Intraoperative Floppy Iris Syndrome

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Introduction

Phacoemulsification entails highly precise manipulations of the intraocular structures. If even one step goes astray, there is great potential for things cascading out of control, especially if the surgeon is relatively inexperienced. It is, therefore, very useful to have some idea of possible difficulties that one may encounter, and plan accordingly. One such entity that has been discovered recently is the *intraoperative floppy iris syndrome* (IFIS). It is perhaps the newest syndrome to be described in ophthalmology.

The discovery of IFIS is credited to Drs David F. Chang and John R. Campbell[1], who initiated prospective as well as retrospective studies based upon observations regarding a possible association of floppy irides with tamsulosin, a drug used by patients with prostatic hypertrophy.

Definition

IFIS is defined according to a triad of signs:

1. A floppy iris that billows in response to normal irrigation currents in the anterior chamber.
2. A marked propensity for the iris to prolapse to the phaco and sideport incisions.
3. Progressive pupillary constriction during surgery.

Figure 1: Iris billows in response to ordinary intraocular currents (photograph courtesy David F. Chang)

Clinical Features

IFIS differs from routine causes of small pupils and associated iris prolapse in that mechanical pupillary stretching or partial-thickness sphincterotomies that usually work so well otherwise, are ineffective in IFIS. This makes IFIS more dangerous than the 'routine' small pupil surgery. A second problem is that it is usually possible to make a reasonable capsulorrhexis with the help of viscoelastic induced mydriasis, but this mydriasis is not sustained once phaco begins, and by this time it is usually too late to safely employ iris hooks etc. In fact, IFIS pupils tend to constrict further with time, further complicating matters.

IFIS manifests in a wide spectrum, and the presentation may vary in severity between the two eyes of the same patient[2]. A classification of papillary behavior during surgery has been suggested as part of the study protocol followed by S. Manvikar and D. Allen[2].

Type 1 Pupil: good mydriasis preoperatively.
Type 2 Pupil: good mydriasis preoperatively but pupils constrict later during surgery.
Type 3 Pupil: a mid-dilated pupil initially that sometimes constricts later.
Type 4 Pupil: poor dilation at the beginning of surgery.

Although Flomax (tamsolusin) is the prime culprit identified, it has been suggested that other drugs may also be involved[3]. Association with diseases that cause endothelial dysregulation, such as congestive heart failure, diabetes and hypertension has also been speculated, although a different study[4] published around the same time definitively rules out diabetes as an association.

Management strategies

Managing IFIS begins with awareness. Once proper history has been taken and the surgeon knows that the patient is taking or has been on tamsolusin, IFIS can be anticipated. According to Dr. Chang, while hard data is yet unavailable, it would seem that IFIS does not occur until patients have been on tamsolusin therapy for approximately 4 to 6 months. The discontinuation of tamsolusin about two weeks before the cataract surgery seems to help a bit, but not consistently, and Dr. Chang has reported IFIS in a patient in whom tamsolusin had been stopped 3 years before the surgery. Tamsolusin induced IFIS seems to be semi-permanent in nature, possibly due to muscular atrophy and loss of tone of the dilator muscles of iris.

Three broad strategies have been described in the literature to handle IFIS. The first of these is the use of mechanical pupil dilating devices such as rings or iris

retractors. This strategy has the backing of Dr. Chang himself, who states that ***'iris retractors or a pupil expansion ring are the most reliable means of maintaining a safe papillary diameter during surgery'***.

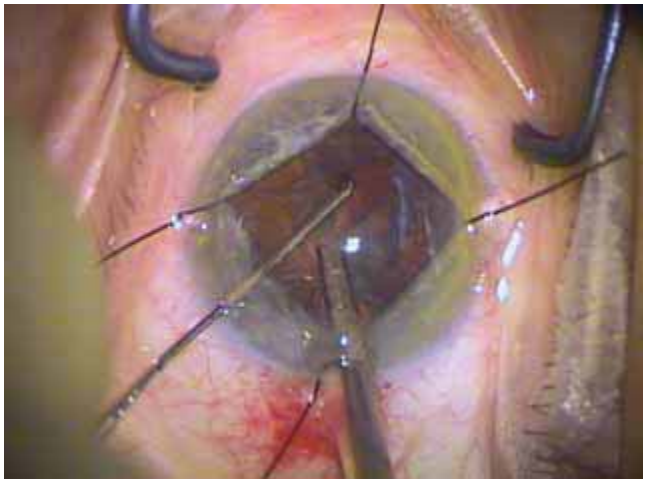

Figure 2: Iris retractors in place. The subincisional retractor goes through a separate stab incision (photograph courtesy David F. Chang)

