



Congenital and Paediatric Hand Surgery

Report for the Stack Travelling Fellowship Award 2023

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1. Introduction

The Stack Travelling Fellowship of the British Society for Surgery of the Hand was introduced in memory of Graham Stack to recognise both achievement and contribution to the development of Hand Surgery in the United Kingdom. It is one of the most prestigious awards bestowed by the British Society for Surgery of the Hand (BSSH) and is intended to recognise achievement, as well as contribution to the development of Hand Surgery in the United Kingdom. It is awarded to enable visits to centres of excellence (The British Society for Surgery of the Hand, 2024).

Hugh Graham Stack (1915-1992) was born in Bristol, the third son of Edward H E Stack FRCS, ophthalmic surgeon to the Bristol Royal Infirmary. Initially studying chemistry at Bristol, after three years he changed direction, and entered St Bartholomew's Hospital as a medical student, qualifying in 1942. Passing the FRCS in 1951, Stack decided to pursue a career in orthopaedic surgery where he developed an interest in reconstructive surgery of the hand and came under the influence of Jackson Burrows, Osmond Clark, Norman Capener and Guy Pulvertaft (Royal College of Surgeons of England, 2015).

Shortly before his consultant appointment the Hand Club of Great Britain had decided to pursue a policy of closed membership. He was one of the founders of the society named the Second Hand Club and assisted in the merger of the two groups into what we know today, the BSSH. He was the President of our Society in 1973 and became the President of the International Federation of Societies for Surgery of the Hand in 1978 (Royal College of Surgeons of England, 2015). Stack contributed to basic science and pathology with his publications and was an early adopter of surgical safety with publications on the safe use of tourniquets and the importance of defined nomenclature to prevent wrong site surgery (Burchell and Stack, 1973; Stack, 1969, 1962).

It is an absolute privilege to be awarded the Stack Travelling Fellowship for 2023 which I shall use to develop my knowledge and understanding of congenital and paediatric hand pathology. Initially trained in trauma and orthopaedics, the visits undertaken as part of the Stack Travelling fellowship follow fellowships in hand and microsurgery at the Pulvertaft Hand Centre and Auckland Regional Centre for Plastic, Reconstructive and Hand Surgery. The visits to the units occur between my time in Auckland and commencing back home in the Pulvertaft Hand Centre as a consultant with an interest in paediatric hand surgery and research.

I specifically choose visits to units over a variety of continents and operating within a range of health systems to witness different styles and approaches to the management of complex problems. During these visits, I wished to see how other services provide safe, effective, and lean tertiary level care to children who often have complex needs and live over a wide geographical catchment area. This is with a view to improving and expanding the service within the East Midlands.

Secondly, I wished to develop frameworks for decision making and appropriate utilisation of the multidisciplinary team. Finally, with an active interest in research and holding a PhD myself, I wished to develop collaborative relationships with other centres for future research opportunities.

2. USA – Stanford Medicine, California

The first of my visits was to the Division of Plastic and Reconstructive Surgery Department at Stanford Medicine, California.



(Figure One : Stanford Medicine)

My host was Dr Paige Fox, a plastic surgeon with an interest in hand surgery and reconstructive microsurgery who also is a member of the congenital hand team. Dr Fox is an Associate Professor with a research interest in wound healing and nerve compression. We share an interest in sustainability and the impact that health care has upon the environment and have both published upon the impact of waste in healthcare (Shah et al., 2024; Taylor et al., 2021). Dr Fox is now the lead for sustainability in Stanford Medicine. We had interesting discussions around the waste within healthcare and how to change culture and have positive and impactful change.

Dr Fox has been undertaking initiatives such as slimming down instrument sets and packs, especially for minor procedures such as carpal tunnel decompressions. As well as reducing the cost of the pack, a tray that is half the size only requires half the room in the sterilizer. She is currently encouraging surgeons within the hospital to review their operation cards and remove

instruments that they do not require such that unnecessary equipment is not opened. In the minor procedure room, she has implemented the switch from large drapes to small hand drapes and not noticed any change in infection rates.

We had lengthy discussions around effective research, running a research team and using sustainable textiles in the operating room. It was a pleasure to be able to share my knowledge from my PhD and work for the Green Surgery Report around sustainable drapes and gowns and the laundering systems required (Morris and Murray, 2024; UK Health Alliance on Climate Change, 2023). Currently, Stanford utilise disposable gowns and drapes in their practice. There are economic and environmental benefits to utilising reusable textiles, though there is still room for improving their environmental impact, particularly with aspects such as laundering (Vozzola et al., 2020). We discussed ways to deal with resistance in implementing change.

During my time at Stanford, I was able to observe operations across three of their hospital sites. Professor Curtin who specialises in nerve surgery undertook a SPIN procedure. Historically, tendon transfers have been used to provide function to those with spinal injuries. Innovation has seen a move towards performing nerve grafts and transfers to create function. A SPIN is where the supinator branch of the radial nerve to power the posterior interosseous nerve. I have been involved with these during my fellowship in Auckland with the tetraplegia team. Here they are often combined with other procedures, such as tendon transfers, and undertaken via a volar approach. It was valuable to watch Dr Curtin who approached by a dorso-radial approach straight onto the radial nerve.

Other highlights were learning new methods for treating 1st CMCJ OA. During my time Dr Fox showed me how to harvest fat and perform a fat graft into the 1st CMCJ. I also observed a CMCJ denervation and was directed to the case series by Suresh et al. which provides a good description of how to undertake the procedure (Suresh et al., 2023). The team have had good results with young patients with early-stage disease as a way of temporising and reducing pain. I was also taught the 'Hollywood dressing' – where you place double dressings to prevent any strikethrough and disgruntled patients!

