Dept. Vet. Surgery,
Fac. Vet. Med., Assiut University,
Head of Dept. Prof. Dr. M.T. Nassef.

CATARACT EXTRACTION IN DONKEYS EVALUATION OF 19 CASES

(With 3 Tables & 16 Figures)

By

N.A. MISK; F.M. MAKADY and A.M. SAYED

(Received at 29/4/1992)

إستخراج الكتاركتا (السد) في الحميـــــر
تقييم ١٩ حالة

نبيل مسك ، فتحي مكادي ، أشرف سيد

تم في هذا البحث وصف الإجراءات الجراحية لإستخراج السد من عين الحمـــــار ثم أجريت العملية على ٢٤ عين بها سد عدسي (أظلام العدسة) لتسعة عشر حمارا مـــن الجنسين (١٤ حالة فردية وه حالات مزدوجة) · أنواع وأشكال مختلفة للكتاركتـــــا كانت موجودة بهذه الحالات · في ٢١ عين كانت مصابة بسد ناضج أو فوق ناضـــــــج أستخرجت العدسة بمحفظتها لعتامتها بينما أستخرجت العدسة بدون محفظتها الشفافـــة في ٣ عيون · في أثناء الجراحة برز السائل الزجاجي للعين (بروزا كليا أو جزئيـــا) في ٩ عيون من ٢٤ عين أجريت بها الجراحة أي بنسبة ٥ر٣٧ · تم متابعة الحالات لعـــدد تراوحت بينمن ٣ إلى ٦ شهور · كانت نتائج العمليات كالتالي : ١١ عين (٨٠ر٤٥٪) عادت لها الرؤية ولم يحدث بها عتامة في جزء من القرنية ، ٥ عيون (٢٠٪) حدثت بهـــا عتامة للقرنية بالكامل و ٢ عين (٣٠ر٨٪) فقدت سوائلها ولذلك فقدت الرؤية بالكامل · ولقد كانت الأسباب الرئيسية لبروز السائل الزجاجي هو وجود سيولة فيه ولم يتم تشخيصها قبل إجراء العملية ، كذلك وجود إلتهاب بالقزحية لم يتم علاجه تماما قبل إجراء العملية · ووجود بعض الأخطاء أثناء إستئصال العدسة ، أما عتامة القرنية بالكامل فقد كان سببهـــا هو وجود أوديما وإلتهابات بالقرنية · كذلك كانت الإلتهابات الناتجة عن الخيط الجراحي المستخدم في قفل خزانة العين الأمامية هو السبب في حدوث عتامة في الجزء العلوي مـــن القرنية · أما فقدان السائل الزجاجي للعين فقد كان السبب الرئيسي في تدهورها ·

SUMMARY

A surgical procedure for extraction of a cataracteous lens from a donkey was described and performed on 24 cataracteous eyes of 19 donkeys of both sexes (14 unilateral and 5 bilateral). Intracapsular extraction technique was used for treatment of mature and hypermature cataract (21 eyes) while extracapsular technique was used for lenticular cataract in which the lens capsule was transparent (3 eyes). During surgery, vitreous presentation (either complete or partial) occurred in 9 eyes out of 24(37.5%). The follow-up of the cases varied between 1-6 months. The results and the fate of operation were, 11 cataracteous eyes (45.80%) had complete recovery, 6 cataracteous eyes (25%) had partial corneal

opacity, 5 cataracteous eyes (20.80%) had complete corneal opacity and 2 cataractous eyes (8.30%) had phthesis bulbi. The main cause of vitreous presentation was the presence of syneresis of vitreous humor which could not be diagnosed before operation, the presence of iridocyclitis which could not be treated completely before operation and some mistakes during destruction of the zonules. Complete corneal opacity was mainly due to corneal edema and inflammatory condition. Partial corneal opacity may be due to the inflammatory processes induced by the suture material at the sclerolimbal incision. Phthesis bulbi was mainly due to complete vitreous presentation and collapse of the eyeball.

INTRODUCTION

Extracapsular and intracapsular lens extraction have been evaluated in horses with normal lenses (VAN KRUININGEN, 1964) and cataracteous lenses (STARTUP, 1955; GELATT, 1977 and LAVACH, 1990). LEWIS (1964) stated that cataracteous lenses were removed from two ponies less than a week old with normal post-operative ampulation.

