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Euskal Herriko Unibertsitatea

Medikuntza eta Odontologia Fakultatea
Facultad de Medicina y Odontología

Trabajo Fin de Grado
Grado en Medicina

Plastic and Reconstructive Surgery elective rotation in Addenbrooke's Hospital

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Leioa, 31 de marzo de 2016

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GRALaren ZUZENDARIAREN AMAIERAKO TXOSTENA
INFORME FINAL DEL DIRECTOR DEL TFG

Plastic and Reconstructive Surgery elective rotation in Addenbrooke's Hospital

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Contents

Abstract

Plastic surgery is among the most competitive specialties in medicine, but little is known about the attributes that drive Medical Graduates to apply to this residency programme, particularly bearing in mind there is no specific training during Medical School. This elective rotation provided me with the basic understanding of the pre and post-operative evaluation of the emergent and elective reconstructive surgery cases, and enabled me to familiarize with surgical judgement and decision making.

Introduction & Motivation

During my first years of Medical School, Gross Anatomy dissection aroused my interest in the surgical field. Cadaveric dissection together with anatomical illustrations aided my orientation and three dimensional mental picture of the human body, helping me to learn and retain the information. Adopting more than two approaches, such as combining visual stimulation and touch, helped me in comprehension of clinical anatomy and helped me gain a deeper understanding, which I believe is necessary for deep and satisfying learning.

After the first years of basic sciences, I became familiar with the main features of most surgical specialties and the management of a broad spectrum of surgical conditions. Once again, I combined the use of books and visual learning techniques I had adopted from Anatomy. Moreover, I became aware of the close relationship between surgery and internal medicine, which share a similar overview of disease diagnosis and prevention. However, the surgical training was programmed to acquire a general view of the most important surgical conditions, giving us a breadth of knowledge and helping us consider potential career paths, and inevitably some contents were scarce. When we studied wound healing, we spent some time discussing the role of Reconstructive Surgery in the management of complex wounds, without deepening into the surgical techniques. This introduction awakened my interest in extended traumatic wounds treatment, and motivated me to attend several procedures during one week in Cruces University Hospital.

On the other hand, I felt that an elective rotation in a foreign hospital would strongly enrich my future studies and profession, as well as helping me to decide which path to take after graduation. I was particularly interested in going to an English-speaking country, due to the importance of having a fluid understanding of medical terminology in what is considered the language of science and medicine. Furthermore, my aim was to gain confidence with using Medical language in a surgical atmosphere and building on the base I had acquired during my first years of Medical School when I studied several subjects in English.

Within this context, my first Professor of Surgery in Medical School, Professor Ignacio García-Alonso, offered me the possibility of a three-week elective rotation in Addenbrooke's Hospital in Cambridge, UK, under the supervision of one of his close friends, Professor Charles Malata, who is a Consultant Plastic Surgeon at Addenbrooke's and Professor of Academic Plastic Surgery at the Postgraduate Medical Institute of Anglia Ruskin University. I thought it was a valuable opportunity to get to know the National Health Service (NHS) in England closely, as well as learning about the broad field of Plastic and Reconstructive Surgery, which includes various subspecialties such as cranio-maxillofacial surgery, microvascular surgery and hand surgery, among others. On the other hand, I was aware of my lack of knowledge regarding many of the reconstructive techniques and peculiarities in the management of patients that could benefit from these procedures, but I was curious about the formation of Plastic residents and the motives that drove them to undergo this residency programme, bearing in mind that in Med School, at least in my case, there is not much information about this field.

Programme sequence

Addenbrooke's is a tertiary referral centre for a number of specialities and has been designated as the major trauma centre (MTC) for the East of England. Of note, it is one of the UK's six liver transplant centers and performs multivisceral transplants. During this three-week rotation I was able to participate in the preoperative and postoperative management of a broad spectrum of congenital (syndactyly, cleft palate), acquired, and traumatic problems in the different services of the Department of Plastic and Reconstructive Surgery. They provide breast reconstructions for the wider West Anglia Cancer Network Region including Hinchingbrooke, Peterborough and the West Suffolk Hospitals, so they are highly equipped to handle a large number of patients.

On the day of my arrival I was impressed by the size of the facilities, but I did not have much trouble to find the ATC building (Addenbrooke’s Treatment Centre) and enter the Ward M5, where I established my first contact with the P & R Department. Mr. Sheena, P&R Surgery Registrar, guided me through the different services of the hospital and helped me to collect my ID badge for the following weeks, which enabled me to have access to public restricted areas and operating theatres. However, it was not until the second week that I was able to scrub in theatres, after I was authorized by the Occupational Health Services.

On my first days, my main goal was to understand all the concepts that were dealt with on their daily basis, so I had to spend some time trying to elucidate the meaning of the medical terms that I had previously learnt in my mother tongue. After the first week, I began to feel more confident using all the new vocabulary I had been learning and felt the need for more details about the management of the cases I was witnessing. The Medical School Library’s secretary provided me access to their collection of medical

journals and books, which enabled me to know more about alternative techniques and surgical indications of the procedures that were programmed for the week.

The table below contains the schedule that was sent by Professor Malata's secretary, Mrs. Sue Ramsey, which describes the surgery opening times, ward meetings, and other activities as well as the name of Plastic surgeons I would be interacting with during these three weeks. As stated in the timetable, there are different procedures running concurrently, so students have the possibility of either joining their preferred subspecialty theatre team or attending the critical steps of the different surgeries, which is not always a synonym of productive learning.

