

# Instrument to Manage Radial Tear in Continuous Curvilinear Capsulorrhesis (CCC)

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**Purpose:** To evaluate the surgical outcome difficulties and complications of managing radial tear in continuous curvilinear capsulorrhesis by using lunar punch.

**Material and Methods:** A prospective case series of sixteen patients who developed tear in the continuous curvilinear capsulorrhesis during cataract surgery at eye unit-III of Sindh Govt. Lyari General Hospital and Dow University of Health Sciences Karachi from July 2008 to June 2009. Upon recognition of a radial extension of the anterior capsule. Lunar Punch was introduced beneath the radial tear by rubbing over the lens cortex and punched to convert it into a lunar edge. After this maneuver capsulorrhesis was completed in a usual manner. After securing the capsulorrhesis the procedure of phacoemulsification was performed in the usual manner.

**Results:** There were ten (62.5%) males and six (37.2) females with a mean age of 45.5 years. Predisposing factors for extension of capsulorrhesis were shallow anterior chamber in 1(6.3%) cases, inexperienced surgeon in 6(37.6%) cases, inadequate local anesthesia in 1(6.3%) cases, intumescent cataract in 1.(63%) cases, positive vitreous pressure in 3(18.8%) cases, hypermature cataract in 2(12.2%) cases and weak zonules in 2(12.2%) cases. Some complications resulted during and after the procedure were postoperative striate keratopathy in 3 (18.8%) cases, vitreous loss in one (6.3%) case and lens dislocation in one (6.3%) case. Eleven (68.8%) cases had no complication. We achieved success in fourteen (87.5%) cases.

**Conclusion:** Managing radial tear in CCC by using lunar punch is a safe and effective procedure, which can be adopted easily and effectively

Radial tears during continuous curvilinear Capsulorrhesis (CCC) are one of the most unwanted events that a surgeon may experience during cataract surgery. Many authors to handle this problem have described different techniques. Attempted redirection of the tear advocated by Mackool<sup>1</sup>. Completing the procedure from opposite side by making a tear of larger size<sup>2</sup>. All these maneuver fails when the tear extends up to the zonular attachment and the surgeon is left with no choice to convert it into extra capsular cataract extraction<sup>3</sup>. Another developing technique is to suture the anterior capsule but the results in human subjects are still awaited<sup>4</sup>. Integrity of the posterior capsule is needed for good centration of intraocular lens,

prevention of their tilting and more recently for correct fixation of multi focal and accommodating intraocular lenses<sup>5,6</sup>. There are many predisposing factors which may leads to a radial tear in the capsulorrhesis such as a shallow anterior chamber, weak zonules as seen in pseudoexfoliation syndrome (PEX), high positive vitreous pressure, intumescent and hypermature cataracts, pediatric cataracts and a surgeon with minimal experience performing capsulorrhesis<sup>7</sup>.

Keeping all these facts in mind we describe a new technique to deal with radial tears even if it extends up to the zonular attachments by using an instrument called Lunar Punch (Fig 1-2).

## BACKGROUND/PRINCIPLE

Circular opening in a trampoline does not extend while the small linear tear extends, in the same way as if the edge of a cloth is loosing thread and we cut the cloth in a zigzag pattern it will no longer be losing threads and become stable. Spear shaped edges have a potential to extend while round edges does not.

## MATERIAL AND METHODS

This study was conducted at the department of Ophthalmology Unit-III of Dow University of Health Sciences Karachi from July 2008 to June 2009.

## SURGICAL TECHNIQUE

Upon recognition of a radial extension of the anterior capsule, needle or forceps was immediately withdrawn, viscoelastic 2% injected to fill the anterior chamber via the incision. Incision was enlarged to 3.0 mm.. When injecting viscoelastic into the anterior chamber care was taken not to overfill. Lunar Punch of 3.0mm with lower lip of the central tip was introduced beneath the radial tear by rubbing over the lens cortex and punched the capsule to convert it into a lunar edge (Fig.3). After this maneuver capsulorrhexis was completed in a usual manner. In situations when the tear extended beneath the iris, an iris hook was used to retract the iris, visualizing the extent of the tear and punching method used in the same way. After securing the capsulorrhexis the procedure of phacoemulsification was performed in the usual manner. Success was defined as completion of CCC without extension of radial tear or vitreous loss.