The main reason that equine cataracts were not surgically treated was that no one had adequately developed and described a satisfactory technique. VAN KRUININGEN (1964) added that there was no standard procedure for cataract extraction in equine making each attempt looks like a new advention. ROBINSON (1983) stated that the success rate for cataract extraction in foals less than 6 month of age was 75% and the percentage decreased in older foals which are more difficult to medicate post-operatively and have a higher incidence of hypermature cataracts.

With the advent in equine veterinary hospitals, improved methods of equine anaesthesia and highly advanced surgical techniques adopted in man and dogs it seems necessary to try a suitable technique for cataract extraction in equine.

The purpose of this study is to describe a surgical technique for cataracteous lens extraction in donkeys and to present findings based on a total number of 24 cataracteous lens extraction.

MATERIAL and METHODS

The surgical procedure was practiced on 24 cataracteous eyes of 19 donkeys of both sexs (14 unilateral and 5 bilateral), ranged from 2-13 years old presented to the Clinic or collected from animal markets. The cataracteous eyes included 7 lenses having immature cataract (Fig. 1), one immature cataract with subluxation (Fig. 2), 12 mature cataract (Fig. 3, 4 & 5), 2 hypermature, one hypermature with posterior synechiae and one hypermature with anterior luxation. Food and water were withheld for 24 hours before operation. The eyelashes and vibrissae were clipped with scissors and the hair covering the eyelids was clipped and shaved. The conjunctival sac was flushed by B.S.C. Solution and the periocular skin was disinfected with bovidine 10%. The animal was placed in lateral recumbency and the head was situated over a soft

mattress to keep the eye on a horizontal level. The animal was covered with sterile draps and the eye with special one keeping it bared. Head loupes (2-5 x) and surgical microscope (10X) were used with good source of illumination.

Isopto-atropine 1%, phenylephrine 1% and isopto-maxidex 0.1% eyedrops were instilled 3-4 times daily for 3 days prior to surgery. Also cambison eye ointment was applied twice daily for 3 days and one subconjunctival injection of forticortin (8 mg dexamethasone in 2 ml solution) 24 hours prior to surgery.

Analgesia and anaesthesia were accomplished by local instillation of Benoxinate Hcl 0.4% applied every 1-2 minutes, 10 minutes before operation and continued during surgery when needed, retrobulbar infiltrations of 5-10 ml of 2% xylocaine Hcl, auriculo-palpebral nerve block with 5 ml of 2% xylocaine solution, chloral hydrate narcosis 10% solution injected intravenously (IV) in a dose of 5 gm/50 Kg b.w. and thiopental sodium 5% solution (IV) until all reflexes subsides.

Surgical procedure :

1- Lateral canthotomy was performed to provide increase exposure of the globe during surgery. Two curved mosquito artery forceps were applied to the lateral canthus forming 45 angle between them for 1-2 mintues then removed. A v-shaped ischemic area was formed. The thumb and forefinger were used to stretch the lateral canthus and a sharp blunt-tipped straight scissors were used to perform the canthotomy.

2- Fornix-based conjunctival flap was performed to cover the corneo-scleral wound post lens extraction. The bulbar conjunctiva was grasped with forceps at 12 O'clock position and incised 1 mm from its limbal attachment. The incision was extended medially and laterally to the 3 and 9 O'clock positions. The bulbar conjunctival flap was undermined for two cm from the limbal region to expose the insertion of the dorsal rectus muscle.

3- Eyelid speculum was applied to retract the eyelids and conjunctival flap. A silk bridle suture was passed under the insertion of the dorsal rectus muscle to provide a method of positioning the globe during surgery.

4- Entry into the anterior chamber was performed 2-3 mm from the limbus at 12 O'clock position (Fig. 6&7), cauterization of a 3 mm width scleral zone was performed using a strabismus hook heated on a direct flame. A pointed sclapel blade No 11 was used for entry into the anterior chamber. At 12 O'clock position, the dorsal angle of the anterior chamber is covered by scleral shelf which extends for 2-3 mm and fads gradually laterally and medially until the angle becomes clearly evident. The procedure of entry was performed with a slow but steady pressure on the sclera using the scalpel holded in the right hand and the globe was fixed using the bridle suture in the left hand. The scalpel blade was withdrawn in the same direction of entry and once the anterior chamber was entered, aqueous humour escapes with partial collapse of the anterior chamber. The scleral incision was then enlarged with left and right castroviejo corneal scissors to the desired length in both directions which was usually

between 3 and 9 O'colock positions (Fig. 8 & 9). The corneal scissors were designed to have a rounded lower blade 1 mm longer than the upper one. This allow to keep the blade within the anterior chamber during incision to reduce trauma to the intraocular structures. The dorsal half of the cornea was reflected ventrally using tissue forceps (Fig. 10).

