Jacksons Cross Cylinder (JCC)

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History

- L.V.Edward Jackson in 1887 discovered the JCC.
- He was also the first president of the American Academy of ophthalmology and otolaryngology.

Uses

1. To assess the strength and axis of the cylinder.
2. To check the accuracy of the distance spherical correction.

Quotes

In Edward Jackson's words JCC is probably “far more useful and far more used” than any other lens in clinical refraction.

Every ophthalmologists should be familiar with the principles involved in its use.

Instruments

The cross cylinder is a combination of two cylinders of equal strength but with opposite signs placed with their axis at right angles to each other and mounted in a handle. The commonly used cross cylinders are of ± 0.25D and ± 0.5D.

Although the cross cylinder is usually used to refine the cylinder axis and power of refraction already obtained, it may also be used for the entire astigmatic refraction.

Method

1. Refinement of the Axis

This is always done first. This is because the correct axis can be found in the presence of an incorrect power but the full cylindrical power will not be found in the presence of an incorrect axis. To refine the axis, the cross cylinder is placed (+0.5D) before the eye with its axis at 45 degree to the axis of the cylinder in trial frame (first with -0.5 D cylinder and then +0.5D cylinder or vice versa) and the patient is asked to tell about any change in visual acuity. If the patient notices no difference between the two positions, the axis of the correcting cylinder in the trial frame is correct. However, if visual improvement is attained in one of the positions a “plus” correcting cylinder should be rotated in the direction of the plus cylinder component of the cross cylinder (and vice versa). The test is then repeated several times until the neutral point is reached.

2. Refinement of cylinder power

To check the power of cylinder, the cross cylinder of ± 0.25D is placed with its axis parallel to the axis of the cylinder in the trial frame. First with the same sign and then with the opposite sign. In the first position the cylindrical correction is enhanced by 0.25D and in the second it is diminished by the same amount. When the visual acuity does not improve in either of the positions the power of cylinder in trial frame is correct. However if visual acuity improves in any of the positions a corresponding correction should be made and verified till final correction is attained.

3. Discovery of Astigmatism

If no cylindrical correction is present initially, the cross cylinder may still be used, placed arbitrarily at 90 degree
and 180 degree to check for astigmatism. If a preferred flip position is found, cylinder is added with axis parallel to the respective plus or minus axis of the cross cylinder until the two flip choices are equal. If no preference is found with cross cylinder axis at 90 degree and 180 degree the 45 degree and 135 degree should always be checked before assuring that no astigmatism is present.

**Points to Ponder – to Summarise**

- JCC is always a sphero cylindrical lens such that one meridian is plus power and the other meridian is of equal minus power.
- The red dots identify the axis of the minus power. The power in the meridian of the red dots is of plus power.
- The JCC in a plus cylinder phoropter is identical to that of minus cylinder phoropter.
- When you use a plus cylinder phoropter you “chase” the white dot instead of the red dots.
- When you perform the JCC power test the length of the astigmatic interval changes. Flipping the lens causes a change in the interval length (a change in image quality) between the two meridians if cylinder is not fully corrected.
- The end of JCC test is when both images appear equal or are equally blurred. This occurs because with the correct cylinder power in place and the JCC lens in place the astigmatic interval is the same length in each position.
- The end of JCC test occurs when the resultant cylinder caused by obliquely crossing two cylinders has been neutralized.
- Placed before an emmetropic eye the cross cylinder blurs the image. Placed before an ametropic eye the cross cylinder does not alter the spherical equivalent but it will enlarge or contract the interval of strum, blurring or clarifying the image as it increases or decreases the net astigmatic correction. The cross cylinder is used for subjective refinement of axis and power of cylinder after placing the best available estimate of refraction before the eye.

**Bibliography (References)**

1. Duke Elders practices of clinical refraction Page: 181 to 183
2. Lalit.P.Agarwal’s principles of optics and refraction Page: 94 to 95
3. A.K.Khurans book on refraction Page: 133 to 134
Releasable and Adjustable Sutures for Safe and Predictable Outcome Following Glaucoma Filtration Surgery

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Introduction

There has been a paradigm shift in our understanding of glaucoma which is currently defined as a progressive, multifactorial optic neuropathy characterized by specific morphological changes with acquired and accelerated loss of retinal ganglion cells resulting in a variety of functional changes including visual field loss. Thus, elevated intraocular pressure is now considered as one among the several but not the decisive risk factor for the development of glaucoma. Despite research on other ways of managing glaucoma all currently available therapeutic interventions – medical, lasers and surgery – have aimed at reducing the intraocular pressure, the benefit of which has been elucidated by several long term studies and trials 1–4.

Trabeculectomy, with or without cataract extraction and intraocular lens implantation and augmented with or without antimetabolites has been the mainstay of surgical treatment to reduce intraocular pressure in patients with glaucoma 5. While a lot of research and interest has been shown in the non–penetrating surgeries, laser surgeries, valve implants, trabeculectomy continues to be the most widely performed procedure. The surgical technique in trabeculectomy continues to be refined and reshaped to make it safer and predictable 6.

Trabeculectomy is fraught with complications related to shallow anterior chamber in the early post–operative period. Shallow anterior chamber leads to a host of complications in the anterior and posterior segment, like corneal decompensation, peripheral anterior synechiae, posterior synechiae, accelerated cataract formation, choroidal detachment, macular edema, suprachoroidal hemorrhage, all of which compromise the desired outcome of the filtration surgery in terms of lowering the intraocular pressure and decrease the vision 7–9. Although the incidence of these complications are less than what is encountered after a full–thickness filtration surgery, these complications may occur more frequently and with greater severity with intraoperative use of antimetabolites especially mitomycin – C (MMC) 10–11. The guarded filtration trabeculectomy being performed now is not as successful as a full–thickness filtration procedure in terms of intraocular pressure control 12.

Releasable sutures permit a controlled achievement of the targeted intraocular pressure in the post–operative period after trabeculectomy 13–14. Placing relatively tight sutures at the time of surgery with subsequent selective suture lysis or removal enables reducing overfiltration in the immediate post operative period without sacrificing long term intraocular pressure control 15. They help maintain the anterior chamber depth, prevent complications thereby ensuring a safe and predictable outcome. With releasable sutures, the aqueous runoff through the sclerostomy reaches the subconjunctival space by a more direct route than in a conventional surgery with fixed sutures and more closely approximates the route of aqueous runoff as that achieved in full–