Data was entered and analyzed on SPSS version 15 for windows. Frequency distribution tables were used to present the data. Mean and standard deviation were used for continuous variables. Categorical variables were presented as proportions and percentages.

## RESULTS

From July 2008 to June 2009 sixteen patients developed radial extension of capsulorrhexis who were managed by Lunar Punch. There were ten (62.5%) males and six (37.2) females. Mean age of the patients was 45.5 years. Predisposing factors for extension of capsulorrhexis (Table I) were shallow anterior chamber in 1(6.3%) cases, inexperienced surgeon in 6(37.6%) cases, inadequate local anesthesia in 1(6.3%) cases, intumescent cataract in 1.(63%) cases, positive vitreous pressure in 3(18.8%) cases,

hypermature cataract in 2(12.2%) cases and weak zonules due to pseudoexfoliation in 2(12.2%) cases. Difficulties encountered during this maneuver were difficulty to introduce the lunar punch due to shallow anterior chamber and thickness of the punch in two (12.2%) cases and formation of tear between eleven and one o'clock in two (12.2%) cases for which an incision at 6 o'clock was made to overcome the problem. Some complications resulted during and after the procedure were (Table 2) postoperative striate keratopathy in 3 (18.8%) cases, vitreous loss in one (6.3%) case and lens dislocation in one (6.3%) case. Eleven (68.8%) cases had no complication. We achieved success in fourteen (87.5%) cases.

**Table 1:** Predisposing Factors for formation of Radial tear in CCC.

Factors	Frequency n (%)
Shallow Anterior Chamber	1 (6.3)
Inexperienced Surgeon	6 (37.6)
Inadequate Local Anesthesia	1 (6.3)
Intumescent Cataract	1 (6.3)
Positive vitreous pressure	3 (18.8)
Hypermature cataract	2 (12.5)
Weak zonules due to pseudoexfoliation	2 (12.5)
Total	16 (100)

**Table 2:** Intra-operative and Post-operative Complications

Complications	Frequency n (%)
Vitreous Loss	1 (6.3)
Lens Dislocation	1 (6.3)
Striate Keratopathy	3 (18.8)
No Complication	11 (68.8)
Total	16 (100)

## DISCUSSION

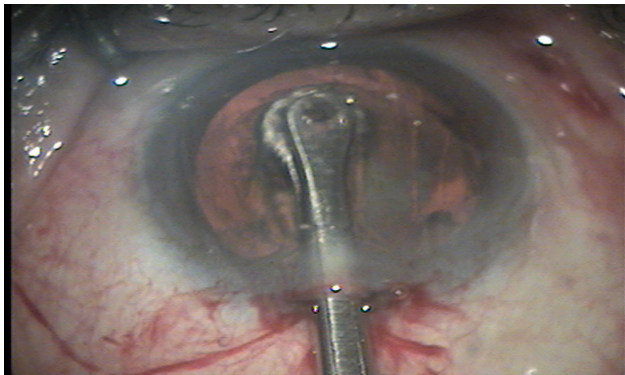
Cataract surgery is a state of art surgery. There is an all or none law effective in this procedure. Capsulorrhexis is the main stay in this procedure. Majority of capsulorrhexis are done easily but if vitreous pressure is high then it can extend peripherally. Beginner's fear for the extension of



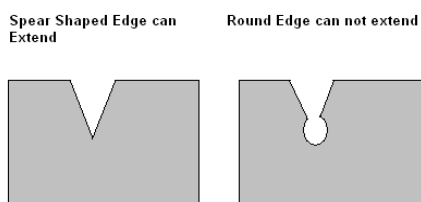
**Fig. 1:** The Lunar Punch



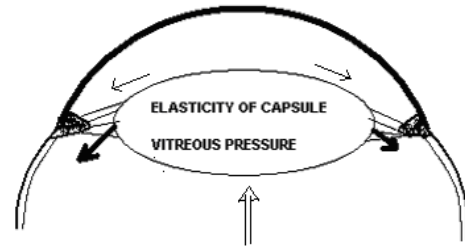
**Fig. 2:** Magnified Tip of the Lunar Punch.