STUDENT SCHEDULE

Monday AM	. Report to Ward M5 at 8.30 to Professor Malata's Registrar or SHO
	. Ward D4 Registrar's Room at 9.00am – Teaching/Ward Round
Monday PM	. Week 3 – Theatre 20 with Professor Malata
	. Week 1,2,4 & 5: Flexible – Research/Trauma/Clinic 7
Tuesday	. Miss Benyon/Mr Irwin – Theatre 20/21 Breast Surgery Theatre / Trauma/Head & Neck
Wednesday AM	. Trauma Theatre
Wednesday PM	. Professor Malata – Clinic 7
Thursday	Whole day theatres
	. Breast: Professor Malata – Theatre 21
	. Head and Neck + skin cancer: Mr Durrani – Theatre 20
	. Cleft lip & palate: Mr Ahmad – Theatre 11
Friday	. Hand Surgery Theatre: Mr Gillespie/Mr Grant
	. Trauma
Weekend	Flexible
	Shadow SHO/Registrar
	+ Research

Report to Ward M5 daily at 08.00am for Registrar rounds - optional

Departamental Teaching Sessions

The formal didactic component of the rotation was obtained through the weekly Teaching Sessions on Mondays and Breast and Skin Multi-Disciplinary Team meetings, preferably on Mondays. There is an abundance of clinical material and registrars are encouraged to prepare presentations describing their clinical experience. On my first week, one of the registrars gave a lecture on the treatment and management of nailbed injuries, enabling his colleagues to share their doubts and experiences in the Emergency Unit, and requiring reading in preparation in order to answer questions from the consultants. In the following weeks, there was a presentation aimed at the SHO (postgraduates prior to specialization), on how the Plastic Surgery Team at Addenobrooke's works (which helped me to understand the coordination of the different services provided by the Department and their distribution between the different areas) and the management of the most common Plastic Surgery emergencies which include compartment syndrome, septic joint and tenosynovitis, amputated part and necrotizing fasciitis.

Multi-Disciplinary Team Meetings

With regard to the Breast and Skin Multi-Disciplinary meetings that took place on Monday mornings, there was a list of controversial cases to be discussed together with their respective radiological images and pathology samples. One of the experienced benefits of MDTMs is the opportunity for clinicians, surgeons, radiologists and pathologists to meet together and build common ground with respect to terminology and expression in formal reports. Furthermore, there is an accepted belief that MDTMs are an improvement in the patient diagnosis and management process and integral to quality systems within the hospital. A matter that has generated heated debate is that of the treatment in early stage breast cancer. There is a sense that many ductal carcinomas in situ are being overtreated, and even though most of the patients are recommended to undergo a lumpectomy (even some argue that DCIS can be safely observed rather than treated), many decide to have a double mastectomy as a preventive measure, which commonly requires the intervention of Plastic Surgery and involves greater risk. Other cases that required the coordination between Breast and Plastic surgeons were desmoid and phyllodes tumors, both aggressive and recurrent, which required wider and potentially deeper surgical margins for complete histologic resection and consequently Plastic surgery techniques for an aesthetic cover.

A further development is the advance in teleconferencing technology that has facilitated the extension of multidisciplinary team working to distant hospitals where the full range of expertise is not available. This new system has enabled the Department of Plastic Surgery of Addenbrooke’s to meet monthly with other hospitals in East Anglia to review difficult cases together and formulate appropriate guidelines.

Outpatient clinics

Every week the Department runs outpatient clinics for the preoperative assessment of all breast patients needing plastic surgery and their postoperative follow ups. On Wednesdays afternoon I was able to join Professor Malata in his weekly revisions and learn about the general approach to patient with recent breast surgery and some subtle complexities of their management.

Most of the outpatient consultations were related to the post-operative care, mainly consisting in the evaluation of scar healing, complications of breast implants such as capsular contracture (increased risk after radiotherapy), and the cosmetic outcome compared with the patient expectations. I learned about the psychosocial skills needed to adequately attend and solve the patient's uncertainty when faced with difficult decisions, such as the cancer risk reducing mastectomies, enabling the patient to choose the most recommendable option for their surgery. There were some reconstructions that were done in more than one stage, such as the DIEP flap, after which many patients requested the removal of the pointy ends of skin on the side of each hip that remain after the abdomen is closed, what surgeons call 'Dog Ears'. Sometimes further surgery is needed to improve the breast contour or for the nipple reconstruction, which is followed by ink tattooed onto the areas around the nipple, to create the look of an areola.

With regard to implant reconstruction, most of the breast tissue expanders used combined silicone and a cavity for saline that would be injected in the outpatient clinics at regular intervals to sufficiently expand the skin and soft tissues of the chest wall to accommodate the permanent implant. These implants have magnetic ports to allow for a more accurate detection of the injection site.

Outpatient local anaesthetic (OPLA) lists

Many minor plastic surgery procedures are performed on an outpatient basis at the OPLA theatres. These include removal of moles, cysts, lipomas, scars and malignant tumors, saving patients' valuable time and promoting optimal outcomes. I attended one OPLA session, where I learnt about the infiltration technique, types of local anesthetics, tailoring the degree of anesthesia to the needs of the patient and resection of superficial lesions in thin and sensitive skin.

