

Combined Intraocular Silicone Prosthesis and Conjunctival Flap for Glaucoma after Corneal Perforation in a Dog

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Abstract : A 7-month-old intact male Maltese dog was presented with a 1.5-month history of glaucoma in the right eye (OD). Ophthalmic examinations revealed a corneal perforation with iris entrapment, corneal edema and neovascularization, and buphthalmos OD. Intraocular pressures were 33 mmHg OD and 19 mmHg in left eye (OS). The right eye was diagnosed with chronic glaucoma and corneal perforation with iris entrapment. Now that the eye was blind, implantation of intraocular silicone prosthesis (ISP) and conjunctival flap were elected to salvage the globe. The corneal perforation healed with the conjunctival pedicle flap and the cornea accommodated the ISP properly. A satisfactory cosmetic result was achieved without complications in the 15 months following the procedure. Therefore, this case report indicates the combined an ISP and a conjunctival flap would be an alternative for the treatment of glaucoma associated with corneal perforation in dogs.

Key words : conjunctival flap, corneal perforation, evisceration, glaucoma, intraocular prosthesis.

Introduction

Several types of salvage procedures have been performed for a chronic uncontrollable primary glaucomatous eye: evisceration with intraocular silicone prosthesis (ISP) implantation, enucleation, intravitreal chemical injection, cyclophotocoagulation, and cryocycloablation. Evisceration involves removal of the contents of the globe leaving only the fibrous tunic of cornea and sclera, and then a silicone sphere is inserted into the corneoscleral shell (15). The evisceration with ISP provides a more cosmetic outcome than other procedures, especially enucleation. Operated eyes retain a functional eyelid with blink and conjugate eye movement with the fellow eye, resulting in a fairly natural appearance to the face. Other potential indications of evisceration with ISP include chronic uveitis, progressive phthisis bulbi, and blinding corneal trauma (2).

In general, globes with panophthalmitis and intraocular neoplasia are not candidates for the evisceration with ISP (9). In addition, corneal integrity is an important factor for the successful results of the ISP device (7). Corneal ulcerative disease such as descemetocoele and perforation must be ruled out and normal pre-corneal tear film should be established prior to ISP to support the intraocular implant and protect the cornea after surgery (12). In spite of this argument, a previ-

ous study reported that the eye with glaucoma caused by intraocular neoplasia could undergo the evisceration with ISP (9). Two reports presented a new possibility of the placement of an ISP in a dog with corneal laceration and in a horse with a corneal stromal abscess (5,11). In addition to that, even transcorneal incisional approach was employed to remove the intraocular content for the ISP (10). To our knowledge, this is the first report of the application of the evisceration with ISP combined with the conjunctival pedicle flap for a dog with glaucoma secondary to corneal perforation and iris prolapse.

Case

A 7-month-old intact male Maltese dog weighing 3.86 kg was presented with a 3-month history of corneal perforation, followed by a 1.5-month history of glaucoma in the right eye (Fig 1A). A menace response and dazzle reflex could not be elicited in the right eye but were normal in the left eye. The consensual PLR from right to left was absent. The Schirmer tear test I (STT I) values were 18 mm/min OD and 13 mm/min OS, and IOPs measured by rebound tonometry (TonoVet, Tiolat, Helsinki, Finland) were 33 mmHg OD and 19 mmHg OS. Ophthalmic examination, including slit lamp biomicroscopy (SL-D7, Topcon Corp, Tokyo, Japan) revealed a full-thickness corneal perforation in the dorsotemporal paracentral cornea with a 3-mm diameter defect and iris prolapse. The conjunctiva was severely hyperemic and the episclera was injected. The cornea was severely edematous and dens, generalized corneal vascularization was present, restricting

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Fig 1. Preoperative and post appearances of intraocular silicone implant with a conjunctival pedicle flap in the right eye of a 7-month-old Maltese dog. (A) Preoperative corneal perforation with iris prolapse. (B) One-week postoperative appearance of intraocular silicone prosthesis with a conjunctival pedicle flap. Diffuse edema and superficial neovascularization are present in the right cornea. (C) Appearance three-weeks after surgery. Corneal neovascularization and corneal edema are much improved compared to one-week after surgery. The conjunctival pedicle flap is stable on the cornea. (D) Appearance of the eye seven-weeks after surgery. Corneal edema, fibrosis, and mild pigmentation are present in the right eye.

