

CATARACTS SURGERY IN DOG BY EXTRACAPSULAR EXTRACTION, MINI-NUC METHOD

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Summary

Cataracts in dogs belong to the eye pathology. It occur whatever the breed and age of the dog. Its etiology is equivocal. The clinical sign consists in the opacities of the lens, resulting in progressive loosing of the vision on one or both eyes. Men were preoccupied over the years to reestablish or at least to improve the vision of the affected dog by conservative treatment or surgery. The results of these treatments and efforts aren't always the desired ones. The efforts were made in an attempt to reestablish (or at least to improve) the vision of man's unselfish companion or defender, the dog, knowing the inefficacy of the medical conservative treatment. It is only the cataract surgery that can be useful. Although the opinion of the national and international specialists concerning the etiopatogeny, the opportunity for lens extraction, the technique, the costs, the instruments and materials needed are disputed, I view it as a justified intention because of the aspects stated above. We choose out from the methods described in the main literature on the subject the extra-capsular extraction of the cataracts by the mini-nuc method, because of the availability of the instruments and the surgery technique and the results consisting in improvement of the eye vision when retina tunic is not affecting.

Key words: cataracts, lens, extra-capsular extraction, dog.

Cataract formation is the most common abnormality of the lens. Significant vision deficits can occur when the lens is opaque from cataracts. Cataracts are classified by a variety of methods, but the most common method are by age at onset, stage of maturity, location in the lens, and percentage of lens involvement.(1).There is no medical therapy for treatment or prevention of cataract formation. Surgical removal of cataracts is the treatment of choice if restoration of vision is desired. There are several techniques that are described and are being used to remove cataracts in veterinary practice. Microsurgical training, cataract surgery training, and proper instrumentation are essential to performing cataract extraction.(6) Extra capsular cataract extraction(ECE) is removal of the lens cortex and nucleus, leaving the lens capsule intact, other than the removal of a small portion of the central anterior lens capsule (capsulotomy).This is a successful procedure for the removal of cataracts in dog. Treatment after surgery is aimed at diminishing the typically severe intraocular inflammation preventing infection and preventing intraocular adhesion. Common long-term complications include posterior capsular fibrosis, elevated intraocular pressure, excessive prolonged inflammation, retinal detachment, and persistent corneal edema.(2,10)

Materials and methods

We performed the extracapsular extraction of the lens (ECE) by mini-nuc method from adapted from human ophthalmology. The advantage is a small opening of the anterior chamber, because in ECE in dogs after the opening of the anterior chamber occurs the collapse of the cornea and hypotonicity of the eye globe.

The animals were first examined and for surgery were chosen only those with a good health and in a good condition, without any other eye globe pathology.

In order to apply the surgical removal cataracts we examined next dogs:

Patient 1. Male dog, commune breed, 11 years – bilateral cataract

Patient 2. Male dog, commune breed, 14 years – bilateral cataract

Patient 3. Female dog, Cocker Spaniel, 12 years – bilateral cataract

Patient 4. Male dog, German shepherd, 7 years – bilateral cataract

Instrumentation: Graefe lancet, Crescens knife, cornea knife or V-lance, sclera knife, discizor needle for capsulotomy, ophthalmologic scissors for conjunctivotomy, scissors, blefarostat, maintainer, anatomical forceps, ophthalmologic holders, Annel needle, atraumatic needles, Hagedorn needles, canulas, perfusion set, saline solution, sterile gauze, surgical biomicroscope.(5)

Presurgical preparations The animals were first of all examined and only the healthy ones were elected for the surgery. Three days before the surgery the animals were given general antibiotics. Daily they got instillations with antibiotics and anti-inflammatory eye drops. We used Spersadex (with Cloramfenicol and Dexametazona) On the surgery day the dogs got instillation with Atropina 1%, two hours before starting the surgery, each 15 minutes in order to produce the needed mydriasis.

