GLAUCOMA SURGERY

Drainage devices find increasing role in glaucoma surgery

by Dermot McGrath in Paris

R
ecent years have seen a marked swing away from trabeculectomy in favour of aqueous shunts as primary glaucoma surgery in many American and European centres, a trend that is likely to continue in the future, according to Keith Barton MD.

“There has been a greater than fourfold increase in the use of aqueous shunts in recent years, even though the current devices on the market are still based loosely on a 40-year-old design. This surgical area has really suffered from a dreadful lack of investment over the years but that is now being addressed and it is very likely that future shunts might be very different from current practice,” Dr Barton told delegates attending the World Glaucoma Congress.

Dr Barton, glaucoma service director at Moorfields Eye Hospital, London, noted the irony of discussing the expanding role of drainage devices in the context of a symposium on innovation, given that the technology underpinning current shunt models dates back to the 1960s.

“Most of our drainage devices today are based on the concepts of Tony Molteno who realised that if you took a long tube and diverted aqueous, not to the limbus but to the equatorial sub-conjunctival space, that you could establish drainage with a device that worked in the longer term. The more popular devices today such as the Ahmed Glaucoma Valve (New World Medical), which has a flow restrictor, and the Baerveldt shunt (Abbott Medical Optics), are really based on the original Molteno design so things have not really evolved as much as we might have hoped in the last 40 years,” he said.

Looking at the US Medicare reimbursement data for the years 1995 to 2004, which showed the number of aqueous shunting devices implanted rose by 184 per cent in that period, Dr Barton said it was not clear to what extent this rise was due to an expanded role for drainage devices.

“This might account for some of the increased use of these devices, but it might also be because of surgeons following the traditional role for shunts more consistently and more often,” he said.

Looking at this ‘traditional’ role in more detail, Dr Barton noted that glaucoma drainage devices are usually indicated in eyes where there is an established poor record of trabeculectomy success.

“This includes single chamber eyes, anterior chamber proliferative conditions, silicone oil cases, multiple filtration surgery failures, and other types of conjunctival scarring such as previous buckle surgery. We are all familiar with the demands of these particular eyes, and the SFU filtering surgery study in 1996 confirmed how pointless it is to perform a trabeculectomy in these eyes because the success rate is so low. These are the eyes in which an aqueous shunt probably has a better outcome,” he said.

There were also other mitigating factors that helped to act as a brake on more widespread adoption of Molteno-type drainage devices, said Dr Barton. “The use of the Molteno device was limited quite a lot because many surgeons were only doing one or two a year and found it very difficult to get the flow rate just right because it was not titratable, it required complete occlusion and it carried a high risk of hypotony.

Long-term success was also limited by plate encapsulation, which was influenced by factors such as plate material, shape, thickness, rigidity and so forth. Last but not least, there was a long-term risk of corneal endothelial cell loss, influenced by previous damage and tube position,” he said.

Nevertheless, some of these drawbacks were also undoubtedly dependent on surgical experience and technique, said Dr Barton, who made an analogy with the introduction of phacoemulsification in cataract surgery.

“Those of us who practised in the early 1990s and earlier will remember how phaco was first received very poorly and was regarded as a very dangerous technique. What changed that perception was partly the evolution of the equipment and technology, but also experience with the technique and knowing how to do it properly. Many of us in the past did so few of these aqueous shunt procedures that we never really built up the necessary experience. Slowly increasing experience has made it safer, with risks such as corneal endothelial cell loss greatly reduced thanks to more careful surgical technique,” he said.

Dr Barton said that several important scientific studies have provided evidence that supports primary drainage implant surgery as a reasonable approach. In this respect, he cited Dr M T Britt’s 1999 study of the Baerveldt device which went a long way to dispelling the myth that tubes could not achieve a low target pressure”, and the five-year results of the Tube Versus Trabeculectomy (TVT) study, in which tube shunt surgery showed a higher success rate compared with trabeculectomy using adjunctive mitomycin C in patients who have undergone previous glaucoma or cataract surgery.

The widespread perception that the TVT study involved lower-risk patients than have traditionally received tube shunt also needs to be put in context, said Dr Barton.

“This was an expansion of traditional indications and these patients had previous cataract surgery or one previous trabeculectomy failure rather than loss. However, they were not all clear corneal phacoemulsification cases. If you examine the data, only 12 per cent were clear corneal phacos and all the rest were either previous trabeculectomy failures or conjunctival cataract surgery. At enrolment the mean deviation and visual field loss was -16 dB so these were actually quite bad glaucoma cases,” he said.

Another important trial, the Ahmed Baerveldt comparison study, showed that the average IOP after one year was slightly higher in patients who received an Ahmed Valve compared to the Baerveldt device, but that there were fewer early and serious postoperative complications associated with the use of the Ahmed Valve compared to the Baerveldt, said Dr Barton.

Finally, Dr Barton said that a clearer picture should hopefully emerge from the primary TVT study, which is currently enrolling patients who have not yet had ocular surgery and have low-risk glaucomas such as primary open-angle glaucoma (POAG), pigmentary glaucoma and pseudoexfoliation glaucoma.

“The potential benefits of the study include much cleaner comparisons as most studies include a mixture of various types of indication for surgery, so it is hard when you have an individual patient to extrapolate the results of a mixed study for that particular patient,” he said.

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