Operating theatres

A large share of my time was spent in theatres, and it was not until the second week that I was able to scrub and assist in surgeries. On my first week, I learnt about the selection of the different suture materials (absorbable sutures vs non-absorbable), and I was impressed by the fine motor skill required for the use of small sized non-absorbable sutures (6-0, 7-0) in vessel grafts and anastomosis, nerve grafts and tendon repair. As an observer, I became familiarized with the rituals in the operating table, the preoperative hand hygiene, skin preparation at operation, protection of the wound and theatre linen.

On my second week, I learned about the importance of a systematic approach to the scrub as an efficient way to ensure a proper technique. The basic principle of the scrub is to wash the hands thoroughly, and then to wash from a clean area (the hand) to a less clean area (the arm). After entering the surgical suit, the antiseptic skin preparation should be performed in concentric circles moving away from the proposed incision site to the periphery allowing sufficient prepared area to accommodate an extension to the incision or new incisions or drain sites to be made. Microbial migration and contamination from nonsterile to sterile areas is minimized by isolating the incision site and creating a sterile field with the use of sterile drapes. Drapes protect the patient from their own skin flora (the main cause of postoperative surgical wound infection) and surgical team members and environment. The benefit of such material is not only to the patient in terms of reducing bacterial contamination of the wound but may be important in preventing the transmission of viral infection from the patient to the surgeon or assistant should they have an open wound exposed to blood or body fluids via the gown.

As an assistant, I was able to provide retraction of different layers of tissue for optimal visualization, apply wound dressings, use bipolar electrocautery to cut and coagulate, suture and other duties directed by the surgeon. With practice and time, I was capable of carrying out the surgeons' instructions more confidently and anticipating to the surgeons' needs. Not only did this experience enable me to learn the different names and functions of the surgical instruments, but also to have a closer contact with the surgical field and therefore gain a deeper understanding of the whole procedure and intraoperative decision making.

Preoperative patient evaluation/discussion

Preoperative planning was discussed in different settings, mainly in Breast and Skin Multi-Disciplinary meetings, and Ward meetings. The team made a thorough assessment of the patients' condition in order to plan an appropriate intervention bearing in mind the relative dangers and success rates of each procedure. The central feature of a careful preoperative plan is first to identify the desired end result and then to add a detailed list of all the surgical steps involved in getting there.

Some procedures have special requirements, such as autologous breast reconstructive surgery with deep inferior epigastric artery perforator (DIEP) flaps, where CT angiography can depict the number, size, course and location of the DIEA perforating arteries, which allows selection of the optimal perforating artery, shortens operative times and decreases patient morbidity.

In breast reconstruction with tissue expanders and implants postmastectomy, the selection for tear-drop implants will depend on the anatomic landmarks of breast and chest wall in the same way as planned in aesthetic surgery. Width, height, and projection are to be measured choosing shape and size of the implant. The success of implant reconstruction is significantly influenced by the manner in which the oncological surgery is performed. Placement of excision biopsy scars, design of the

mastectomy incisions, maintenance of adequate flap thickness and vascularity, and preservation of the inframammary fold all impact heavily on the final reconstructive outcome. The inframammary fold should be well-marked preoperatively and respected as the inferior limit of the mastectomy.

Ward rounds and Postoperative care

On my last two weeks I had the opportunity of following the Plastic Surgery team in the evaluation of ward patients, primarily postoperative patients. One of the main objectives was to detect patients who were at high risk of developing a complication. Postoperative wound infection is the most frequent complication of surgical treatment, so a close supervision of the wound is needed in patients with risk factors for impaired wound healing, such as obese, diabetic or elderly patients. With respect to wound assessment, it is important to document the appearance of the wound for healing; observe the wound bed, edges (colour, raised, rolled, contraction and sensation), exudate and the surrounding skin (edema, induration, cellulitis).

Many wound complications related to breast procedures are relatively minor and frequently are managed on an outpatient basis, because it is a peripheral soft tissue organ. Drains evacuate postoperative fluid collections preventing the formation of seroma under the skin flaps of axillary or mastectomy wounds, which impairs the healing process. The team evaluated the daily totals of drain output in order to accurately assess the patients' fluid balance, detect possible complications and plan removal of drain tube. Seroma collections that develop after drain removal can be managed by percutaneous aspiration.

Hematomas can be quite painful because of rapid expansion through the closed wound space and should be evacuated surgically, with aggressive wound irrigation and reclosure to optimize cosmesis. The use of a support brassiere in the postoperative period helps to sustain hemostasis and relieves tension on the skin closure imposed by the weight of the breast. The patient should be encouraged to wear the support brassiere day and night for several days.

A minority of breast cancer patients experience chronic incisional pain that can be quite debilitating and refractory to standard analgesics, lasting for several months to years postoperatively. The exact etiology of this syndrome remains obscure, although it commonly is assumed to be neuropathic in nature. Fortunately, recent successful management has been reported with use of serotonin uptake inhibitors, such as the antidepressants amitriptyline and venlafaxine.

It is not clear whether systemic venous thromboembolism (VTE) prophylaxis is routinely indicated in patients who have undergone a breast surgery for oncological reasons. Anti-VTE management consisting of early ambulation and compression stocking is normally sufficient in these cases.

