. In addition to affecting maturation, excess adipose tissue overlying the vessels in obese patients often makes the AVF too deep to cannulate for hemodialysis and can necessitate more extensive procedures in order to access the vessels.

The recommended vein depth for reliable cannulation is <6 mm to allow repeated safe cannulation.² In order to do this, vein elevation, surgical excision of fatty tissue, and tunneled vein transposition have been used to superficialize vessels. However, patients with a high BMI require additionally large incisions that can develop surgical site complications such as prolonged wound healing duration.³

Liposuction to superficialize AVFs is an emerging procedure with limited reports of its use. Though minimally invasive, the procedure is somewhat subjective, and it may be difficult to assess when “enough” has been done. Ultrasound guidance can help objectively evaluate the effectiveness of the procedure, in addition to ensuring the safety of the procedure by maintaining visualization of the AVF at all times. We describe our technique and experiences with ultrasound guided liposuction (UGL) as a promising method for salvaging deep AVFs for dialysis.

Four patients were included in this study, three of which had a brachiocephalic fistula. All patients had adequate maturation with flow rates >600 mL/min. The mean depth of AVF access was determined pre- and postoperatively in each patient via ultrasound (Table 1, Figure 1). Technical success was defined as a continuous thrill being palpable along the entire length of the vessel needle access point (NAP), and ultimately, the vessel successfully cannulated, and hemodialysis performed. There were no intraoperative or postoperative complications. Technical success was achieved in all cases.

In contrast to large incisions and manipulation of vessels with traditional superficialization procedures, liposuction allows for removal of excess fat without need for additional anastomosis through a single small incision. Prior groups have used a protective shield overlying the AVF to guard the vessel from damage, and ultrasonic-powered liposuction to liquefy subcutaneous fat at the canula’s distal tip. However, ultrasonic liposuction is known to be associated with burns and seromas from the thermal and mechanical disruption of surrounding adipocytes. The use of continuous ultrasound guidance removes the need for a device to guard the AVF while avoiding the risk of damaging neighboring structures along the NAP with direct visualization. Furthermore, injection of tumescent solution prior to liposuction reduces bleeding during the procedure while enlarging the deep adipose layer to be aspirated, thereby preserving more superficial layers and avoiding the thermal effects of ultrasonic liposuction.

Although the patients in our study experienced no complications, caution should be exercised for liposuction, and users must be wary of accidental injury to the fistula with the canula. A large cavity left behind after deep liposuction may involve a higher risk of complications including scarring, fat emboli, hematoma, or soft tissue deformity requiring removal or revision as the maximal depth at which liposuction should be performed to superficialize a venous outflow track has yet to be determined. Ultrasound guid-

Table 1 Patient information.

#	Gender	Age	BMI (kg/m ²)	AVF	Prior AVF	Preop. Mean vein depth (mm)	Postop. Mean vein depth (mm)	Lipoaspirate Volume (mL)	Time of AVF creation to Superficialization	Comorbidities
1	F	61	34	Brachiocephalic	Y	16	6	110	66	DM2
2	F	68	30.2	Brachiocephalic	Y	11	4	80	39	DM2, HTN
3	F	74	27.3	Brachiocephalic	Y	14	6	60	16	DM2, HTN, PAD

*Abbreviations: BMI: Body mass index; AVF: arteriovenous fistula; DM2: diabetes mellitus type 2; HTN: hypertension; PAD: peripheral arterial disease.

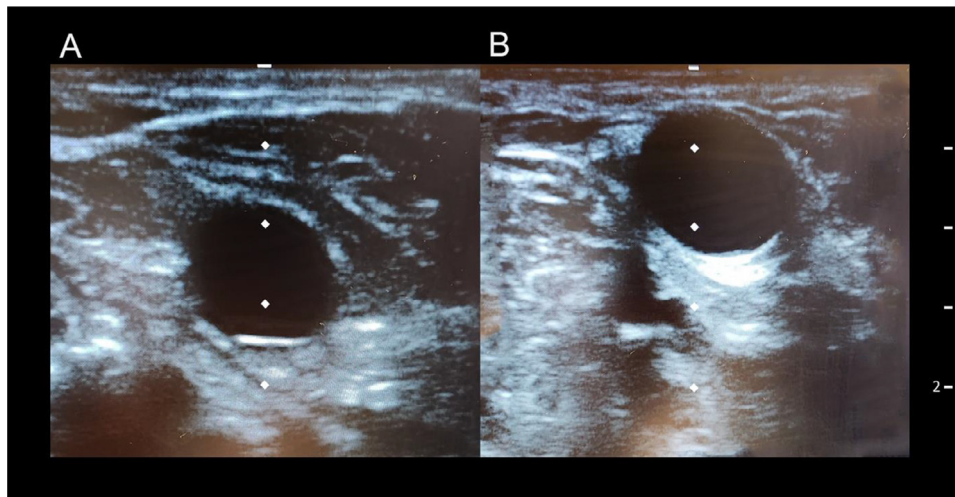


Figure 1 Ultrasound examination of the arteriovenous fistula before (A) and after (B) liposuction.

ance, however, can help mitigate some of these potential complications. We find ultrasound guided liposuction to be a safe and effective minimally invasive method for superficialization of AVFs through a single small incision with short operative times.

Technique

A regional block was performed in the target arm for all patients. Patients laid in a supine position with the arm abducted at a 90-degree angle. Under B-mode ultrasound guidance, the AVF and venous outflow tract was mapped and an incision site was selected. A 1 cm incision was created. Under ultrasound guidance 50-100 mL of tumescent solution (1 L normal saline, 30 mL of 1% lidocaine, and 1:1000 dilution of 1 ampule epinephrine) was infiltrated on both sides of the venous outflow tract followed by a 10-minute wait for the tumescent solution to take effect.

Using a 3 mm spatula cannula, liposuction was performed over the top of the fistula with the bevel directed away from the vessel, and the cannula angled toward the skin to avoid damage to vasculature. Liposuction was carried out directly lateral to and overlying the AVF in a radial pattern. This allowed for adequate visualization of the AVF path as well as width once the thinned skin has scarred down along the fistula's anterior surface upon healing. Ultrasound was used to verify the depth of the venous outflow tract and position of the cannula every 10 mL of lipoaspirate that was removed.

