Combined trabeculotomy-trabeculectomy for congenital glaucoma

Trabeculectomy is now the recommended surgical treatment of choice for congenital glaucoma.[1 2] Elder's paper, in this issue of the journal, suggests that combined trabeculotomy-trabeculectomy should supersede trabeculectomy alone as the primary treatment for congenital glaucoma.

Primary trabeculectomy has replaced goniotomy as the preferred surgical treatment for congenital glaucoma. The principal reason for this transition is that approximately 50% of patients with congenital glaucoma are unsuitable for goniotomy because of a variably opaque cornea.[3] In addition, goniotomy is an infrequently performed surgical procedure (congenital glaucoma occurs in approximately 1:15 000 live births),[4] requiring previous goniotomy experience, and significant surgical dexterity and binocularity in order to produce a reasonably predictable result. Many children with congenital glaucoma may be generally unwell (Lowe's syndrome, Rubenstein-Taybi syndrome), and repeated surgical procedures are unacceptable, not only from an anaesthetic point of view, but also because of the concomitant psychological trauma for the parents and child.

Congenital glaucoma may be classified as primary congenital glaucoma, which is the classic 'buphthalmos' described so well by Ambroise Paré, in the sixteenth century.[5] Anterior segment dysgeneses include posterior embryotoxon, Axenfeld's anomaly, Reiger's anomaly, and Peter's anomaly. Paediatric syndromes include Lowe's, Sturge-Weber, neurofibromatosis, Rubenstein-Taybi, Pierre Robin, and trisomy 13 (the Patau syndrome). Secondary glaucoma may be associated with ocular injury, tumour, juvenile xanthogranuloma, retrolental fibroplasia, ectopia lentis, specific uveitis syndromes including Still's disease or pars planitis, and secondary to surgery for congenital cataracts or persistent hyperplastic primary vitreous.

In congenital glaucoma the reduction of intraocular pressure is considered a more important surgical end point than optic disc or visual field changes.[6] The intraocular pressure in awake neonates was reported by Radtke and Cohen at 17 mm Hg. It has been calculated that the probability of a pressure of 20 mm Hg being normal in an infant is less than 0·05%. Intraocular pressure is frequently measured following a standard anaesthetic with thiopentone induction and a non-depolarising agent such as pancuronium. However, intravenous ketamine is also useful, as there are very few eye movements during a period from 20 seconds to 120 seconds after the injection. Scleral rigidity is not a problem in the paediatric age group, and there is a reasonable correlation between the pneumotonometer and other tonometers (Perkins, Schiotz). Assessment of optic disc cupping is of more importance in the long term assessment of children with congenital glaucoma once the intraocular pressure has returned to normal. The optic disc is best assessed using a direct ophthalmoscope; in most normal children there is no apparent central cup in the optic nerve and Shaffer has stated that very few normal infants have a cup-disc ratio greater than 0·3, whereas a high percentage of children with congenital glaucoma would exceed such a ratio.[7] Up to 6 months of age, the horizontal corneal diameter is normally less than 10 mm and is less than 12 mm at 1 year of age. The adult horizontal corneal diameter of 12·5 mm is usually attained by the child's third birthday. Corneal diameter measurements of 13 mm or more, at any time in childhood, are strongly suggestive of congenital glaucoma.[8]

Bearing in mind the anatomical dimensions of Schlemm's canal, and the mechanical dimensions of Harms' trabeculotome, it is not surprising that Schlemm's canal is not found in approximately 15% of trabeculotomy procedures.[1] McPherson, discussing trabeculotomy, states that previously unsuccessful glaucoma surgery reduced the successful surgical outcome from 81% to 64%. He also underlined the significant advantage of being able to convert from trabeculotomy to trabeculectomy if Schlemm's canal cannot be found.[9] Anderson, in 1983, warned against the inadvertent entry into the anterior chamber before entering Schlemm's canal, while performing a trabeculotomy.[10] It may well be that the trabeculectomy-like results of this latter action are responsible for the success of some cases of trabeculotomy.

Trabeculectomy is now advocated as the initial surgical procedure of choice in adult primary open angle glaucoma. There are also many published reports of successful results following primary trabeculectomy for congenital glaucoma.[1] Beauchamp and Parks' pessimistic results of 50% surgical success, have fortunately not been substantiated since their initial report in 1979.[11] Elder, in this issue, reports success using a combined trabeculotomy-trabeculectomy procedure for congenital glaucoma. Although the combined procedure was prospective and had a follow up period of only 27 months and analysed only 16 eyes of nine patients, it is unique in that this institution previously produced a paper highlighting primary trabeculectomy for congenital glaucoma. After 2 years of follow up the cumulative chance of success of the primary trabeculectomy was 72% compared with the combined procedure of 93·5%. It is well documented that the majority of surgical failures occur within the first year.[6] Trabeculotomy alone yields approximately a 50% cumulative chance of success at 24 months in a similar population group.

Elder's success rate remains to be substantiated by other institutions and paediatric ophthalmologists, but it is potentially a very successful surgical procedure in the management of congenital glaucoma and may represent the next step in the search for the best surgical treatment of congenital glaucoma.

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