Discussion of Surgical Procedures

Many surgical options are available in reconstructive procedures when faced with a difficult wound. It is vital to deeply understand the concept called by reconstructive surgeons the “reconstructive ladder” in order to comprehend the management of different wounds, which generally aims to obtain rapid wound closure with the simplest method and with minimal compromise of cosmesis and function. Essentially, the more problematic the wound, the higher up the ladder the surgeon has to climb. Simple wounds may be closed by primary suturing, sometimes in the primary care setting. But others may require complex reconstruction, including free tissue transfer, in hospital.

All traumatic wounds should undergo debridement and thorough irrigation before primary closure. The aim of debridement is to remove all potentially contaminated and devitalised tissue along with foreign material. Primary suture may not be indicated in heavily contaminated wounds, where the risk of infection is high. In such cases the wound should be debrided, with “delayed closure” carried out later. Occasionally, wounds may be allowed to heal by secondary intention, where areas of skin loss are initially replaced by granulation tissue. Where skin defects are too large for skin apposition, and healing by secondary intention is inappropriate, skin grafts may be used. Free skin grafts are taken from another part of the body and rely on revascularization from a healthy, well vascularized wound bed. Grafts will not be successful on non-vascularized beds, such as exposed bone or tendon.

Split skin grafts consist of the epidermis and a variable amount of dermis. The donor area will heal within 10-14 days from remaining dermal adnexal structures. Such grafts are the mainstay of treatment of large wounds such as burns. Full thickness grafts consist of the epidermis and dermis and offer several advantages, but are size limited as the donor area must be directly closed.

Expansion of local skin using subcutaneous tissue expanders is a method of increasing the amount of skin locally available. A tissue expander is placed beneath the skin and inflated at weekly intervals by injecting saline through a remote port. The overlying tissue expands and epidermal thickness increases as a result of cellular hyperplasia. This also results, however, in a reduction in dermal thickness and separation of dermal appendages, such as hair follicles.

Many wounds, such as fracture sites and exposed bone or tendon, are not suitable for grafting, and techniques further up the reconstructive ladder, such as a flap reconstruction, must be used. A flap is a unit of tissue that can be moved to cover a wound while surviving on its own vascular supply. Random pattern flaps rely on random cutaneous vessels for their blood supply.

Greater lengths of flap can be used by including the underlying deep fascia and also by including a perforating blood vessel in the base of the flap. In some circumstances better cosmesis may be obtained by raising the flap as fascia only, leaving the overlying

skin behind. “Islanding” a flap on its vascular pedicle allows even greater pedicle length and thus greater mobility and versatility. Occasionally no options are available for local wound cover, and tissue has to be harvested from elsewhere around the body by using microvascular techniques. This transfer of tissue, known as a free flap, represents the top rung of the reconstructive ladder. Any tissue that can be isolated on a suitable vascular pedicle can be used, and it may include muscle, skin, fascia, fat, nerve and bone.

These main principles of wound management can serve as a guideline to understand the treatment of specific wounds and reconstructive techniques that I was able to observe and learn during my three week experience. I will comment on the most representative Plastic and Reconstructive cases, and just name those of General Surgery and Traumatology.

10th of August

Change of VAC dressings bilateral upper limbs & lower left ankle in Necrotizing fasciitis

Acute infections such as necrotizing fasciitis can cause rapid tissue loss in a very short time. They have polymicrobial etiology, and the classic Lancefield group A þ hemolytic streptococci may be present in only 15% of cases. Diagnosis is often delayed because of the paucity of symptoms and the unfamiliarity of the condition among clinicians.

After adequate resuscitation, appropriate antibiotics and prompt surgical debridement of affected areas may be lifesaving, and the patient would need a period of intensive support.

Significant tissue destruction can occur in minutes, highlighting the importance of rapid debridement, and subsequently large body surface areas may require surgical reconstruction, most often with split skin grafts. Flap coverage may occasionally be needed when the bed is not suitable for a graft.

In this case, following extensive debridement, a Vacuum Assisted Closure (VAC) system was applied to the large residual defects to facilitate skin graft application and optimize wound healing. VAC requires the application of an adhesive sterile seal around the wound combined with a continuous or intermittent negative external pressure, which removes excess wound exudate and decreases edema.

Cross Finger flap: Dorsal ring finger flap (donor site) to ventral middle finger + skin graft

This technique is used for soft-tissue defects in the proximal or middle phalanges not suitable for skin transplantation. It consists in the harvesting of an adipocutaneous flap (longer than the gap due to location of the patient’s wound in proximal interphalangeal joint) from the dorsum of the ring finger to the midlateral line, preserving the paratenon of the donor phalanx. The flap is then transferred into the defect of the neighboring finger and coverage of the donor site by full-thickness skin grafting. This would not be

enough in extensive tissue defects crossing the finger joints. The flap pedicle is transected after 14-21 days.

Alternative technique: Reversed cross-finger flap, which consists in the preparation of a subcutaneous flap with preservation of the peritenon by separating a skin flap from the subcutaneous fat according to the "open book - closed book" technique.