Once a palpable thrill was felt through the skin and an even depth was achieved along all points of the NAP, the area was irrigated and steri-strips were applied after closure with a 3-0 vicryl followed by a 4-0 monocryl subcuticular stitch.

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Declaration of Competing Interest

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Roadmap for the use of FACE-Q skin cancer module in multidisciplinary practice



Dear Sir,

Data from patient-reported outcome measures (PROMs) have been adopted in outcome-based research.¹ There is an increasing interest to integrate PROMs data into routine practice to improve care management pathways.² The authors report the features of a roadmap for the use of FACE-Q Skin Cancer Module, a new skin cancer-specific PROM for facial lesions,³ in multidisciplinary practice. Targeting the maximization of the patient-clinician encounter and standardization of data collection led to this roadmap's (Figure 1) gradual construction (using a problem-solving model with constant monitoring and adjustment). This was based on an accumulated experience of the authors during the process of validation of the FACE-Q Skin Cancer tool into Brazilian-Portuguese language as well as the use of the validated PROM in a multidisciplinary practice model managing patients with private health insurance.

For a proper understanding of patients' perceptions throughout the cycle of surgical care while monitoring patients' progress and identification of problems, the selected scales and checklists were routinely applied at predefined time points (preoperative and 1, 6, 12, and 24 months post-surgery), and also administered for particular symptoms-

and request-driven time points (e.g., request for scar revision 3 months after surgery) on a case-by-case approach. The adoption of tablets (during the waiting time for office visits) or personal computers (at home) assisted this process for the use of FACE-Q data during consultations. A FACE-Q administrator (a trained non-clinician member of staff) accelerated this workflow by contacting patients, preparing the dataset for consultation, and storing the data. During the postoperative period, the individual data of each patient allowed clinicians to assess the scores' fluctuations. Clinicians working with a multidisciplinary team-based approach in the same building facilitated the intrateam interaction with prompt FACE-Q-driven actions. Not only were the overall Rasch score-based interventions implemented (e.g., psychological support to deal with cancer-related apprehension as measured by the Cancer Worry scale) but each item was also addressed during consultation. For example, during the evaluation of the Sun Protection Behavior scale, the item "how often have you worn sunscreen when you were outside?" was adopted to reinforce the need for regular use of sunscreen, contributing to patient instructions (just-in-time education model) and engagement with care. As FACE-Q was adopted during clinical evaluations, we have perceived that the patients have properly and timely answered the scales. The PROM also improved their ability to describe their concerns and feelings.

This roadmap should not be interpreted as unique or absolute as it can be revised and adapted to other health care settings, organizational system, and to the composition of multidisciplinary teams, with distinct challenges for implementation. Despite the existence of literature-derived support for the described strategies,^{4,5} future robust analyses could judiciously assess the impact of this roadmap on patients and clinicians' time burden, patient-clinician communication, PROM-driven changes in interventions, patient satisfaction with care, and whether outcomes are improved as a result. Future investigations should also generate cut-points and define normative data which could enhance routine use and interpretations of individual FACE-Q data toward the delivery of truly personalized patient care.⁵

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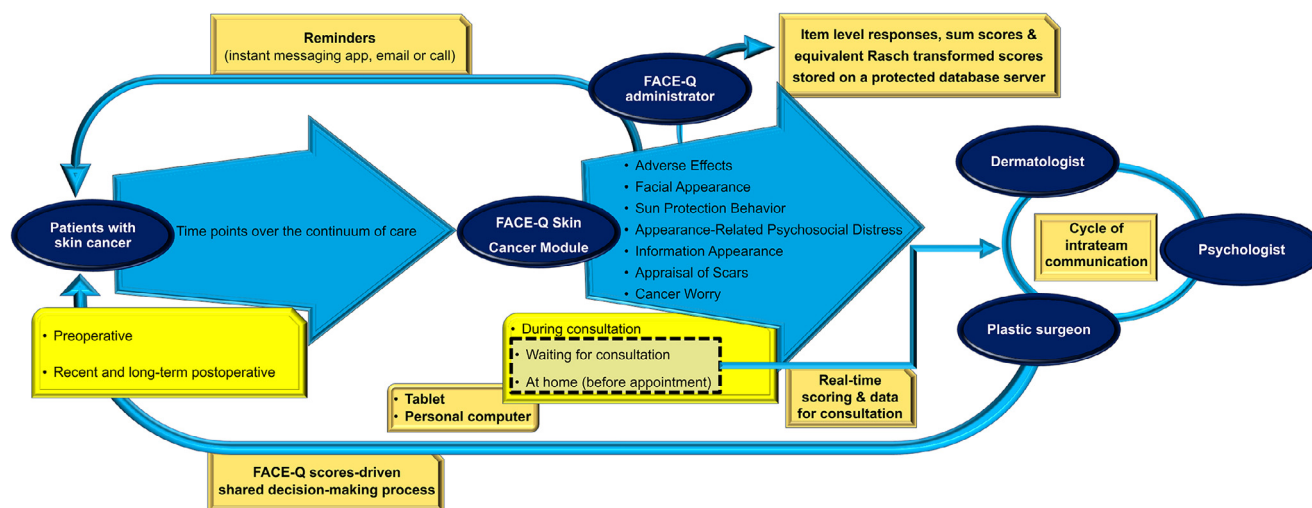


Figure 1 The FACE-Q-based roadmap. As the FACE-Q scales (appearance satisfaction, quality of life, and patient experience) and checklists (sun protection and adverse effects) can be used independently in any given combination or order with individualization of scores, clinicians have adopted only those that were relevant to a specific contexts throughout the continuum of care, that is, diagnosis, surgical treatment, recovery, and follow up processes. The FACE-Q data (item level responses and Rasch scores) acted as a trigger element for cascades of actions and interventions in a shared-decision making approach. The patients' reports were inserted within the clinical flow, for example, patients reported their symptoms (Adverse Effects checklist) just before the clinical appointment (at home or waiting room) and received immediate symptom-tailored recommendations and treatment. The constant interaction between clinicians while crosschecking with the FACE-Q administrator avoided patient burden when it came to re-answering a scale that they had recently completed. For example, the dermatologist and plastic surgeon's interest in the Appraisal of Scars scale to identify a potential poor patient-perceived result and then plan the best-suitable therapeutic intervention, did not have to be re-answered.