Anesthesia The general anesthesia needed for lens extraction was of type N-NLA (Narconeuroleptanalgesia). We proceeded as follows: first of all we injected i.m. Xilazin, 2mg/kg. After 10 minutes we injected Ketamina, 2-5mg/kg. Just before the surgery we injected Tiopental i.v., approximately 11mg/kg, until the reflexes disappeared and until the akinezia of the eye globe was present. To obtain even a better eye globe akinezis and a protrusion of the eye globe we proceeded also to perform retrobulbar anesthesia with Lidocaine 1%.

In lateral recumbency on the surgical table, the animal's head being fixed by a helper so that the eye globe may be displayed as much as possible horizontal to provide anterior chambre's drainage of the perfusion liquid.

Extracapsular extraction by mini-nuc metod: surgical technique. We maintained the palpebral fissure wide open by using the blefarostat. *Corneal port-side performing:* the corneal port-sides are two little corneal incision performed by the corneal knife (V-lance). One of the port-sides has to be made at 5 or 6 o'clock level to apply the maintainer. The other port-side will be at 9 or 10 o'clock level to introduce the discizor needle for capsulotomy. The incisions will be approximately 15 grades. *Application of the maintainer:* the maintainer is a type of cannula we

introduced in the port-side at 5 o'clock level. It is manual connected through a perfusion set to a physiological serum bag. The role of the maintainer is to irrigate continually the anterior chamber and the eye globe, to help to remove the cataract nucleus and to prevent the cornea collapse after the anterior chamber had been opened. It is a new and very useful method, easy to be performed, replacing the utilization of the very expensive viscoelastic products.

Perilimbal conjunctivotomy: in order to open the eye globe a very important step forward consisted in conjunctivotomy. The first incision of the conjunctiva was made with the ophthalmologic knife upon which we used the conjunctiva scissors, lightly oblique to the sclerocorneal limbus at a distance of 3mm. The conjunctival incision was approximately 120-150 degrees long. Its role is to uncover the sclera in order to open the anterior chamber, but also to cover the scleral wound for a better healing. The best place to do this incision was at the superior limb at 12 o'clock level.

Opening of the anterior chamber: it is a special step in extra-capsular extraction, especially as regards its technique. We realized it by the sclerocorneal approach. First there had to be an incision of the sclera, 120 degrees long at 12 o'clock level with the sclera knife, followed to do a tunnel between the sclera and cornea with the Crescens knife. The position of the knife being with the blade and point oriented from below upwards. The resulting sclerocorneal wound has to be like a "tunnel", with the big base looking at the anterior chamber and the opening to the exterior. This form is very important for expelling the lens. It has to fit closely in the wound. The pressure created through perfusion by the maintainer the cloudy lens will progress step by step to the exterior, very alike to the birth process. One will even use the expression "birth of the nucleus".

Anterior capsulotomy: it represents the opening of the anterior crystalloid to extract the nucleus from its bag. We chose the "beer can opener" technique. For the anterior capsulotomy we used the discisor needle – a needle specially prepared and shaped. It will be introduced in the anterior chamber through the port-side at 9 o'clock. The needle will perforate the capsule and cut little radial incisions from the periphery to the center, very careful not to harm the corneal endothelium and not to unwind the Zinn zonulla, otherwise the surgery would be compromised. The title of the procedure resembles the opening of a can. It is aimed to remove as much as possible of the anterior capsule (5).

Posterior capsule hydrodissection: it's the detaching of the lens' posterior capsule in order to move the lens in the anterior chamber. We used a cannula adjusted for a syringe filled with physiological serum. The cannula had to be introduced starting from the limit of the anterior capsulotomy to the equatorial area all the way injecting the serum to the posterior capsule in order to expel the lens. It has to be proceeded very carefully not to dislocate the zonula Zinn or perforate the posterior capsule or else there will be loss of vitros.

Luxation of the lens in the anterior chamber: after the hydrodissection, the lens has to be brought into the anterior chamber for the final extraction. We

increased the flow of the serum in the perfusion and the lens nucleus had been luxated in the anterior chambre by the Annel needle. It has to be done very carefully not to unwind the posterior capsule (8).

