Bag-in-the-lens IOL showing promise in prevention of PCO in paediatric eyes

Roibeard O'hEineachain in Paris

Marie-José Tassignon

A "bag-in-the-lens" IOL has proved very effective in providing stable vision without PCO in a small series of paediatric cataract patients, Marie-José Tassignon MD told the XXII Congress of the ESCRS.

In a study involving 15 eyes of 12 children aged (ages ranged between seven months and four years) who underwent implantation of the bag-in-the-lens IOL, there have been no cases of PCO throughout a follow-up that has lasted up to four years, said Dr Tassignon, University Hospital, Antwerp, Belgium.

"We have yet to detect PCO in any of these eyes. This result has never been achieved with any lens-in-the-bag type of lens. Because PCO is of no concern anymore, we can plan intensive visual training in order to prevent amblyopia in the early postoperative period."

In addition, in patients who were old enough to undergo visual acuity testing, mean UCVA improved from 0.22 to 0.4 and mean postoperative BCVA was 0.76. Furthermore there have been no cases of tilting or decentration, she noted.

The principle behind Dr Tassignon's lens is that patients undergo both anterior and posterior capsulorhexis and the IOL's special haptic rims clasp the edges of the remaining capsular bag together. In this way the lens prevents lens epithelial cell migration and PCO. In addition, the anterior and posterior haptics are oriented perpendicularly to each other in order to prevent tilting or decentration of the lens.

"Because of the special design of the lens, the remaining capsular bag is tightly closed, preventing the lens epithelial cells from coming into contact with anterior chamber fluid, posterior chamber fluid or anterior vitreous. Within this tightly closed area the remaining cells have little space to proliferate, in fact just enough for keeping the capsular bag transparent and flexible," Dr Tassignon explained.

Special implantation technique

In its current design, the lens has an overall diameter of 5.0 mm and is composed of a hydrophilic acrylic material. Prior to implantation the lens must be folded manually, after which it can be implanted through a 3.2 mm incision. For good fixation and centration of the lens, it is necessary to perform matching anterior and posterior capsulorhexis of roughly the 4.5 to 5 mm, said Dr Tassignon.

After performing the anterior capsulorhexis, Dr Tassignon performs the posterior capsulorhexis and injects a dispersive viscoelastic into the space of Berger. The viscoelastic pushes the posterior capsulorhexis forward to bring it into contact with the anterior capsulorhexis. She then glides the rhexis edges into one side of the grooved margin of the lens and uses the visco needle to manoeuvre the remaining capsular edges into place.

Dr Tassignon has been working with Morcher in order to develop a special calliper for performing the anterior capsulorhexis. Her early results with the device indicate that it may be particularly useful for performing the procedure in paediatric eyes.

"In these paediatric eyes the anterior capsule is extremely elastic, but when you have this ring to guide you it makes it much easier to create a well-centred and round capsulorhexis."

Because of the extremely vigorous growth of lens epithelial cells in young eyes, the standard practice in paediatric patients is to perform a posterior capsulorhexis and anterior vitrectomy. However, PCO can occur even when a surgeon takes those additional steps. In fact, in adults undergoing such procedures the rate of PCO is 33%, with 4 % requiring YAG laser treatment.

In a recently published study Dr Tassignon and her associates were able to demonstrate that in such cases the scaffolding for lens epithelial cell migration is provided by the anterior hyaloid, which has the same type of collagen as the posterior capsule. The bag-in-the-lens IOL prevents the migration of lens epithelial cells and also obviates the need for anterior vitrectomy, she pointed out.

Moreover, several studies have shown that posterior capsulorhexis does not in itself compromise the integrity of ocular barriers. Instead, as shown by a fluorophotometry study she and her associates conducted, it is not the posterior capsule but the anterior hyaloid which maintains the intraocular barriers, Dr Tassignon noted.

Maintaining capsular elasticity

An additional benefit of the lens is that the enclosed lens epithelial cells keep the basal cell membrane alive. This in turn maintains the elasticity of the remaining capsular bag and prevents the bag from contracting and changing the position and orientation of the lens. The surgeon can therefore determine the final position of this type of lens in the eye.

Dr Tassignon and her associates are currently working on devising a means of intraoperatively determining the line of sight of patients.

"When you have your line of sight well-defined you can insure the best orientation of lens with the cornea and induced aberration will be minimal. This will also promote remaining accommodation possibilities."

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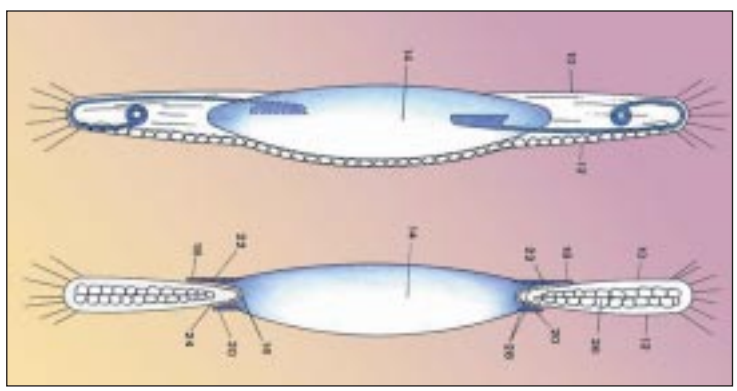

Courtesy of Marie-Jose Tassignon MD

Whereas conventional IOLs are fixed in the bag by means of haptics, the bag-in-the-lens IOL is fixed by means of the capsular bag itself. This implantation requires an anterior and posterior capsulorhexis of a well-defined diameter (4.5 to 5 mm).