11th of August

Bilateral mastectomy (cancer + risk reducing) & immediate reconstruction with bilateral ADM and implant

Risk-reduction mastectomy is a controversial clinical option for women who are at increased risk of breast cancer. High-risk women, including women with a strong family history of breast cancer and BRCA1 or 2 mutation carriers or personal history of breast cancer, have several clinical options; risk-reduction surgery (bilateral mastectomy and bilateral oophorectomy), surveillance (mammography, clinical breast examination, and breast self-examination), and chemoprevention (tamoxifen).

Implant-based breast reconstruction is the most common means to restore the breast following mastectomy for breast cancer treatment or risk reduction. A single-stage direct-to-implant (DTI) breast reconstruction offers an ideal reconstructive choice in select patients by replacing loss of the breast at the time of the mastectomy in a single operation. In the past, DTI reconstruction was largely abandoned secondary to issues with pectoralis muscle retraction, implant malposition, and contracture. This approach is best suited for patients with good preservation of the breast skin after mastectomy. The advent of acellular dermal matrix products (ADM) offered a solution to these problems by holding the released pectoralis muscle on stretch and forming a complete pocket (sewn to IMF inferiorly and to the chest wall laterally) around the implant in the desired position.

The patient is marked preoperatively while sitting or standing. Important landmarks include the inframammary fold (IMF), the relation of the inframammary fold on one side to the other side, and the lateral borders of the breast. A plane is created from lateral to medial in the fine areolar tissue beneath the pectoralis muscle to the sternal attachment of the muscle. Once the muscle is released, an acellular dermal matrix (ADM) is used as the inferior and lateral borders of the implant. The final implant is chosen based on the diameter of the breast pocket and the volume that did not induce significant ischemia. The pocket is closed over the implant. Two closed suction drains are placed with one inside the pocket along the inframammary fold (IMF) and the other outside the pocket in the axillary region.

12th of August

Reconstruction of a fasciotomy: Lateral side direct closure & medial side covered by graft and foam + VAC

This patient had undergone urgent decompression fasciotomy due to a compartment syndrome (the patient had fallen asleep on his leg, presumably under the influence of drugs, blocking the venous outflow of the leg). The clinical profile of this syndrome consists of progressive pain in the compartment, paresthesia, paresis and dark coloration of the skin in the distal region. The only form of treatment for acute compartment syndrome is urgent decompression fasciotomy, which will allow the expansion of tissues, the normalization of pressure, and consequently, reperfusion. Two fasciotomies (medial and lateral) were carried out to release the four leg compartments. One week later, the lateral cut was closed directly and in the medial side a skin graft was placed together with a VAC system.

Stab incision delbulking of calcinosis cutis deposits in LSE

13th of August

Unilateral mastectomy & immediate reconstruction with DIEP flap + Sentinel axillary node biopsy

The DIEP (Deep Inferior Epigastric artery and vein Perforators) flap relies on blood vessels that perforate the rectus abdominus muscle to supply the overlying abdominal skin. The DIEP flap provides the necessary tissue for a breast reconstruction while sparing the loss of the rectus muscles and fascia, resulting in less post-operative pain compared to the TRAM (Transverse Rectus Abdominis Myocutaneous) flap which involves muscle removal. This technique requires precise dissection of small perforating vessels of DIE artery and vein through the rectus muscle. For a single breast reconstruction (like in this case) we use approximately one-half of the lower abdominal skin and discard the side we find less favorable in terms of vessel size and vessel orientation. If two breasts require reconstruction, both lower halves are used, one for each reconstruction.

The flap is moved into the mastectomy field (through the mastectomy scar) and the perforator vessels are microsurgically repaired to branches from the internal mammary artery and vein. To access the internal mammary artery and vein some surgeons remove a portion of the third rib costal cartilage, but Prof. Malata prefers the “total rib preservation” technique which results in shorter recovery time, decreased long term tenderness at the recipient site and less postoperative morphine requirements .

14th of August

Dupuytren´s fasciectomy (Ring finger and palm)

Dupuytren's contracture is a progressive fibrous proliferation of the palmar fascia of the hand. The disease most commonly affects the ring finger, and the little finger is second most commonly affected. Surgery for Dupuytren's cord generally should be performed on an affected metacarpophalangeal (MCP) joint if the contracture is 30° or greater. Such contractures most likely cause some debilitation for the patient. Usually, a limited fasciectomy of the pretendinous cord is sufficient to establish normal function in the MCP joint. Alternative treatments include percutaneous needle fasciotomy (cutting the tight contracted Dupuytren's cord under local anesthesia as on office procedure using hypodermic needles), subcutaneous Fasciotomy, segmental Fasciectomy (short segment or piece of a contracted cord), limited Fasciectomy, Dermofasciectomy (cutting out the diseased Dupuytren's with its overlying skin and replacing the defect with a skin-graft)and medical treatment with Collagenase or Radiotherapy.

Exploration of ALT flap on face (orbital exenteration)*

**Concern about venous outflow due to venous compression during the night (Leech therapy)*

Hirudotherapy (Leech therapy) is a cost-effective treatment modality to save reattached body parts and compromised microvascular free-tissue transfers in reconstructive plastic surgery. Leeches are generally used during the critical postoperative period when venous outflow cannot match the arterial inflow, which can lead to venous congestion, clinically identified by the dusky purple appearance of the skin. If this complication is not corrected, cell death may result and the flap may be lost. The early recognition of flap failure and initiation of leech therapy is of paramount importance. Prophylactic treatment with antibiotics (anti-Aeromonas) and continuous monitoring of blood parameters are necessary.