5- Sphincterotomy or iridectomy were performed when mydriasis was not complete. Small incision into the iris was performed between the two processus irides through the sphincter muscle located at the pupillary border. When partial iridectomy was performed the dorsal quadrant of the iris from 2 to 10 O'clock position including the processus irides was removed (Fig. 11 & 12).

6- Sliding delivery of the intracapsular cataract was used for extraction of the lens. The anterior lens capsule was grasped by Schwiger capsular forceps. Pressure was applied inferiorly at the limbus while the capsule was grasped and the lens was pulled slowly upward and rocked gently from side to side (Fig. 13). A blunt metal probe was used to facilitate breaking down of the lateral and medial zonules and a lens spoon was introduced under the lens to carry it, then the lens was slowly delivered. In cases of hypermature cataract with or without subluxation of the lens, this procedure was easy and zonules were found partially ruptured or stretched.

The use of the cryoprobe in an intracapsular lens extraction was performed in may cases. The probe yields a firm attachment to the anterior lens capsule. In these cases completely dilated pupil was necessary. A cellulose sponge or iris hook was used to maintain the iris away from the freezing probe. The cryoprobe was activated and placed on the superior quadrant of the anterior lens capsule. After 4-6 seconds an ice ball was formed on the anterior lens capsule then rotatory movements were used to break the zonular attachment and to remove the lens.

When the animal was suffering from immature or mature cataract and the anterior lens is transparent, extracapsular extraction of the cataracteous lens was performed. The anterior lens capsule was opened by the cystetome or pointed scalpel blade in a half circle manner starting from the left side and going on a parallel line to the limbus to the right side. The dorsal segment of the capsule was reflected down and then removed. Once the anterior capsule was opened, the dorsal border of the lens was extruded outward. Lens forceps or cryoprobe was applied to this part of the lens and the lens was completely removed. Delivery of the lens in this way was very easy and occurs without any additional surgical manipulation.

7- After lens removal either by intracapsular or extracapsular method, reflected cornea was returned back to it normal postion and closure of the wound was started at its middle using vicryl No. 6-0 with eyeless needle. Three interrupted stitches were applied 4 mm. apart at the scleral wound and then proceeded in both directions to the limbal wound until complete closure. A total number of 8-12 stitches were applied and the bridle-suture was removed. Fornix based conjunctival flap was gently drawn down to cover the sclero-limbal wound and anchored at 9 and 3 O'clock position with

two stitches using 6-0 vicryl. Eyelid retractor was removed. Canthotomy incision was sutured using skin suture alone and allowing the conjunctiva to heal by second intension. All cataracteous lenses removed during surgery were preserved in 10% formalin for further studies (Fig. 14).

8- Post-operative care included subconjunctival injection of Decadron phosphate, continued atropinization and topical corticosteroid antibiotic instillation for 2-3 weeks.

Complications occured during surgery as well as the fate of operations were recorded at different periods post-operatively.

RESULTS

The results of the present work are illustrated in tables 1, 2 & 3 and Figures 15, 16.

DISCUSSION

Three basic anatomic incisions have been suggested by many authors to gain entry into the anterior chamber, namely, limbal, corneal and scleral (VAN KRUININGEN, 1964; BISTNER et al., 1977; GELATT, 1981; MISK, 1988 and LAVACH, 1990). Each of these approaches have certain advantages and limitation. In equines, we found that the angle of the anterior chamber specially at the dorsal segment (from 10 to 2 O'clock position) is usually hidden from view by the projection of the oblique edge of the scleral limbus. Entry into the anterior chamber in donkeys was performed through scleral incision 2 to 3 mm from the limbus at this position and then extended through the limbus. No haemorrhage was detected during incision taking in consideration that this area was previously cauterized before entry into the anterior chamber. VAN KRUININGEN (1964) advised the use of scleral incision for entry of the anterior chamber in horse. On the contrary, GELATT (1981) stated that a diffuse haemorrhage was detected in scleral incision negates its use in the dog.

From our point of view, the presence of a narrow strip of sclera with the cornea after completion of sclerolimbal incision facilitates grasping and reflection of the dorsal half of the cornea ventrally without touching the cornea. In addition, closing of the anterior chamber well occurred through suturing of the scleral incision without traumatizing the cornea itself.

