THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by prepared by Dr Shannon Webber; 2015 Churchill Fellow

The Dr Dorothea Sandars and Irene Lee Churchill Fellowship to train in the surgical procedure known as Osteo-Odonto-Keratoprosthesis – UK, Italy, Switzerland.

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Signed: Dr Shannon Webber  Dated:  1st September 2018.
We make a living by what we get, but we make a life by what we give.

- Winston Churchill
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Introduction

The Osteo-Odonto-Keratoprosthesis remains the keratoprosthesis of choice for end-staged corneal disease despite being described over forty years ago. It is particularly resilient to the hostile environment of a dry, keratinised eye in conditions such as Stevens-Johnson Syndrome, Cicatricial Pemphigoid and chemical injury to the eye. The rigid optical cylinder used during the surgery gives excellent image quality and longevity. The technique is finally gaining recognition by corneal surgeons worldwide as the treatment of choice for end-stage corneal disease. This is largely due to the dento-osseous lamina, which supports the optical cylinder, being resilient to the harshness of a dry eye.

The technique has by far the best results and proven long-term follow-up and was invented by Strampelli, in Rome, Italy, and modified over the years by Falcinelli. The role of OOKP in contemporary Ophthalmic Surgery was cemented by the first International Meeting in Rome in 1993. At this meeting, a twenty year follow up of good results was presented and it laid the platform for the surgery being performed all over the world for deserving patients. Falcinelli’s dream, prior to his death a few years ago, was recognised by OOKP surgery being performed on every continent throughout the world.

The perspective from which my report is written differs to what it would have been, given I was granted the award three years ago in 2015. This was prior to embarking on any sort of training to learn the technique known as Osteo-Odonto-Keratoprosthesis (OOKP). Since receiving the award, I have learnt, and subsequently performed the procedure five times. The surgery has been carried out at the Sydney Eye Hospital with our results rivalling any OOKP facility throughout the world. We have modified the surgical technique further and created a few innovations to improve the long-term success of our patients. Some of these developed techniques are world-first procedures.

The Fellowship grant has subsequently aided me travelling to multiple OOKP centres throughout Europe to observe, discuss and further refine techniques to improve surgical outcomes. The knowledge I obtained is going to be most beneficial those Australian people who satisfy the requirements for this surgical procedure.
Acknowledgements

First and foremost, I would like to offer my sincerest gratitude to the Winston Churchill Memorial Trust and to Dr Dorothea Sandars. The receipt of this prestigious award paved the way for the OOKP programme to catapult into existence in Australia, plus assisted with my subsequent credentialing at the Sydney Eye Hospital back in 2016.

Special thanks must be directed at Dr Gregory Moloney, as well as the Executive Office, Ophthalmic Department and Nurses, and Allied Professionals at the Sydney Eye Hospital. The Sydney Eye Hospital Foundation and the Save Sight Institute have been most crucial to the establishment of the OOKP programme by allowing equipment to be purchased and referrals to be accepted from all over the Australia.

A special debt of gratitude must be paid to Professor Konrad Hille who resides in Offenburg, Germany. Professor Hill was most forthcoming when we were trying to organise observation to learn the technique in 2016. He was a fantastic host and put together a saturated schedule of surgeries for Dr Moloney and myself to observe. He also volunteered his time to visit Australia and assist with the first case ever performed in this country in 2017.

Professor Christopher Lui was also most obliging in initially providing us with knowledge and assistance in developing the OOKP programme in Australia back in 2016. He has always been readily available via email correspondence and is a World leader in the OOKP field. My recent visit to his United Kingdom Department was an absolute pleasure.

A special thank you must also be given to Dr Christoph Kunz and my Oral and Maxillofacial Colleagues in Basel, Switzerland. They were extremely accommodating hosts and very collegiate in their attitude and acceptance of my cultural differences.

Finally, to Dr Johnny Falcinelli in Rome, Italy. A true gentleman and pioneer in the field of OOKP Surgery.
Executive Summary

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The Dr Dorothea Sandars and Irene Lee Churchill Fellowship to train in the surgical procedure known as Osteo-Odonto-Keratoprosthesis (OOKP) – UK, Italy, Switzerland.

Project Description
The purpose of my Winton Churchill Fellowship was to visit the OOKP Centres in Switzerland, Italy and the United Kingdom so that I could observe, discuss and further develop and refine the surgical procedure. The result being increased knowledge and experience, thus allowing improvement to the surgical procedure and maximising outcomes and minimising future morbidity for our deserving Australian patients.

