Subtle signs of an intact anterior vitreous face during pediatric cataract surgery

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We describe the subtle signs of the anterior vitreous face as a bulging structure, a homogenous staining pattern of 3 buttonholes, and a lamellar or fibrillar pattern intact. This should help surgeons correctly recognize the intact anterior vitreous face.

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Visual axis obscuration is a common complication of pediatric cataract surgery. To avoid the obscuration, primary posterior continuous curvilinear capsulorhexis (PCCC) with or without vitrectomy is recommended.1–4 Manual PCCC is a technically demanding procedure and frequently leads to anterior vitreous face disturbance.5,6 The status of the anterior vitreous face, whether intact or disturbed, is important in the management of pediatric cataract. In eyes with an intact anterior vitreous face, vitrectomy can be avoided. This is especially true for older children or adults having cataract surgery with primary PCCC.

We recently described subtle signs of anterior vitreous face disturbance during pediatric cataract surgery.7 Although there are numerous descriptions of the clinical morphology of the anterior vitreous face using a slitlamp biomicroscope,8,9 there is little information on the intraoperative morphology of the anterior vitreous pertinent to cataract surgery. We describe the intraoperative morphology of the intact anterior vitreous face with the aid of triamcinolone acetonide.

CASE REPORTS

Case 1

A 4-year-old boy had cataract surgery in the right eye. After the lens was aspirated, the capsular bag was filled with sodium hyaluronate 1.4% (Healon GV). Posterior continuous curvilinear capsulorhexis was initiated using the vertical element of a 26-gauge cystotome. The sodium hyaluronate was injected around the area of the initial puncture over the posterior capsule to achieve a flat or concave capsule. Later, the flap was grasped and regrasped to complete the PCCC. After completion, preservative-free triamcinolone acetonide (Aurocort, Aurolab Laboratories) was injected intracamerally. Triamcinolone acetonide particles uniformly stained the anterior vitreous face, which appeared as a well-demarcated, round bulging structure with a granular appearance (Figure 1).

Case 2

After the PCCC had been completed and triamcinolone acetonide injected intracamerally in a 5-year-old boy, a well-circumscribed circle with 3 concentric rings with granular patterns within the circle was visible. The 3 concentric rings, which appeared as buttonholes, gave the impression of a tabletop configuration (Figure 2). In the 3 subramifications, 2 buttonholes were almost contiguous, with the superior ramification showing the presence of a concentric depression. The third buttonhole was eccentric; however, it lay within the capsulorhexis zone, showing uniform staining of triamcinolone acetonide (Figure 3).

Case 3

After an intracameral injection of triamcinolone acetonide in a 6-year-old boy, a fibrillar or lamellar variant of the intact anterior vitreous face was observed within the area of the PCCC. No vitreous strand extended into the anterior segment. The staining was homogenous, suggesting that the vitreous face was intact (Figure 4).
DISCUSSION

Identification of the contours of the normal anterior vitreous face is vital for the ophthalmologist in general and the cataract surgeon in particular. This identification helps surgeons select the method of management should any vitreous disturbance be seen. Surgeons prefer different techniques for performing posterior capsulotomy. A survey of members of the American Society of Cataract and Refractive Surgery revealed that manual PCCC and posterior vitrectorhexis were preferred by an almost equal number of respondents (41.3% and 43.2%, respectively). During the past decade, there have been many improvements in the intraoperative management of the posterior capsule, from manual PCCC to the use of a vitrector or diathermy. Some surgeons prefer vitrectorhexis when vitrectomy is planned with a primary posterior capsulotomy. However, when an anterior vitrectomy with posterior capsulotomy is not a planned procedure, manual PCCC is a must; it keeps the anterior vitreous face intact in most eyes. Further, in children between 2 years and 6 years of age in whom PCCC is performed without vitrectomy, information on the presence or absence of anterior vitreous face disturbance is important, as it suggests the need for a vitrectomy. In addition, knowledge of the normal anterior vitreous face contour and its variations would serve as a guide to uneventful cataract surgery.

