INFANTS WITH CATARACT
Clinical relevant anatomy, histology and cell biology of the vitreolenticular interface

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When performing paediatric cataract surgery a primary posterior capsulorrhexis is a necessity, independently of the choice of intraocular lens implantation. However, when performing this procedure in newborns and young children a variable amount of adherence of the anterior hyaloid face to the centre of the posterior lens capsule was found. The adherence increases the difficulty of separating surgically both the anterior hyaloid from the posterior capsule structures (Figures 1 A-B). During this manoeuvre, the integrity of the anterior hyaloid face could not always be preserved, sometimes even necessitating an unintended anterior vitrectomy.

Numerous studies have tried to unravel the regression process of the tunica vasculosa lentis during gestation. This complex event is believed to be influenced by many factors such as eye growth, hypoxia, apoptosis and autophagia, but normal lens development also seems to influence this process. As a consequence, alterations in the formation of Berger’s space are expected to occur frequently in young age groups presenting with congenital cataract.

In eyes presenting with persistent fetal vasculature or even minimal fetal vascular remnants (without a fibrovascular plaque behind the posterior lens capsule) membrane-like structures between the posterior lens capsule and anterior hyaloid face are a well-known feature. From all currently known hereditary cataracts many can be associated with other ocular anomalies of the anterior and/or posterior segment, but the isolated dysgenesis of the vitreolenticular interface has rarely been investigated.

Since scanning electron microscopy already has been used to study the early morphogenesis of persistent hyperplastic vitreous in dogs and humans, we wonder whether we would succeed in visualising the subtle persistent adhesions on the posterior lens capsule. We therefore collect the posterior capsule for further analysis including differences in gene expression in eyes with vitreolenticular dysgenesis compared to eyes with normal Berger’s space formation.

It is important to elucidate the pathogenesis of congenital vitreolenticular dysgenesis associated with congenital cataract. This knowledge will likely lead to improvements in surgical procedures in the future. The genetic insights may even lead to prenatal detection of congenital anomalies of the lens and its anterior interface.

We performed a consecutive case series of all paediatric cataract surgeries performed in our centre during the course of one year. All surgeries were videotaped and posterior capsulorrhexis procedures were analysed focusing on the presence of vitreolenticular adherences and the ease by which they could be dissected using viscoelastics. Unfortunately, regular histology evaluation is of poor interest since they only show collagen, fibroblasts and rare epithelial cells (Figures 2A, B, C, D). Extracted posterior lens capsules presenting various types of adhesions to the vitreous were further analysed using scanning electron microscopy. Immediately after extraction the samples were oriented and fixated in gluteraldehyde. The fixated tissue was dehydrated using critical point drying and sputter-coated with gold tissue was dehydrated using critical point drying and sputter-coated with gold. The removed posterior lens capsules present collagen, multiple fibroblasts and rare epithelial cells.

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