



The perfect cut: A combined clinical & research elective in Plastic and Reconstructive Surgery at Oxford

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Isabel is currently a Trainee Intern at the University of Auckland, mainly based at Middlemore Hospital. She is an aspiring plastic and reconstructive surgeon and is actively involved in several plastic-surgery related clinical research projects. She will be furthering her passion with another upcoming research stint at Cambridge University Hospitals National Health Service Foundation Trust in the United Kingdom after graduation. Outside of medicine, she is a competitive swimmer and triathlete who also enjoys expressing herself through arts and playing the piano.

Introduction

My final-year elective was done at the Plastic and Reconstructive Surgery (PRS) Department at the Oxford University Hospitals (OUH) National Health Service Foundation Trust. As an internationally established teaching hospital, the OUH Trust not only provides world-class medical care in almost all medical and surgical fields, it also has strong links with the University of Oxford through education of medical students, research, and academic consultants. The main hospital of this trust is the John Radcliffe Hospital (JR) where I was primarily based. Through the various academic and hands-on experiences undertaken during my time at Oxford, I developed a greater appreciation of the work and challenges that plastic surgeons face on a daily basis.

Having set my heart on pursuing PRS upon graduation, I conscientiously aligned my interest with hands-on experiences by being involved in as much clinical and research work in the field of PRS, all aimed at bettering existing evidence-based medical practices. My interest for this field stems from a documentary series I watched back when I was 14 years old. This unconventional series offered me an interesting insight into the life of a plastic surgeon, the challenges he faced both at work and in his personal life illustrated the complexities of medical dilemmas and how these could be closely intertwined and influenced by one's personal values. What I especially liked about this series is its exploration of the multidimensional reasons and motives behind each patient's presentation.

As the title of my article, 'The Perfect Cut', suggests, I wanted to challenge the negative stereotypes and social stigma that mainstream media has popularised – equating plastic surgery solely as a tool for artificial beauty enhancements. To me, PRS is more than mere creation of artificial beauty. I feel strongly that reconstructive procedures not only restore the initial physical self, but also reaffirm self-confidence with the aid of a surgical

scalpel. Hence, the aim of this article is to consolidate my eight-week elective experience at Oxford, and also inspire readers to appreciate and understand of the beauty of PRS by unveiling the multiple dimensions of PRS, showcasing how a surgeon can help one recreate parts of their body and provide a new lease of life in the process.

Often, the job of a plastic surgeon is deemed as 'non-life-saving'. This way of thinking completely overlooks the close affiliation between reconstructive surgery and one's psychological and mental well-being. I have always believed that the opportunity to play a key role in helping someone regain his/her confidence is an extremely gratifying and provides a meaningful purpose in life, and hence the primary reason why I would love to make this my life's work.

Overview of elective schedule

As PRS is a highly specialised field of study, the department does not have a prescribed structure for students. To maximise my own learning, I took the initiative to source for the Department's weekly rota – checking for interesting cases taking place in the operating theatre and out-patient clinics. Other than the time I spent in the hospital with clinical work, I spent a fair amount of my time at the various Bodleian Libraries, working on the four research projects I had on hand.

Microsurgical skills training

During my time at the OUH PRS Department, I was pleasantly swarmed with an abundance of learning opportunities.

I attended several major surgeries involving free flaps where I asked to be involved in the microsurgery component of the operation. For the first time, I was appointed as the first assistant microsurgeon during the microsurgical repair of a contused radial artery that was only 2 mm in calibre on a five-year-old child who presented with a pulseless supracondylar fracture.



Figure 1 Practicing microsurgical skills under the microscope in a laboratory setting

I built on the basic principles of microsurgery and skills that I had previously picked up from laboratory practises and observing registrars assisting consultants. The view under the microscope was very different from when one operates macroscopically, or even from those laboratory practises under the microscope (Figure 1). I experienced first-hand the transition from practising on synthetic vessels to performing on real human vessels. This transition showed me the importance of taking laboratory practises seriously, as our basic surgical skills are a reflection of the repetitive execution of surgical techniques we practice before adapting them to each individual patient's situation. Practising in laboratory settings is a very safe environment to help trainees build confidence and competence, improving patient safety in the long run.¹

Outpatient clinics

Besides having my first go as the assisting microsurgeon, attending outpatient clinics was probably my next favourite thing to do. I attended a whole variety of subspecialty clinics – general plastic, breast, head and neck, cleft palate and lip, upper/lower limb and hand surgery, and polytrauma.