The extracapsular method for extraction of the lens was the most popular method for may years (MAGRANE, 1969). In extracapsular extraction, the anterior lens capsule, lens cortex and nuclear material are extracted. The posterior lens capsule remains intact adjacent to and frequently attached to the anterior hyaloid membrane. In our present results in most cases of mature and hypermature cataract, the lens and lens capsule were completely opaque and severely adhesed together thus extracapsular extraction was impossible.

In most of our clinical cases intracapsular extraction of cataracteous lens was obligatory. This technique was suggested by many authors (VAN KRUININGEN, 1964; STARTUP, 1965; BISTNER et al., 1977 and LAVACH, 1990). In spite of the fear of anterior vitreous presentation, trials have been performed before surgery to reduce the intraocular pressure and decrease incidence of the anterior vitreous presentation. Among these trials, intravenous injection of mannitol have been tested without any satisfactory results. Moreover, massaging of the closed eyeball before surgery for several times may be helpful.

In cases of hypermature cataract, the lens was found in many instances loosely attached to the cilliary body and thus subsequently facilitated its extraction.

LAVACH (1990) stated some arguments against lens removal in equines. He mentioned that horses without a lens are not considered sound, since vision is altered although they may be servicable. In our clinical cases, donkeys are not used for sport and racing purposes and only are obligated to act as working animals. Also, the same author added that horses are large and difficult to restrain and post-operative medication is considered problem, however, donkeys are queit animals and application of post-operative medication was possible. He also added that vitreous presentation during surgery can cause detachment of the retina. This complication cannot be overcomed completely in our present study. However, ophthalmic surgery with special reference to cataract needs experienced ophthalmic surgeons.

Vitreous presentation (either complete or partial) occurred in 9 cases out of 24 with a percentage of 37.5%. From our point of view, the main cause of vitreous presentation was the presence of syneresis of vitreous humor which cannot be diagnosed before operation, the presence of iridocyclitis which cannot be treated completely before operation and some mistakes during destruction of the zonules. However, in many cases the suspensory ligament was found partially or completely distracted due to enlargement of lens or its displacement.

Corneal opacity occured in 5 cases mainly due to corneal edema and in very rare cases due to inflammatory condition resulting in permanent keratitis. However, generalized corneal opacity was a serious complication most often resulting from damage of corneal endothelial cells from surgical trauma with a lens spoon or other instruments or from excessive irrigation and application of different medicaments to the anterior chamber. Fortunately, most cases of corneal edema which results from endothelial damage are transient and gradually clear up within few weeks post-operatively.

Partial corneal opacity was recovered in 6 cases out of 24. This may be due to the inflammatory process induced by the suture material at the sclerolimbal incision and supposed to subside later on after complete absorption of these materials during life.

Phthesis bulbi was recorded in 2 cases out 24 mainly due to complete vitreous presentation and collapse of the eyeball.

REFERENCES

Bistner, S.; Gurrie, A. and Batik, G.S. (1977): Atlas of Vet. Ophthalmic surgery. 1st ed. W.B. Saunders Company, Philadelphia, London and Toronto. 180-200.

Gellatt, K.N. (1972): The Eye. In Equine Medicine and Surgery. 2nd ed. American Veterinary Publications. Wheaton, IL. 247-272.

Gelatt, K.N. (1981): Textbook of Veterinary Ophthalmology. Lea and Febiger Philadelphia. 185-201.

Lavach, D.J. (1990): Large Animal Ophthalmology. The C.V. Mosby Company. Baltimore, Philadelphia, toronto.

Lewis, F. (1964): Ellicott City, Md. Personal Communication.

Magrane, W.G. (1969): Cataracts extraction: An evaluation of 104 cases. Journal of Small Animal Practice Vol. 1: 163-168.

Misk, N.A. (1988): Fundemental of Veterinary Ophthalmology, Fac. Vet. Med., Assiut University, Egypt, 128-134.

Robinson, N.E. (1983): Current Therapy in Equine Medicine. W.B. Saunders Company, 319-325.

Startup, F.G. (1965): Lower temperature cataract extraction. The Veterinary Record Vol. 77 No. 34: 978-980.

Van Kruiningen, H.J. (1964): Intracapsular cataract extraction in horse. Journal of Amer. Vet. Med. Ass. 145: 773-785.

LEGENDS

Fig. 1: Immature cataract in 8-year-old male donkey.

Fig. 2: Subcapsular immature cataract with lens luxation in 5-year-old donkey.