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Plastic surgery in the time of Coronavirus in Italy. Can we really say “Thanks God we are plastic surgeons?”



Dear Sir,

We may all imagine how things go when a huge tragedy like that of COVID-19 hits on the health care system of a

country. Medical and surgical specialties live as they are in a “parallel world”, which exists alongside the Intensive Care Units, the Departments of Infectious Disease, Pneumology, Hygiene and all the buildings which have been converted in COVID buildings in order to assist infected or suspected of being infected people. The most difficult prediction is the maximum number of infected patients that will be reached in Italy and, most importantly, the maximum number of patients who will require intensive care unit admission.¹

The social significance of the almost heroic task of those who fight the virus, fighting against time, and the treatment strategies to be invented persuade that this is the only medical battle to be won. We certainly cannot blame it: the coronavirus is the game of life but also the game of medical science.

But who is on the other side?

If the coronavirus dictates the planetary health agenda, certainly the other disciplines, alas, do not live between reality and memory. The idea of a certain snobbery towards some surgical branches such as plastic surgery does not really coincide with the sudden increase in specific surgical cases. Indeed, it is curious to observe how the urgent provisions concerning the contrast and containment of the spread of the COVID-19 virus issued by the Italian Government with the DD.PP.CC.MM. of 08.03.2020 and 09.03.2020 may have influenced this trend.

Something has changed since people have been forced at home, wondering what to do.

We reviewed the data of all the patients admitted to our Plastic Surgery Unit, which is located in a COVID hospital, from our institution digital databases from the 1st to the 31st of March 2020 and we compared those data with the

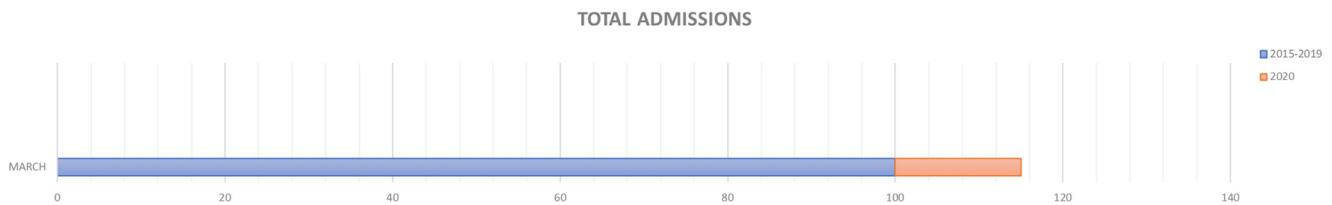


Figure 1. Comparison of the total admissions in Plastic Surgery Unit between March 2020 and March 15-2019 (average value).

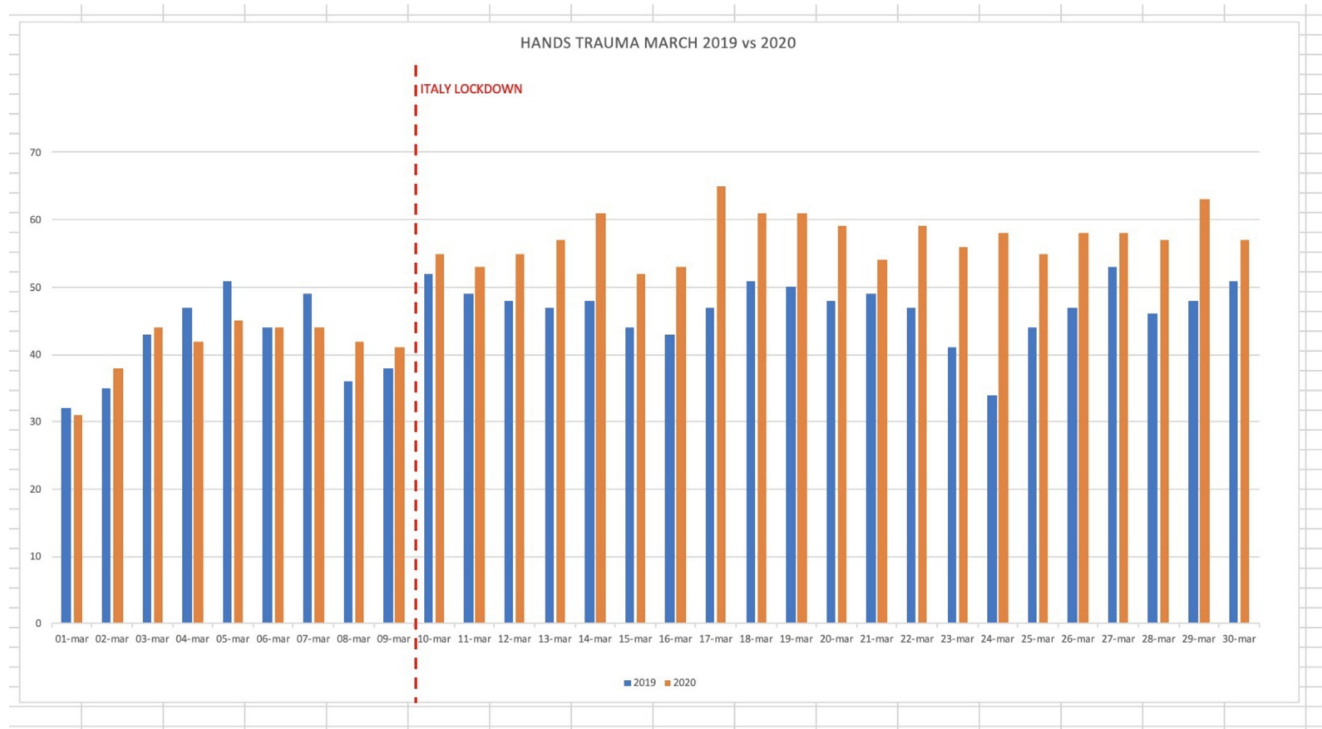


Figure 2. Comparison of admissions for home hand accidents between March 2020 and March 15-2019 (average value).

ones of the previous 5 years. In accordance with the Circulars of the Ministry of Health, the ordinary hospitalization and outpatient activities have all been remodulated in order to meet the potential increase in hospitalization needs and to limit patient flows within the care facilities. Only urgent or emergency surgery or not postponable oncologic surgery have been guaranteed. As a matter of fact, the number of total admissions in our Unit demonstrated a reduction rate of 85% (Figure 1). On the other hand, the results of the statistical analysis for the month under review has shown that hand trauma related to home accidents have raised of 15.8% on average compared to the same period of the previous five years. This figure has been essentially the result of clumsy experiments with tutorials for carpentry works of all kinds, bricolage and gardening, with the milder weather as an excellent ally (Figure 2).