The breast out-patient clinic is one that I have attended the most frequently under a few different reconstructive surgeons – it is also the clinic that I have learnt from and enjoyed the most.

Being diagnosed with breast cancer is a devastating situation for many, as it comes with profound implications for both the individual and his/her family. Despite an increasing incidence of breast cancer, survival rates have dramatically increased over the years.² This can be attributed to improvements in screening techniques and treatment regimes. An increasingly common and viable option is to undergo a mastectomy.³

At OUH Trust, all individuals undergoing complete/partial mastectomy are routinely offered the option of undergoing breast reconstruction post-mastectomy. Existing literature shows that women are more vulnerable and at high risk of suffering from anxiety, depression, negative body image, and impaired quality of sex life post-mastectomy.⁴⁻⁶ To this end, breast reconstruction has been proven to have a positive impact on an individual's physical and psychological rehabilitation, despite its inability to restore the 'femininity in its entirety'.⁷

With that in mind, patients are entitled to attend a consultation with the breast-reconstruction surgeon. Each consultation session will be specifically tailored to the needs, preferences, and also general health of the patient. During my time at JR, I had the privilege of being involved in several ladies' breast reconstruction journeys. However, there is one

particular lady Ms KT, who I had the privilege of following through her preoperative consultation, to her reconstruction surgery, and then her first post-operative visit – this forms the highlight of my eight weeks.

Ms KT was referred to the breast-reconstruction team for a consultation after receiving the diagnosis of right multi-focal breast cancer. From an oncology point of view, she was scheduled to undergo a right-nipple-sacrificing mastectomy with axillary clearance. During her first consultation, when I first met Ms KT, I recalled her being understandably very emotional, unable to really accept the fact that mastectomy is the most appropriate therapeutic management given her condition. Initially, she was adamant that she preferred her breast reconstructed with implants rather than using her own abdominal tissue, as she was very adverse to the idea of having a large abdominal scar following the 'tummy-tuck' (donor site closure). Prior to making this decision, she was briefed at length on the options available to her (e.g. breast implants versus using her own autogenous tissue).

Considering the fact that Ms KT would most likely require post-operative radiotherapy, she was highly encouraged to go for the autogenous tissue option rather than implants, as there is evidence to suggest that perioperative radiotherapy increases the risk of capsular contracture and causes slow healing. This could potentially result in a long sequelae of pain, poor cosmesis, or even implant extrusion.⁸⁻¹¹ The autogenous option was recommended in her case, as it has been shown that using the patients' own tissues will not only produce a more natural-looking breast, it is also associated with greater patient satisfaction as compared to implant-based reconstruction.^{4,12}

This is consistent with the recommendations and findings of a study conducted at the local Breast Reconstruction Unit at Middlemore Hospital, which I was personally involved in. This recently-published paper showed that perioperative radiotherapy increases complication rates and reconstructive failure with implant-based breast reconstruction, which is consistent with existing literature.^{8,13} In view of the study results, the current policy is to steer patients towards autogenous breast reconstruction if they are likely to undergo radiotherapy as part of their breast-cancer treatment. The study has also been reported by the New Zealand Herald.¹⁴

Ms KT heeded the surgeon's advice and proceeded with a ten-hour surgery, which I was present throughout. She recovered beautifully without any complications and returned to the follow-up clinic for her post-operative review. She gave me a big hug when I went to the waiting room to get her – she was extremely satisfied with the outcome and thanked the team profusely. She even told me that she did not regret heeding the surgeon's advice to opt for the autogenous option.

