THE MANAGEMENT OF TRAUMATIC IRIS INJURIES

ANDREEA MARIA HÂNCU[1], SEBASTIAN ILIE SUCIU[2], LORANT KISS[3]

[1,2]County Clinical Emergency Hospital Sibiu, [2]"Lucian Blaga" University of Sibiu

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Abstract: *The traumatic iris injuries are extremely challenging and require a proper management in order to restore the anatomical integrity of the eye. In the majority of cases the surgical treatment is necessary in order to achieve the best clinical outcome. The purpose of this work is to highlight the appropriate surgical management of traumatic iris injuries and the surgical procedures which are necessary to restore both the iris' anatomy and function.*

The significant iris injuries are important signs of cilliary body trauma. The iris must be carefully examined for the presence of wounds, membranes, intraocular foreign bodies (IOFBs) and also for the presence of iridodialysis. The pupil's examination is very important and involves the assessment of its static and dynamic components. The inflammation process determines the pupil to become smaller and may produce a "muddy" appearance due to the swollen vessels and protein debris.(1,2)

The surgical approach of traumatic mydriasis:

The condition requires surgical correction if it determines photophobia which compromises the visual acuity. The mydriatic pupil should be addressed during the vitrectomy. The purpose is to remove the scar tissue from the pars plana, ciliary body and the back surface of the iris. It is not always possible to remove the scar completely and even if it is successfully removed the mobility of iris or pupil is not certain.(1,3)

If there is a radial laceration which is the cause of the sphincter muscle's dysfunction, transcameral suture is the best option to restore the anatomy.(1)

The surgical procedure of transcameral suture for damaged iris sphincter muscle: it is very important to check very carefully that there is no synechia as any synechia has to be broken before suture:

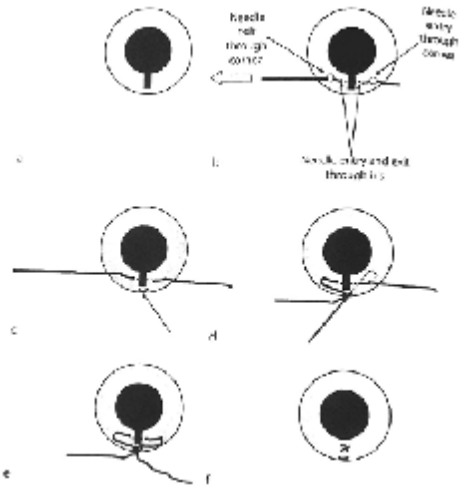
a. With a curved or straight needle, enter the anterior chamber outside de visual axis. As soon as the suture has been pulled through, cut off the needle.

b. Make a paracentesis between the two needle entry or exit points, over the iris defect and not far away from where the knot will be.

c. Engage the two sutures above the iris and pull them out from the anterior chamber through the paracentesis.

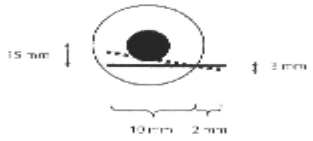
d. The next step is to tight the sutures. The iris should not be firmly fixed as it will be tented as the suture is tightened. A rigid iris or a wide lesion requires an intraocular suture. For the intraocular suture, a paracentesis on both sides is needed. The needle enters the anterior chamber through one paracentesis, picks up the iris and exit through the other paracentesis. The suture is tied. It is very important to make the knot inside the anterior chamber without tenting the iris. The next step is to allow the iris to slide back and therefore the gap in the iris will disappear or become very tiny. In a phakic eye, this procedure is performed after injecting viscoelastic under the iris.(1)

Figure no. 1. Transcameral suture for damaged iris sphincter muscle (1)



Transcameral needles are very difficult to use and are extremely challenging for the surgeon (figure no. 2). The more forward the needle's position in the anterior chamber is, the smaller movement with the needle holder is needed. To use the needle easier, the needle's entry point should be brought very close to its intracameral target or another instrument (vitrectomy forceps) might be used to guide the needle inside the anterior chamber.(1,4,5)

Figure no. 2. The difficulties using a long transcameral needle (1)



[1]Corresponding author: Andreea Maria Hâncu, Str. George Enescu, Nr. 2A, Ap. 4, Sibiu, România, E-mail: andreansy@yahoo.com, Phone: +40749 589124