The anxiety and the fear of contagion have led many to do-it-yourself for the sanitization of environments and the hygiene of hands and clothes. Quite for this reason, ten patients were admitted to our Burn Center this month alone. The 67% of the patients were treated for burns caused by denatured alcohol, while in the 33% of the cases, the injury

was caused by the improper use of corrosive substances, awkwardly used for the artisanal realization of disinfectants. The total number is 22% higher than the five years before.

Not even the prison system has remained foreign to the previous observations, with reference to patients who had needed recovery and treatment in a plastic surgery department. Riots in Italian prisons hit the headlines after the Italian Government decision to discontinue visiting from relatives. Maxillofacial trauma admitted to the selected Departments raised from the last 5 years of 35%.

The Plastic Surgery Community continues to work and to fight the same universal battle with the same sense of responsibility. Responsibility to be part of the cure and not part of the disease.² For instance, dedicated plastic surgery teams comprising attending physicians and residents have been established in our Center. They do not come into contact with each other and alternate on a weekly basis. We should be role models for good hand hygiene and enforce strict compliance to minimize disease spread and not add to the general hysteria.³

Declaration of Competing Interest

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How defined an abdomen should be: Survey-based study with young women



Dear Sir,

Cultural beliefs, social media, perception of other people, and several other issues can directly influence the patient's self-image¹; hence, the ideal abdomen is not the same for every patient. To better understand these variables a prospective survey was conducted of volunteers of a Brazilian hospital recruited randomly through an email survey from January 2020 to April 2020. The Hospital de Clínicas de Porto Alegre's institutional review board approval was granted.

The inclusion criteria were being a female medical resident; there were no exclusion criteria. Based on percentages found in the ongoing literature, the sample size of 80 participants was calculated based on the expected difference among groups, with alpha error 0.05 and power of 80%.²

Data was collected sending an email to the academic mailbox of 150 female residents of a particular University-related Hospital. After the first email, 3 reminders were sent. In the email, firstly was described as a short abstract, the objective, and the confidentiality statement of the survey so that volunteers understand the relevance of it. Then it was asked the age of the participant, how many times does she practice physical activity during the week, and if she was totally, partially or not satisfied with her current abdomen muscle definition. Finally, using the classification proposed by Viaro (supplementary figure 1)³ with the written and figure description added to an actual photograph example, it was asked which grade of the classification would best fit in her goal of abdominal etching.

The comparison of the variable age was assessed through the ANOVA test. All other variables were evaluated through the exact fisher test. For all comparisons, the significance level of 0.05 was considered.

A total of 81 female participants were interested in the survey. The response rate was 54%. The age range of the volunteers was between the ages of 24 and 40 years, being an average of 27.6 years. Furthermore, 88% of the participants were aged 25-30 years. The age did not directly influence the abdominal etching grade goal.

As proposed by Gould, participants who exercise (any sort of physical activity was considered) at least twice a week were considered the exercise cohort; and, who did not, the sedentary cohort.² It was found that 65% (53) of all study participants claimed to exercise at least twice a week ("exercise cohort"), whereas 25% (28) of study participants exercised one or no times per week ("sedentary cohort"). (Supplementary figure 2) The cohort of individuals that exercised multiple times per week was more likely to desire a higher grade of abdominal muscle definition goal with a statistically significant difference (Figure 1) ($p < 0.05$). There was no statistically significant correlation between satisfaction with the current abdomen and one specific ideal of abdominal muscle definition grade.

There is a current tendency to the High Definition Liposuction (HDL). As described by Hoyos, because HDL is designed to be a sculpting procedure rather than a debulking technique, appropriate patients should have good muscle tone without an excessive amount of fat or skin laxity (Body Mass Index $< 30 \text{ cm}^2/\text{m}^2$).⁴ Young patients with good understanding are natural candidates for high definition liposuction; then, young residents would be a representative group of this population.

Hoyos described HDL as a precision technique, involving a 3-dimensional multilayer concept of body contouring, stating that it is "all or nothing lipoplasty" once the whole body musculature must match in order to allow natural and optimal results.⁴ Our findings agree with Hoyos statement. On our survey it can be observed once the more physically active (better body musculature strength) - the volunteer was (better body musculature strength), the higher her abdominal etching ideals were. However, even among those with the greatest physical activity a minority desires the appearance of multiple packs.

Although this study is restricted to a specific group of patients, and the response rate was 54% even though 3 reminders were sent to the participants who did not answer the survey; it serves as a guide to a discussion of the pa-