Professor Chang is the Johnson & Johnson Distinguished Professor and Chief of the Division of Plastic and Reconstructive Surgery. Amongst the many plates that he spins, he teaches the undergraduate course 'From Rodin to Reconstruction'. Bernie Cantor began his obsession with Rodin (1840-1917) when he was a broker on Wall Street in his 20s and purchased a small bronze Hand of God. Over time his personal collection grew. Donated by the Cantors and their Foundation, the Cantor Art Center houses an extensive Auguste Rodin (1840-1917) collection with indoor exhibits and an outdoor sculpture garden (Stanford University, 2022). Impressed with the talent demonstrated in creating such lifelike hands, Professor Chang made Rodin's creations a central element in his undergraduate seminar on hand anatomy where he could also discuss the

pathologies some of the hands demonstrate. He has since formally collaborated with the Cantor and undertaken an exhibition where he utilised computer-generated views of the internal structure of the sculpted hands and superimposed patient CTs demonstrating the same pathologies as a teaching tool and an exhibition to the public.

It was one of the highlights of my visit and an absolute honour for Professor Chang to donate his afternoon to provide me a personal tour of the Rodin collection that the Cantor houses. Not only did I have a personal tour, but he had brought his laptop with the lectures he provides and talked me through the process of creating a bronze statue and then the work he undertook for the exhibition. Following the tour, we enjoyed a glass of wine in the café at the gallery and discussed art, textiles and surgery! In particular, we discussed sustainability in surgery and the importance of global surgery. I am a big fan of the Nobel Prize winning work by Esther Duflo and her husband Abhijeet Banerjee around eradicating global poverty; we discussed the importance of training and upskilling surgeons in developing countries to improve their health outcomes (Stanford Medicine, 2023).



(Figure Two : Professor Chang and myself with some of the Rodin hands)

One of the other highlights of the gallery was the temporary exhibition “Day Jobs” which highlighted the jobs that artists hold to survive. One particularly poignant textile exhibit was a knitted scarf depicting the time a female spends attending to activities other than paid work once she has children. The 2023 Nobel Prize in Economics was awarded to Claudia Goldin whose work

focuses upon understanding inequality and women's participation in the workplace. Food for thought as we see the number of female trainees and consultants increase.



(Figure Three : Timesheet by Ahree Lee)

Dr Kamal is an orthopaedic trained hand surgeon with an academic interest in health quality data and value-based care. One of his current projects is as Co-Chair of the Clinical Practice Guidelines for Carpal Tunnel Syndrome. During my time in Auckland, I have treated patients on a same day pathway where patients attend for a consultation and surgery. These patients are screened with a questionnaire completed at the time of referral. We had an enjoyable discussion around the benefits of streamlining care and the possible pitfalls to avoid and I was able to share my own experience. He is currently working on national hip fracture guidance and I was particularly grateful for his insight into combining clinical practice with an academic field that overlaps clinical practice but differs and the importance of having an identity.

3. USA – Shriners Children's, St Louis, Missouri

Following my week at Stanford, I flew East to spend time with Professor Charles Goldfarb in St Louis, Missouri. An orthopaedic trained hand surgeon, his special interest is in paediatric and congenital conditions. He is the author of the congenital hand blog and the upper limb podcast.

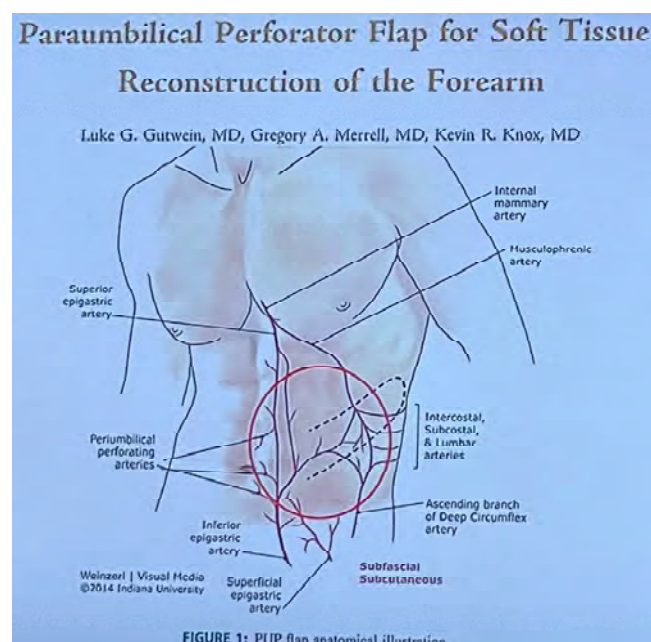
Professor Goldfarb practices out of Shriners Children's and is faculty at Washington University and his adult practice is out of Barnes-Jewish Hospital. The week kicked off with an invitation

to dinner with Professor Goldfarb and his family. After dinner we discussed plans for the week and what I hoped to achieve during my visit.