intraocular examination of the right eye. Fluorescein stain was negative in both eyes. The history and ophthalmic findings suggested that the right eye had sustained corneal perforation approximately 3 months prior, resulting in chronic glaucoma. While the owner debated the desired surgery, medical treatment was initiated for 12 days and included following topical medications: 2% dorzolamide HCl (Trusopt, Laboratories Merck & Dohme-chibret, Marsat, France), 0.5% timolol maleate (Timoptic, Laboratories Merck & Dohme-chibret, Marsat, France), 0.03% flurbiprofen sodium (Ocufen Liquifilm, Allergan, TX, U.S.A.), 0.5% levofloxacin (Cravit, Santen Pharmaceutical Co., Osaka, Japan), and 0.5% sodium carboxymethylcellulose sodium (Refresh-plus, Allergan, TX, U.S.A.).

The owner elected evisceration surgery with intraocular silicone implantation over enucleation in order to achieve better cosmetic outcome. Pre-operative complete blood count and chemistry panel were unremarkable. Radiographic examination revealed hiatal hernia of dorsolateral quadrant. Systemic medication administered before surgery were: cefazolin (22 mg/kg, IV; Cefazolin Inj, Chongkundang Pharm. Co., Ltd, Seoul, Korea), ranitidine (2 mg/kg, IV; Ranitac Inj., Hana Pharm. Co., Ltd, Seoul, Korea) and metoclopramide HCl (0.5 mg/kg, IV; Macperan, Dongwha Pharm. Co., Ltd, Seoul, Korea). The dog was sedated using acepromazine (0.005 mg/kg, IV; Sedaject, Samwoo Medical Co. Ltd, Chungnam, Korea) and hydromorphone (0.1 mg/kg, IV; Dilid, Hana Pharmaceutical Co. Ltd, Gyeonggi, Korea). Induction of anesthesia was performed with propofol (6 mg/kg, IV; Provive 1%, Claris Lifesciences Limited, Ahmedabad, India). Anesthesia was maintained via inhalation of 2.5% isoflurane

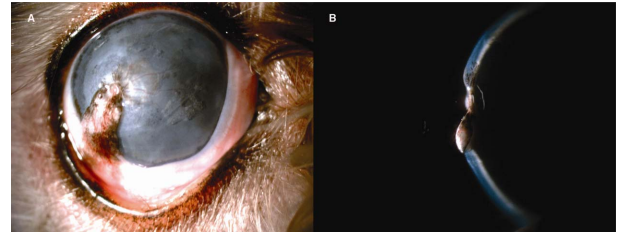


Fig 2. Fifteen-month postoperative appearance. (A) The cornea is completely opaque due to diffuse fibrosis and mild superficial neovascularization presented adjacent to the corneal perforation, and corneal pigmentation is observed near the limbus. (B) Slit lamp biomicroscopy reveals the conjunctival flap incorporated into the corneal wound, and the silicone prosthesis maintaining a normal globe size within the fibrous tunic of the eye.