Figure 3: Characteristic billowing and prolapse of the iris are evident after IOL insertion and removal of iris retractors (photograph courtesy David F. Chang)

The second strategy is to use stronger mydriatics preoperatively or intraoperatively. S Manvikar and D. Allen have reported that intraoperative pupilllary constriction was reversed with intracameral phenylephrine, which also

prevented iris prolapse and billowing and further pupillary constriction in patients who had medium to small pupils preoperatively[2]. Other recent studies also report that the preoperative administration of atropine or the intracameral use of phenylephrine effectively prevented the occurrence of IFIS [5,6].

The third strategy is the use of different types of viscoelastics to effectively tamponade the iris and perform phacoemulsification. Dr. Chang mentions that Healon-5 can be used effectively to dilate the pupil and prevent iris from prolapsing, and cites the support of Dr. Robert Osher and Dr.Douglas Koch in this approach. Dr. S.A. Arshinoff describes a multi-agent technique to tackle IFIS.

Arshinoff's strategy to manage IFIS[7]

The incisions should be tight to prevent fluid egress and movement of the floppy iris towards the main incision or the side port. A longer tunnel helps to keep the iris out. The anterior chamber is filled through the phaco incision with sodium hyaluronate 3%–chondroitin sulfate 4% (Viscoat) until the anterior chamber is 75% to 80% full. Healon-5 is then injected onto the surface of the anterior capsule, thereby pushing the existing gel towards the corneal dome. The injected Healon should reach only upto the papillary edge. This serves as a physical fracture line between the two gels and keeps the iris steady and prevents miosis. The outer soft shell is important because dispersive viscoelastics tend to stay in the eye longer, and the Healon-5 will serve to limit the access of fluid to this outer shell, prolonging its life.

A water pocket is next made over the lenticular surface by injecting BSS under the Healon-5 layer. This provides safe passage for hydrodissection fluid to exit the eye and a working space for phacoemulsification later. Hydroprocedures are to be performed using short bursts of fluid.

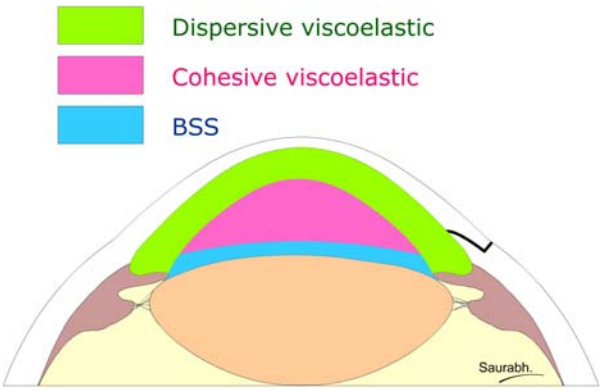

Figure 4: Viscoelastic placement in Arshinoff's strategy for IFIS (after Arshinoff)

The capsulorrhexis is kept a little smaller than the pupil, which confines fluid currents to the centre and minimizes iris disturbance.

While performing cataract surgery, care is taken to keep the aspiration rate as low as possible. Aspiration should only be turned on when nuclear material is actively being aspirated in order to minimize disturbance of the shell.

If the soft shell is disturbed during surgery, it can be easily formed again. Dr. Arshinoff reports excellent iris stability with this technique.

About tamsolusin

Tamsulosin (Flomax; Boehringer-Ingelheim Pharmaceuticals, Inc., Ridgefield, CT) is one of several systemic alpha-1 blockers. It highly specific to alpha-$_1$ receptor subtype A, which is found in the musculature of the urinary bladder and dilator muscles of the iris. It improves urinary outflow by relaxing the smooth muscle in the prostate and bladder neck. Flomax is also prescribed for some women with urinary retention, and therefore IFIS is seen in males as well as females.

Since tamsolusin is a very well tolerated drug otherwise, and proper surgical planning for cataract patients with IFIS yields satisfactory results, it is yet too early to banish it from our therapeutic armamentarium. However, both ophthalmologists and urologists need to be educated about the possibility of IFIS in tamsolusin users.

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