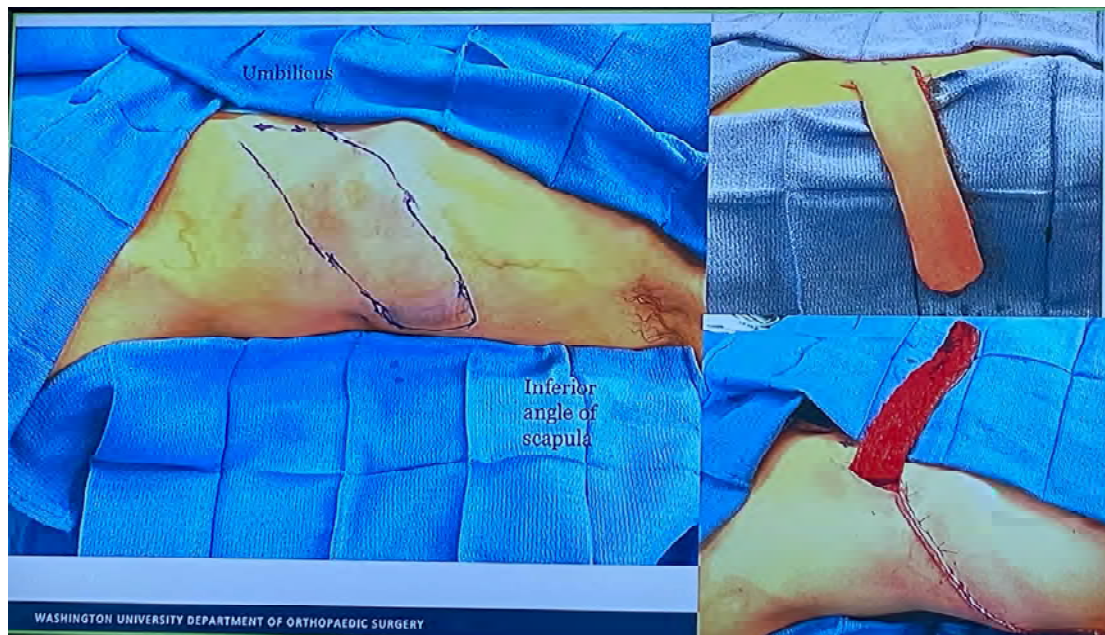


(Figure Four : Barnes Jewish Hospital)

The first day commenced with conference and Dr Brogan discussing soft tissue coverage for hand trauma. A flap that the department often use for forearm coverage is the paraumbilical perforator flap (Gutwein LG et al., 2015). They have had good results with this but acknowledge that whilst the forearm is joined to the torso, the site can be difficult to care for. Following this, complex cases were discussed for the week.



(Figure Five : Paraumbilical Perforator Flap)



(Figure Six : Intraoperative Paraumbilical Perforator Flap)

I spent the remainder of the day in clinic at a peripheral hospital site. There were sixty patients booked and the set up involved a specialist nurse and therapist working alongside Dr Goldfarb and his resident. Again, the importance of multi-disciplinary working was stressed and the availability of therapy involvement to discuss and provide ongoing rehabilitation. Their computer system allows for immediate dictation, by voice recognition software, into pre-formed templates. The system also linked all laboratory and radiology results within the one program; this seemed particularly advantageous compared to systems I have used within the National Health Service.

I used the opportunity in clinic to ask about management as patients were seen. Dr Goldfarb is a fan of using external fixation for ulna lengthening in the paediatric population to try and prevent dislocation of the radial head in those with a short ulna. We discussed his regime and the system he uses (www.orthopaedics.com). Of the twenty ways to skin a cat and perform a trapezectomy, his preference is to suspend the first metacarpal with an internal brace rather than with an autologous tendon. I have seen this used in revision procedures whilst in Auckland for those with collapse and shortening of the first metacarpal but never as a primary procedure.

During the lunch break, I was taken to see the cicadas. This year the cicadas have emerged en masse with both the annual and the periodical 13-year broods. Up to 60 million are expected!! They are very noisy and a bit of a nuisance. They are also not especially aerodynamic. One patient in clinic had a cicada related injury where he had gone to remove the insect from himself and ruptured both sagittal bands to his middle finger extensor tendon!



(Figure Seven : Cicada)

After a day of adult clinic, I spent the following day at the Shriners Children's with Professor Goldfarb and Professor Lindley Wall. The first Shriner hospital opened in 1922 in Louisiana to provide medical care to children and families, regardless of their ability to pay or insurance status. The idea was born after a polio epidemic swept across the United States in the late 1910s and it was apparent that many children were going without appropriate care (Shriners Children's, 2024).



(Figure Eight : L-R Professor Goldfarb, Holly Morris, Professor Wall)

Between the two Professors, they run a simultaneous clinic and operating list alongside a multidisciplinary team consisting of physiotherapy and occupational therapy. Currently, the department has no resident psychologist. During clinic I saw the first ulna longitudinal deficiency. I have seen several radial longitudinal deficiencies whilst working with Ms Jill Arrowsmith but had not, as yet, seen an ulna longitudinal deficiency! Radial sided longitudinal deficiency occurs 10x more frequently than ulna. Both are associated with cardiac defects – which one would expect given that limb development occur at the same gestational period in which the cardiac system is formed. Children with ulna longitudinal deficiency tend to do very well and this child was happily playing baseball. Mizuno had even custom modified a glove to allow them to catch!



(Figure Nine : Ulna Longitudinal Deficiency)

I have always been fascinated with embryology especially when one considers the complexity and number of steps involved to create a limb. I am constantly surprised that there are not more differences. Prof Goldfarb shared with me Dr Oberg's (of the Oberg-Manske-Tonkin classification) lecture on limb embryology (Oberg K, n.d.). I had seen this previously at the 2023 World Symposium of Congenital Malformations of the Hand and Upper Limb in Minneapolis but, given the complexity, it is always good to review and refresh. As a refresher for the readers, it is the Sonic Hedgehog gene that is involved with development of the anterior-posterior (radial-ulna) axis and concentrates at the zone of polarising activity. A reduction in the level of sonic hedgehog

gene affects sonic hedgehog dependent regions resulting in a loss of the ulna and/or ulna border digits. By contrast, radial longitudinal deficiency is due to a deficiency in FGF function and is sonic hedgehog independent. Over expression of sonic hedgehog, or a second location, can lead to ulna dimelia.

