

Lens

The lens is clear as in normal or opaque (cataract) with increasing age. The eye may well be aphakic (no lens) or pseudophakic (intraocular lens).

By directing the vertical slit beam, but this time focusing behind the anterior chamber, you will note the yellowing or browning of nuclear sclerosis cataract. By retroillumination to obtain the red reflex through the pupil, you can detect the peripheral spokes of cortical cataract or the opaque blob of posterior subcapsular cataract at the centre of the pupil. Cataract is best observed through dilated pupils.

Vitreous

The anterior vitreous is visualised by using a vertical beam of light focusing behind the lens. 'Tobacco dust', pigmented cells in the vitreous, is a sensitive marker of retinal detachment. It has similar appearance as AC cells though brown in colour and can be encouraged to float by asking the patient to move the eye.

There are many more advanced uses of slit lamp including Goldmann applanation tonometry, gonioscopy and funduscopy with condensing lenses. These skills are however not expected of a non-ophthalmologist.

SOME TIPS

1. If you are not in focus, you are either too near or too far from your target. Always navigate the slit lamp backwards so that you do not hit patient's face with the slit lamp, then refocus.

2. Try to use the swing the illumination arm from temporally so that it does not hit the patient's nose.

SLIT LAMP - A VERSATILE INSTRUMENT

The slit lamp is an instrument that incorporates many functions. There are a whole range of ophthalmological tools for various specific indications. Despite these, slit lamp remains unrivalled as the first line tool in ophthalmology practice.

SUMMARY OF HOW TO USE THE SLIT LAMP

To position patient and yourself, make the following necessary adjustments:

- Patient chair
- Chin rest: turn the knob under it to slide it up or down. This is especially useful for eye to chin distance variations.
- Table height: adjust the lever which may be found below the table.
- Examiner chair: make sure the microscope is at your eye level while you are sitting comfortably.

Slit beam properties:

- Dimensions: The beam width and height can be manipulated using their respective knobs (refer to the diagram).
- Intensity: The brightness is varied by controlling the voltage using the power knob or the filter control.
- Colour: The filter control has the options of blue-cobalt, red-free (green) or no filter (some have infrared filter which reduces heat from light)

To focus the slit beam:

- Joystick: navigate forwards, backwards, diagonally, or laterally with one hand. The other hand is free to manipulate the knobs on either side of the illumination arm, swing the illumination arm or hold a condensing lens in front of the eye for funduscopy.
- Magnification switch: low magnification is used most of the time. Higher magnification is used to give detailed focus but has the disadvantage of reducing perception depth.

To manipulate the angle of illumination:

- Move the slit beam horizontally: steadily hold the beam width knob and swing the illumination arm within a 180° arc.
- Change to orientation of the slit beam: steadily hold the beam height knob and swing the top of the illumination arm within a 180° arc.

FURTHER READING

- James CB., Benjamin L.
Ophthalmology: Investigation and Examination Techniques
- Lim ASM, Constable JJ, Wong TY
Colour atlas of ophthalmology
- Pane A., Simcock P.
Practical Ophthalmology: A Survival Guide for Doctors and Optometrists

ADDITIONAL SOURCES FOR PDA USERS

- www.eyepalm.com

FEATURE : ARTICLE

Runway to a dream: A flying doctor's story

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Dr Koert-Jan Schonewille is an emergency medicine registrar from Holland currently working in Queensland, Australia. He has successfully combined his two great passions of flying and medicine, and hopes he can inspire others to follow their dreams too!

Childhood dreams

From a young age I was always attracted to the sky. Airplanes, birds, views from the tall buildings or mountains in Europe, I loved it all. My favourite Lego toy was a yellow rescue helicopter, which I took everywhere. In high school I fantasised about being a rescue diver. I dreamed that I would be picked up by a rescue helicopter from the school's sport ground and depart on life saving adventures!

At the age of 16 I realised that despite a good academic performance at school, I was not happy. Thankfully I discovered gliding and ballroom dancing. These helped me to become more social and a team player. Although these new commitments caused my school marks to drop, my quality of life soared!