We modified the technique of performing manual PCCC to avoid anterior vitreous face disturbance by injecting an ophthalmic viscosurgical device (OVD) around the area of the initial puncture to achieve a flat or concave capsule. As Gimbel and DeBroff observed, an excessive injection through the central puncture may make the posterior capsule convex and this can direct the tear peripherally. In a study by Dholakia et al., primary posterior capsulorhexis was completed in all the eyes and anterior vitreous face disturbance during manual PCCC was reported in only 5 of 106 eyes (4.7%) of children younger than 2 years of age. A few authors have demonstrated the role of the anterior vitreous reticular response, which is not visually significant by itself but might lead to opacification of the visual axis. Given this fact, the authors stressed the importance of adequate vitrectomy. Some surgeons prefer to err on the conservative side and avoid anterior vitrectomy. Surgeons should

Figure 1. A: Intraoperative completion of manual PCCC prior to administration of triamcinolone. B: Uniformly stained anterior vitreous face appearing as a well-demarcated round bulging structure with a granular appearance after manual PCCC and triamcinolone staining.

Figure 2. A: Intraoperative completion of manual PCCC prior to administration of triamcinolone. B and C: A well-circumscribed circle with 3 concentric rings with granular patterns appearing as buttonholes and giving the impression of a tabletop configuration on triamcinolone staining after manual PCCC (oblique and retroillumination).
watch for signs of an intact anterior vitreous face in every patient having pediatric cataract surgery with PCCC. To avoid disrupting the anterior vitreous face, we hold the cystotome at a slant for the initial puncture; subsequent elevation of the flap is performed by lifting the flap anteriorly (toward the cornea). We recommend injecting the OVD around the area of the initial puncture over the posterior capsule to achieve a flat or concave capsule. This maneuver, along with frequent regrasping, enables the surgeon to make a PCCC of the desired size without anterior vitreous face disruption.

The diagnostic signs of an intact anterior vitreous face are a smooth contiguous contour and a homogenous staining pattern of 3 buttonholes, giving the impression of a tabletop configuration with 3 subramifications. No portion of the vitreous should extend into the anterior segment, suggesting that the 3 buttonholes are probably the physiological depressions in the anterior vitreous face. Further, we believe that the pattern of the 3 buttonholes with the 3 subramifications could be due to the presence of Wieger ligament in which the vitreous is attached to the posterior surface of the lens, classically described as having 3 ramifications of the ligament head. The presence of the buttonhole could be due to the adhesions between the posterior capsule and the anterior vitreous face.

The other diagnostic sign of an intact anterior vitreous face is a concentric pattern with a fibrillar or lamellar variant as radial septa. We think this pattern could be due to the compression of a number of cisterns by filling of adjacent cisterns or a vertical overlap (interdigitation) between the various layers of cisterns, creating multiple tracts in a radial fashion as noted in physiological conditions. We think this pattern represents the vitreous tracts created by the lamellae that traverse in the anteroposterior direction in the vitreous cavity.

In conclusion, identifying subtle but important signs of an intact anterior vitreous face, including its bulging structure; the homogenous staining pattern of 3 buttonholes, suggesting a tabletop configuration with its 3 subramifications; and fibrillar or lamellar variant as radial septa, will help surgeons correctly recognize the intactness of the anterior vitreous face. This information may not have widespread application in children younger than 6 years of age, in whom anterior vitrectomy is rapidly becoming the standard of care. However, it is of value for older children and young adults in whom PCCC without vitrectomy is often performed.

Figure 3. A: Three subramifications. B: Two buttonholes are almost contiguous, with the superior ramification showing the presence of a concentric depression.

Figure 4. A and B: Two views of fibrillar or lamellar pattern on the intact anterior vitreous face on triamcinolone staining after manual PCCC.
REFERENCES


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