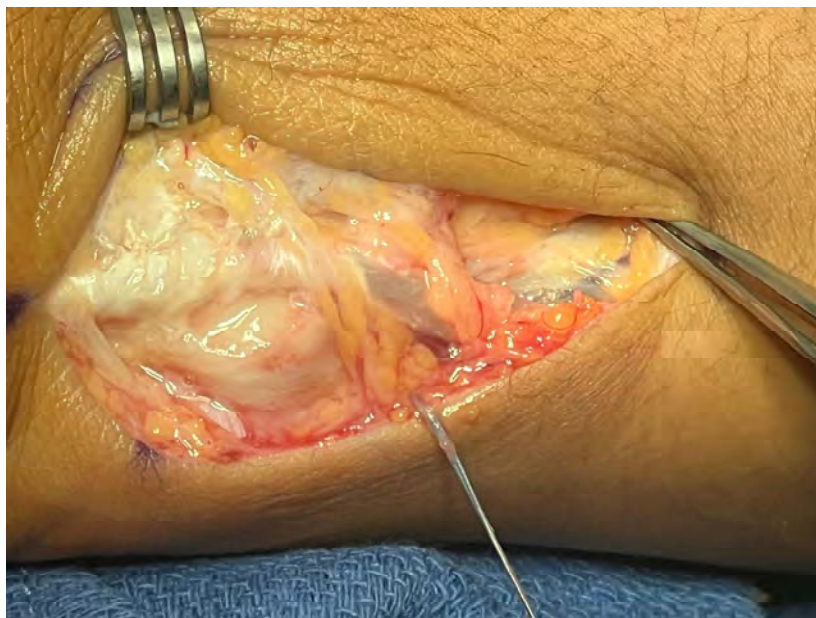
It was incredibly valuable to chat with both the Professors about the use of registries for congenital hand, particularly as it was Professor Goldfarb who established the Congenital Upper Limb Differences (CoULD) registry (CoULD Registry, 2024). There has been a push recently to use a registry and the BSSH now has a congenital registry. There are several registries available and still quite some debate at conferences around how to classify complex cases – twenty opinions from ten surgeons. One of the benefits of having a registry is for collaboration between centres and pooling of cases. Congenital hand is a young and evolving field and generally complex cases of the same pathology are spread wide and far. As we gain further information on the genetics and embryology of limb development, our understanding of how to classify and manage conditions changes. A significant proportion of work in the field has involved identifying patterns in larger cohorts of patient to look at associations with other conditions. Due to the rare nature of many differences, pooling of cases is required to have a cohort sizeable enough to find significance.

We ran the list of research trials currently in progress; many are undertaken in collaboration with other congenital hand units for the reasons listed above. I am very fortunate that Ms Arrowsmith is happy for me to retrospectively review her careers caseload and identify the various complex cases. This is one of my first tasks as a consultant and to also commence prospectively collating data of my patients and patient reported outcomes. This will allow us as a unit to contribute and participate in collaborative research.

The remainder of the week was spent operating in adult theatres across two sites. At a peripheral site that takes day case patients who are well enough for regional and general anaesthesia, I watched Professor Goldfarb and his team undertake surgeries whilst running two theatres simultaneously. To enable this to work efficiently, Professor Goldfarb has a dedicated nurse as part of this team who ensures that theatre cases are appropriately timed and co-ordinated prior to the day of surgery. Cases of interest included repairing the radial collateral ligament of the thumb with an internal brace and transposition of an unstable extensor carpi ulnaris tendon



(Figure Ten : Radial Collateral Ligament Repair)



(Figure Eleven : Extensor Carpi Ulnaris Transposition)

In the main hospital, cases were undertaken on patients with a higher ASA score due to the availability of higher-level care. In the next theatre, Dr Brogan and Professor Boyer were performing free tissue transfer to cover a dorsal hand and forearm defect and kindly took me through the principles for ALT free flap harvest. We had a discussion on learning free tissue transfer as an orthopaedic surgeon which I found particularly valuable. During my fellowship in Auckland, one of my aims was to increase my knowledge and skill set on soft tissue coverage and I have spent time with their plastic surgeons gradually learning the principles of split and full thickness skin grafting, rotational and advancement flaps and pedicle flaps. Free flaps were next on my list!

I attended a complex nerve and brachial plexus clinic which was a mixture of new referrals and follow up patients. This is another evolving field within hand surgery and it was useful to discuss the management of various defects and compare and contrast management with those that I have seen in the UK and New Zealand.

The week ended watching the installation ceremony of Lindley Wall as the inaugural Jacqueline N Baker and w Randolph Baker Professor. Professor Wall practices purely as a paediatric hand surgeon and has a special interest in cerebral palsy of the upper limb. She is an accomplished academic with many publications within the field.

4. Australia – The Royal Children’s Hospital, Melbourne, Victoria

The Royal Children’s Hospital in Melbourne has been providing care to Victoria’s children and their families for over 150 years as the major specialist paediatric hospital in Victoria and designated state-wide major trauma centre. Their care extends to children from Tasmania and southern New South Wales and further afield (The Royal Children’s Hospital Melbourne, 2024).

My host for the week was Associate Professor David McCombe. Another plastic surgeon, he specialises in adult and children’s hand surgery, peripheral nerve and reconstructive microsurgery. He undertook his fellowship in the United Kingdom at St James University Hospital in Leeds. Associate Professor McCombe is active in clinical research and is part of the steering committee for the Australian Hand Difference Register.

As a tertiary centre, the plastic and maxillofacial department have a large caseload of complex cases. I spent a day and a half in theatre with Mr Dan Wilks. The first case was an eight-month-old child with bilateral amniotic constriction ring syndrome. Pre-operative planning had involved imaging with both radiographs and CT to identify which phalanx was where. The right side was more severely affected than the left and this was the first stage surgery. Due consideration was given to the releases to ensure that there was appropriate soft tissue coverage and vascularity

following release. The team were pleased with the final release which allowed the thumb to be released and the index. A further surgery will be required to deepen the first webspace and to attend to release of the middle and ring fingers.

The rest of list was a mix of hand and general plastic cases with release of a trigger thumb and fixation of hand trauma. Between cases, we discussed entrapment of the median nerve during supracondylar fixation. In any child with a deficit of median nerve function, early exploration is advised – as the fracture is reduced, some fibres of brachialis can become entrapped and this can cause a constriction on the median nerve.

The outpatient department at the Royal Children's is famous for their meerkats which are the pet of the department and give the children something to occupy themselves with whilst waiting to be seen. During the week there was the congenital hand clinic and brachial plexus clinics. The consultants run the clinics simultaneously which allows for immediate second opinions from each other and a pooling of experience. Given the distance that some of the patients and their family travels, this is certainly advantageous to the care of the patient and family.