(Forane solution, Choongwae Pharm. Co., Seoul, Korea). The right eye was prepared and draped routinely for intraocular surgery. A routine evisceration with ISP procedure was performed for the dog positioned in sternal recumbency. A 5 mm lateral canthotomy was performed to increase the size of the palpebral fissure and improve surgical field exposure. A 6 mm, 150°, dorsal limbus-based bulbar conjunctiva and Tenon’s capsule was incised. The sclera was incised about 4 mm posterior and parallel to the limbus. A lens loop was used to separate the uvea from the sclera with separation between the edges of the corneal perforation and the iris. All intraocular tissues were gently protracted from the anterior globe. Following gentle flushing of the intraocular space with 0.9% saline, a sterile 16-mm diameter silicone implant (Silicone Prosthesis Acrivet Orbit, S & V Technologies AG, Hennigsdorf, Germany) was introduced into the fibrous tunics using a Carter sphere-introducer. The scleral incision was closed with 6-0 Polyglactin 910 absorbable suture material (Coated-Vicryl, Ethicon, NJ, U.S.A.) by simple continuous pattern, and the bulbar conjunctiva and Tenon’s capsule were closed with 8-0 Polyglactin 910 absorbable suture material (Coated-Vicryl, Ethicon, NJ, U.S.A.) by simple continuous pattern. Complete debridement of necrotic and septic tissue around the edge of corneal perforation was performed with Beaver No. 6400 blade (Becton, Dickinson and Company, Franklin Lakes, NJ, U.S.A.) and sterile cotton-tipped applicators. In order to facilitate healing of the corneal perforation, a rotational bulbar conjunctival pedicle flap was placed over the perforation site and sutured to the cornea in a simple interrupted fashion with 8-0 absorbable sutures material (Polyglactin 910, Coated-Vicryl, Ethicon, NJ, U.S.A.). The lateral canthotomy was closed with 5-0 non-absorbable nylon suture material (Blue nylon, Ailee, Busan, Korea) in figure-of-eight and simple interrupted suture. A partial temporary tarsorrhaphy was performed to close the lateral third palpebral fissure utilizing 5-0 non-absorbable nylon suture material in order to provide protection for the cornea for 2 weeks post operatively. Topical medications were applied through the remaining opening of the palpebral fissure and a fentanyl patch (Durogesic D-trans, Jassen Cilag GmbH, Neuss, Germany) was attached to the dorsal thorax for pain relief. Considerable hemorrhage occurred after the procedure and diminished over the 3 days of hospitalization. Postoperative

treatment included amoxicillin-clavonate (12.5 mg/kg, PO, *q* 12 hr; Clavamox-drop, Pfizer Inc, NY, U.S.A.), carprofen (2.2 mg/kg, PO, *q* 12 hr; Rimadyl, Pfizer Inc, NY, U.S.A.), and tramadol (4 mg/kg, PO, *q* 12 hr; Tridol, Yuhan Co., Seoul, Korea) for 1 week. Ocular medications consisted of flurbiprofen, levofloxacin, and 0.5% sodium carboxymethylcellulose sodium 3 to 4 times a day for 3 weeks postoperatively.

One week after surgery (Fig 1B), the owner reported that there was hemorrhage from the eye for the first 4 days following discharge, and the eye seemed to be comfortable. Ophthalmic examination of the right eye was performed through the partially opened palpebral fissure and revealed generalized corneal edema with superficial neovascularization and the conjunctival pedicle flap appeared to be attached to the cornea. Mild mucoid discharge was noted on the eyelids.

Three weeks after surgery (Fig 1C), the partial temporary tarsorrhaphy was removed. The corneal edema was less prominent and neovascularization extended from the limbus to the margin of conjunctival flap. The conjunctival flap was attached to the cornea and well vascularized. Both corneas were negative to fluorescein stain and no significant findings were noted in the left eye.

Seven weeks after surgery (Fig 1D), the conjunctiva was mildly hyperemic, and STT I values were 22 mm/min OD and 18 mm/min OS. The corneas did not retain fluorescein dye in both eyes. Corneal edema, fibrosis, and mild pigmentation were observed in the right eye by slit lamp biomicroscope. At this time, all medications treatment was discontinued.

The dog was re-examined 15 months after surgery (Fig 2A, B). The owner reported that the right eye had appeared comfortable with mild serous discharge. Both globes were of similar size and had normal ocular motility. Schirmer tear test values were 15 mm/min OU. Neither cornea retained fluorescein dye. The conjunctival flap was intact with pigmentation in both the base and tip of the flap. The cornea of the right eye was completely opaque and had mild superficial neovascularization around the previous corneal perforation, diffuse fibrosis, and pigment around the limbus. The owner was pleased with the cosmetic results.