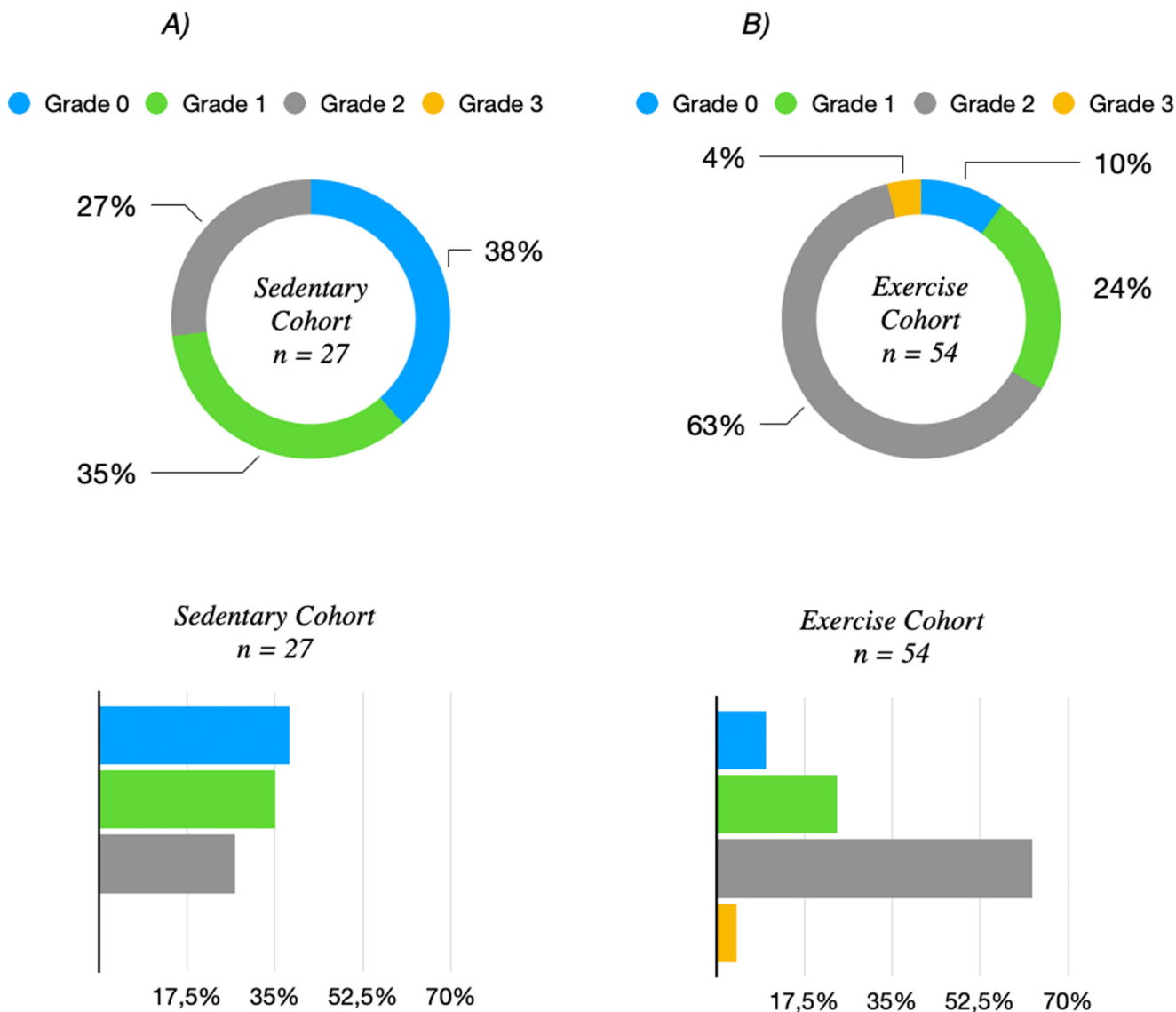


Figure 1 (A) The proportion of individuals in the sedentary cohort that consider each grade of abdominal etching ideal (B) The proportion of individuals in the exercise cohort that consider each grade of abdominal etching ideal.

tient’s wishes regarding their goals and frustrations concerning their fitness objectives with a surgical procedure. We also highlight that the procedure is not risk-free, and that must be taken into consideration.⁵

In conclusion, our study did have limitations inherent to our methodology. Although it is fair to conclude from these data that physical activity is directly related to the abdominal muscle definition grade pursued. It is also plausible of concluding that appearance of the patients’ “4, 6, or even 8 pack” muscle is not an aesthetic ideal for most patient. Importantly, the level of etching may differ, and patients may have divergent desires. We believe this discussion must be included in every preoperative body contour consultation; also, evaluating each patient with a careful and realistic sense may be the way to achieve patient and surgeon’s satisfaction. This conclusion should be further evaluated

in future studies including other particular variables and groups.

Disclosures

All authors have seen and approved the manuscript. The current “Guide for Authors” has been read. The authors declare that they have no conflict of interests. The authors declare that they have no funding. The research followed the Helsinki principles. If accepted, the paper will not be published elsewhere in the same or similar form, in English or in any other language, without written consent of the copyright holder. The authors declare that they have no conflict of interests or funding.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2020.08.082](https://doi.org/10.1016/j.bjps.2020.08.082).

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Letter comments on: "Use of a virtual 3D anterolateral thigh model in medical education: Augmentation and not replacement of traditional teaching?"



Dear Sir,

It was our pleasure to read the article by Lo et al.,¹ who applied a virtual three-dimensional (3D) anterolateral thigh model in medical education. Indeed, the study showed that

this model could be proved useful for anatomy teaching and able to complement traditional methods. However, the authors stated that "despite the appetite for virtual and augmented reality models, empirical evidence supporting current technologies is limited", doubting that those technologies could significantly contribute to acquisition of anatomical knowledge. We would like to note that the literature has provided strong evidence to support 3D digital visualization technologies, including virtual reality (VR) and augmented reality (AR), not only in anatomical education, but also in several fields of plastic surgery.

The study by Lo et al.¹ evaluated students' perceptions after the educational intervention via the virtual model, as well as via traditional methods, including two-dimensional (2D) images and lectures. However, knowledge acquired by students via the virtual model, lectures and 2D images was not assessed, as it was also noted in the commentary by Chu and Fan.² Our respectful disagreement with the opinion expressed by Lo et al.¹ is not based on studies which just evaluated students' perceptions, but on reviews of the literature. These reviews have included comparative studies, which have illustrated the benefits of 3D computer-based visualization, VR and AR in terms of acquisition of anatomical knowledge and aid in plastic surgery practice. On the other hand, to the best of our knowledge, there is no published review article to support the superiority of traditional 2D anatomy teaching methods to 3D ones.

Yamine and Violato³ published a meta-analysis of studies which compared 3D visualization technologies, including VR, with other anatomy teaching methods. It was found that 3D visualization led to significantly higher spatial anatomy knowledge acquisition compared to other methods. The results of the meta-analysis had high internal validity for better outcomes of 3D technologies in comparison with other anatomy education modalities.

