THE TREATMENT OF CONGENITAL GLAUCOMA*

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THIS series comprises fourteen cases, in which 25 eyes were operated on. The time over which the eyes were under observation after operation varied from seven years to two months. Three of the cases were reported in a previous communication (McAreevey, 1948); their subsequent history is now followed up.

As a cause of blindness in early life, congenital glaucoma has a high incidence. Anderson (1939) reported surveys from several countries, the incidence varying from 2.4 to 13 per cent. of children admitted into schools for the blind. In Eire, in the school of an Institute for the Blind, seven out of 44 were blind from congenital glaucoma, which had by far the highest incidence. An historical review of the treatment of congenital glaucoma would include the various operations for decompressing the eye, the results of which have not been good. The report by Barkan (1942) urged me to try goniotomy. Success in reducing the intra-ocular pressure in my first case gave me further encouragement to proceed in the use of this operation.

Congenital glaucoma, with the subsequent enlargement of the eye in untreated cases, can go on to buphthalmos; this emphasizes the importance of the early detection of the condition in order to prevent damage by the increased intra-ocular pressure. A case treated early, will, by successful lowering of the intra-ocular pressure, give an eye which to all appearances is within normal limits. Congenital glaucoma in early life, however, can easily escape detection until the increased tension has caused great damage to the eye. The earliest symptoms are photophobia and oedema of the cornea; these small children will bury their heads in the pillow, in a manner resembling phlyctenular disease.

Material

This series comprises three types of congenital glaucoma and buphthalmos to which the operation of goniotomy was applied:

- (1) Early cases with increased intra-ocular pressure where the eye appeared relatively normal.
- (2) Advanced stages of buphthalmos.
- (3) Eyes which had already been unsuccessfully operated on by various decompressing operations.

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Of the fourteen cases reviewed, ten were males and four females, bearing out the established fact of the higher incidence of the disease in males. No case reported showed any evidence of naevus of the face or eyelids; all appeared to be true, uncomplicated cases of congenital glaucoma.

Group 1.—Early cases with increased ocular tension giving a favourable prognosis included fourteen eyes. The youngest child operated on in this group was four months old (Case 7). Eleven eyes were treated in infants under nine months old. In this group, with two exceptions, the condition could not have been of long standing.

One child was first seen when $4\frac{1}{2}$ years old; the left eye was in an advanced stage of buphthalmos, the right eye had only recently been noticed to have become enlarged. A second child was brought when two years old; there was definite buphthalmos, but the eye was not much enlarged.

The best results were obtained in this group—the tension of nine eyes was reduced by one goniotomy operation, three by two operations, and one by three operations. One child had had both eyes operated on in 1942 at the age of 9 months; in 1950 the tension was 15 mg. and the vision 6/18 in each eye. A second child had been operated on in 1943; seven years later the vision in the eye was 6/9 and tension 15 to 18 mg.

Group 2.—Six eyes were treated for advanced stages of buphthalmos, the length of time from the onset of the disease varying from one to five years (Case 13). The tension in all cases in this group was 50 or over, and notwithstanding the duration of the disease, some eyes retained useful vision. In one case of over nine years' standing, vision was still 4/60 in one eye, showing how compensation can occur. In this case, goniotomy was not successful in reducing the tension. All these cases had severe haemorrhage at the time of the operation, and this group gives the worst prognosis.

Group 3.—Four eyes were operated on, the two cases having been referred by colleagues. The eyes had previously been trephined and a goniotomy operation performed on each unsuccessfully. The disease in these cases could not have been of long duration, as the children's ages were five months and one year respectively. The tension was reduced, the prognosis comparing favourably with cases in Group 2.

This result supports the view that, after congenital glaucoma has lasted for a long time, Schlemm's canal becomes obliterated, so that the division of the embryonic tissue in the angle of the anterior chamber has no effect.

Technique

The technique was that followed by Barkan. The tension in all cases was taken by Schiötz tonometer, the weight used in all cases being 7.5 g. Ether anaesthesia was employed; it is particularly necessary to have deep anaesthesia while recording tension. A canthotomy was necessary in most cases, particularly in advanced buphthalmos. An assistant fixes the eye at 12 and 6 with scleral forceps and draws the eye forward, thus allowing access to the nasal side of the limbus, making all the angle of the anterior chamber available for stripping.