Highlights
- Visiting multiple OOKP centres with a collective history of over 80 years of OOKP surgical experience.
- Getting to spend time with world renowned surgeons and pioneers of OOKP Surgery.
- Experiencing the differences in healthcare delivery by spending time in Surgical Departments in three different countries.
- Being able to research OOKP patient histories dating back twenty to forty odd years.

Outcome
Despite the differences in facilities and healthcare systems, all three units based their technique off the modified version described by Falcinelli. None of the centres had thought of, or tried, the innovations we have developed since commencing the surgery. I was able to share our experience, technique and results and we are favourably positioned in Australia to be a world-leading centre for OOKP surgery.
Programme

16th – 22nd June
Clinic for Oral and Craniomaxillofacial Surgery
University Hospital
Basel, Switzerland

24th – 29th June
Ophthalmology Department
San Camillo Hospital
Rome, Italy

2nd July – 10th July
Sussex Eye Hospital
Brighton, United Kingdom
Fellowship Report

Background

The Osteo-Odonto-Keratoprosthesis (OOKP) has proven to be a far superior and optimal implant compared to other types of keratoprostheses. In majority of patients, the implant will remain viable, anatomically and visually successful over many years, if not decades. The surgery is time consuming, technically difficult and can place a great burden on the patients and their families, the surgeons involved, the allied team and the referring ophthalmologists. The outcomes however, are life changing and the rewards for all involved by far outcome the potential complications.

As previously mentioned, the Osteo-Odonto-Keratoprosthesis remains the keratoprosthesis of choice for end-staged corneal disease. It is particularly resilient to the hostile environment of a dry, keratinised eye in conditions such as Stevens-Johnson Syndrome, Cicatricial Pemphigoid and chemical injury to the eye. The technique has by far the best results, and proven long-term follow-up when compared to other types of keratoprostheses.

The first OOKP procedure was successfully carried out in Australia in 2016/17. The story was followed and aired on Channel Nine’s 60 Minutes program. Prior to carrying out the surgery, Dr Gregory Moloney and myself travelled to Offenburg, Germany, and The Sussex Eye Hospital in Brighton, England, to become exposed to the OOKP surgery and learn the technique.
The Procedure

OOKP surgery is carried out in two stages. The first stage is mainly performed by the Oral and Maxillofacial Surgeon. The second stage by the Ophthalmic Surgeon.

The first stage involves preparing the corneal surface, via de-epithelialisation, so that it accepts the buccal mucosal free-graft harvested intra-orally. The appropriate, and pre-chosen, tooth is carefully harvested, with attempts made to keep all surrounding bone and periosteum intact. The dento-alveolar complex is then cut down to size, and shaped, prior to perpendicularly cementing the chosen optical cylinder in position. The complex is then placed in an infra-orbital soft tissue pocket to enable epithelialisation of the complex prior to insertion into the eye during stage two.

The second stage involves preparing the tissue-covered tooth complex prior to suturing it onto the surface of the cornea. The buccal mucosa is peeled up off the corneal surface and a punch hole is then created through the middle and most anterior of the cornea. The lens and iris are removed, and the tooth complex inserted through the prepared hole and sutured to the corneal surface. The buccal mucosa is then draped over the complex allowing the optical cylinder to protrude through the mucosal surface. This allows light to then enter the eye and thus activating the retina and restoring sight.

Australian Modifications

The main cause of OOKP failure is osteo-necrosis of the dento-alveolar lamina and subsequent protrusion and rejection of the complex. To improve the blood supply to the complex and the surface of the eye and reduce this complication, we created a temporo-parietal fascial rotation flap via a pre-auricular temporal incision. This was based on an inferior pedicle and pulled it into the eye from the temporal region via a sub-periosteal lateral canthotomy incision. The aim is a create an alternative blood supply to the cornea and buccal mucosa, thus improving the likelihood of the complex surviving long term.
When a suitable tooth is not available to harvest, most centres around the world utilise a tibial bone graft to retain the optic. When confronted with this situation in 2017, we harvested a calvarial bone graft from the outer layer of the skull to retain the optical cylinder. The modification has been a success at this stage and will be the alternative source of lamina for our Australian patients if a tooth is not present.
International OOKP Centres

Basel, Switzerland

The University Hospital in Basel, Switzerland, is a brand-new Tertiary level Facility. The Oral and Maxillofacial Department is headed by Professor Christoph Kunz. Between Professor Kunz and other the faculty members, the complete scope of Maxillofacial Surgery is covered including Head and Neck Cancer and Trauma Reconstruction, Craniofacial Surgery and Temporomandibular Joint Surgery.