Triepels et al.⁴ performed a systematic review of studies which compared 3D digital models (including VR and AR) with traditional anatomy teaching tools. It was concluded that 3D digital visualization led, in general, to significant improvement of anatomical knowledge in comparison with traditional 2D modalities.

Since the aforementioned review articles demonstrated the high potential of 3D visualization methods to enhance anatomy knowledge, it could be concluded that those technologies provide students with adequate illustration of 3D anatomy of structures of the human body. Thus, it could be hypothesized that this illustration could also be beneficial for surgeons. Indeed, especially concerning plastic surgery, the systematic review by Sayadi et al.⁵ showed that VR and AR have remarkable ability to contribute to preoperative planning, surgical training and intraoperative decision-making and to reduce operative errors.

The article by Lo et al.¹ proposed that VR could augment and not replace traditional anatomy teaching, as it was indicated by students' perceptions. We consider that decisions regarding augmentation or replacement of traditional anatomy teaching tools should not be based on students' perceptions but on data concerning illustration of spatial anatomy and acquisition of anatomical knowledge. Chu and Fan,² in their commentary, stated that there is need for studies to compare students' performance with and without 3D virtual models. In contrast, we believe that

the aforementioned review articles have demonstrated that 3D visualization technologies could essentially contribute to enhancement of anatomy knowledge, adequate illustration of 3D anatomy and improvement in plastic surgery planning, navigation and training.

Given that plastic surgery has a 3D nature of education and practice,¹ we consider that the findings of the aforementioned review articles are pertinent. The fact that the 3D visualization technologies are continuously evolving will probably enlarge their ability to accurately represent anatomical structures, reinforce anatomy knowledge and be beneficial for plastic surgery practice.

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Ethical approval

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Declaration of Competing Interest

None

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DIEP flap reconstruction as salvage option for Poland syndrome breast hypoplasia



Dear Sir,

Poland syndrome is a congenital abnormality mostly associated with unilateral hypoplasia of the sternocostal head of pectoralis major, rib cage and upper limb abnormalities. It may include absent or hypoplastic breast can which have a significant psychological impact in female patients who often experience body image disorders. Mild cases can be improved with lipo-modelling, but traditional reconstruction options include Latissimus dorsi (LD) flap reconstruction with or without implant or a Transverse Rectus Abdominis Muscle flap¹. The use of a custom-made rubber silicone implants based on 3D Computer Aided Reconstruction is another option. Nevertheless, complications associated with implants such as infection, rotation, rupture, capsular contracture and poor cosmetic outcomes make perforator flaps a valid alternative². The Deep Inferior Epigastric Perforator flap (DIEP) is the gold standard in breast cancer reconstruction and the literature seems to be restricted to single case reports from different units as primary treatment for Poland syndrome²⁻⁵. Several other factors probably also contribute towards this, such as the young age at which affected female patients tend to present. In early adulthood, tissue excess in the lower abdomen is uncommon which makes harvesting a decent flap with a low donor scar technically challenging. Additionally, breast development is not completed at this stage and, as a result, any intervention will likely need significant adjustments to account for contralateral changes in size and ptosis over time which is difficult with a DIEP flap. It is however an ideal option when breast development is complete and where implants have failed.

We present our early experience in Whiston Hospital with 3 female patients who underwent salvage surgery with a DIEP flap reconstruction between 2012 and 2019. All our patients were previously treated with implants but were unhappy with tightness in the chest and unsatisfactory cosmetic results. Two patients had capsular contractures and one patient had a ruptured implant. None of them had any other medical problems. CT angiography was performed as a routine method of perforator mapping, but in this occasion to confirm internal mammary vasculature as well. The DIEPs were performed by the senior author of this study.

The first female patient was 48 years old and initially presented at the age of 17 with right sided absence of sternal head of pectoralis major and hypoplasia of the breast. She was treated with a 200ml silicone implant which un-



Figure 1 Pre-operative presentation with implant rupture.



Figure 2 Final result after implant removal, expansion, DIEP flap, mastopexy, nipple reconstruction, lipomodelling.

fortunately ruptured. She presented to our department and initially had exchange of the implant for a tissue expander later replaced by a right DIEP flap which had an uneventful recovery. Subsequent left breast mastopexy was carried out along with right nipple reconstruction with areola sharing and underlying cartilage. Two further lipo-modelling sessions completed the reconstruction and she was satisfied with the results. (Figures 1 and 2)

The Second patient was 42 years old and had undergone right Poland syndrome breast reconstruction with a Becker implant and a left sided symmetrising implant. She

presented to us with grade 4 capsular contracture on the right side and had removal of the right implant, capsulectomy and DIEP flap reconstruction with an uneventful recovery. One year later, the skin paddle of the flap was inset along with liposuction and left sided removal of implant and mastopexy. The final procedure was a revision of the position of the NAC to achieve a satisfactory result.

The third patient was 43 years old and previously had an implant reconstruction for a right sided Poland syndrome and left mastopexy. She presented with a ruptured implant and had an uncomplicated DIEP flap reconstruction followed a year later by lipofilling and adjustment of the skin paddle. She was happy with the result and got discharged from our care.

Although implant reconstruction remains the most commonly used method for Poland patient breast reconstruction, we have shown that autologous reconstruction gives a better permanent cosmetic result with no sequelae of capsular contracture or implant rupture. Autologous free flap replacement should be considered for failed implant reconstruction. Pre-operative imaging is essential and further refinement of results can be achieved with lipofilling and contralateral symmetrisation. There is a clear need for more studies so DIEPs and other free flaps can be routinely offered to patients with Poland syndrome, especially when breast development is complete or implants have failed.

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The origins of modern plastic surgery



Dear Sir,

In a fascinating editorial, Dr Zhang and Dr. Hallock draw attention to the Dunedin connections of four pioneers of Plastic Surgery; Gillies, Pickerill, Mowlem and McIndoe. Dunedin is without doubt a charming location, but to grace it “The Birthplace of Modern Plastic Surgery” is somewhat dubious.

As a consequence of the large numbers of severe maxillofacial injuries inherent in trench warfare, the Allies and the Central Powers fighting in Europe found themselves with a new and vast spectrum of facial mutilations. Hastily improvised specialized units were set up to treat the severely injured and disfigured.