Complications.—Haemorrhages were more copious in the advanced cases. In one case there was prolapse of iris, which was, however, easily replaced. In two cases the iris was caught by the knife, but without any damage.

Cases

Case 1. Boy aged 9 months. Both eyes marked buphthalmos, photophobia. Mother stated both eyes enlarged since birth.

18.9.42. Tonometry: R.E. 7.5 g., Schiötz, 45, L.E. 7.5 g., Schiötz, 45.

28.7.43. Bilateral goniotomy. Tension R.E. 7.5 g., 15, L.E. 7.5 g., 15. Vision R.E. 4/60, L.E. 4/60.

1949. Corrected R.E. 6/18, L.E. 6/18. Both corneae clear, pupils active, child attending school.

Case 2. Boy aged one year. Left eye advanced buphthalmos. Right eye corneal oedema.

9.6.43. Bilateral goniotomy. Tension R.E. 35, L.E. 50.

23.6.43. Left eye trephine. Tension R.E. 25, L.E. 50.

1949. Vision R.E. 6/9, L.E. 6/60; Tension R.E. 15 to 18, L.E. 20. In this case, goniotomy was not successful in lowering the tension of the left eye. A trephine operation had been performed on the left eye. Pupils active both eyes, residual opacities in the cornea of the left eye.

Case 3. Boy aged 4½ years (Shields). The right eye had been noticeably large since birth. Within the last year the left eye appeared to be getting larger. Child brought on account of pain. Right eye acute glaucoma, hazy cornea. Left eye, buphthalmos, deep anterior chamber, cornea appeared clear when examined without anaesthetic.

12.8.47. Tension R.E. 7.5 g., 40, L.E. 7.5 g., 30.

15.8.47. R.E. goniotomy operation not successful.

5.9.47. R.E. trephine.

22.9.47. Tension R.E. 7.5 g., 20.

22.9.47. L.E. goniotomy.

R.E. tension 7.5 g., 20, L.E. tension 7.5 g., 15.

Two years after operations, vision R.E. 6/60, L.E. 6/9. Both pupils active, cornea left eye clear, some opacities right cornea, child attending school.

Case 4. Girl aged 5 months. Admitted 8.12.47, having been born Rotunda Hospital 7.7.47, very under weight at birth, no eye abnormalities noted then. When seen, marked photophobia, both corneae hazy, definite congenital glaucoma.

15.12.47. Tension R.E. 29, L.E. 33.

19.12.47. L.E. goniotomy.

24.12.47. R.E. goniotomy.

2.1.48. Tension R.E. 14, L.E. 29.

9.1.48. L.E. goniotomy.

19.1.48. Tension R.E. and L.E. 23.

9.2.48. R.E. goniotomy.

18.2.48. Tension R.E. 24, L.E. 19 to 20. R.E. goniotomy.

25.2.48. Tension R.E. and L.E. 17.

28.4.48. Tension R.E. 15, L.E. 18.

6.8.48. Tension R.E. 15, L.E. 20.

24.11.48. Tension R.E. and L.E. 9.

28.2.49. Tension R.E. 12, L.E. 9.

5.4.49. Tension R.E. and L.E. 12.

Pupils active, left eye inclined to diverge, right disk cupped, left disk difficult to see, opacities in cornea.

Case 5. Boy aged 7½ years. Admitted 25.1.48 from St. Mary's Institute for the Blind, Merrion, Dublin, with glaucoma. Tension R.E. and L.E. 50. Old case of buphthalmos with advanced changes, thinning of sclera, scarring of each cornea. Bilateral goniotomy. Both anterior chambers filled with haemorrhage.

7.2.48. Tension R.E. 20, L.E. 18. Vision, count fingers hand movements about 2 metres, each eye.

7.5.48. Tension R.E. 25 to 27, L.E. 14 to 15.

8.5.48. R.E. goniotomy.

15.5.48. Tension R.E. and L.E. 15.

Case 6. Baby girl aged 5 months. (Reference A.M.) Admitted with marked photophobia, enlarged cornea each eye, congenital glaucoma.