The vascular anatomy of the thigh allows considerable flexibility when designing an ALT flap for a given defect in the head and neck. The ALT (AnteroLateral Thigh) flap is is nourished by perforating branches from the descending branch of the lateral femoral circumflex vessels (profunda femoral trunk). The ALT flap lies on the axis of the septum dividing the vastus lateralis and the rectus femoris muscles (marked by a line connecting the anterior superior iliac spine and the lateral patella) and can be innervated by a major branch of the lateral cutaneous nerve of the thigh. This flap can be harvested at the suprafascial level to include just skin and subcutaneous fat, or at the subfascial level, including the fascia lata (and vastus lateralis)on the deep surface, which can be useful when creating a sling to support the oral commissure.

During the ALT flap exploration, the Doppler ultrasound suggested poor flap perfusion, which indicated the need of replacing the compressed vessels by a segment of the cephalic vein of the forearm (turned 180 degrees to avoid valves). Not all the edges of

the flap were closed directly, as one side was covered by a skin graft to avoid the increase of pressure due to swelling as a result of the vascular compression.

Release syndactyly third web space

Syndactyly repairs are usually performed between 12 and 18 months of age to minimize scar contracture (operating too early) and deviation of the joints (operating too late). Techniques include use of full-thickness flaps, triangular/zig-zag/rectangular incisions to separate digits (used in this case), preservation of vascular supply to the digit, and a meticulous approach to reconstruction with attention to preserving anatomic proportions and details. The most common acute postoperative complications of syndactyly repair are related to skin infection and necrosis, graft failure, and scar contracture related to a child's activity or lack of immobilization. These often require resurfacing with another graft and debridement.

Left wrist division of pedicled groin flap and inset *(inserted zone)* + repair of ulnar nerve defect at the wrist by cadaver nerve graft

The ulnar nerve is a mixed motor and sensory nerve, which making nerve repair more difficult and functional recovery less predictable than pure sensory nerves. Recovery of muscle activity and restoration of sensibility are essential for a functional extremity. A nerve graft, if performed in a tensionless manner, has been shown to generally have better results than an end-to-end approximation performed under tension. The nerve graft used in this procedure is a processed nerve allograft which is intended to bring nerve discontinuities to support axon regeneration. It is decellularized and cleansed extracellular matrix from donated human peripheral nerve. This nerve graft implant connects the proximal and distal ends of a transected nerve and serves as a scaffold allowing regenerating axons to grow into the patient's distal nerve tissue toward the target muscle or skin. A segment of the cephalic vein in forearm was used to cover the joining ends of the nerve graft to the patient's proximal and distal ends of the ulnar nerve.

Proximal interphalangeal fusion in middle finger (patient with arthrosis)

Reduction & K-wire in left middle finger

17th of August

Tracheostomy + right mandible (*squamous cell carcinoma)* & neck resection + fibular free flap + reconstruction using ATL flap

Composite mandibular defects are ideally reconstructed with an autogenous bone flap, most commonly the vascularized osteoseptocutaneous fibula flap. Another option is to bridge the bony gap with a reconstruction plate and gain coverage with a soft tissue flap (usually indicated for short or lateral mandibular segmental defects, older patients, or patients with a poor prognosis). In our patient, both techniques were combined,

inserting the modelled fibula flap between the mandibular stumps and fixing the compound to the plate with multiple bicortical screws. Prior to this, a plastic sheet wass shaped to create a template that was used to model the flap, taking into consideration the length and orientation of the two fragments of the fibula and the location of the osteotomy that were used.

Although a composite vascularized osteoseptocutaneous fibula flap can provide intraoral and external coverage, its volume is usually inadequate for larger resections. The simultaneous use of a second free flap has been advocated by several authors as a means of overcoming this soft tissue deficiency. Adequate volume and quality of soft tissue is important to prevent bone and plate exposure, especially in patients scheduled for radiation therapy. An ALT flap was used to obliterate the dead space resulting from resection of the masticator muscles and buccal fat, as it provides a good contour for the face.

18th of August

Right Breast Capsulectomy and Implant exchange

Frequent local complications of breast implants include the rupture of silicone-gel-filled implants, the deflation of saline-filled implants, infections, hematoma, pain, implant displacement and severe contracture of fibrous tissue around the implant (capsular contracture). Capsular contracture is the most common complication in post-mastectomy, implant-based breast reconstruction in patients requiring radiation therapy. However, evidence is limited that radiation therapy can cause capsular contracture and somewhat less pleasing cosmetic results (shrinkage and distortion of the implant area). Surgical treatment may require a capsulectomy to remove a portion, or all, of the capsule to soften the pocket, together with an implant exchange.

Lipofilling Breast Coleman Fat transfer to left medial aspect of breast *(overfill)* & left nipple reconstruction

Autologous fat grafting is widely used in breast surgery to refine and optimize aesthetic outcomes. Despite its widespread use, obtaining predictable, reliable, and consistent outcomes remains a significant challenge and is influenced by the technique used for procurement, processing, and placement of the fat. Prior to fat grafting, the harvested fat is typically processed in some manner to eliminate tumescent fluid, blood, cell fragments, and free oil (from disrupted adipocytes). By eliminating these contaminants, processing aims to retain viable adipocytes in a concentrated form, which is believed to enhance graft take.

