Spontaneous multiple iris sphincter tears during cataract surgery in high myopic children with midfacial hypoplasia

Amit Mohan, Pradhnya Sen, Chintan Shah, Elesh Jain, Alok Sen

Key words: Bilateral cataract, children, high myopia, iris sphincter tear, midfacial hypoplasia

Midfacial hypoplasia (MFH) is an uncommon congenital/developmental anomaly characterized by flat underdeveloped midface, flat nasal bridge, and maldeveloped maxilla and nasal complex. The ophthalmic findings associated with MFH include high myopia, strabismus, amblyopia, microphthalmia, and cataract.[1] The aim of this study is to report the series of cases of the rare occurrence of spontaneous multiple iris sphincter tear (MIST) during phacoaspiration in pediatric cataract surgery of high myopic children of MFH.

Seven eyes of five children who developed spontaneous pupillary iris sphincter tear during irrigation aspiration in cataract surgery were analyzed. Since all children with sphincter tear in our study were high myopic with MFH [Fig. 1a and b], to know the odds of its risk, 10 randomly selected age, sex, and case-matched myopic children without MFH that underwent cataract surgery were used as a control group to compare with the patients' group. Preoperative slit-lamp findings in all cases showed featureless iris and sluggish pupillary reaction.

All surgeries were performed through clear corneal incisions with manual continuous curvilinear capsulorhexis of the average size of 5 to 5.5 mm. The cataracts were aspirated using irrigation–aspiration handpiece (aspiration flow rate- 30–35 cc/min, vacuum limit 400 mmHg, bottle height 90 cm above eye level). A hydrophobic acrylic single piece or three-piece intraocular lenses (AcrySof, Alcon Laboratories, Inc) were implanted in both groups.

Frequencies of intraoperative complications (sphincter tear, anterior capsulorhexis complications, and posterior capsulorhexis complications) were calculated as a number. Comparative analysis was done using the contingency data

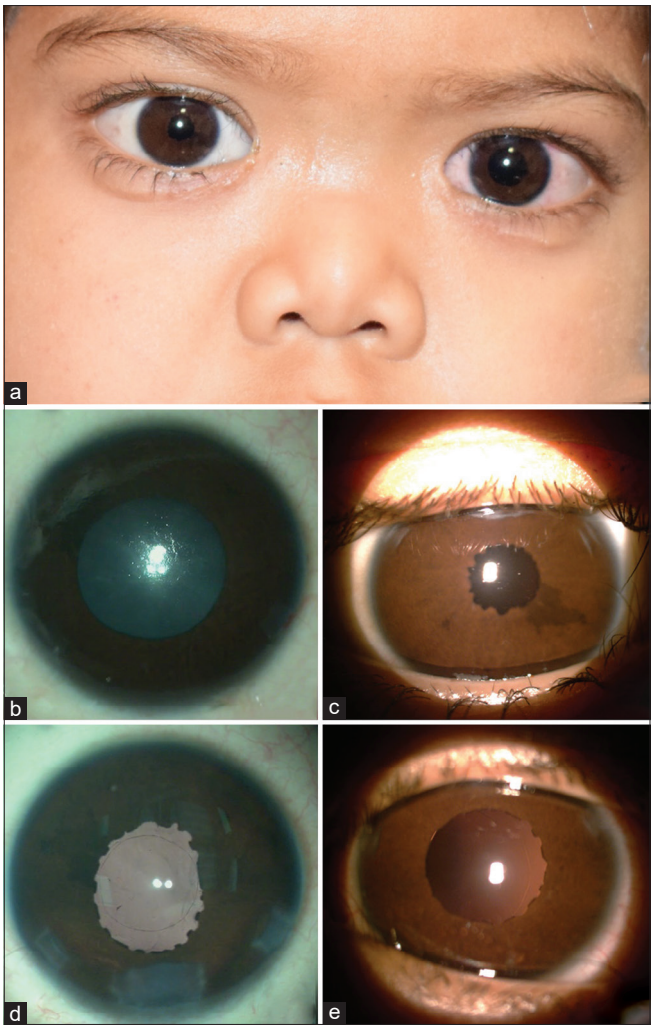

Figure 1: (a) Characteristic facial features—Depressed nasal bridge, hypertelorism, and hypoplastic nose, (b) eye showing total cataract, (c) intraoperative photograph showing sphincter rupture, (d and e) postoperative slit-lamp photo showing both eyes multiple sphincter tear with mid dilated pupil

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Children Eye Care Center, Department of Pediatric Ophthalmology and Strabismus, Sadguru Netra Chikitsalya and Postgraduate Institute of Ophthalmology, Jankikund, Chitrakoot, Madhya Pradesh, India

Corresponding author: Dr. Amit Mohan, Children Eye Care Center, Department of Pediatric Ophthalmology and Strabismus, Sadguru Netra Chikitsalya and Postgraduate Institute of Ophthalmology, Jankikund, Chitrakoot, Madhya Pradesh, India. E-mail: mohan.amit1@yahoo.co.in

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Table 1: Demographic profile of high myopic children with cataract in cases and control groups (midfacial hypoplasia [MFH] vs normal facial features)