20.9.43. Tension R.E. and L.E. 53.

Bilateral trephine failed to reduce tension.

6.12.48. Bilateral goniotomy.

15.12.48. Tension R.E. 20, L.E. 24.

5.1.49. Tension R.E. and L.E. 50.

11.1.49. Bilateral goniotomy, both eyes full of haemorrhages.

4.2.49. Bilateral goniotomy. Tension R.E. and L.E. 50.

16.2.49. Tension R.E. 12, L.E. 12 to 15.

25.3.49. Tension R.E. 15, L.E. 20.

6.5.49. Tension R.E. and L.E. 15. Marked improvement in baby's general health. There is some scarring of each cornea.

Case 7. Boy aged 4 months. Mother said both eyes large since birth, marked photophobia, hazy corneae, child evidently in pain, bilateral congenital glaucoma.

31.7.49. Tension R.E. 40, L.E. 23.

3.8.49. Bilateral goniotomy.

2.9.49. Tension R.E. 35, L.E. 27.

7.9.49. R.E. goniotomy.

14.9.49. Tension R.E. and L.E. 24.

26.10.49. Tension R.E. 18, L.E. 18 to 20. Both corneae clear, no photophobia, under observation.

Case 8. Boy aged 7 months. Admitted 11.7.49, marked photophobia, enlarged and hazy corneae. Tension R.E. 27, L.E. 22.

13.7.49. Bilateral goniotomy, no haemorrhages at operation.

27.7.49. Tension R.E. 12, L.E. 18.

Case 9. Boy aged 6½ months. (Referred G.I.W.) Both corneae enlarged, some haziness of each cornea, some photophobia. Tension R.E. 27 to 30, L.E. 22 to 25.

19.3.49. Bilateral goniotomy.

6.4.49. Tension R.E. 12, L.E. 25.

6.4.49. L.E. goniotomy.

14.4.49. Tension R.E. 12, L.E. 18 to 20.

20.4.49. Discharged, under observation.

11.10.49. Child progressing satisfactorily, no photophobia, tension normal.

Case 10. Boy aged 10 months. (Referred M.C.) Admitted 17.9.48. Mother noticed cloud over both eyes when a month old, enlarged hazy corneae, great photophobia.

18.9.48. Tension R.E. 50, L.E. 53. Bilateral goniotomy was performed prior to trephine operation, but neither equalized tension.

5.10.48. R.E. trephine.

12.10.48. L.E. trephine.

23.10.48. Tension R.E. and L.E. 30.

27.11.48. Tension R.E. 50, L.E. 45.

29.11.48. Bilateral goniotomy.

8.12.48. Tension R.E. 26, L.E. 43.

13.12.48. L.E. goniotomy.

29.12.48. Tension R.E. 20, L.E. 12 to 15.

29.1.49. Tension R.E. and L.E. 12 to 15. Diameter of each cornea 15 mm., right optic disk cupped, left optic disk normal, both corneae clear, no photophobia.

Case 11. Girl aged 6 months. When one month old, it was noticed that the left eye appeared larger than the right. Brought to hospital suffering from acute glaucoma, hazy cornea, deep anterior chamber, congenital glaucoma.