It was an amazing learning experience to observe the interactions between Ms KT and the surgeon – she was detailed in her explanation and consistently checked back to ensure that the patient understood what she said. She utilised drawings, tables, and photos to help her patients understand what they were signing themselves up for, and made it a point to take a meaningful pause to acknowledge the dilemmas the patient was facing. This was indeed an extrapolation of William Osler's famous quote, 'The good physician treats the disease, the great physician treats the patient who has the disease'.

Theatre experience

Out of all the interesting cases and surgical techniques I observed, there were two surgeries that stood out. Apparently, each of the two innovative surgeries described below have been performed less than 20 times in the United Kingdom and have never been performed anywhere else in the world, as they are designed by the internationally-renowned reconstructive surgeon, Mr Henk Giele. These two novel methods are based on basic principles of medicine and plastic surgery. Mr Giele's team is currently collating more evidence before writing up a paper for

publication, so one might not be able to find much information from a basic Google search.

(1) New microsurgical vascularised bone flap: using coracoid as a free vascular bone graft for reconstruction of non-union scaphoid

The scaphoid is one of the most commonly fractured carpal bones. Although most scaphoid fractures heal spontaneously, there are a number of nastier scaphoid fractures that will cause problems due to non-union.¹⁵

With this background knowledge in mind, Mr Giele utilised the coracoid as a free vascularised bone flap for patients with non-union scaphoid problems. Post operation follow up demonstrated good clinical and functional outcomes in all cases thus far – showing that the free vascularised coracoid is a reliable microsurgical vascularised bone flap.

(2) Sentinel flap in kidneys +/- pancreas transplant patients

The most undesirable outcome for a transplant patient is the rejection of the transplanted internal organs. Existing literature reveals that current techniques used to monitor organ rejection are not adequately sensitive, hence contributing to late presentation of organ rejection. By that time, little can be done to salvage the situation.

With the knowledge that skin is one of the most immunogenic organs in our body, Mr Giele hypothesises that if a small segment of the donor's skin is transplanted to the donor together with the internal organs (pancreas in this case), early warning signs of organ rejection could be detected by monitoring the appearance of a rash on the patch of donor skin. The appearance of this rash will alert both the patient and medical team to start anti-rejection medication (in the early phases of detection), hence minimising the chances of total organ rejection.

Depending on where the patch of donor's skin is harvested, it will usually be transplanted onto the volar side of the recipient's forearm for easy monitoring. After a prolonged period of stability with no signs of organ rejection, the recipient can opt to have this patch of donor skin excised.

At the time of my elective, there were approximately 20 such sentinel flaps performed in the world by Mr Giele in collaboration with the Oxford Transplant Team over 3–4 years. If Mr Giele's hypothesis is proven to be true, the sentinel flap technique could represent a new paradigm in the world of organ transplantation – the birth of a new and reliable way of monitoring internal organs post-transplantation.

Using the word 'inspiring' to describe my working experience with Mr Giele is definitely an understatement. Mr Giele is also the author of the Plastic and Reconstructive Surgery Oxford Handbook – as a fan of his, I purchased the book from Blackwell's Bookshop and got him to autograph it (Figure 2).

Working with such an inspiration like Mr Giele has reinforced a very important lesson for an aspiring amateur surgeon like myself. Acquiring surgical skills and textbook knowledge is only one small part of the story, in fact, it is just the beginning. It is only when we start to utilise the concepts we learn and apply it to other fields that true learning really begins. Other than learning from Mr Giele's skilful surgical skills, the most important takeaway for me was a new way of thinking and learning.

Other reconstructive surgeries I observed include therapeutic reduction mammoplasties, correction of breast deformities, correction of congenital/acquired limb deformities, nerve graft implants, surgical correction of facial palsy, cleft palate and lip repair, reconstruction of traumatic limb injuries, and post-resection of head and neck cancers.



Figure 2 Photo with Mr Henk Giele, the legendary reconstructive surgeon who authored the Oxford Handbook and myself at the Nuffield Orthopaedic Centre Main Operating Theatre

Ward rounds

Contrary to the popular belief that surgical-ward rounds are mainly business rounds, I managed to see a wide range of different cases.