In the 1980s I watched the Australian television series 'Flying Doctors' every Sunday night. Although my mum thought I was too young to watch the gory scenes, I had no concerns. I loved it! The adventure, flying, suspense, gossip, romance and heroism were thrilling. I fell in love with Coopers Crossing, the Australian Outback and the pretty sister Kate (ask your dad, I am sure he remembers her too!).

During medical school I tried to organise an elective with the Australian Royal Flying Doctor Service. Countless communications between the Netherlands and Australia ended in no more than "thanks for your interest, but we can't help you". A bit disillusioned I organised a non-flying research programme involving hyperbaric medicine in Sydney. It was mostly for treatment of carbon monoxide poisoning, patients with non-healing wounds and divers with 'the bends'. During those three fantastic months I went gliding, ran a marathon, completed a scuba diving course, and the amazing Landmark Forum and Landmark Advanced courses.

The Landmark Forum is a revolutionary self-education programme focusing on personal and professional growth, training and development. It challenges conventional thinking about ourselves, the world around us and how we interact with it. It filled me with even more passion and drive to take medicine to the sky. I highly recommend this course to everyone!

A few weeks after Sydney I arrived in Christchurch for six weeks of anaesthetics and pain management with Prof Shipton. I'll be honest here;

I didn't spend even a few days in the operating theatre! On my first day I mentioned my dream of becoming a flying doctor. Prof Shipton immediately referred me to the Christchurch retrieval specialist, Dr David Bowie. Within minutes I was in his office. He was showing me pictures of the NZ Flying Doctor Service's planes and helicopters when his phone rang. A retrieval job to pick up a patient from Greymouth came through. I couldn't believe my ears when Dr Bowie asked the flight nurse & pilot if I could join them in flight. Within hours on my first day in Christchurch I was flying over the Southern Alps to pick up a patient. My childhood dream was fulfilled!

As a medical student I didn't have any direct responsibility for the patient, but the experience introduced me to the challenges faced when transporting patients by air. I thoroughly enjoyed these flights, when I would accompany the flight nurse and occasionally Dr Bowie. Not all retrieval flights require a doctor. When the Airway, Breathing, Circulation and neurological state of



the patient (Disability) are not threatened, a flight nurse can manage the patient alone. When the ABCD's are unstable, a doctor with resuscitation experience and airway management skills joins the retrieval team. I was simply observing and loving it all! And I was 'only' a medical student; a rookie!

Quickest way to the sky!

Fired up after eight amazing months in Australia & New Zealand, I returned to Maastricht, the Netherlands and quickly finished my medical studies. The next step was applying for dutch anaesthetic training positions. My intention was to become an anaesthetist within five or six years and then move to Australia & New Zealand to become a flying doctor.

While waiting for replies from the training programmes, I started as a resident in a large cardiothoracic intensive care unit (ICU). The cool thing about this job was that only consultant anaesthesiologists and ICU specialists worked here. It was hands on learning from the masters. This was my first medical job and quite scary despite adequate supervision. Some patients would come to ICU with arrhythmias, continuous bleeding or blood clotting derangements after their coronary bypass or heart valve surgery. Many required defibrillation, blood product infusions, medications or interventions to maintain their blood pressure and heart contractility or even a return-trip to the operating theatre.

I found the coolest procedures to be intubations and central venous and arterial line insertions. Central venous lines go in the right internal jugular, subclavian or femoral veins. In those days I used anatomical landmarks to guide me, but in recent years the ultrasound scanner has taken over. Direct visualisation with ultrasound decreases chances of hitting arteries or causing a pneumothorax. For some unknown reason I feared chest drain insertions. Luckily I eventually came to 'enjoy' putting them in.

Adventure training before the real thing

In 2004 I moved to Australia and worked as resident registrar in ICU and internal medicine in Toowoomba. The medical chief of 'CareFlight', an aeromedical retrieval organisation, advised me to do six or twelve months of emergency medicine to get more exposure to paediatric and trauma patients before starting aeromedical retrieval work. So I did. After passing the Australian Medical Council exams for general medical registration and permanent residency in Australia, I moved to the Gold Coast and fell in love with emergency medicine. I enjoyed this so much that I chose it as my main specialty.