- 6.12.48. Tension L.E. 7.5 g., 50, R.E. 7.5 g., 25.
L.E. goniotomy.
- 15.12.48. Tension L.E. 7.5 g., 15, R.E. 7.5 g., 25.
- 7.1.49. Clear cornea left eye, active pupil, under observation.
- Case 12. Boy aged 8½ years.* Came to hospital with acute glaucoma left eye, buphthalmos. Corneal diameter L.E. 15 mm., R.E. 12.5 mm.
- 27.11.48. Tension R.E. 18, L.E. 50. Vision R.E. 6/9, L.E. 6/36.
- 27.11.48. L.E. goniotomy.
- 18.12.48. Tension R.E. 18, L.E. 15.
- 18.5.49. Tension R.E. 18, L.E. 50.
- 1.6.49. L.E. goniotomy (contact lens).
- 7.6.49. L.E. acute glaucoma.
- 8.6.49. L.E. goniotomy.
- 20.2.50. Tension R.E. 20, L.E. 22. Vision R.E. 6/9, L.E. 4/60, cornea left eye, clear, 18 degrees myopia, deep cupping optic disk.
- Case 13. Girl aged 3 months.* Attended hospital first in 1940 with acute glaucoma. Tension R.E. and L.E. 7.5 g., 55.
- 29.3.40. R.E. cyclodialysis.
- 2.4.40. L.E. cyclodialysis.
- 24.6.40. Tension R.E. 60, L.E. 70.
- 24.6.40. R.E. trephine.
- 25.6.40. L.E. trephine.
- 1948, aged 8 years (Referred B.S.L.).
- 26.6.48. Tension R.E. 35, L.E. 48.
- 4.7.48. R.E. goniotomy. Very severe haemorrhage completely filling anterior chamber.
- 4.8.48. Tension R.E. 50, L.E. 45.
- 3.9.48. Vision R.E. and L.E. 1/60.
- 12.11.48. Tension R.E. and L.E. 40.
- 3.1.49. R.E. goniotomy, very great haemorrhage filling anterior chamber.
- 11.2.49. Tension R.E. and L.E. 50.
- 5.9.49. Tension R.E. 35, L.E. 45.
- R.E. goniotomy. Large haemorrhage during operation filling anterior chamber.
- 3.10.49. Tension R.E. 35, L.E. 40.
- L.E. Goniotomy.
- 15.11.49. Tension R.E. 35, L.E. 30.
- Case 14. Boy aged 2 years.* R.E. pthysical, with central nebulae, probably the result of ophthalmia neonatorum. (Referred L.W.) L.E. buphthalmos.
- 16.9.49. Tonometry R.E. 25, L.E. 50.
- L.E. goniotomy (10-5) (DD) some hyphaema.
- 29.9.49. Tonometry R.E. 20, L.E. 22. Both pupils dilated, pilocarpine T.I.D., report one month.
- 21.10.49. Child's eyes open much better.
- 7.11.49. L.E., corneal oedema, pupil small. Tonometry L.E. 45 mm. Hg.
- 12.11.49. Goniotomy 12 to 9. Pilocarpine T.I.D. (Referred D.D.)
- 23.11.49. Tonometry 32.
- 30.11.49. Goniotomy 6 to 9.
- 16.12.49. Tonometry R.E. 22, L.E. 15. To use Eserine ½ per cent. drops, under observation, report one month.

Comment

Goniotomy was successful in lowering the tension in 21 of the 25 eyes reported. In two eyes, on which a goniotomy had first been performed without success, a trephine operation was required as a follow-up to reduce tension.

Tension was reduced in ten eyes with one previous goniotomy

operation, in seven with two goniotomy operations, and in three with three operations. Tension was also reduced in three cases of advanced buphthalmos; severe haemorrhages occurred in all these advanced cases. The tension of two eyes with advanced buphthalmos was not reduced. In four eyes, which had been unsuccessfully trephined, goniotomy reduced the tension.

I found that the tension in the eye did not become stabilized after a goniotomy operation for perhaps three weeks or more, and unless there were definite symptoms of increased intra-ocular pressure, such as pain, photophobia, and cloudiness of the cornea, it was better to defer a second goniotomy, keeping the eye on myotics.

Summary

- (1) The tension in 21 of 25 eyes with congenital glaucoma was lowered to within normal range by goniotomy.
- (2) Failure occurred in two eyes with advanced buphthalmos.
- (3) The operation is easy to perform and it would appear that it should be adopted as a primary operative procedure. If it is unsuccessful, other methods of decompression should be applied.
- (4) Barkan's claims are well supported.

Conclusions

Provided cases with congenital glaucoma are seen early enough, goniotomy will reduce the ocular tension. This is borne out by the cases in Group 1 of this series, and by four eyes operated on in Group 2, in which previous unsuccessful decompressing operations did not interfere with the results.

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