The placement of the processed concentrated fat into a recipient site is one of the most challenging aspects of fat grafting. The general principle is to position small parcels of fat between layers of host tissue so as to encourage uniform survival, stability, and integration into the surrounding tissues.

With regard to the nipple reconstruction, with the patient in a standing position, the areolar location was determined with consideration of symmetry with the opposite complex. In the centre of the proposed areola, one circle equal to the diameter of the nipple is marked and represents the future location of the nipple. There is a wide variety of flaps used for nipple reconstruction. A major problem with local flaps is flattening and subsequent diminished nipple projection, which is believed to be multifactorial in etiology. The dermal foundation of the some flaps (such as the angle flap) ameliorates this problem compared with other methods' fat as foundation.

19th of August

Superolateral Lumpectomy

Right sided breast Reduction to help with symmetry of post- left Mastectomy

In order to match the left breast, they chose an inverted T technique (wise pattern, which is the skin resection pattern) with medial pedicle (blood supply coming from medial pedicle). After de-epithelialization of the pedicle, the first incision is made up to the pectoral fascia all around the pedicle and the pedicle is isolated. Inframammary incision is taken and the area between the pedicle and the crease is resected. Superiorly the area of areolar inset is resected too. The pedicle is rotated upwards (superolaterally) and it is stitched to the periosteum of the rib. Finally, the breast pillars are approximated to conify the breast, resulting in a T- inverted type closure of the breast skin.

20th of August

Right superomedial T- scar Breast Reduction + Left axillary clearance + excision of abdominal dog ears.
This procedure has already been commented in the report corresponding to August 19.

Right completion mastectomy + right centinel node biopsy + inmediate reconstruction with ADM & implant (right breast implant insertion).
This procedure has already been commented in the report corresponding to August 11.

Rectus sheath haematoma evacuation

21st of August

Change of VAC dressings bilateral upper limbs in Necrotizing fasciitis.
This procedure has already been commented in the report corresponding to August 10.

Dog bite wound debridement

Right thenar eminence wound + repair small nerve branch

Middle finger flexor sheath exploration

24th of August

Upper lip exploration + washout+ repair (closure)

OPLA: Thumb granulation tissue excision (resection), Cutaneous lesions of external ear excision/ biopsy

25th of August

Sentinel node biopsy: Right Axillary & Neck dissection

Lesion Excision in Left Flank

Wire guided partial excision right breast & Sentinel node biopsy

Mastectomy and axillary clearance (level II)

26th of August

Wide local excision for melanoma (calf) & sentinel inguinal lymph node biopsy (groin)

Block dissection of inguinal lymph nodes & Sartorius Switch

Exploration of laceration in index, middle, ring finger+ tendon repair + interdigital nerve repair

27th of August

SIEA flap to cover right hand wound

This procedure is similar to the DIEP flap, but with different arterial supply and venous drainage. The SIEA flap relies on superficial inferior epigastric vessels just below the skin surface. Thus, unlike the DIEP flap, the harvest of the SIEA flap does not injure the anterior rectus abdominis fascia or the muscle, providing a minimization of donor site morbidity such as bulge and hernia formation. Disadvantages are the smaller pedicle diameter and shorter pedicle length than in TRAM and DIEP flap. Preoperatively, an exact examination of the abdominal vessels is obligatory to determine, if the patient complies the requirements for an SIEA flap or not. However, if unsuitable perforators are noticed no more than during the operation, the SIEA can be converted into a TRAM or DIEP flap.

Groin free flap (superficial circumflex iliac pedicle) to cover facial defect & neck dissection for pedicle anastomosis.

The groin flap arterial inflow is provided by the superficial circumflex iliac artery (SCIA), a branch off the external iliac at the level of the inguinal ligament. Venous drainage is provided by a cutaneous vein that drains into the saphenous system below

the inguinal ligament. The SCIA pierces the fascia at the medial aspect of the Sartorius muscle, making the Sartorius a key landmark in identifying the pedicle during dissection.
Although groin flaps are used by many reconstructive surgeons for soft tissue defects of the hands when free tissue transfer is not feasible, here they used a free groin flap to cover a facial defect.

SCC (squasmous cell carcinoma) excision in lateral chest wall & direct closure

28th of August

Skin-sparing mastectomy & Latissimus Dorsi (LD) flap reconstruction

This procedure consisted of a skin-sparing mastectomy (SSM) followed by a latissimus dorsi (LD) myocutaneous flap (pedicled) immediate breast reconstruction without expander or breast implant. The former refers to a mastectomy which involves en-bloc removal of all breast tissue and nipple-areola complex while preserving the native breast skin and the infra-mammary fold.

The LD muscle is supplied by the thoracodorsal artery, and branch of the subscapular artery, which is accompanied by the nerve and vein with the same name. A skin island can be designed anywhere overlying the muscle, but preferably it should be placed along the upper two thirds where a higher density of myocutaneous perforators is found. After SSM, the thoracodorsal vessels were identified, and the anterior portion of the LD muscle was dissected. The muscle can then be transected distally at a level determined by the amount of tissue required. The muscle was then elevated from distal to proximal and is divided at a level just proximal to the entrance of the thoracodorsal vessels. The LD flap is then based solely on the thoracodorsal neurovascular pedicle and can be rotated and then transferred subcutaneously to the mastectomy defect.