Before flying in fancy helicopters and aircraft, I had to survive a full-on training week with 16 other young doctors. Experienced consultants taught us the ins and outs of the medical equipment; the advanced first aid pack, airway pack, ventilator; syringe drivers, pelvic splints, and vacuum mattress to name a few pieces.

A full day was spent with the fire and rescue services to observe their skills which included cutting open cars with the 'jaws of life'. Two days were spent in a swimming pool for Helicopter Underwater Escape Training. Strapped



in a fake helicopter (cage) and dumped into a pool while the "cage" rolls over and sinks. The purpose is to be in the brace position till all movement stops, then (blindly) find the door handle or emergency window, undo the straps and escape to the surface. It sounds scary, but in reality this training is fun, safe and exciting!

Passing this training was a huge buzz and, finally, my childhood dream was realised. I had qualified as a flying doctor!

Winching: The most exciting part of helicopter retrievals

Sometimes patients can only be reached by winch which requires dropping someone down on a winch and cable to pick up the patient. All the while the helicopter hovers above. It can be done over all ranges of terrain, from a dense rain forest to ships in heavy swell. A few weeks after my winch training I was lowered 60 metres into a valley to retrieve a walker with a fractured tibia. After inserting a cannula and giving him I.V morphine, we splinted his leg, winched him up in a stretcher and returned him to hospital. Both of us were held by a simple 7mm cable. Performing feats like this calls for amazing trust in equipment, engineers and aircrew.

Teamwork to save lives

The teamwork shown in this profession is amazing. A typical helicopter crew has a pilot, crew man/winch operator, rescue crewman, intensive care paramedic and a doctor. Each team member has their own unique area of expertise and the other team members are dependent on those skills. The doctor's skills of clinical assessment, focusing on the ABCD, applying clinical skills to manage the patient's condition is just one part of ensuring a successful mission.

I clearly remember one (busy!) day when we flew from Gold Coast base to an 'ultralight' plane crash. The pilot was reasonably well-off, but the passenger had a large bruise on her right hip and a malrotated right femur. She hadn't lost consciousness after the impact. After satisfying ourselves that her ABCD were within normal limits, the paramedic and I put a pelvic splint around her, splinted her leg and put her in a vacuum mattress before flying her to a trauma centre. Pelvic fractures can easily cause hypovolemic shock as litres of blood pool in the pelvis and thighs. We normally take two to four units of O negative blood with us when we fly out to an accident site. Thankfully this time the blood was not needed and she made a good recovery.

Later that day we were tasked to attend a motor vehicle accident. A bus hit a truck, throwing the unrestrained driver through the windscreen. He landed head first on the road. By the time the ambulance, and fire and rescue service arrived, he had regained consciousness, but was confused and agitated. He was restless and would not tolerate an oxygen mask on his face. He had to be held down on the ambulance stretcher by his rescuers. They were all relieved when the rescue helicopter arrived.

After a primary survey and working diagnosis of severe head injury, we quickly decided to anaesthetise, paralyse and intubate him. This way, we could safely transport him to a neurosurgical unit for a head scan and possibly an operation to evacuate a blood clot in his head. By controlling his breathing, blood pressure and conscious state, we could prevent another harmful brain injury occurring.

The next job necessitated preparing the intubation and we laid all the equipment out near the patient. This included all the different airway adjuncts, endotracheal tubes, and laryngeal masks. We also eyeballed the surgical airway kit in case the 'can't intubate, can't ventilate' scenario occurred. Suction was working, all the drugs drawn up in the right dosages, two patent I.V lines completed with an all important team briefing. I love the saying, "If you fail to plan, you plan to fail!" Don't worry, once you become a doctor these things just become a second nature.

To cut a long story short, he was intubated, packaged up with full spinal immobilisation and flown to a major trauma centre in Brisbane. These jobs are exciting, rewarding and a bit scary which keeps you focused. Unfortunately there is a lot of waiting around as well. Nonetheless, it is good for studying the latest literature, drinking tea and emptying the email inbox!

Free as a bird as a (glider) pilot

Part of the job is to transport ventilated trauma or ICU patients from smaller hospitals to tertiary centres by fixed wing aircraft. I thoroughly enjoy these flights. On the empty legs I often sit in the right hand seat next to the pilot. Most of them love talking about flying and I am a keen listener. The only rule is that I have to keep my hands away from the flight control.