Fig. 3: Mature cataract 7-year-old male donkey.

Fig. 4: Mature cataract in 10-year-old female donkey.

Fig. 5: Mature cataract with head pin subcapsular opacitis in 10-year-old female donkey.

Fig. 6: Entry to the anterior chamber in a case of immature cataract. Note: A scalpel blade No. 11 is used at 12 O'clock position 2-3 mm from the limbus.

Fig. 7: Entery to the anterior chamber in a mature cataracteous eye. Note: Processus irides are absent and mydriasis is not complete. Surgery indicates syneresis and may be retinal detachment.

Fig. 8: Widening of the sclero-limbal incision using castroveijo corneal scissors towards 3 O'clock position. Immature cataract with subluxation of the lens.

Fig. 9: Widening of the sclero-limbal incision towards 9 O'clock position.

Fig. 10: Reflection of the dorsal half of the cornea.

Fig. 11: Dorsal quadrant iridectomy. Two vertical incision are made at 10 and 2 O'clock positions.

Fig. 12: Dorsal quadrant iridectomy. One horizontal incision at the base of the two vertical ones to complete iridectomy.

Fig. 13: Intracapsular lens extraction in a mature cataracteous eye.

Fig. 14: A number of cataracteous lenses (a) with normal lenses for comparison (b) All fixed in 10% formalin.

Fig. 15: Compelete recovery after intracapsular cataracteous lens extraction in 9-year-old donkey one month after surgery. Note the presence of a narrow zone of corneal opacity along the sclerolimbal wound.

Fig. 16: Cornel opacity at the dorsal 1/3 of the cornea with pigmentation and slight superficial vascularization of the cornea 3 weeks after surgery in cataracteous eye in a 7-year-old donkey.

Table 1: Illustrates methods of cataracteous lens extraction, complications which occured during operations as well as fate of operation.

No.	Sex	Age (years)	Type of cataract	Type of operation	Complication during operation	Fate of operation
1	male	4	immature with iridocyclitis	extracapsular ext.	complete vitreous presentation	phthesis bulbi.
2	male	9	mature	extracapsular ext.	partial vitreous presentation	corneal opacity & complete blindness.
3	male	6	hyper mature	intracapsular ext.	———	partial opacity of dorsal 1/2 of cornea.
4	male	2	mature	intracapsular ext.	complete vitreous presentation	complete recovery within 5 weeks.
5	female	9	mature	intracapsular ext.	———	complete recovery within 4 weeks.
6	male	3	mature	intracapsular ext.	complete vitreous presentation	corneal opacity.
7	female	2	mature	intracapsular ext.	———	partial opacity of dorsal 1/3 of cornea.
8	male	8	hypermature with anterior luxation	intracapsular ext.	complete vitreous presentation	corneal opacity.
9	male	9	mature	intracapsular ext.	———	complete recovery.
10	male	5	immature	extracapsular ext.	complete vitreous presentation	complete opacity of the cornea.
11	male	4	immature	intracapsular ext.	———	partial opacity of dorsal 1/2 of cornea.
12	male	9	hypermature with post. synechiae	intracapsular ext.	partial vitreous presentation	corneal opacity and complete blindness.
13	male	6	immature with iridocylitis	intracapsular ext.	synerosis	phthesis bulbi.
14	male	2	hypermature	intracapsular ext.	———	complete recovery.
15	female	9	immature	intracapsular ext.	———	complte recovery.
16	male	3	mature	intracapsular ext.	———	complete recovery.
17	female	2	immature	intracapsular ext.	———	partial opacity of dorsal 1/3 of cornea.
18	male	8	mature	intracapsular ext.	partial vitreous presentation	complete recovery.
19	male	9	immature with sub-luxation of lens	intracapsular ext.	———	complete recovery within 4 weeks.
20	male	5	mature	intracapsular ext.	partial vitreous presentation	partial opacity of dorsal 1/3 of cornea.
21	male	4	immature	intracapsular ext.	———	complete recovery within 3 weeks.
22	male	9	mature	intracapsular ext.	———	partial opacity of dorsal 1/2 of cornea.
23	male	6	mature	intracapsular ext.	———	complete recovery within one month.
24	male	2	mature	intracapsular ext.	———	complete recovery within 2 weeks.

