

CRYO EXTRACTION OF SENILE CATARACTS

(A Modified Approach & Reappraisal)

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SYNOPSIS

A modified approach in the extraction of senile cataracts by using the cryogenic probe is described.

The results of five hundred intracapsular extractions done by this method are analysed. A comparison of this method of extraction employing a smaller incision, multiple buried sutures, chymotrypsin and the Amoil's cryoprobe with standard and other modified methods is made. An attempt to demonstrate and confirm the increased safety of this modified method at the same time allowing earlier ambulation is made.

INTRODUCTION

The use of freezing methods to remove cataracts is one of the more common uses to which ocular cryogenic instruments are being applied. It has found its advocates in glaucoma and retinal detachment surgery too. Ocular cryosurgery as we know it today was first introduced in Singapore in the Eye Department of Outram Road General Hospital by one of the authors (R.C.K.L.) in 1967. The authors have presented their modified approach to the cryoextraction of senile cataracts which they have found simpler and perhaps, in their opinion, even safer than methods used in the past, at the 6th Congress of Medicine 1971. They would like to present their up to date results of 500 extractions and slight variations in technique which have evolved since then.

Operation Technique Employed

1. Anaesthesia is either general or local and the usual premedication is given.
2. A conjunctival flap, limbal based, is made, almost triangular in shape, from 10 o'clock to 2 o'clock, after retraction of the lids by sutures and a superior rectus bridle suture is placed.
3. The flap is dissected down to the limbus with Tooke's knife. Light cautery to coagulate prominent blood vessels along line of incision is made.

4. Two Half scleral thickness incisions are made with a piece of razor blade. Two preplaced virgin silk sutures are inserted and the free ends are looped into knots for safety and quick closure of the wound.
5. The Anterior Chamber is entered with razor blade with deft strokes and widened slightly.
6. The scleral wound is widened further with the corneal scissors up till 10 o'clock and 2 o'clock positions and slightly further beyond these points. The wound opening is usually between 120° to 140° and no more.
7. Two peripheral iridotomies are done at 12 o'clock and 10-30 or 1-30 o'clock.
8. Chymotrypsin is now instilled and allowed to remain from 2½ to 3 minutes at full or ½ strength depending on the patient's age. A little pressure is applied just beyond the limbus to help rupture of the Zonule.
9. The A.C. is washed out with normal saline.
10. The cornea is pulled forward by the conjunctival flap.
11. The A.C. is dried out. This is important to prevent unnecessary freezing in neighbouring tissue.
12. The iris is retracted with Mac Clures retractor carefully. This is where good assistance is important. However over the last 120 cases, we have used an iris repositor with the one hand, to push the iris aside, and the cryoprobe with other. The assistant pulls the flap forwards.
13. The cryoprobe is switched on and applied very gently on the superior end of the anterior surface of the lens capsule.

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14. The sliding technique is employed and the iris is released at the same time the lens is brought out.
15. Replacement of iris is done, if necessary.
16. The cornea-scleral sutures are pulled tight.
17. Air is injected into the A.C. and the sutures are then knotted.
18. 3-4 other post placed virgin silk sutures in the early cases and now 8-9 additional sutures are inserted at regular intervals in order to make the wound water tight.
19. Eserine $\frac{1}{2}\%$ is instilled and a subconjunctival dose of Framygen is given.
20. The eye is closed and covered with a pad and bandage. Only the operated eye is covered.

Post Operative Therapy

1. Only one eye is padded i.e. the operated. The patient may be propped up if desired on the day of operation.
2. The patient may even be allowed to get up to micturate if needed, with help, from the day of operation.
3. He is allowed to sit up in bed on the first post-operative day. The eye is dressed and covered with a pad and Cartella Shield. He is allowed toilet facilities.
4. He may walk about on the 2nd day after operation.
5. He is discharged on the 5th or 6th day and occasionally earlier if patient requests it and it is not inconvenient for him at home and he can find his way to the clinic for dressings.
6. No sedation with Phenergan and Largactil is administered.