Removal of the cloudy lens: the lens being in the anterior chamber, we used a clip or a hook to rotate it to be sure that there aren't any connections between the lens and the posterior chamber. It has to be rotated very carefully to break the adherence or connection if there is any and to obtain total mobility. The next step is to increase the flow of the liquid in the anterior chamber so that the lens may progress towards the sclerocorneal incision for evacuation. Once at the incision, the inferior side will be depressed with a glide (a piece of plexiglas 3cm/5mm) at the same time pressing the sclera so that the lens may progress forward. To be repeated several times until the lens will be removed from the anterior chamber. (3,5)

Removal of the cortex and capsular rests: by continual irrigation of the anterior chamber which will lead eventually to the mobilization of the rests, followed by their aspiration with a syringe with cannule. Capsular rests are to be cut one by one with the ophthalmologic scissors.

Suture of the surgical wound: it refers to the suture of the incision at the bulbar conjunctiva in some separate points. We used Prolene 8.0 in 3 different points with the knots placed inferior to prevent conjunctival irritation. After the removal of the maintainer, we introduced physiological serum with a syringe and some air to put the iris into right position. .

After the surgery daily examination of the dogs, instillation with Spersadex for 7-14 days after the surgery until recovery from the post surgical inflammation.

Results and discussions

After examination of the 4 patients mentioned above ECE by mini-nuc method was practiced on 3 eye globes.

Patient 1. The dog had bilateral cataract with total loss of the vision. After careful examination we found in the left eye the luxation of the lens in vitreos, more exactly a total zonulolysis but without loss of the vitreos. The owner of the dog told us about an accident in which the dog had been involved resulting in opacities of the lens. The owner did agree with our decision of right lensectomy.

Diagnosis: Mature bilateral cataract. Left lens luxation

Patient 2. The dog had bilateral cataract with total loss of the vision and could hardly move around. The owner did agree with the surgery. Established diagnosis after examination: senile bilateral cataract. We couldn't get any other information nor could we have some supplementary examinations to specify the cataract type.

Patient 3. The dog had bilateral cataract. The owner did not agree to take the risk of the surgery after listening to the recovery chances. He favored instead the treatment with topical colir.

Patient 4. The dog had mature unilateral cataract, the owner couldn't remember any trauma in the history. Being unilateral and the dog being able to move around, the owner decided to postpone the surgical treatment.

Actually ECE was performed in case 1 and 2, on 3 eye globes, case 2 having a bilateral surgery, case 1 only on the right eye.

General anesthesia of the patients, by combination of Xilazina + Ketamina, plus Tiopental Sodic i.v., provided the necessary conditions for the surgery. Although one can read in the specialized literature about necessity of intubation and gas anesthesia, the procedure involved allowed us to perform the surgery without any difficulties. One difficult appeared in patient 1. Tiopental is active only for a short period of time. The animal patient reacted to pain when we were to close the conjunctiva so we had to supplement the Tiopental dose. For a total akinezia of the eye globe in case 2 we performed also retrobulbar anesthesia with Lidocaina. The quality of the anesthesia was superior to that of case 1 and we obtained also the propulsion of the eye globe to the exterior, a benefic position for the surgery. For ECE in man the specialist will perform only retrobulbar anesthesia.

The *surgery mydriasis* has to be of high quality and unlike in man, it is hardly to be acquired in dog patients. The animal patient has to get Atropina 1% some hours before starting the surgery in order to have the right mydriasis. In case 1, after opening the anterior chamber when we performed the capsulotomy we registered a strong myosis and had to stop any other procedure. It has to be added that in this case the Atorpina installation had been given only half an hour before starting the surgery. In case 2 we instilled Mydrum (tropicamida) again only half an hour before starting the surgery. The effect of Mydrum in man consists in a severe mydriasis. But in dog we registered again myosis during the capsulotomy. Good results were noticed using a combination of Mydrum with Atropina 1% that had been instilled some hours before the surgery, resulting in a good and long enough mydriasis during ECE at the left eye.