	Cases (*n*=10)	Control (*n*=10)	*P*
Male/female	5/0	5/0	
Age (Mean±SD)	6.8±1.3038	7±1.5811	0.359010
Age range (min-max)	(5-8 years)	(5-9 years)	
Right/left	5/5	5/5	
Average axial length	27.712±0.3779 mm	27.932±0.2988 mm	0.329995
Average intraocular lens (IOL) power	4±0.866 D	4.2±2.2528 D	0.04528
Range (min-max)	(3.5-5.5 D)	(1.0-7.0 D)	

Table 2: Frequencies of intraoperative complications in cases and control group

Intraoperative complications	Cases (*n*)	Control (*n*)	Odds ratio	Relative risk	*P*
Spontaneous iris sphincter rupture	7	0	Infinity	Infinity	0.00309
Anterior capsulorhexis extension	1	2	0.4444	0.5	1
Posterior capsulorhexis extension	2	3	0.5833	0.6667	1

table; relative risk and odds ratio was calculated. Fischer exact test was used to compare the rate of intraoperative complications in cases and control groups. A *P* value of less than 0.05 was considered statistically significant. Table 1 shows the demographic profile and biometric measurements in both the groups which were comparable ($P > 0.05$).

Out of 10 eyes of the case group, seven had an intraoperative complication and three eyes in the control group had intraoperative complications. Multiple small radial iris sphincter tears [Fig. 1c] were noted in the pupillary margin by the surgeon in seven eyes in the case group and none in the control group during or on completion of surgery. Table 2 shows the frequencies of intraoperative complications in both groups. The relative risk of spontaneous iris sphincter rupture is significantly higher in MFH children as compared to the control group ($P = 0.00309$). However, for other complications odds were nonsignificant.

Postoperatively, none of the eyes developed intraocular lens (IOL) decentration, wound leak, or optic capture in both the groups. None of the children of intraoperative iris sphincter tear complications complained of any symptoms of intolerance to light, photophobia, and glare. Postoperative slit-lamp images of these children showed multiple radial iris sphincter tears in the pupillary margin [Fig. 1d and e] without any cosmetic awareness of defect by all guardians of children except one. Pupil reactions were sluggish in these eyes.

Discussion

MFH is an easily recognizable condition with characteristic facial appearance. It is characterized by depressed nasal bridge, hypertelorism, hypoplastic nose with peaked tip.[1]

The higher incidence of ocular abnormalities has been reported by Roarty *et al*. in frontonasal dysplasia cases which include significant refractive errors, strabismus, amblyopia, ptosis, microphthalmia, cataract, and retinal degeneration.[2] All of our patients had no other detectable systemic abnormality at the time of consultation except bilateral cataract with high myopia.

Cataract surgeries in high myopic eyes are known for increased risk of intraoperative complications which include posterior capsular tear, anterior capsule tear and zonular dehiscence.[3]

Cataract surgery in adults has been known to be associated with postoperative pupillary abnormalities. The reported incidences of iris sphincter ruptures both macroscopic and microscopic are 30.09% following extracapsular cataract extraction in adult. Direct iris trauma is known to cause pupillary sphincter abnormality during phacoemulsification in 5.3% cases.[4] Highly myopic eyes are also susceptible to sphincter tears during cataract surgery. A case was reported by Goverdan *et al*.[5] of spontaneous multiple iris sphincter ruptures in a 76-year-old man during phacoemulsification in a high myopic eye. They postulated the probable etiology is lens iris diaphragm retropulsion syndrome in this single case. However, there was no comment on a facial feature or any systemic association in their case. In our series, 70% of children of high myopia with MFH had spontaneous sphincter rupture during phacoaspiration, but none of the myopic children without MFH developed sphincter rupture. Our observation supports the theory that the underlying etiology is not only high myopia but maybe some iris hypoplasia or anterior segment dysgenesis or defect associated with midfacial abnormality leading to lax zonules and weakened iris sphincter and lens capsule.

Iris sphincter ruptures may be due to mechanical damage by infusion surge during phacoaspiration aggravated by susceptible weak iris sphincter and lax zonules. Phaco parameters were also quite high in our series which might attribute to spontaneous iris injuries. In three eyes of MFH cases which did not develop trauma to iris were because of our modifications of phaco irrigation aspiration parameters with lowering of the infusion bottle height and increasing the aspiration flow rate.

To support our hypothesis the numbers of cases are adequate with a comparative control group. However, it was observational case series, further confirmation might be needed by other ophthalmologists at multiple centers in the different ethnic populations.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. McWilliam J. Hypoplasia of the middle third of the face-a morphological study. Angle Orthod 1976;46:260-7.
2. Roarty JD, Pron GE, Siegel-Bartelt J, Posnick JC, Buncic JR. Ocular manifestations of frontonasal dysplasia. Plast Reconstr Surg 1994;93:25-30.
3. Fesharaki H, Peyman A, Rowshandel M, Peyman M, Alizadeh P, Akhlaghi M, *et al*. A comparative study of complications of cataract surgery with phacoemulsification in eyes with high and normal axial length. Adv Biomed Res 2012;1:67.
4. Yap EY, Aung T, Fan RF. Pupil abnormalities on the first postoperative day after cataract surgery. Int Ophthalmol 1996-1997;20:187-92.
5. Goverdhan SV, Madhavan C, Burgess SE. Spontaneous iris sphincter ruptures due to lens-iris diaphragm retropulsion syndrome during phacoemulsification. Eye (Lond) 2001;15(Pt 2):246.