**Fig. 3:** (Wahab S and Ahmed J) Lunar Punch in the Anterior Chamber.



**Fig. 4:** Principle of extension of tear in round edge



**Fig. 5:** Biomechanics of Capsule and Zonules Showing Zonular Pull (Thick Black Arrows), Elasticity of capsule (Thin Arrows), Vitreous Pressure (Hollow White Arrow)

capsular extension in periphery. This lunar punch is useful to stop the extension. The principle is based on the round edge as shown in (Fig. 4). Biomechanics of the capsule and zonules play the role in extension of elastic capsule which is encircled with pulling zonules outwards (Fig. 5). Spear shaped edge of the tear is converted into round edge with the lunar punch. It is a cost effective procedure. Since costly alternatives are bipolar diathermy and vitrectomy probe by which we can take help. Both are costly and not available always. This lunar punch can work even if the tear has extended in the zonular area. Disadvantages are that it is thick and sometimes difficult to introduce in shallow anterior chamber of the hypermetropic eyes. This can be managed by making the punch finer by decreasing the thickness of the tip. One should not deepen the anterior chamber too much because it could be counter productive. Capsulorrhexis should be started at six o'clock position so that extension could easily be managed by the punch. Extension at six o'clock should be avoided because for that a new wound will be required at six o'clock to introduce the punch. This instrument can be useful in the armamentarium of a cataract surgeon. Limitations are deep sunken eyes. Other alternatives could be Radio frequency diathermy, Pulsed electron avalanche knife<sup>8</sup>, Fugo Plasma Blade and Vitrectomy cutter.

### CONCLUSION

Successful capsulorrhexis can be done without extension of capsular flap running behind the iris and lens equator. Spear shaped edge is converted to smooth round edge, which does not extend peripherally.

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### REFERENCE

1. **Mackool RJ.** Personal Phacoemulsification Techniques. In: Buratto L, Werner L, Zanini M, Apple DJ, editors . Phacoemulsification: Principles and Techniques. Second Edition. Thorofare, USA: SLACK Incorporated. 2002. 363-73.
2. **Braga- Mele R.** My Capsulorrhesis Flap Tore Radially How should I proceed? In Chang DF, Kim T, Oetting T A, editors. Curbside Consultation in Cataract Surgery: 49 Clinical Questions: Thorofare, USA: SLACK Incorporated. 2007; 86-8.
3. **Fishkind WJ.** Complications in Phacoemulsification: Avoidance, Recognition, and Management. 1st ed. Thieme: 2002;. 42.
4. **Kleinmann G, Chew J, Apple DJ,** et al. Suturing a tear of the anterior Capsulorrhesis.Br J Ophthalmol 2006;90:423-426
5. **Menapace R, Kriechbaum FO, Koeppl KC.** Accommodating intraocular lenses: a critical review of present and future concepts. Graefe's Archive for Clinical and Experimental Ophthalmology. 2007; 245: 473-89.
6. **Sarikkola A, Uusitalo R, Laatikainen L.** Quality of vision after AMO Array multifocal intraocular lens implantation . Journal of Cataract & Refractive Surgery. 2004; 30: 2483-93.
7. **Mohammadpour M.** Management of Radial Tears during Capsulorrhesis. Techniques in Ophthalmology. 2006; 4: 56-9.
8. **Priglinger SG, Heritoglou C, Palanker D, et al.** Pulsed electron avalanche knife for capsulotomy in congenital and mature cataract. J Cataract & Refractive Surg. 2006; 32: 1085-8.