(Figure Twelve : Meerkats in Outpatients)

During the clinic, we were presented with a range of pathology in both new and follow up patients. Of interest, there was a case of split hand foot syndrome with mum and her baby. Prior to the birth, there had been contact with the plastics service for antenatal counselling. Mum functioned incredibly well with her hands and feet which were very much of a classic appearance. However, the child had interesting hands as the first and second metacarpals were without phalanges and the cleft was minimal. There was significant discussion between the consultants on how to improve

function and a referral to orthopaedics made for advice on gait if any available phalanx from the toe were harvested.

One of the post operative follow ups was of a teenager requiring stabilisation of the 1st CMCJ with Ehlers Danlos, classic subtype. FCR had been harvested, via a Wagner approach, and passed through the base of the 1st metacarpal and trapezium with a tape augment to create stability. The teenager was delighted with the results and keen to proceed with the contralateral side.



(Figure Thirteen : Pre and Post Operative 1st CMCJ Stabilisation – Dorsal View)



(Figure Fourteen : Pre and Post Operative 1st CMCJ Stabilisation – Radial View)

It was interesting to spend some time with Mr Will Alexander who has an interest in the management of upper limb cerebral palsy. We saw a new referral together of a teenager with epilepsy and upper limb cerebral palsy. It was helpful to discuss his thresholds and results of nerve surgery vs tendon transfers vs fusions of joints. This is an evolving field and a similar conversation was held during the brachial plexus clinic on the timing of intervention and which intervention to undertake.

During my time in Melbourne, it was lovely to catch up with friends. Anne Sophie Kruit visited the Pulvertaft when I was there as a fellow prior to Auckland. She is the current Melbourne fellow and it was lovely to have a coffee, discuss fellowship and consultant life, and meet her daughter who had been in her growing bump during her time in Derby. She will return to the Netherlands on completion of her fellowship and take over the practice of Mr Hovius and I look forward to another catch up back in Europe.



(Figure Fifteen : Anne Sophie, Baby Julia and Me)

It was also great to catch up with Justin Parr, David McCoombe's adult hand fellow. Justin was the senior plastics trainee when I started as a fellow in Auckland. He didn't miss the opportunity to talk me through some of the hand flaps he had been doing and the pitfalls I should avoid. His three-year-old son, Seb, choosing to educate me on Australian wildlife instead.



(Figure Sixteen : A Kookaburra)

5. Australia – Royal North Shore Hospital, Sydney, New South Wales

The Royal North Shore Hospital is a principal tertiary referral hospital for the Northern Sydney Local Health District and provides a comprehensive range of complex services to patients from across North South Wales (Northern Sydney Local Health District, 2024). My host for the week was Dr Richard Lawson. An orthopaedic surgeon, Dr Lawson has a special interest in brachial plexus and peripheral nerve surgery, congenital hand surgery and Dupuytren's disease. He trained in Australia and undertook a fellowship at Duke University, North Carolina.

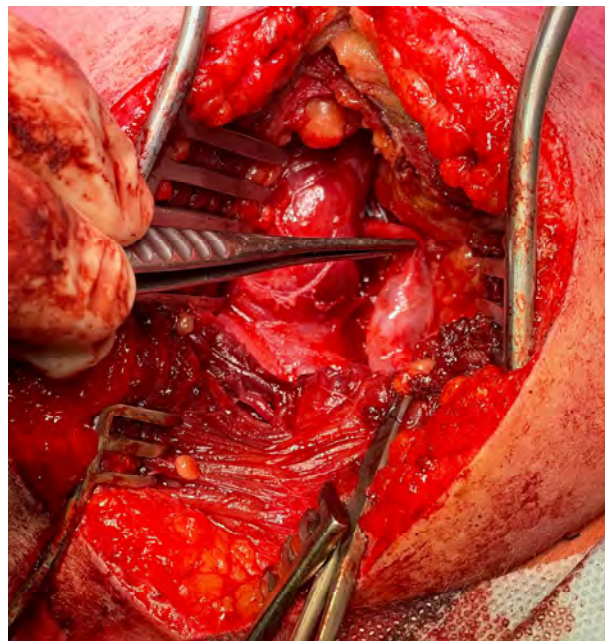
I started the week in clinic reviewing a mixture of new and follow up trauma patients. In a similar manner to the Pulvertaft, the hand clinic at North Shore has dedicated hand therapists who review patients immediately and offer rehabilitative advice. Patients may travel for three to four hours if coming from peripheral places within the catchment region and so minimising travel whilst providing care is essential.

During clinic, Dr Lawson took the training registrar and me through a full brachial plexus examination and we reviewed some new referrals, making plans and ordering investigations as

appropriate. It was a good opportunity to discuss early intervention and the role of investigations to guide treatment plans. All operative patients are captured in a REDCap database which allows for easy identification of patients for any audit and research purposes.