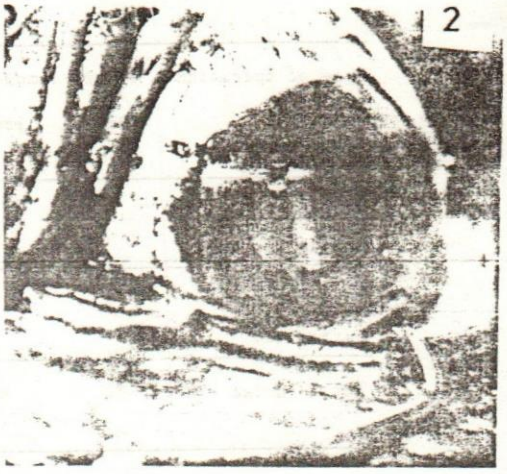
Table,(2):Showing the number of lens extraction performed either by extra or intracapsular method in relation to vitreous presentation during operation.

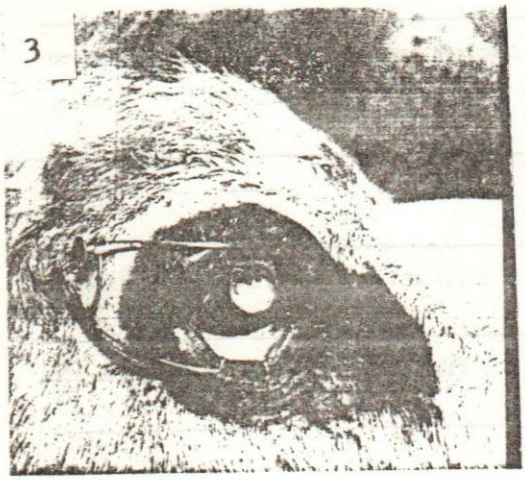
Type of operation	Total No.	Complete vitreous presentation	Partial vitreous presentation	No vitreous presentation
Extracapsular extraction	3	2 (66.60%)	1 (33.30%)	-------
Intracapsular extraction	21	1 (4.70%)	5 (23.80%)	15 (71.40%)
Total number	24	3 (12.50%)	6 (25.00%)	15 (62.50%)

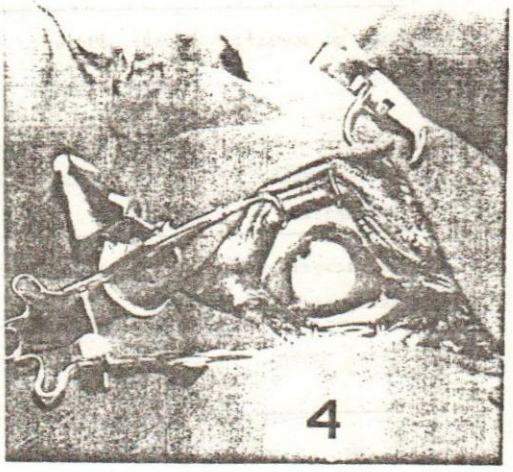
Table,(3):Showing the number of cataract operation performed either by extra or intracapsular method in relation to fate of operation.

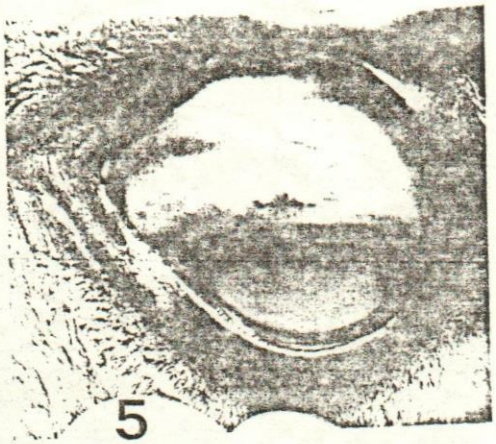
Type of operation	Total No.	Phthesis bulbi	Complete corneal opacity	Partial corneal opacity	Complete recovery
Extracapsular extraction	3	1 (33.30%)	2 (66.60%)	------	------
Intracapsular extraction	21	1 (4.77%)	3 (14.80%)	6 (28.50%)	11 (52.30%)
Total number	24	2 (8.30%)	5 (20.80%)	6 (25.00%)	11 (45.80%)