Non-British pioneers were: French; Hippolyte Morestin, Charles Valadier, Albéric Pont, Raymond Passot, Pierre Sébilleau, Charles Claoué, François Dubois, Léon Dufourmentel; Americans: John Staige Davis, Vilray Blair, Vazartad Kazanjian; Russian: Vladimir Filatov, Vera Gedroits; German: Christian Bruhn, Jacques Joseph, Hugo Ganzer, Otto Lanz, Erich Lexer, August Lindemann; Turkish, such as: Cafer Tayar Kankat Cemil Topuzlu, Cafer Tayyar Kankat, Dr Halit Ziya Konuralp, and Belgians, such as Maurice Coelst, and Gino Pieri in Italy, were those who established what is now recognized as plastic and reconstructive surgery.¹⁻⁵

Clearly, that fact that they rarely published in English excluded the work of these pioneers from Gillies and the British Empire and impeded their contributions to early modern plastic surgery.¹⁻⁵ Gillies was often unnecessarily self-taught, and only his surgical inventiveness, daring and social skills allowed him to come, with his cousin McIndoe, to symbolize the speciality in the English speaking world. He had no time for the Europeans like Coelst and Esser in spite of their translations. Despite being on its executive council he took little interest in the European Society for ‘Structive Surgery’ (founded by Maurice Coelst).

This very incomplete list of surgeons were faced with the same surgical challenges; it is fascinating to consider the parallel developments in each country. An article in 1972 by J. P. Laldrie in the British Journal of Plastic Surgery recounts that Morestin published six hundred and thirty four articles in French, which limited his reputation in England. Esser’s magisterial book on arterialized flaps was published in English in 1928, yet ignored by Gillies and his coterie. Most of the other war surgeons published widely, alas, often in their own language. Ludwig Wittgenstein, who fought for the Austro-Hungarian army and later became a famous philosopher in the United Kingdom, wrote in his “Tractatus logico-philosophicus” during World War One: “The limits of my language are the limits of my world.” Hopefully the advent of the international scientific exchange, the internet and easy translation will eventually no longer prove a barrier to the general advancement of knowledge.

Notably, Zeis wrote: “We think we have provided an adequate description of the current status of plastic surgery,” but then adds, with his typical modesty, Tagliacozzi’s warning: “*sed, ut neque in universa medicina, imo in omni actionum genere. Cuncta firma sunt, et aeterna, ita neque hic, quod jam diximus, perpetuum est,*” “But nothing lasts for ever, as in all of medicine and everything else that we do or say.”² Zeis and Tagliacozzi were well aware that plastic surgery is not an exact, but a historical science, that has to modify its conclusions over time as knowledge changes. Not only that. It must admit this, if it wants to be honest.

Authorship

All authors have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data; (2) drafting the article or revising it critically for important intellectual content; and (3) final approval of the version to be submitted.

Declaration of Competing Interest

The author declares that he has no conflict of interest.

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Informed consent

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The value of preoperative computed tomography angiography (CT-A) in patients undergoing delayed latissimus dorsi flap breast reconstruction after axillary lymph node dissection or irradiation and suspicion of pedicle injury[☆]



Dear Sir,

The latissimus dorsi (LD) flap first described by Tansini in 1906 has proven to be a versatile resource in breast reconstruction remaining as one of the most popular reconstructive options. This flap is unmatched in reliability and its dissection is usually straightforward. Notwithstanding, when the axilla is severely scarred due to a previous aggressive lymph node dissection or irradiation, identification and dissection of the thoracodorsal pedicle may be laborious and tedious carrying a risk of injury. On the other hand, as the neurovascular flap pedicle is particularly vulnerable to injury during axillary lymph node dissection, its cauterization or ligation is not an uncommon complication. In this regard, Santanelli et al. reported their experience on the accidental injury of the thoracodorsal pedicle during axillary dissection and proposed a classification and a reconstructive algorithm.¹

[☆] This work was a podium presentation at Plastic Surgery The Meeting, American Society of Plastic Surgeons (ASPS), Chicago, IL, USA in September 28-October 1, 2018.

Although CT-A is an established practice study in the preoperative planning of abdominal perforator flaps to select optimal perforators and identify iatrogenic or congenital anatomical variations^{2,3}, its indication in delayed cases of breast reconstruction with LD flap has received no attention. Situations such as inconclusive physical examination, previous axillary radiotherapy or aggressive dissection without a detailed record of past surgeries might justify its indication.

Therefore, we aimed to elucidate the role of preoperative CT-A in patients undergoing delayed LD flap breast reconstruction after aggressive axillary lymph dissection and/or irradiation assessing its indications and benefits on surgical time, operative room fees and outcomes.

Between January 2010 and January 2018 all patients undergoing delayed LD flap breast reconstruction with a preoperative CT-A were included in the present study. Electronic clinical records were retrospectively reviewed to analyze patients age, body mass index (BMI), referral center, history of radiotherapy, and indications for preoperative CT-A. The recorded operative time of every procedure was also evaluated and compared to same number of consecutive patients undergoing LD flap breast reconstruction with similar BMI in whom preoperative CT-A was not indicated (control group). In addition to the analysis of their clinical records the cost of preoperative CT-A and operating room fees (per-minute) were compared between both cohorts. The groups were also statistically compared using a parametric test for independent samples (Student's t-test), setting the level of statistical significance at 0.05. An additional comparison considering the value associated with each group was made, but this time considering the total surgical costs, which depends on the surgical time and CT-A costs. Statistical analysis was performed with IBM SPSS statistic 20.0 software.

A total of 26 patients were included in the present study. Preoperative CT-A was indicated in 13 patients (study group). All of them had history of axillary node clearance or axillary radiotherapy. Information regarding the description of the first procedure was not available or incomplete and physical examination was not conclusive in eleven patients who were referred from another distant center and in two patients previously operated at our hospital. Patients demographics are summarized in [Table 1](#).