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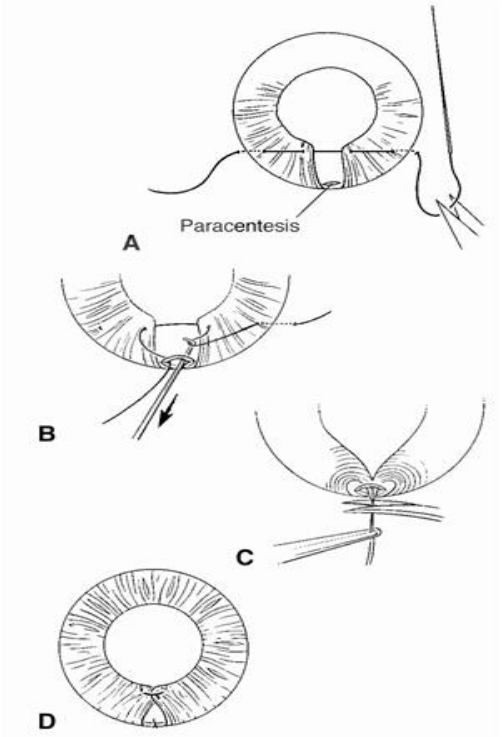
If the needle is 10 mm long inside and 2 mm outside the anterior chamber, a 3 mm movement at its external end with the needle holder results in a 15 mm movement of the needle's tip in the anterior chamber. Because in real life this situation is three-dimensional, the difficulty is even greater.(1,4,5)

Any suture placed into iris must provide a permanent lock as there is no iris healing. The suture material must be nonabsorbable (10/0 or 9/0 polypropylene) on a straight or curved needle and the knot must be very secure. If the sphincter muscle is completely non-functional, an iris cerclage suture should be performed.(1,4,5)

The surgical approach of iris laceration/coloboma

Surgery should be taken into account if the lesion determines a pupillary dysfunction, visual disturbances or represent a significant cosmetic problem. The surgical procedure is similar to the one described above for the sphincter muscle injury (figure no. 1).(1,6) Another surgical procedure is the MacCannel technique.

Figure no. 3. MacCannel technique (6,7)



A. Limbal paracentesis over the iris defect. Through peripheral cornea and the edges of the iris a needle is passed and the suture is cut.
B. A hook is introduced through the paracentesis and around the suture
C. The suture is tied.
D. Cut the suture and allow the iris to retract. (6,7)

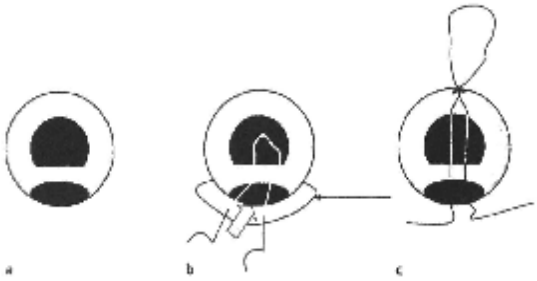
Surgical options in case of iridodialysis:

An iridodialysis might be asymptomatic if it is covered by the upper lid.

Surgical reconstruction is recommended if the condition causes visual disturbances (monocular diplopia, glare, photophobia).(1,2,8,9)

The surgical technique of suturing an iridodialysis very close to the iridodialysis area, a scleral bed is performed and there it is created a limbal wound.(1,8,9) A double- armed suture with curved needles is used to catch the iris root and to pass into the scleral bed.(1,10,11) The next step is to cut the needles , tight the suture and close the scleral bed.(1,12,13) It might be necessary more than one suture. A straight double-armed suture is passed through the incision, avoiding the capture of corneal tissue with the needle. Then the needles are passed through the iris root and exit the sclera at 1 mm from the limbus, cut away and the suture is tightened. The knot is compressed and turned into the scleral channel (figure no. 4c).(1,14,15)

Figure no. 4. The surgical technique of suturing iridodialysis (1)



The management of acute traumatic aniridia, "the case of the missing iris"

The iris can be found completely extruded in some severe ruptures. It is also possible that the iris to be rolled up and pulled posteriorly by fibrin and scar tissue (pseudoaniridia). The earlier such an iris retraction is discovered, the easier its unrolling is. Pulling the iris back to its normal position presents several risks:

- In case of scarring, the iris can be torn from its root.
- A forceful pull can lead to a severe bleeding.
- If the forceps is squeezed too strongly, the pupillary margin can be seriously damaged.(1,16)

Corrective options for traumatic aniridia:

- *Iris print contact lens* – simple and easily reversible.(1,17)
- *Corneal tattooing* – simple and effective; the epithelium is healing over the tattooed region; the colour fo the new "iris" can be customized.(18)
- *Implants (iris prothesis)* – various devices are available; they might be used for partial or total loss of the iris and certain types combine an intraocular lens as well; the colour can also be customized.(1,19,20,21,22,23)

Conclusions:

Although it is very challenging to achieve, restoration of the iris is one of the most rewarding procedure of ocular traumatology. Iris surgery is an important part of the reconstructive microsurgery. Also, it is important not to underestimate the value of the pupil's appearance. Large traumatic iridodialysis may lead to chronic glare and diplopia and often require surgical repair. For iris lacerations, transcameral suture is the best option to restore the anatomy of the iris. For large lacerations multiple sutures may be used. The surgical repair of iridodialysis can be successfully combined with other anterior chamber surgeries such as trabeculectomy, pars plana vitrectomy or cataract surgery.

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