1

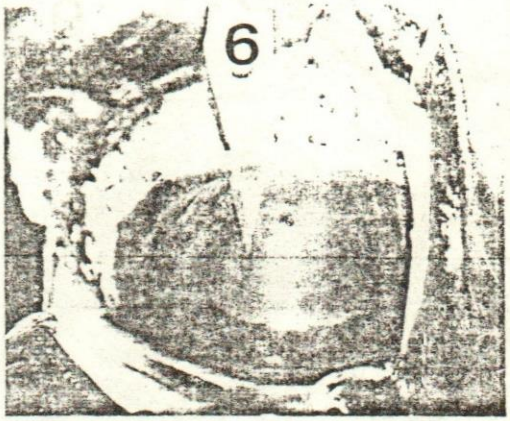

2


3

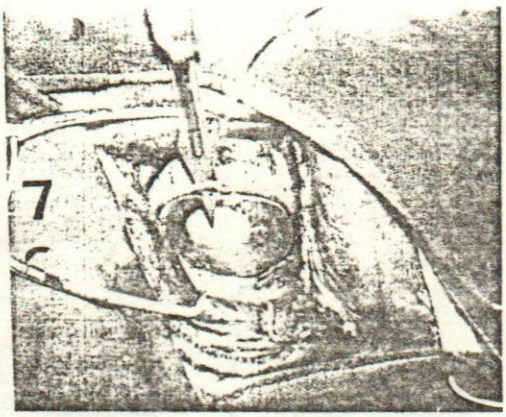

4



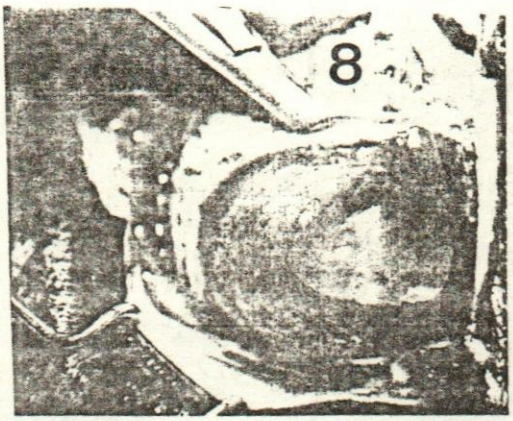
5



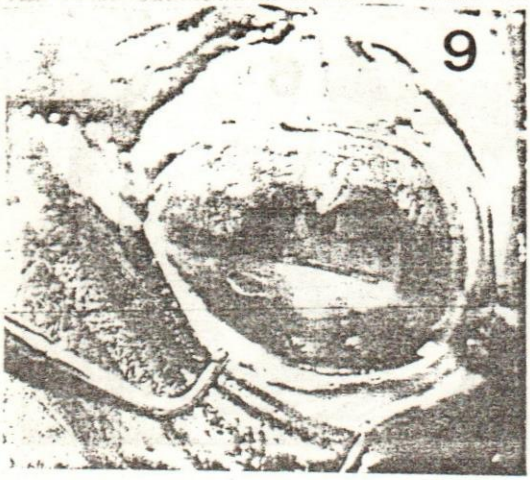
6

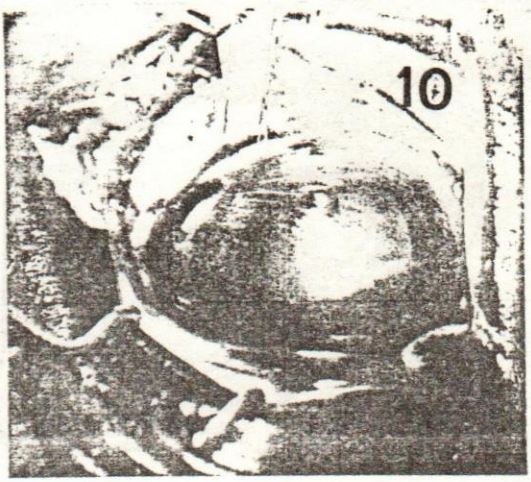


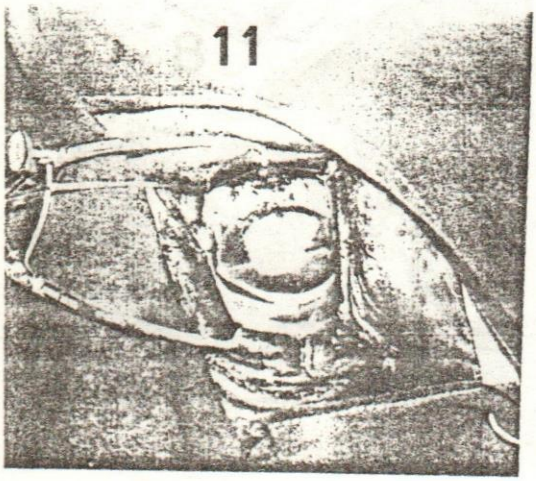