Early ambulation is encouraged but the patient is warned not to bend down or over and not to strain throughout the first few weeks after operation.

Results

Table I shows that of 500 senile cataracts operated on by this approach, there were only 2 failures and all the cataracts were removed intracapsularly. All types, cuneiform, cupuliform, mature, intumescent, brown cataracts and cataracts in high myopes were done by this method. The 2 failures can be attributed to poor Zonulysis and the extraction had to be completed with Arruga's capsule forceps.

TABLE I
ANALYSIS OF SENILE CATARACT
EXTRACTIONS PERFORMED BY
THE MODIFIED METHOD

No. of operations	Complete Intracapsular Round Pupil	Failures	Percentage of successful intracapsular extractions
500	500	2	99.6%

Table II shows the analysis of significant complications incurred in this method. Striate Keratitis was very mild in 40 cases and all cleared up rapidly in 2 to 3 days. Trauma to the endothelium was minimal as the cryoprobe was applied to the upper part of the anterior surface of the lens, exposed by drawing the cornea forwards by 45° - 60° and hooking or pushing the iris with the special retractor or iris reposer upwards and away from the lens. Hyphaema or blood in the Anterior Chamber

TABLE II
ANALYSIS OF COMPLICATIONS OF EXTRACTIONS PERFORMED BY THE
MODIFIED METHOD

Type	Number
Striate Keratitis	40 very mild (all cleared up rapidly in 2-3 days)
Hyphaema	20 all mild
Prolapse Iris	2
Slightly Shallow A.C.	25
Flat A.C.	Nil
Prolapse Vitreous	Nil
Late complications	Nil (12 months to 48 months follow-up)

was seen in 20 cases, all of which were mild and cleared up rapidly in a few days without intervention or further immobilisation.

Prolapse Iris occurred in 2 patients. These were unfortunate in that, despite 5 corneo-scleral sutures and a conjunctival suture, the prolapses occurred. However both had good reasons for these. The prolapses occurred on the 5th and 6th day after operation. The prolapsed irides were abscised without any untoward results. Both patients were quite restless and developed severe coughs in the post operative period.

Perhaps in both cases, an added factor could have been that the post placed sutures were not spaced apart regularly. That was the impression we had. These two occurred early in our series and since then, with even more careful attention to the placement, number and spacing of sutures, we've had no further incidents like these two.

A slight shallow Anterior Chamber occurred in 25 cases but none of them gave us any anxious moments and no corrective surgery was needed. The majority occurred after discharge and could be due to relatively excessive activity in their post operative recovery period at home.

No prolapse of vitreous occurred in any of our case. This perhaps best demonstrates the safety that this method provides. The chymotrypsin ensures no traction on the vitreous. The cryoprobe, by removing the necessity to press on the lens and yet allowing the capsule to adhere to the probe on touch, reduces any likelihood of the lens dislocating into the vitreous or pressure being applied on the vitreous.

No late complications have been seen after followups for the period of 12-48 months.

Table III and Table IV show the immediate comparison of the various groups of extraction of senile cataracts done by different methods. It can be seen that as far as complications are concerned, the present modified method is in no way inferior and in fact superior to all the other methods.

DISCUSSION

The authors believe that this method used by them is simpler and at the same time safer. It is simpler because of the following:—

- (i) A much smaller section is required.
- (ii) All types of senile cataracts can be removed *intracapsularly* by this method.

- (iii) The capsule will always be gripped because the capsule is frozen on the probe. The probe may fail (due to blockage, power failure, or drop in CO₂ pressure) but we have always kept a disposable cryoprobe ready for such emergencies.
- (iv) Manipulation with the probe is absolutely gentle. No pressure, or counter pressure is necessary. Chymotrypsin removes the need to use heavy traction.
- (v) It is removed expeditiously with no manipulation or manoeuvring in the A.C., by the sliding method.