Discussion

Therapeutic options for chronic glaucoma in animals include cyclodestructive techniques, chemical intravitreal injection, enucleation, and evisceration with an intraocular prosthesis (13). Various factors should be considered in order to increase the rate of success in surgery: client expectations, therapeutic goals, visual status, surgical preference, age of patient, and underlying systemic disorders. In a recent retrospective study, most clients were satisfied with the result of evisceration with ISP implantation (8). Due to the age of the patient, a guarded prognosis for vision and at the request of the client for a cosmetic outcome, evisceration of the globe with implantation of an ISP combined with conjunctival flap was settled.

Severe uveitis such as panophthalmitis and endophthalmitis is usually considered a contraindication for the evisceration with ISP procedure due to high risk of wound dehiscence after surgery (1). However, this procedure was reported to be

successful when performed on eyes with noninfectious inflammatory process and active uveitis (15). In order to improve the status of the eye prior to surgery and to reduce the risk of rejection of the implant, an intensive topical treatment was applied in our case.

In this reports, a conjunctival pedicle flap was successfully used to provide tectonic support to a perforated cornea of an eye that was going through evisceration and ISP implantation. One case report described the performance of a conjunctival flap for the treatment of corneal ulcer after ISP implantation in a Great Horned Owl (6). A horse with glaucoma and corneal stromal abscess was reported to have a good outcome after intraocular silicone prosthesis and a conjunctival pedicle flap (5). Conjunctival flaps can provide tectonic support and fibrovascular tissue to fill the weakened cornea with no risk of host rejection (3). Therefore, they are frequently indicated for deep corneal ulcers, descemetocoele, and perforated corneal ulcers with iris prolapse.

It is well known that central corneal ulceration is one of the most frequent complications following the implantation of ISP. Therefore, some reports recommended 3rd eyelid flap or a complete temporary tarsorrhaphy to protect the cornea (1,8). Partial temporary tarsorrhaphy provides several advantages over third eyelid flap or complete tarsorrhaphy: monitoring of surgical site and its healing, instilling of topical eye medications and removing inflammatory exudate from the eye (14). Based on the previous reports, the partial temporary tarsorrhaphy in the study sustained for 20 days post operatively to protect the surgical site and the conjunctival flap and to permeate adequate topical medication. Furthermore, the temporary tarsorrhaphy used may be considered to reduce eyelid-induced trauma to the surgical site, and to provide some support to the flaps, leading to successful outcome of the implantation of ISP.

Conclusion

Evisceration and intraocular silicone prosthesis have been widely utilized in dogs and horses with absolute glaucoma as a more cosmetic alternative to enucleation. However, several studies have been advocated that the procedure should be performed only on eyes with intact cornea (4,13,15). In this report, we describe the successful outcome of evisceration and implantation of an ISP in a dog with uncontrolled glaucoma and concurrent corneal perforation. Therefore, perforated cornea should not be considered absolute contraindication for ISP. In addition, the combined an ISP and a conjunctival flap would be an alternative for salvage of the glaucomatous globe associated with corneal perforation in dogs.

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실리콘 안내 보철물과 결막 플랩의 병용 적용을 이용한 개의 각막천공에 의한 속발성 녹내장 치료

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요 약 : 7개월령 수컷 말티즈견이 1.5개월 동안 오른쪽 눈의 녹내장으로 치료를 받던 중에 내원하였다. 안검사에서 우안, 각막 천공, 홍채 탈출, 각막부종 및 혈관화가 관찰되었다. 안압은 오른쪽 눈이 33 mmHg, 왼쪽 눈이 19 mmHg이었다. 오른쪽 눈은 만성 녹내장, 각막 천공 및 홍채 탈출로 진단되었다. 그 눈은 실명하였으며 안구를 보존하기 위해 안내 보철물 삽입과 결막 플랩을 함께 적용하기로 하였다. 수술 후에 결막 플랩은 각막 천공 부위를 막고 안내 보철물을 적절하게 유지하였다. 수술 15개월 후에도 아무런 합병증 없었으며 보호자는 매우 만족하였다. 그러므로 안내 보철물과 결막 플랩의 병용 적용은 각막 천공으로 인한 녹내장의 치료에 이용될 수 있을 것이다.

주요어 : 결막 플랩, 각막 천공, 안구내용물제거술, 녹내장, 안내 보철물