The week I spent in the Department reminded of the USA system I had experienced earlier in my career. The day began with a formal meeting of all Faculty members, including Trainees and Junior Doctors. The patients admitted within the Specialty were discussed, as was the daily operating lists and upcoming larger cases. An educational session was then carried out by a faculty member or a visiting Specialist. A group ward round then occurred before the team members disseminated into their respective daily duties.
Professor Kunz is the Oral and Maxillofacial half of the OOKP team in Switzerland. They have completed approximately ten cases and use the same modified technique described by Falcinelli. I was able to peruse the charts of the 10 cases although it was difficult without translation as they speak and write in German.

We had many long discussions regarding the OOKP procedure and ways to improve it. I was able to present my talk titled “OOKP, The Australian Experience” at one of the morning meetings. The modifications of the procedure sparked much interest and possible persuaded them to trial similar techniques.

Although I did not physically see an OOKP whilst in Basel, due to the diversity within the Department, I was able to see other elements of Oral and Maxillofacial Surgery that aren’t that common in Australia which was fantastic. This included a “pro-planned” cranial synostosis correction using self-made 3D models onsite and real time dental implant insertion.

The Maxillofacial Department has channelled funding towards establishing a complete 3D printing laboratory on campus. This enables all Craniofacial, Corrective Jaw, Implant-Guided and Traumatic and Elective Reconstructive cases to be planned with ease and minimal turn-around time.
I was fortunate to be able to attend an AOCMF Course on the Surgical Management of Temporo-Mandibular Joint Disorders. I was exposed to AO ten years ago during my training in Brisbane. Basel Faculty member, Dr Florian Thieringer, rekindled my interest in this organisation. It was a fantastic gathering of Maxillofacial Surgeons from many different surrounding European Countries, with a common goal to achieve the best possible outcomes for patients. It made me join the AOCMF organisation upon my return to Australia.
Rome, Italy

What an honour it was to spend a week within the Ophthalmological Department at the Ospedale San Camillo Hospital in Rome under the guidance of Dr Johnny Falcinelli. The Ospedale San Camillo Hospital is the largest Hospital in Italy. It was the birthplace of the OOKP procedure some forty years ago, and the place where all the pioneers of this surgery throughout the world have come to learn including Professor Konrad Hille and Professor Christopher Lui.

The Hospital is in keeping with the rest of Rome in that it is old, but highly functional. My week spent within Dr Falcinelli’s Department was made more enjoyable as most of the other Consultants could speak reasonably good English.
My time was spent floating between Outpatient Clinics, the Operating Theatres and reviewing and discussing OOKP patients and techniques. It was absolutely fascinating to be taken through the history behind the surgical technique and the evolution of the procedure since its time of inception. Given the clinical notes were in Italian, I learnt to utilise my time with Johnny by asking as many questions as possible, mostly aimed at management of complications and common pitfalls encountered.

Unfortunately, as mentioned earlier in my report, Johnny’s father, Giancarlo Falcinelli, passed away in the last few years. This was devastating to all involved in OOKP surgery as he was essentially the Godfather and founder of the modern day, widely adopted technique. He was passionate about OOKP surgery until his death, and Johnny said many times during the week that his father was extremely proud that the surgery was being performed in Australia as this was the last continent to take on procedure. I reassured Johnny that we would do our upmost best to continue building the legacy established by his father.

During my week, I was able to facetime my colleague back in Sydney, Dr Gregory Moloney, so that Ophthalmological interaction could occur between the two of them and some pertinent questions answered.

Quite amazingly, through Johnny’s outpatient clinic, I reviewed patients who underwent OOKP surgery thirty to forty years ago. The prostheses were quite remarkably working fine and although the lenses have changed in the modern era, these patients still had sight and are functioning completely independently. This was an absolute treat and to see the humbleness displayed by Johnny was awe-inspiring.
I spent time explaining the adaptations we had made to the surgery in Australia and Johnny and his colleagues were extremely intrigued. The Italians had not thought of alternative blood supplies as an option for reducing OOKP failure rates. Rather, they had been focussed on trying to hault and repair complications as they arise. Although we don’t have the caseload behind us yet in Australia, they are certainly excited to track out results and outcomes.