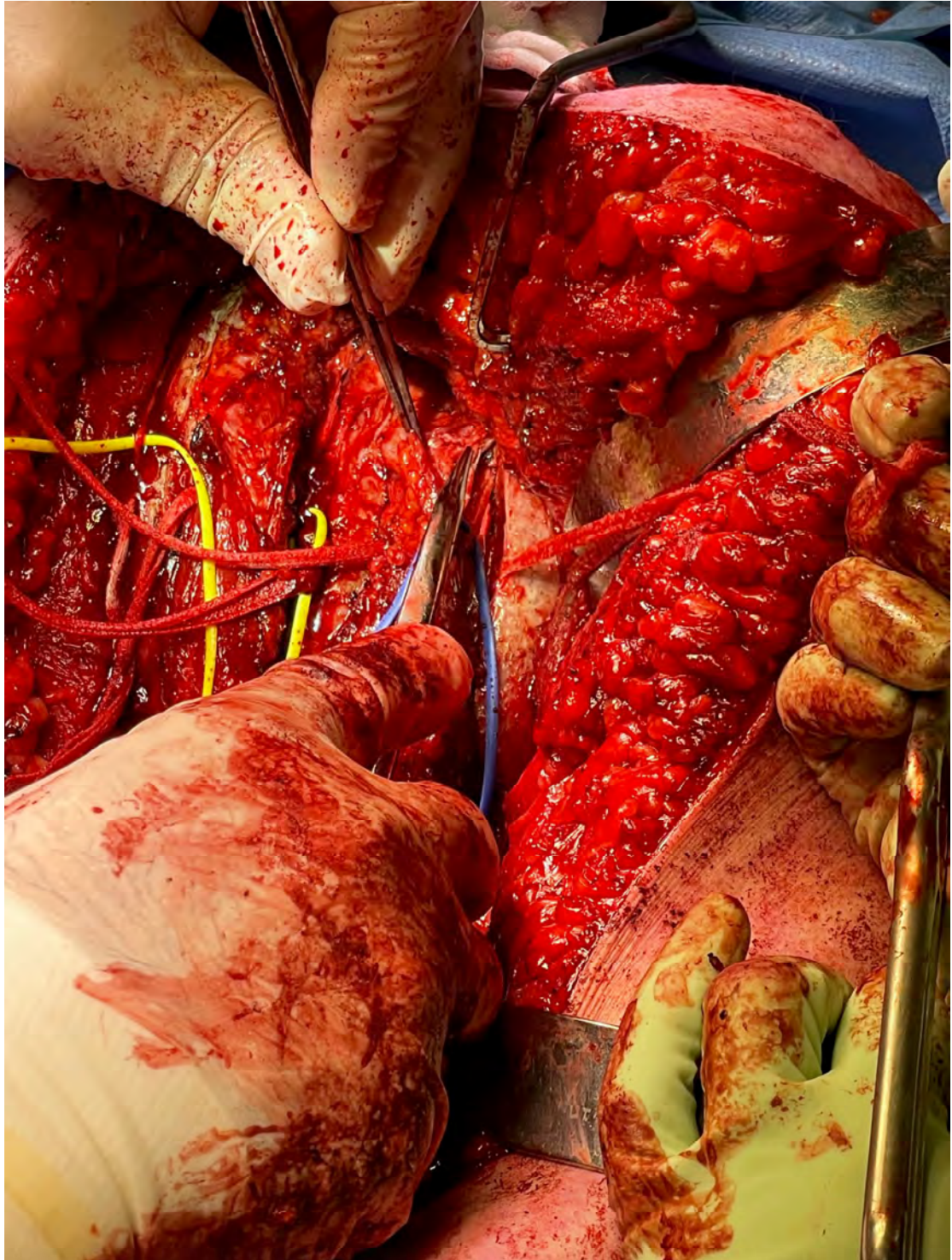
The remainder of the week was spent in theatres split between the public and on-site private hospital. A significant proportion of the population living in the catchment have private health insurance and the insurance allows for patients to access services at both the public and private sites.

One of the highlights of the week was observing nerve transfers for an adult patient with a brachial plexus nerve root avulsion following a motorcycle accident. During this procedure, two different transfers were undertaken. First, the patient was positioned in the lateral position to allow access to the suprascapular notch for an accessory nerve to suprascapular nerve transfer. The patient had clear anatomy and apart from being lateral, rather than prone, the procedure followed the same plan as per that in Dr MacKinnons videos.