A recurring concept that stood out was the intensity of post-operative flap monitoring, which is key to flap survival. Free flaps are an important reconstructive tool used in the world of PRS. Since their first use in the 1950s,¹⁶ the use of free flaps to reconstruct defects has greatly increased. This was of particular importance, especially at my stage of medical training, because as a junior doctor, one could be left in charge of looking after wards full of post-operative patients. As such, I decided to do a proper literature review of the current post-operative flap monitoring techniques.

Studies have shown that the likelihood of a successful flap salvage is very much dependent on the time after initial flap surgery that the problem is recognised. Hence, the longer it takes to detect signs of a failing flap, the lower the salvage rates.^{16,17} There is currently no standardised flap monitoring protocol, which explains the large degree of heterogeneity in the flap-monitoring techniques employed by different institutions. Most centres assess flaps by both subjective and objective measures, as shown in Table 1.¹⁶

Throughout my eight weeks, I was personally involved in closely monitoring a couple of flaps post-operatively. One memorable experience was a tubed forehead flap, performed to reconstruct the right cartilaginous portion of the alar after excising full-thickness skin due to a squamous cell carcinoma recurrence. This case stood out from the rest for me because I was actively involved in the patient's reconstructive surgery. I remember vividly that I was instructed by the operating surgeon to commit the appearance of the tubed flap to memory at the end of the surgery. At that point in time, I was not aware of how useful this 'photographic image' of the immediate post-operative view of the flap would be, until a few hours later one of the nurses from the recovery unit arrived in theatre commenting that the flap 'turned purple' – I was sent to assess the viability of the flap. I assessed the flap as I was taught, reported my findings to my registrar, and proposed to release alternate sutures to relieve the (external) tension. Soon after releasing the alternate sutures,

	Arterial Compromise	Venous Compromise
Flap colour	Pale, mottled or bluish	Cynotic, bluish or dusky
Capillary refill	Sluggish (>2 seconds)	Brisker than normal
Tissue turgor	Flat, decreased turgor	Tense, increased turgor
Temperature	Cool (>2 degrees of difference compared with control)	Cool (>2 degrees of difference compared with control)
Pinprick test	Scant amount of dark blood/serum	Rapid bleeding of dark blood
Doppler signal	Absence of pulsatile arterial signals	Absence of continuous venous signals

Table 1 Signs of arterial and venous compromise¹⁶

the flap re-perfused nicely with good venous outflow, and regained its original healthy colour.

Conclusion

My elective experience at Oxford has been nothing short of amazing. My enthusiasm was met with an abundance of opportunities to learn and contribute to patient care. I was very privileged to be actively involved in the work of various world-renowned reconstructive surgeons – this includes scrubbing in with the author of the Plastic & Reconstructive Oxford Handbook who pioneered novel techniques that are performed exclusively in Oxford and nowhere else in the world. Working in an internationally-reputable institution also facilitated access to a wide range of research facilities, not forgetting that the Bodleian Libraries are within a stone's throw away.

In addition to my maiden experience assisting in a microsurgical repair of a 2 mm wide vessel, I met great mentors who enabled me to author four publications. Immersing myself wholeheartedly into the Oxford experience, I presented on two fundamental plastic surgery topics, attended two full-on call weekends, and joined the Oxford Transplant Team to retrieve organs from a brain-dead patient, where I also performed the mortician stitch after the organs were harvested. None of these would have been possible if not for the kind help and assistance everyone I met at OUH provided me with.

As the quote goes, 'Many surgeons can manipulate anatomy, but very few can revitalize hope with a human touch'. Words cannot express how grateful I am to have met such a brilliant, yet humble surgeon like Mr Henk Giele during my time at Oxford – he walked the talk and exemplified the values I hope to embody as an aspiring plastic and reconstructive surgeon.

Ending this off with an extremely thought-provoking quote that Mr Giele autographed in my copy of the Oxford Handbook, 'you only find what you look for; but only look for what you know!'.

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