All Australian Royal Flying Doctor Service and NZ Flying Doctor pilots have logged thousands of flying hours and possess a wealth of experience. Twenty thousand hours flight time is the highest I have heard of. This amounts to over two years in the sky. This experience is imperative because sometimes they are required to land on roads or dirt strips near farms, and at night time they might even use car headlights to light up a strip.

My lifelong passion for aviation has reached another level after passing the New Zealand private pilot license flight test in Christchurch. In my spare time I fly (with passengers) over the stunning South Island and the Australian Outback in gliders or motorised aircraft feeling free as a bird. I encourage you all to combine work with something you are really passionate about.

International retrievals from Pacific Islands to New Zealand and Australia by Learjet

Promise yourself to ALWAYS have travel insurance when you travel overseas and know that medical care overseas is often way below the standard that you expect in New Zealand. It costs about \$5000 per flying hour to retrieve a patient. International retrievals take many hours to complete, thus creating HUGE bills for the insurance company or worse: for you.

Over time I have been involved in picking up numerous tourists, teachers, businessmen and missionaries from Pacific islands and flying them to Australian or New Zealand hospitals. I remember picking up a tall, tough fisherman whose right hand got caught in metalwork while fishing far away on the Pacific Ocean. The skipper had applied first aid and had changed the dressings twice daily while sailing full steam for three days and nights to reach a Pacific island with a runway long enough for a Learjet 36 ambulance jet to land on.

On our arrival the patient looked clinically well, his pain was well-controlled with morphine, but his hand looked and smelled infected with three fingers partially amputated. We continued with antibiotics and pain relief, flew him straight to Auckland and on to Middlemore Hospital. The hand surgeon had great concerns about the hand, fearing she would have to amputate the fingers and perhaps auto-transplant a toe in order to maintain grip function. Imagine being stuck in an overseas hospital with suboptimal treatment and without proper insurance.

Last year I worked in Christchurch ICU in a registrar position and did about 20 retrievals with the ICU flight nurse in the NZ Flying Doctor Service's King Air plane. We flew mainly to the West Coast but paediatric and burns patients were flown to Auckland. Retrievals over shorter distances were done by helicopter. If the weather was too bad, we were forced to travel by road. It was fun to work again with the nurses, pilots and consultants that I had first met as a medical student eight years earlier. Some have grown a few grey hairs since then!

What does it take to become a flying doctor?

First of all, you need to be enthusiastic. It opens a lot of doors which would otherwise remain closed. Secondly, you need dedication and commitment. After graduating from medical school it took me six years of working as a resident and (advanced) registrar in the Netherlands, Australia and New Zealand before it was safe enough for me to care for critically ill patients in the pre-hospital setting.

Experience in emergency medicine, paediatrics, ICU or anaesthetics is necessary. Most paediatric retrievals are done by a team from a Paediatric Hospital, but not always! Resuscitating two toddlers in the same week had a much bigger impact on me than trying to revive adult patients. Getting used to treating critical ill patients comes with the experience. It gets less scary over time. Consider participation in resuscitation courses like advanced trauma life support, advanced paediatric life support and pre-hospital trauma life support in your resident years. These are fun, practical and extremely useful and prepare you for the 'real stuff' in a safe and (often very!) realistic teaching environment.

Anything is possible!

If there is one thing I would like to get into your hearts and minds, it is that ANYTHING IS POSSIBLE. So follow your dreams. Remember that despite the ups and downs in a medical career, it is rewarding to make a difference in other people's lives. In two years time I will be an emergency physician and I look forward to combining clinical work with flying, teaching, travelling and participating in adventurous medical projects all over the world.

Last year I met many of you at the NZMSA conference in Queenstown. It was a pleasure to present at the conference and to write this article for you. If you would like more information, email me on koertjanschonewille@yahoo.co.nz.

I wish you all the best with recovering from the consequences of the earthquake, with your medical careers and with finding the right balance between work and your personal life. Who knows, we might work together in a Kiwi, Aussie or overseas hospital in the (near) future.

Warm regards from the Gold Coast, Koert-Jan Schonewille.