Patient who received OOKP surgery forty years ago. Still smiling!
Brighton, United Kingdom

Arguably the modern-day, world-leader in OOKP surgery, the Sussex Eye Hospital is a delightful destination in Brighton on the Southern Coast of England. The Department is headed by Professor Christopher Lui. He has carried out the OOKP Surgery in combination with Oral and Maxillofacial Surgeon, Dr Jim Herold, for the past twenty years.

The National Health System (NHS) allows for a structured Department which we have tried to replicate here in Australia. The OOKP service gets a certain amount of funding and support and the Ophthalmology Department itself has 11 allocated beds at the Sussex Eye Hospital. This is significantly more than other major NHS Hospitals throughout England. It enables Professor Lui to treat patients from all over the United Kingdom and function as the National referral centre for OOKP surgery.

My week spent within the Department commenced with a daily review of the Ophthalmology inpatients and operating lists with Professor Lui and his Fellow. It was a refreshingly relaxed service and enabled ample discussion regarding everything from Australian culture to OOKP surgery. One morning a week is spent with a Maxillofacial Radiologist, and potential OOKP cases are planned by reviewing plain films and CT’s of the dentition. It also enables their previous OOKP cases to be radiological assessed in terms of the dental lamina size and resorption. This is a fantastic way to examine for potential failures and allows patient focussed treatment to be implemented early.
Professor Lui is currently conducting a study on inserting Bone Morphogenic Protein (BMP) into resorbing dental laminas to halt and or repair bone necrosis. The results are yet to be determined and I am confident our Australian adaptation to create a better blood supply may be a more predictable long-term solution. I presented my talk on the “Australian OOKP Experience” and it created good discussion about our modifications. It highlighted the fact that although there is only a small community of surgeons doing this work around the world, the more ideas brought to the table, the more modifications that will be made and the better the surgical outcomes will be.

Professor Lui is quite protective of his OOKP patients and has a wall containing every OOKP patient chart he has treated in the last twenty years. It was a fantastic resource and provided me with much education during my downtime during the week.

I got to experience two full OOKP Outpatient Clinics which was fantastic as that volume does not exist in Australia yet. I was able to examine the past and present patients, explore the charts to determine the timeline of events over their OOKP journey and get a better understanding of the many adversities involved in treating these patients. The diversity in pathology and patients was incredible. There were young and old patients, varying ethnicities and religions, injuries ranging from chemical splash to traumatic dog bites as well as the common autoimmune causes we have seen in Australia.

![Clinical notes/Charts](image-url)
Professor Lui kindly arranged a private OOKP case to be carried out for my benefit. The patient travelled from Hong Kong to have the surgery under his care. I was able to scrub and assist Mr Herold and observe the technique he had honed over many years during Stage 1. We were able to assist each-other with our own tips and it was an extremely enjoyable and valuable experience.

To thank any visitor to his Department, Professor Lui treated myself and the rest of the theatre team to a traditional Chinese Banquet. It was a fantastic way to end a great week with the team at the Sussex Eye Hospital.
OOKP Team dinner before I left

The Sussex OOKP Surgical Team
Conclusions and Recommendations

My Churchill Fellowship was an absolute privilege and honour to fulfil. I was able to observe and interact clinically and socially with World-Leaders in the field of OOKP Surgery. We are in the infancy stage of OOKP Surgery in Australia. Our results, however, have been extremely encouraging and our modifications and adaptations have been well received overseas by all the OOKP Centres I visited.

I obtained insight into the differing surgical techniques, and, in combination with the observation of long-term patients and the ability review their charts, the entire experience was invaluable to the OOKP service in Australia.

Given some patients were living examples of successful OOKP surgery carried out up to forty years ago, it echoed the validation for funding and continuation of this service within the Public Hospital sector in Australia.

The aim, going forward in Australia, is to continue offering the surgery to deserving and qualifying patients which will equate to approximately two to three cases every twelve months. In the quest to optimise surgical outcomes, the OOKP team will continue to correspond with the Departments I visited via email plus, attend the Biannual OOKP World Meeting.

The Winston Churchill Fellowship handed me the opportunity to cement relationships on a world stage and allow the OOKP program in Australia to be viewed as a legitimate and innovative partner. We are excited to grow our patient bank and look forward to producing optimal and long-term success for all our brave and resilient OOKP patients.
References

1. Lui C et al. The Osteo-Odonto-Keratoprosthesis (OOKP); *Seminars in Ophthal*, 113-128, 2005.