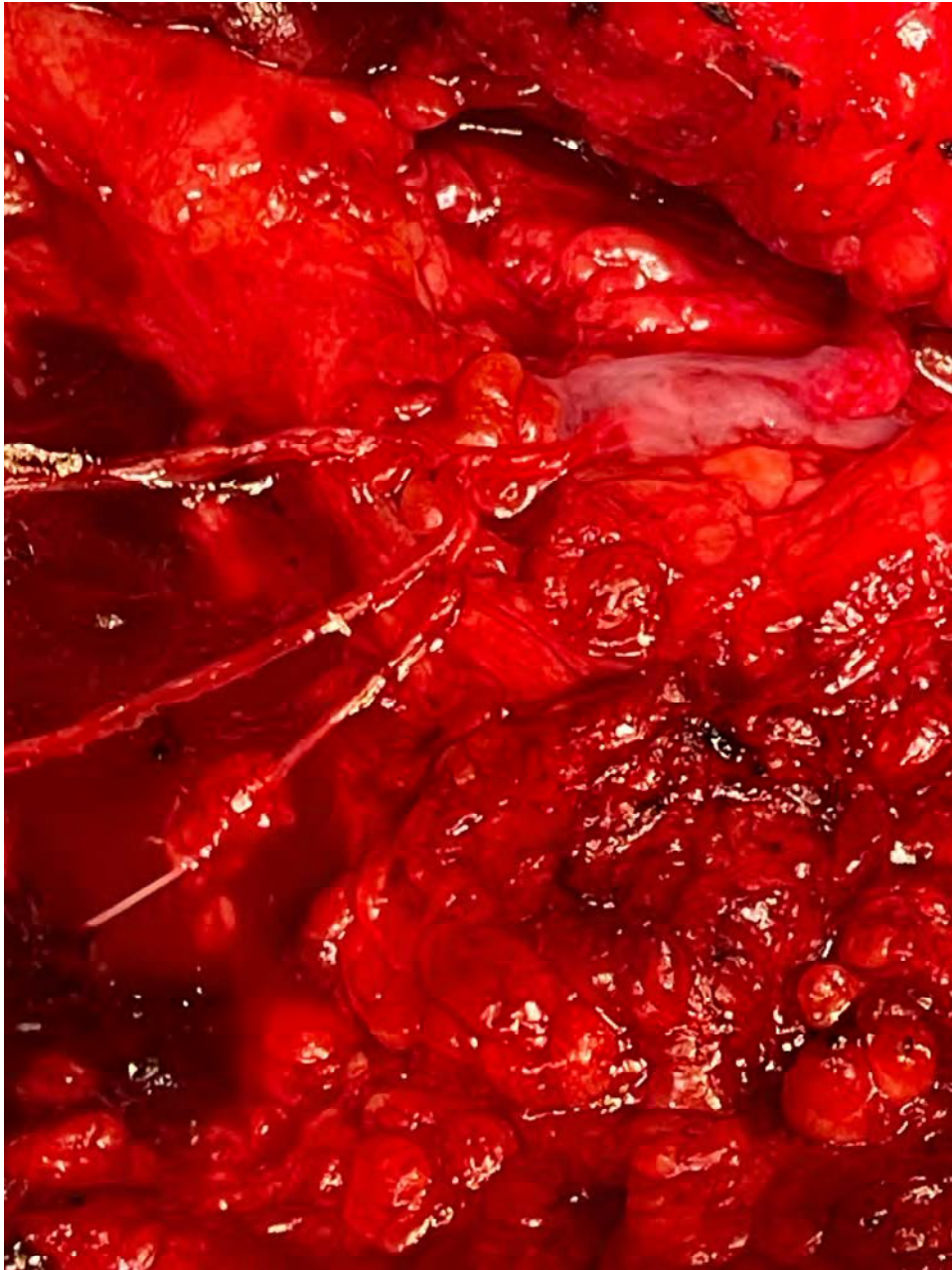


(Figure Seventeen : Accessory to Suprascapular Nerve Transfer)

Following this transfer, the patient was subsequently placed prone and a large incision made to allow for harvest of the 3rd, 4th and 5th intercostal nerves and transfer into the musculocutaneous nerve. Again, the anatomy was clear and the harvest and transfer successful.



(Figure Eighteen : Harvest of Intercostal Nerves)



(Figure Nineteen : Transfer of Intercostal Nerves to Musculocutaneous Nerve)

I had the opportunity to spend time in theatre with Dr David Stewart and Associate Professor Brahman Sivakumar and discuss their clinical practice and interests. Other procedures witnessed during the rest of the week included a trapezectomy involving a slip of abductor pollicis longus and a delayed primary repair of flexor pollicis longus and a digital nerve in an eight-year-old.

During my week in Sydney, there were several strikes by nursing staff wanting better financial compensation for their work. These strikes were by nurses in both the public and the private

healthcare sectors. All of my visits to date have demonstrated that there is no perfect health system. All of the clinicians that I have worked with during my visits have shared their frustrations of their respective healthcare systems and these have common themes – poor utilisation of theatre resources (and healthcare in general), understaffing and under development and pay of employed staff and a gradual erosion of autonomy.

6. India – Dr Paul Brand Centre for Hand Surgery, Leprosy Reconstructive Surgery & Peripheral Nerve Surgery, Christian Medical College, Vellore

The Christian Medical College (CMC) Vellore was started in 1900 by Dr Ida Sophia Scudder, the daughter of second-generation medical missionaries. Medical education began in 1918 with a Licentiate Medical Practitioner course to impart medical training to women. In 1942, the MBBS degree course was started and in 1947, the medical college became co-educational.

Today, the healthcare organisation is one of the top-ranked educational, healthcare and research institutes in the country. It includes a network of primary, secondary, tertiary and quaternary care hospitals, with around 3675 beds spread across seven campuses in and around Vellore, and in the neighbouring state of Andhra Pradesh. As a strictly not-for-profit society, all available funds are used to subsidise student education, provide free or subsidised treatment for deserving patients, fund charitable outreach activities, or are invested in infrastructure and projects necessary to sustain and develop capacity to pursue their mission and objectives (Christian Medical College Vellore, 2024a).

The Dr Paul Brand Centre for Hand Surgery, Leprosy Reconstructive Surgery & Peripheral Nerve Surgery (HLRS Unit) is one of the oldest units in Asia dedicated to hand reconstruction, hand therapy and rehabilitation. It was founded in 1951 by Dr Paul Brand to reconstruct the deformed hands, feet and faces of patients with leprosy with pioneering tendon transfer techniques. Today, the centre has evolved into a large unit treating a diverse range of hand and peripheral nerve pathologies (Christian Medical College Vellore, 2024b). Whilst they used to operate on four or five leprosy hands a week, due to advances in treatment, the department now operated on that number a year. A random hand fact - it was the book which Dr Brand wrote on hand surgery and reconstruction of the hand that inspired Professor Bainbridge to pursue his career in hand surgery.



(Figure Twenty : Paul Brand Block on CMC Main Campus)

I spent six weeks at CMC Vellore in Tamil Nadu, timed to avoid the monsoon season, where I was hosted by Professor Sam Pallapati. Professor Pallapati spent two years in Louisville working with Harold Kleinert for his fellowship after his orthopaedic residency. Apart from this stint in the USA, he has spent the rest of his career at CMC Vellore. CMC Vellore, as a charity institution, ensures that training doctors are bonded for a period of time after their initial undergraduate training to serve the population. On return from Louisville, he had written a letter to his fiancée (now wife) to say that he wouldn't be staying long and would be looking to move. That never eventuated and now he is leading the unit and in his own words 'doing gods work'! His two sons are also in the medical system at CMC Vellore whilst his wife, who is an architect, led the build of the new hospital campus.

The weeks were split between a mix of outpatient clinics and theatre lists based mainly on the old and central Hospital Campus in town with the odd session at the newly built Ranipet Campus to the East of Vellore. There was quite a difference between the old and new hospital. In the old hospital, we were literally wading through patients in the waiting room to get to our clinic room in the basement of the outpatient building!



(Figure Twenty One : Ranipet Campus)



(Figure Twenty Two : An empty waiting room at Main Campus)

Not only do patients travel from all over India to visit CMC Vellore, such is its reputation, but they also travel from surrounding Bangladesh and Nepal. Patients pay fees according to what they can and the consultants have the ability to either waive entirely or heavily subsidise the fee for the patient with charity funds. The choice to operate is based upon need. As such, there is a certain pragmatism with the kit used to try and reduce the costs to the patient or the hospital. For example, very few phalangeal fractures are plated and are, instead, fixed with Kirschner wires. A prerequisite for surgery is that patients must be willing to stay for therapy with the specialist hand therapists that work within the unit.