CT-A findings showed patency of the thoracodorsal pedicle in all patients in the study group ([Figure 1](#)). Although it was reduced in its internal diameter in 3 cases (less than 1,5 mm), the partial occlusion was not considered to be severe enough to preclude the procedure. The analysis of the recorded operative time for the study group compared to 13 consecutive patients undergoing the same procedure without preoperative vascular imaging (control group) showed a mean saved time of 32 min. Regarding the cost analysis, at our institution, the value of the CT-A is USD 250, while the operating room fee per hour is USD 1380 (USD 23 per min). In this fashion, CT-A indication allowed an average saving of USD 486 per procedure. The statistical comparison between both groups using a parametric test for independent samples showed significant differences in surgical time and costs.

Table 1 Patients demographics and cost analysis. This table shows the comparison between the two groups. The OR cost at our institution is U\$D 23/min while the cost of a thoracic CT-A is U\$D 250. This makes a total surgical cost saving of U\$D 486. The statistical comparison between both groups using a parametric test for independent samples showed significant differences in surgical time and total surgical costs.

Parameter	Study Group (CT-A)	Control Group
Patients	13	13
Age: Mean and (range)	45 (36-53) y.o.	46 (40-55) y.o.
Mean BMI	20.6 kg/m ²	21.3 kg/m ²
Axillary lymph node dissection (ALND)	13	13
Axillary radiotherapy associated to ALND	3	-
Surgical time: Mean \pm SD and range	172 \pm 17.7 (146-199) min	204 \pm 13.9 (175-226) min
Average surgical time difference	32 min less	
Average OR cost \pm SD	U\$D 3956 \pm 408	U\$D 4692 \pm 319
CT-A cost	U\$D 250	
Average total cost difference	U\$D - 486	U\$D + 486

(Student's t-test: $p < 0.05$). Considering the level of statistical significance set and sample size, the study was able to detect monetary differences over U\$D 250 between groups obtaining a statistical power of 80%.

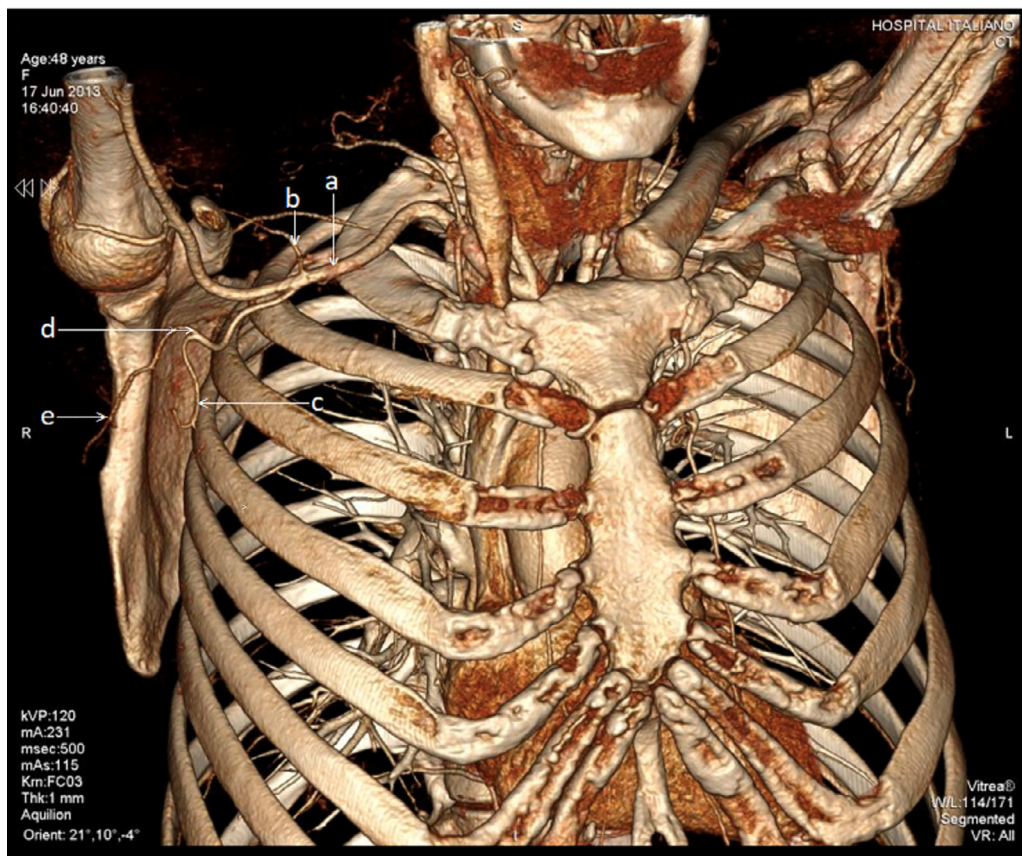


Figure 1 This CT-A image shows the patency of the thoracodorsal pedicle in a 48-year-old patient in whom her right axilla was previously dissected during a mastectomy and her physical examination was inconclusive. The axillary artery and its branches are indicated with arrows: a) axillary artery; b) thoracoacromial artery; b) lateral thoracic artery; d) subscapular artery and e) thoracodorsal artery.

There are only two previous studies in the medical literature reporting the preoperative use of vascular imaging to visualize the pedicle integrity. Pauchot et al. proposed a systematic preoperative Doppler ultrasound imaging of the thoracodorsal pedicle to detect altered flow.⁴ However, ultrasound is known to be an operator-dependent

imaging modality. Angiography was also previously proposed as a more objective, although more invasive, way to explore the pedicle patency.⁵ Nowadays, CT-A has supplanted invasive angiography providing high-quality vascular imaging and valuable information on the patency of the serratus anterior branch and lateral thoracic artery. In pa-

tients with severely scarred or irradiated axilla, preoperative CT-A provides an additional benefit by avoiding the axillary exploration and risk of injury. In our series, axillary exploration avoidance decreased surgical times resulting in a more expedite and straightforward procedure. Cost analysis of our data shows that preoperative CT-A costs in these highly selected patients is compensated by the cut-back in overall surgical costs while avoiding the risk of pedicle injury. Notwithstanding, further prospective multicentric studies to confirm these preliminary findings are needed.

Ethics

This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. For this kind of retrospective study formal consent form a local ethical committee is not required.

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Declaration of Competing Interest

The authors have no financial interest to declare in relationship to the content of this presentation

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