It is safer for the following reasons:—

1. The smaller section allows quicker healing.
2. Better closure is achieved with the 9 to 11 cornea-scleral sutures.
3. There is therefore less likelihood of prolapse iris post operatively.
4. There is a lesser risk of vitreous prolapse at the time of surgery. Manipulation in the A.C. is minimal.
5. There is no danger of rupture of the capsule or inability to get a hold of the lens.
6. There is no pressure used on the lens and therefore less likelihood of the lens dislocating into the vitreous.
7. The danger of hyphaema and infection (None in our series) is minimised as the wound is smaller.

There are added advantages in:—

- (i) Earlier ambulation—less risk as the wound is smaller.
- (ii) Quicker post operative recovery and discharge from hospital also because the wound is smaller.
- (iii) The astigmatic correction needed is about 1. OD (against the rule) and certainly as good or better than the figures of 1.2 D and 1.6 D in previous results. The smaller section could possibly be responsible for this improvement.

The only disadvantages as can be seen are in:—

- (i) The need for an assistant to hold up the conjunctival and corneal flap. This is quite important to make sure that the cornea is pulled away from the probe and

TABLE III
COMPARISON OF DIFFERENT GROUPS DONE BY DIFFERENT METHODS

Group	Cases	Failures	Striate Keratitis	Hyphaema	Prolapse Iris	Slightly Shallow A.C.	Flat A.C.	Prolapse Vitreous	Late Complications
I	500 Intracapsular round pupil	2	very mild in 40	20 all mild	2	25	—	—	—
II	30	2	very mild in 5	2 all mild	Nil	4	—	—	D.R. (1)
III	100 Intracapsular	3	20 all mild	9 all mild	5	15	2 requiring air injection	3	Aph. Glaucoma (1) D.R. (1)
IV	404	16	No record	36	20	50	5 requiring air injection	10	Aph. Glaucoma (3) D.R. (4)
V	50	5	Mild in 12	4	3 (one torn iris) several stuck to iris	10	2 requiring air injection	3	Epithelisation (1) Aph. Glaucoma(1)

Explanation:

- Group I — Group of senile cataracts extracted intracapsularly by the modified method.
- Group II — Group of senile cataracts extracted intracapsularly by conventional Arruga's capsulic forceps with 5 c.s. sutures and without chymotrypsin and early ambulation.
- Group III — Group of senile cataracts extracted intracapsularly with chymotrypsin (graded) and Arruga's forceps.
- Group IV — Group of senile cataracts extracted intracapsularly in O.R.G.H. by several surgeons with one or two cornea-scleral sutures and Arruga's forceps and conventional post-operative treatment.
- Group V — Group of senile cataracts extracted intracapsularly with cryosurgery but without chymotrypsin and with a 180° or open sky technique (tumbling lens out) with 2-3 c.s. sutures.

TABLE IV
COMPARISON OF THE GROUPS

Group	Size of Wound	Type of Cataract	Failures	Manipulations in A.C. e.g. Pressure	Speed	Complications due to technique e.g. vitreous prolapse	Special Assistance	Chymotrypsin and possible ill-effect
I	small 120°-140°	all senile types	Yes—occasional 2 out of 500	Negligible	Fast	Nil	No	Yes but not seen
II	bigger 170°-180°	Difficult with intumescent and brown cataract	Yes—rupture and slipping	Yes	sl. slower	Possible	No	No
III	bigger 170°-180°	Difficult with intumescent and brown cataract	Yes	Yes—less than Gr. II	Fairly Fast	Yes	No	Yes
IV	180°	Difficult with intumescent and brown cataract	Yes	Yes	slower	Yes	No	No
V	180° to gr. 180°	All Senile Types	Yes	Yes—quite good deal of trauma to cornea and iris	slow	Yes	Yes	No

the lens. The timing of releasing the retraction is also quite important.

- (ii) The use of Chymotrypsin and its deleterious effect on wound healing and the trabeculae are well documented. However if care is exercised as to the strength, duration of exposure, and the avoidance of unnecessary spillage, and the careful drying up of the wound edges, the effect should be minimal. In addition it can certainly be reduced by putting in more sutures as we've done. Our personal experience of twelve years with chymotrypsin has done nothing to shake our confidence in its use if it is used judiciously.

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