7

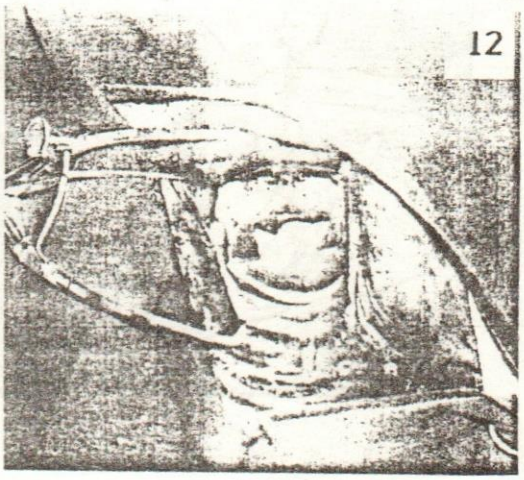


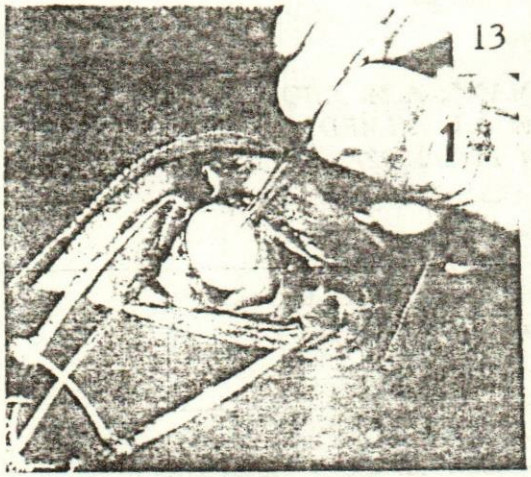
8


9

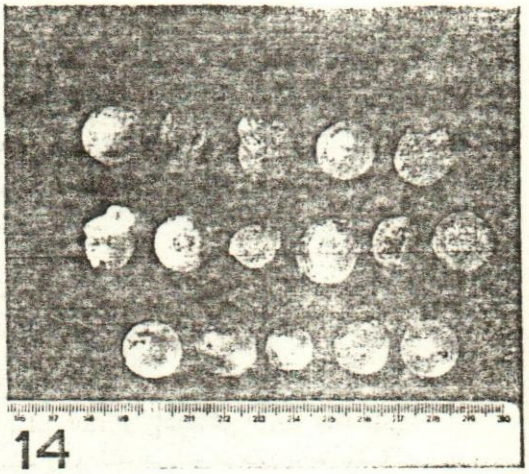

10


11

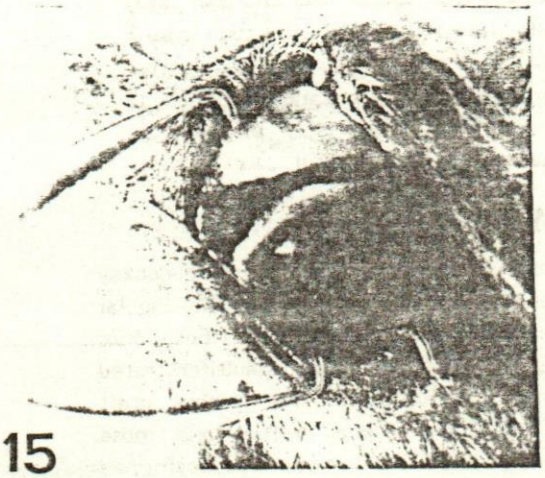

12



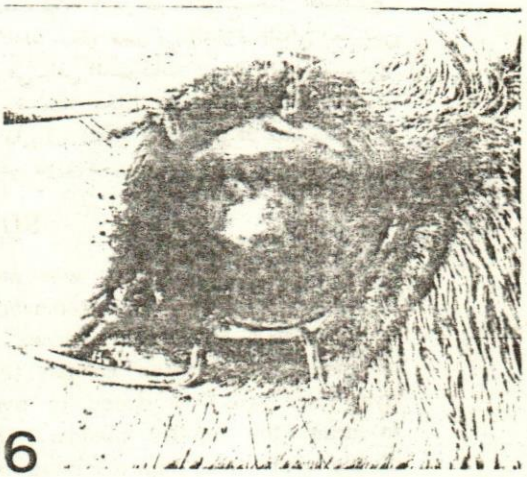
13



14



15



16