

Autologous serum platelet gel effective in healing neurotrophic corneal ulcers

Devon Schuyler
in Las Vegas

IT WAS thanks to his horse, Nikki, that Bruce Koffler MD learned how to use autologous serum platelet gel to enhance the healing of corneal ulcers.

"I have a small horse farm in Kentucky, where my wife raises jumpers," said Dr Koffler, speaking at the annual AAO meeting. One of their purchases was Nikki, an eight-year-old mare with a history of corneal ulcer in her right eye that required a continuous flow tube in her upper lid. A year after they bought her, Nikki developed a corneal ulcer that did not improve despite treatment by an ophthalmic veterinarian.

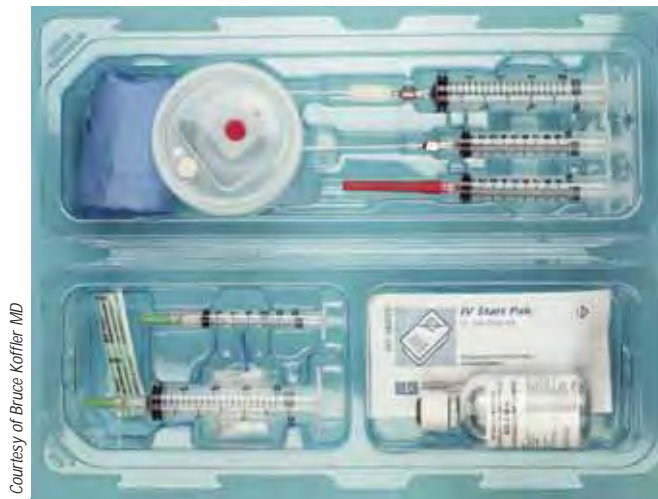
When the left eye also developed an immune ring with a subsequent ulceration, the veterinarian decided to use autologous serum.

"There was improvement within 48 hours, and total healing within seven days," said Dr Koffler, who is an associate professor of ophthalmology at the University of Kentucky Medical Center in Lexington.

After this experience, Dr Koffler began using the serum in people. He gave some historical background on autologous serum, saying that it was first used as a healing agent for ocular surface disease by Fox and colleagues in 1984. Subsequent surgeons used the serum to treat patients with Sjogren's, persistent epithelial defects, superior limbic keratitis, neurotrophic keratitis, dry eye and corneal erosions after LASIK and photo-therapeutic keratotomy.

The current version of the serum is autologous platelet concentrate enriched with growth factors (APC+), which is formed by concentrating about 20 mL of a patient's own blood with a centrifuge. This boosts the number of platelets in the blood from 200,000 per mL to about two million per mL.

"These concentrated platelets contain huge reservoirs of growth and wound healing factors that will enhance and accelerate the body's normal healing process," he said.



Courtesy of Bruce Koffler MD

Potential benefits include reduction of bleeding and bruising, decreased inflammation and swelling, enhanced wound closure, accelerated bone growth, and reduction of overall healing times. As a result, APC+ is used to control bleeding from cardiovascular and orthopaedic procedures, to stabilise grafts of bone and soft tissue, to accelerate bone growth in orthopaedic and dental procedures, and to seal wounds and accelerate soft tissue healing in facial plastic and cosmetic surgeries.

Not all platelets created equal

Dr Koffler cautioned that all platelet concentrations are not created equal, and that the platelets must be viable and functional in order to form a bioactive matrix. He said that any system that claims to produce platelet-rich plasma should have multiple laboratory test results demonstrating the above criteria as well as a robust regulatory profile. For example, fibrin glues are virally inactivated derivatives of blood components drawn from other donors and do not contain any growth factors.

Dr Koffler uses the SmartPREP 2 Platelet Concentrate System (Harvest Technologies) in order to prepare his APC+. He begins by

drawing a sample of the patient's blood into a syringe containing heparin, mixing the two, and placing the mixture into the centrifuge. A dual-chamber applicator gun is used to hold the resulting platelet concentrate in one chamber and a mixture of calcium chloride and thrombin in the other chamber. Dr Koffler drops the mixture onto the cornea where they gel. This gelling is a new concept and allows for contact of the serum concentrate to the cornea

for a 24-hour period. The eye is then covered with a collagen shield and a patch.

Leftover platelet concentrate and platelet poor plasma are preserved so they can be mixed with Systane lubricant eye drops (Alcon) and used postoperatively every one to two hours. Dr Koffler recommends a fresh bottle every two weeks for a total of 20 weeks. We can obtain about 12 (3cc.) bottles of the Systane/Autologous Serum mixture in a 25 per cent concentration. The Systane has a gelling compound called HP-Guar which helps to extend the contact time on the ocular surface.

Dr Koffler presented his results with autologous serum platelet gel on six human patients with neurotrophic corneal ulcers that had not responded to treatment with patching, lubricants, bandage lenses, and appropriate topical medications. Two eyes had phthisis following multiple surgeries for retinal detachment, three had a history of shingles, and one had a history of herpes.

He found that the ulcers healed in an average of nine days, with a range of five to 14 days. Patients became "almost pain free" in the postoperative period, and visual acuity improved in three cases.

In another series of two corneal transplant cases, application of the gel led to

an intact, vibrant-looking epithelium starting the same day as surgery.

"It's amazing when you see these patients, that the donor epithelium on the graft is crystal clear," he said.

Dr Koffler said that he would like to see the development of an ophthalmology-specific system for creating small amounts of autologous serum platelet gel, thereby reducing the cost of the procedure. Another improvement would be for the gel to adhere for a whole week instead of just for a day. He said that in the future, he could see using the technique in combination with bandage contact lenses and amniotic membranes.

"I think it is fortunate that Dr Koffler is educating everyone regarding the use of autologous serum platelet gel," said William H Ehlers MD, who co-chaired the session on healing of the ocular surface, in an interview with *EuroTimes*. He pointed out that years ago, some patients with refractory corneal problems had blood drawn and "spun down" to produce autologous serum to be used as an eye drop, and in some cases they showed remarkable improvement, but this treatment never gained wide acceptance.

"Dr Koffler's technique is much more sophisticated, and the results are impressive. The process as it exists seems somewhat complicated and many ophthalmologists will not have easy access to the necessary equipment, but with advanced preparation and refinement I think this could become a major tool for difficult corneal problems."

Dr Ehlers is the director of refractive surgery with the division of ophthalmology at the University of Connecticut Health Center in Farmington.

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