The LD muscle flap represents a valuable option in breast reconstruction but can result in postoperative twitching and retraction, discomfort, arm movement limitations, and breast deformation. It has been suggested that these complications can be avoided by denervation of the thoracodorsal nerve.

Wound exploration right volar (flexor) wrist laceration + simple flexor tendon repair primary end to end + exploration of peripheral nerve and repair (median nerve motor branch)

Conclusion

There is a tremendous variety of conditions that fall into the plastic surgeon's area of treatment expertise. Although the field of plastic surgery is broad and challenging, the focus of the practice can be towards areas such as trauma or breast surgery, where the knowledge and skill in the design and transfer of flaps is vital to be capable of

functioning as an independent surgeon. During this rotation, I felt inspired by the challenging reconstructive problems encountered by the Plastic Surgery team I worked with, as well as communication skills and professional attitudes in relationships with patients.

Often, it is more important to know when not to operate or who not to operate on, than being able to do the surgery. Alternatively, it is crucial to know when to choose an alternative technique to the one that was planned due to unexpected circumstances or findings. No matter how good a reconstruction looks at the end of a surgery, if it fails postoperatively, it typically has more to do with selection of tissues (qualitywise), technique and timing of the surgery than any perceived lack of skill. As Professor Benson (general surgeon) told me during a mastectomy procedure prior to a DIEP flap reconstruction, “You cannot make a silk purse out of a sow’s ear”.

Bibliography

1. Andtbacka RH, Babiera G, Singletary SE et al. Incidence and prevention of venous thromboembolism in patients undergoing breast cancer surgery and treated according to clinical pathways. Ann Surg 2006;243(1):96–101.
2. Schaffzin DM, Douglas JM. Vacuum-assisted closure of complex perineal wounds. Dis Colon Rectum 2004;47:1745–1748. doi: 10.1007/s10350-004-0633-9.
3. Megerle K, Palm-Bröking K, Germann G. The cross-finger flap. Oper Orthop Traumatol 2008;20:97–102.
4. Papatheodorou LK, Dailiana ZH, Varitimidi SE, Hantes ME, Basdekis GK, Malizos KN. Digital coverage with flaps from the same or neighboring digits. Hippokratia 2011;15(2):153-156.
5. Sayum Filho Jorge, Ramos Leonardo Adeo, Sayum Jorge, Carvalho Rogério Teixeira de, Ejnisman Benno, Matsuda Marcelo Mitsuro et al. Leg's compartment syndrome after reconstruction of the anterior cruciate ligament: case report. Rev Bras Ortop [Internet] 2011 [cited 2016 Mar 27]; 46(6):730-732. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-36162011000600017&lng=en.
6. Colwell AS. Direct-to-implant breast reconstruction. Gland Surgery 2012;1(3), 139–141. http://doi.org/10.3978/j.issn.2227-684X.2012.10.04
7. Rosich-Medina A, Bouloumpasis S, Di Candia M, & Malata CM. Total “rib”-preservation technique of internal mammary vessel exposure for free flap breast reconstruction: A 5-year prospective cohort study and instructional video. Annals of Medicine and Surgery 2015;4(3):293–300. http://doi.org/10.1016/j.amsu.2015.08.006
8. Gabriel A, Champaneria MC, Maxwell GP. Fat grafting and breast reconstruction: tips for ensuring predictability. Gland Surgery 2015:4(3), 232–243. http://doi.org/10.3978/j.issn.2227-684X.2015.04.18
9. Wong WW, Hiersche MA, Martin MC. (2013). The angel flap for nipple reconstruction. Can J Plast Surg 2013;21(1):e1–e4.
10. Chopra K, Tadisina KK, Patel KR, Singh DP. Syndactyly Repair. Eplasty 2013;13:ic51.
11. Mumcuoglu KY. Recommendations for the use of leeches in reconstructive plastic surgery. Evid Based Complement Alternat Med. 2014:205929. doi: 10.1155/2014/205929. Epub 2014 Feb 6.
12. Zaretski A, Wei F-C, Lin C-H, Cheng M-H, Tsao C-K, Wallace CG. Anterolateral Thigh Perforator Flaps in Head and Neck Reconstruction. Semin Plast Surg 2006;20(2):64-72. doi:10.1055/s-2006-941712.
13. Pellini R, Mercante G, Spriano G. Step-by-step mandibular reconstruction with free fibula flap modelling. Acta Otorhinolaryngol Ital 2012;32(6):405-409.

14. Purohit S. Reduction mammoplasty. Indian J Plast Surg 2008;41(Suppl):S64-S79.
15. Teymouri H, Stergioula S, Eder M, Kovacs L, Biemer E, Papadopulos N. Breast reconstruction with autologous tissue following mastectomy. Hippokratia 2006;10(4):153-162.
16. Kim Z, Kang SG, Roh JH et al. Skin-sparing mastectomy and immediate latissimus dorsi flap reconstruction: a retrospective analysis of the surgical and patient-reported outcomes. World J Surg Oncol 2012;10:259. doi:10.1186/1477-7819-10-259.
17. Schroegendorfer KF, Hacker S et al. Latissimus dorsi breast reconstruction: how much nerve resection is necessary to prevent postoperative muscle twitching? Plast Reconstr Surg 2014;134(6):1125-9. doi: 10.1097/PRS.0000000000000739.