I was amazed at the speed of the system. It is the most efficient I have seen. A patient attending clinic on Monday, will have all their investigations (radiology, nerve conduction studies etc) within the next few days, be seen in clinic at the end of the week and listed for the next week. Very commendable. For myself, I had ongoing continuity of patient care. Patients stay in the area following surgery for the specialist hand therapy and there is a weekly clinic attended by all therapists and patients within the system that allows the surgeons to trouble shoot problems early and tweak therapy plans.



(Figure Twenty Three : Soft tissue coverage post debridement following necrotising fasciitis)

The unit undertake a whole range of surgeries and I was fortunate enough to work with all the team including Professors Binu Thomas and Anil Mathew and Associate Professor Sreekanth Raveendran. During my time I was involved in brachial plexus explorations and reconstructive surgeries including a contralateral C7 and a Steindler flexorplasty. I also assisted with soft tissue coverages including random pattern abdominal flaps to cover a defect post necrotising fasciitis, a free fibula transfer to reconstruct a radius following resection of an osteosarcoma and a reverse sural artery flap following resection of a Marjolin's ulcer on the heel in a leprosy patient.

The main reason for my visit was to gain further exposure to congenital hand surgeries. I was fortunate enough to see many complex cases during my time in the unit and to assist in surgeries. Prof Pallapati took me through how he undertakes syndactyly separation and the flaps that he makes.



(Figure Twenty Four : Syndactyly release)

Flatt described cleft hands as a “functional triumph but social disaster” (Flatt AE, 1977). Interestingly, in India it is more of a functional disaster as the inability to pinch the fingers together to eat rice is a real issue. Thus, they often have reconstructive surgeries to close the cleft. Interestingly, patients with amputations of middle and ring fingers often end up having a ray amputation such that they can eat rice with their hands.

There were a couple of children with radial longitudinal deficiency undergoing treatment at different stages. As such, I was able to assist in the placement of an external fixator for distraction and then a further centralisation procedure with a bilobed flap on another child.



(Figure Twenty Five : External Fixator for distraction and correction)



(Figure Twenty Six : Centralisation)

There were two children with macrodactyly in clinic during my time. We discussed the role of PIK3A inhibitors which are showing some promise in a trial with Professor Canaud. The exact drug used in the trial is not available in India. However, the oncologists use another within the same family. However, hyperglycaemia and deranged liver function tests are common. The option for medical management was broached with the parents who declined it as their child was well in themselves. A debulking operation was undertaken to attempt to improve pinch.



(Figure Twenty Seven : Macrodactyly)

There was one clinic with three children all with Volkmanns ischaemic contracture presenting for the first time. Traditional bone setters still have a heavy practice within India and are attractive to the public due to the lower costs compared with visiting an orthopaedic surgeon. There are also still areas in rural India which lack orthopaedic services. The bone setters use gauze dipped into pastes with medicinal herbs and then immobilise the area with bamboo sticks and bandages. Unfortunately, Volkmanns ischaemic contracture can be a complication. One of the children was operated on during my stay with a flexor-pronator slide which improved the flexion contracture. They were still immobilised when my time ended so I do not know how much improvement they gained following rehabilitation.

Prof Pallapati and I had interesting discussions on the cultural differences between the UK and India in regard to congenital hand differences and how society perceives the difference. The stigma of having a congenital hand difference is very noticeable in India. Mothers often turn up alone to clinic with a baby or toddler as the father may abandon the family following delivery and the discovery of a hand difference. The obvious differences also make it far less likely that an

individual will go on and marry. As such, there can be pressure from parents for corrective surgery and the search for perfection so that their child can marry and have a family for social support.

My time in Vellore was during November and December and so I was around for the festive celebrations leading up to Christmas. I was a guest at the departmental Christmas party. The annual event invites all members of the team as well as some of the leprosy patients undergoing treatment. I had the privilege to give a greetings speech.



(Figure Twenty Eight : Ward staff singing at Christmas Party)

I was made to feel very welcome by the department and enjoyed embracing Indian life. Having arrived following the monsoon season, I did still have the experience of the tail end of a cyclone passing through. Even the cows were hiding from the rain!



(Figure Twenty Nine : A cow hides from the weather)

I managed to navigate myself around town on hospital transport, rickshaws and the public buses – where I managed to find a seat, rather than hanging from a rail. I tried several different Indian dishes, mastered the art of eating biryani with my hand, and also visited the newly opened (and only) McDonalds in Vellore.



(Figure Thirty : Trying McDonalds with Dr Karma and Dr Teja)

7. Conclusions

I would like to take this opportunity to thank those who kindly hosted me during my travelling fellowship. Not only did they give their precious time to discuss their practice, caseload and experiences in the field, but they coordinated my time to ensure I could maximise my opportunity. I am indebted to my friend, Dr Jeet Patel, who organized my time in CMC Vellore and introduced me to his classmates who are still working within the institution.

I felt very fortunate to be awarded the Stack Travelling Fellowship and enjoyed my time travelling between the units. It is always lovely to make new friends and discuss a subject I feel passionate about.

Great things are never done alone and so a huge thank you to the team at the Pulvertaft Hand Centre who are always encouraging of my ideas for service development and ongoing research. In particular, a thank you to my main mentor for congenital hand, Ms Arrowsmith who supports me to aim high and think big. A special mention also to Mr Jim Brousil, a pediatric orthopaedic

surgeon at Royal Derby Hospital, who continues to advise and guide me and involve me in a collaborative service.

Thanks are extended to the very many past mentors through my training who have shaped me into the surgeon I am today. Many continue to keep in touch and offer advice and guidance on managing patients, implementing change and undertaking research.

Finally, a mention to Ms Kath Hamlin who was the one who suggested I apply for the fellowship when we first met over coffee on our fellowship in Auckland. I had dismissed applying feeling I was not senior enough but Kath, having been the previous recipient, insisted that I place the imposter syndrome to one side and apply.



(Figure Thirty One : A cup of tea with Kath in Auckland)

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