

CONTROL OF ASTIGMATISM IN CATARACT SURGERY

Dr. J. AGARWAL
Dr. Mrs. T. AGARWAL
Dr. R. SURYAPRAKASH
Madras, India

Astigmatism is a type of refractive error in which the light rays passing through the pupil will not come to a point focus because of the difference in the degree of refraction of light in different meridians of the eye. The variations of curvature in the cornea and lens determine the amount of astigmatism. In aphakia, it is only the cornea which creates the astigmatism. Astigmatism of high degree, causes tremendous amount of eye strain and the patient develops headache. He sees distorted images and his visual acuity is reduced. Many patients may develop intolerance to high astigmatic correcting spectacles. Even fitting of contact lenses becomes difficult in these cases. Therefore, it is the responsibility of the surgeon to give the patient good vision and comfort. This can be done only if he takes greater care on the operating table to reduce induced astigmatism due to surgery.

High astigmatism will occur if there is;

1. Irregular sectioning.
2. Improper suturing.
3. Vitreous incarceration in wound.
4. Iris prolapse and iris inclusion.

Sectioning and suturing are the main factors which determine the post operative astigmatism.

Sectioning:

A good section should be a clean cut, regular and in two planes. We have achieved it with the use of Diamond tipped knife. It makes a clean cut, regular and exactly circular groove parallel with the limbus in Cataract Surgery. The wound margins produced by it have an exact right angle configuration thus making easy to give sutures radially.

The section thus made is not at all ragged and the incision depth is about 2/3 of the thickness of sclera. The wound thus made makes placement of sutures easy and promotes cicatrization with a hermitically sealed anterior chamber and reduces the amount of astigmatism.

Instrument:

The instrument consists of 3 parts.

1. A central axil with a handle at the upper part and thread at the bottom into which a ring is fitted. The ring has 3 fixation points and 2 asymmetrical arms supporting a raised central column which is threaded to receive the lower part of the axil.

2. A sleeve which is in two parts: a) straight cylinder into which the axil is passed through and can be rotated freely; b) a spring arm which is fitted in the upper part of the sleeve. The distance of the spring arm from the sleeve can be adjusted by a small screw. The free end of the arm has a small hole through which (3) a diamond tipped blade holder is passed. The blade holder can also have a fragment of razor blade instead of a diamond tip. The diamond tip avoids chaging of the blade and allows very precise cutting with least pressure.

Procedure:

A fornix based flap is preferred although limbal based flap can also be made. The ring is carefully fixed on the globe near the limbus to obtain a perfect centre which is equi-distant from limbus all around. Keeping the central axis perpendicular to the cornea, the spring arm is rested on the ring and rotated around its axis. The tip enters the sclera at one end and the sleeve is rotated with a continuous and uniform movement. Thus a groove is made in 2/3 thickness of the limbus which is parallel all around. Then the groove is pierced with a blade horizontally on the right

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hand. side and the section is enlarged with the corneal scissors. The scissors follow the groove exactly and perpendicular to it. The resulting wound has a vertical wall made by the diamond tip and an inner horizontal tip which increases the surface of contact and aids cicatrization. The angle formed by these two planes represents the limiting depth for the placement of sutures.

There is no danger of entering the anterior chamber while making the incision as the tip of the diamond knife cannot penetrate more than the desired depth.

Suturing:

Improper suturing creates irregular astigmatism. Although pre-section corneo-scleral sutures give better wound apposition but sectioning is made more difficult. 3 pre-place double armed sutures, one in the 12 O'clock and one on either side at 10 O'clock and 2 O'clock positions help not only in immediate safe closure of the wound after lens delivery, but also give better wound edge approximation.

By using the operating keratometer the tension in the sutures can be manipulated before tying them so as to reduce astigmatism to the barest minimum.

By keeping 3 double armed sutures tight and looking through the operating microscope, the round shape of the ring of the keratometer in the centre of cornea is adjusted and maintained by tightening or loosening the appropriate sutures. After tying the double armed sutures, the ring of the Keratometer is observed and remaining sutures are tied with the precise amount of tension so that the round shape of ring is maintained.

Vitreous disturbance is avoided as far as possible. In case of inevitable vitreous loss it is made certain that before closing the wound there is no vitreous in the A. C or incarcerated in the wound. Incarcerated vitreous may cause traction on the wound and create irregular astigmatism. If there is vitreous disturbance anterior vitrectomy must be done immediately by Kaufman Vitrector or any other vitreous machine.

Iris prolapse is avoided by applying more number of sutures. Iris inclusion in the wound also may create irregular astigmatism and hence extra care is taken while applying the suture so that iris is not included in the wound. Reposition of the iris is done well before tying the last suture.