

BEVA Trust Travel Grant Report

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Introduction:

Ocular disease is one of the most common health problems in horses. Veterinary ophthalmology has developed hugely in the last 10 years, however equine ophthalmology lags behind advancements in other domestic species and much of the knowledge of equine eye diseases is borrowed from other species. Equine ophthalmology is a small specialist discipline. Recently the International Equine Ophthalmology consortium (IEOC) (www.equineophtho.com) was founded by Professor Gilger and Professor Brooks to aid the research, clinical development and advancement of equine ophthalmology.

The University of Florida Veterinary Medical Centre (UFVMC) has one of the busiest large animal clinics in the world. Professor Brooks heads a world renowned ophthalmology department at UFVMC. In recent years, the ophthalmology group at the UFVMC has been developing new therapies for corneal disease in horses and one of the most promising is amniotic membrane transplantation. After seeing Professor Brooks give the keynote speech at the BEVA ophthalmology workshop in 2007, I sought funding from the BEVA Trust to spend some time at UFVMC as part of my study towards the European College of Equine Internal Medicine (ECEIM) diploma. The aim was to experience some specialist equine ophthalmology training and to experience novel surgical therapies with a view to bringing that knowledge back to The Equine Referral Hospital at the Royal Veterinary College.

The relative incidence of corneal disease is different in Florida from that seen in the United Kingdom. In the hot, humid climate of Florida, fungal and bacterial melting ulcers anecdotally occur with much greater frequency and this provides a constant stream of severe corneal disease to UFVMC. The UFVMC also sees a high number of ocular squamous cell carcinomas (SCC) of which 30% involves the cornea. Both disease processes involve corneal epithelium and stromal loss and therefore finding a substance to reconstruct the equine cornea with has been an area of active research by the ophthalmology group at UFVMC.

Amniotic membrane transplantation:

Amniotic membrane transplants are used in human medicine to treat corneal perforations, descemetocles and infected corneal ulcers. Amnion has



been shown to be a strong biomaterial that contains anti-angiogenic, anti-inflammatory, anti-fibrotic properties and contains growth factors. There is no published protocol for the harvest of equine amniotic membrane; however at the UFVMC they have developed a technique of harvesting amnion from equine placenta. The amnion is separated from the basement membrane and then cleaned in normal phosphate-buffered saline solution containing antibiotics and antifungals. It is then placed on nitrocellulose paper and stored in Dulbecco's modified Eagle medium and glycerol containing antibiotic and antifungals at a ratio of 1:1. It is then frozen at -80°C for up to 12 months.

Case Study 1: Corneolimbic and third eyelid SCC.

An 8 year old Belgian Warmblood presented with SCC of the nictitans glands and the lateral corneo-limbic area. The horse was anaesthetised and neuromuscular blockade was achieved with atracurium besylate to allow the central position of the globe. The nictitans gland was removed in its entirety. Under a surgical microscope, corneal microsurgery was performed. A curvilinear incision was made one-half thickness into the corneal stroma, using a #64 Beaver blade following, and outside the margin of, the corneal lesion. A Martinez corneal dissector was used to elevate the anterior half of the cornea from the underlying stroma and create a corneal flap containing the whole lesion attached. The dissection continued laterally under the



bulbar conjunctiva and the superficial layers of the sclera. Wescott tenotomy scissors were then used to sharply dissect the flap of the anterior cornea and conjunctiva from the globe. The exposed corneal stroma was then irradiated with strontium⁹⁰ delivering 20 Gray to the surgical site. Following irradiation, the corneal defect was covered with an amniotic membrane (AM) graft. The AM was thawed, rinsed in sterile saline and cut to size of the corneal defect. It was then sutured in place with 7-0 vicryl with AM stroma against the corneal stroma. Topical and systemic antimicrobial and anti-inflammatory treatments were administered for two weeks post surgery.

Case Study 2: Ulcerative fungal keratitis resulting full thickness penetration of the cornea.

A 16 year old Thoroughbred presented with an ulcerative keratitis which was confirmed by both cytology and fungal culture to be fungal in origin. Despite aggressive medical treatment with topical natamycin, miconazole, ciprofloxacin, neomycin, polymixin B, bacitracin, serum, EDTA, atropine and systemic flunixin meglumine, the lesion failed to respond and keratomalacia ensued. This resulted in a full thickness penetration of the cornea and a small aqueous leak as detected by Seidels test. The horse was therefore taken to surgery and extensive debridement of the necrotic and infected stroma was undertaken. This left a very large stromal deficit and Descemet's membrane still breached. A conjunctival graft was unlikely to provide sufficient mechanical support and therefore a technique reported in human medicine of staking multiple layers of amnion in the defect was performed. Four layers of amnion were packed into the defect and sutured to the corneal epithelium. A bridging conjunctival graft was also performed. Aggressive medical treatment was continued over the next 6-8 weeks. The amnion maintained the integrity of the globe and was gradually incorporated into the cornea. The globe was slightly smaller in size but despite this the eye became more comfortable and the cornea started to become transparent at the medial canthus. The horse regained dazzle and menace responses in this eye and contralateral pupillary light response. The hope is that the



amnion will gradually become transparent and the eye will retain some visual capacity albeit much reduced compared to a normal eye.

Conclusion:

I saw many more amazing cases in all domestic species during my stay in Florida. The close-knit and friendly team environment was highly conducive to academic learning and was highly enjoyable to be a part of for all too short a period. The balance, enthusiasm and dedication of the faculty team are a tribute to the University of Florida. In three short weeks I made friends which I hope to keep for the rest of my career. It was a pleasure to be once again doing a comparative specialty. In an era of veterinary medicine where there is ever increasing species specialisation at both post-graduate and, possibly more worryingly, at undergraduate level, it was great to see skills that developed in one species being transferred to another species. As a clinician specializing in equine internal medicine, it was good to refresh my memory of small animal medicine. Having been taught at an undergraduate level from a comparative medicine perspective it was refreshing to again visit a subject from a comparative point of view.

Personally I gained a huge amount from my experience in Florida. I now have the skills to learn how to be a competent user of all the ophthalmic diagnostic equipment and how to be systematic and thorough in my ocular examination. I have a better database of cases, including more extreme examples, to base my clinical decisions on in the future. This will aid my journey to becoming an equine internal medicine specialist by hopefully helping me passing by European boards in 2011. The eye is often a window on to the soul of the body in terms of disease and therefore very important from an internist point of view when considering the body as whole. I hope to bring the skills I learnt back to U.K. and for them to drive my future interest and passion for ophthalmology and oncology.

As the veterinary profession continues to specialise we must not forget to view problems from a comparative perspective as well as a species specialist point of view as comparative knowledge is one of the great strengths of the profession. Equine ophthalmology is a small and very specialist discipline but one that has much to offer to equine medicine as a whole. Micro-surgery, the preserve of the ophthalmology specialist, requires prolonged and structured post-graduate training. University clinics need to be supported by the profession to ensure these training programmes have a sustainable number of cases with which to train the next generation of specialists. In return, the universities must provide the highest standard of service to the referring veterinary surgeon and to ensure close and collaborative links with private first opinion practice. My three weeks in Florida showed me what was possible and how boundaries can be pushed. To do this requires ever increasing specialisation but the need to integrate this with practical, affordable, first opinion practice is the dilemma my generation of the profession will need to address.

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