There weren't any special difficulties while performing the *port-side incision* at 5 and 10 o'clock level for the maintainer and the capsulotomy needle. While performing the incision by the V-lance surrounding area will immediately become opacified.

We opened the anterior chamber by the sclerocorneal technique. It has to be done very careful and correct, i.e. to get a tunnel into the sclera and the origin of the cornea to realize a surface of contact between the two side of the wound. Otherwise there will be a loss of the anterior chambre's content when opening it that will lead to the cornea collapse and the impossibility to continue the surgery. In case 2, right eye, the incision of the sclera was too close to the limb. When opening the anterior chambre we lost the aqueos humor. The perfusion liquid of the maintainer couldn't sustain the anterior cahmbre's tonus. Because of the cornea collapse and the eye globe hypotonia followed by myosis we had to stop the surgery. We failed to improve the situation by introducing some viscoelastic substance.

The *anterior capsulotomy* we performed by a discizor needle introduced through the port-side at 10 o'clock level. It is more difficult to perform the "can opener" capsulotomy but one can cut up a larger a portion of the capsula. In case 1, during capsulotomy, more exactly while performing the puncture of the capsule the lens mobility was abnormal. The close examination revealed a subluxation, the lens being fixed at the upper limb and the Zinn area being completely unwound. Because of the subluxation we had to stop the surgery. In case 2 the capsulotomy developed without any difficulties.

We didn't have any difficulties with the hydrodissection and the nucleus removal. It is very important to inject the serum very slowly not to perforate the posterior capsule.

To succeed in luxation of the lens from his bag into the anterior chambre, one would need a total hydrodissection and a moderate but constant pressure with the Annel. To remove the lens from the anterior chamber the total turning around of the lens is crucial for breaking all its connections with the posterior chamber and also for avoiding to unwind the capsule.

The conjunctival wound suture isn't difficult but the suture knots must be placed on the interior. (1,2, and 7) There weren't any situations of suture rejection or dehiscence of the conjunctival suture.

After the surgery the dogs were closely followed up for 14 days in a clean environment (free of dust and irritating gaze). Daily they were given eye instillation with Spersadex and the developing of the eye inflammation and the postsurgical reactions has been closely observed.

First day after the surgery – cornea inflammation in all cases, cornea slightly cloudy with blue shadows. The liquid in the anterior chambre is opalescent and slightly dim. This will last for 5 days. We'll get the transparency of the cornea and the clarifying of the chambre's liquid only after 7-10 days. They will be absolutely clear after 14 days from the surgery when the dog's vision also improved considerably. Seven days from the surgery one can notice an intense pruritus because of the cicatrization of the conjunctival wound. The dog has to be closely observed, otherwise it will get severe wounds from scratching its eye. We have to inform the dog's owner about this evolution in the first days after the surgery. (2,4)

Conclusions

1. The ECE surgery of cataracts by mini-nuc method is very complex, needing proper instrumentation and adequate surgical training.
2. Not all the dogs with cataract can benefit of lens extraction. The ECE surgery has to be chosen only in mature bilateral cataract, in dogs with severe problems of accommodation in their environment.
3. The cataracts we examined for surgery were of traumatic or senile etiology. We can't explain the metabolic etiology of the senile ones.

4. The dogs' fixation during the surgery, especially the head, has to facilitate the access to the eye globe.

5. The anterior chambre has to be opened by a tunnel sclerocorneal incision; otherwise there will be loss of aqueous humor and eye globe hypotonia.

6. The cornea is very sensitive. Its incision will be immediately followed by local opacities. To open the anterior chambre has to provide permanent perfusion, otherwise – corneal collapse.

7. Post surgical opacities of the cornea and the liquid in the anterior chamber for 7-10 days. Anti-infectious and anti-inflammatory treatment needed.

8. ECE of the cataracts by mini-nuc procedure has the great benefit of a smaller sclerocorneal incision than the classical technique – thus smaller risk of hypotonia of the eye globe.

9. ECE by mini-nuc procedure is more favorable than the intracapsular extraction because won't lead to loss of vitreos.

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