

# Evisceration and Intrascleral Silicone Ball Prosthesis with Penetrating Keratoplasty on Perforated Corneal Ulcer Secondary to KCS in a Shih Tzu Dog

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**Abstract :** When severely large corneal perforation occurs, penetrating keratoplasty is a treatment of choice alternative to enucleation. A twelve-year-old male Shih Tzu was referred with perforated corneal ulcer secondary to keratoconjunctivitis sicca (KCS). Perforated cornea was directly sutured using 10-0 non-absorbable suture material, and rotational conjunctival flap was performed. However, re-perforation of cornea by wound dehiscence was observed at 1 month after operation. The yellowish lens escaped outside the orbit during corneal re-perforation, the diagnosis was re-perforated corneal ulcer, moderate corneal edema, moderate KCS (STT; 6 mm) and endophthalmitis caused by escaped lens outside orbit. Accordingly, penetrating keratoplasty (PK) and evisceration through corneal recipient site and intrascleral silicone ball prosthesis were carried out as the planned treatment, and resulted in good cosmetic improvement compared to enucleation. However, exposure of silicone ball occurred at the 9 months after the surgery due to the irritation of implant, thus enucleation was performed. In perforated large corneal ulcer with severe intraocular damage, evisceration with silicone ball insertion with PK would be alternative treatment choice to improve the cosmetic appearance.

**Key words :** corneal allograft, dog, evisceration, intrascleral silicone ball prosthesis, keratoconjunctivitis sicca, penetrating keratoplasty.

## Introduction

A perforated corneal ulcer is usually associated with an iris prolapse. If the perforation of cornea is small, temporary third-eyelid flap and topical and systemic antibiotics may be the treatment of choice for iris prolapse. If the cornea is largely ruptured, efforts are made immediately to replace the iris with an iris spatula before the cornea is sutured. If this is not possible, the protruding iris may be carefully excised with the use of an electrosurgical cautery (7). The cornea is directly sutured, and the anterior chamber is reconstructed with balanced salt solution or an air bubble. If severely large corneal perforation and severely damaged intraocular content (secondary lens escape outside orbit by corneal perforation) occur, penetrating keratoplasty is a treatment of choice (7). However, complication of phthisis bulbi is common after the operation. Thus, evisceration and silicone prosthesis is necessary with penetrating keratoplasty to prevent phthisis bulbi in large corneal rupture and severely impaired intraocular content.

This case report describes on evisceration through a recipient corneal site with intrascleral prosthesis and how penetrat-

ing keratoplasty is performed to maintain a more cosmetically satisfied eye.

## Case

A twelve-year-old male Shih Tzu (body weight 4 kg) was presented with corneal perforation was referred from a local animal hospital. Reason for perforation was hit by toy thrown by owner's children, while corneal ulcer (6 mm) secondary to keratoconjunctivitis sicca (KCS) [Schirmer tear test (STT); 7 mm] was treated by medical therapy without cyclosporine. Perforated cornea was directly sutured using 10-0 non-absorbable suture material, and rotational conjunctival flap was performed. The margin of conjunctival flap began to show necrosis at postoperative 3 days, and entire conjunctival flap was detached at postoperative 7 days. Direct-sutured corneal wound was maintained with topical antibiotics. But, re-perforation of cornea by wound dehiscence occurred at postoperative 1 month. The yellowish lens escaped outside orbit during corneal re-perforation.

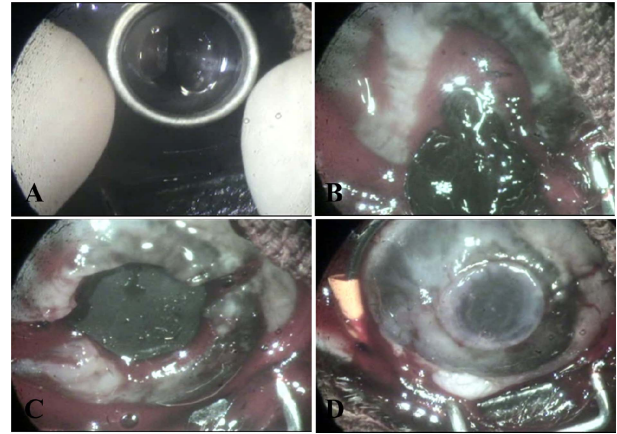
The diagnosis was re-perforated corneal ulcer (ulcer diameter; 6 mm), moderate corneal edema, moderate KCS (STT; 6 mm) and endophthalmitis caused by escaped lens outside orbit (Fig 1). Owner didn't want enucleation but wished to maintain a more cosmetically satisfying eye. Treatment plan

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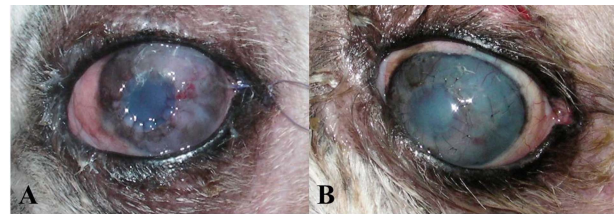


**Fig 1.** Image of corneal re-perforation on 4 weeks after surgery of direct corneal suture and rotational conjunctival flap for corneal perforation by corneal ulcer. Suture of conjunctival flap was detached (arrow head). The fibrin clot (arrow), resected stump of flap (blank arrow), and margin of corneal ulcer (dashed circle) are seen.

was penetrating keratoplasty (PK) and evisceration through corneal recipient site and intrascleral silicone ball prosthesis. The donor cornea was obtained from a beagle dog whose owner consented to euthanasia by traffic accident. Donor cornea was harvested aseptically using 7.5 mm corneal trephine, and was kept in normal saline for 2 hours. Left eye was prepared aseptically after inhalant anesthesia. Handmade 24 mm Flieringa ring was placed at peri-limbus after lateral canthotomy, and was fixed with sclera at 4 sites using 7-0 absorbable suture material. The fibrin clot covering the perforation site was removed, recipient cornea which would be resected was marked using 7.0 mm corneal trephine (Fig 2A), and it was resected using corneal scissors. There was no anterior chamber; whole iris was synechia to cornea. Evisceration was performed through recipient cornea hall (Fig 2B). Corneal incisions from 9 o'clock and 3 o'clock of corneal recipient site to limbus was made for intrascleral silicone ball prosthesis insertion. A 20 mm silicone prosthesis (Acrivet Orbit<sup>®</sup>, Acrivet Inc., USA) was implanted using silicone ball introducer (Carter sphere introducer and holder<sup>®</sup>, Acrivet Inc. USA) (Fig 2C). Each 4 interrupted corneal sutures from 9 o'clock of corneal recipient site and from 3 o'clock of it was conducted using 10-0 non-absorbable suture material. Viscoelastic agent was instilled over silicone ball, and 7.5 mm donor cornea was placed over recipient site, and recipient cornea from 3-12 o'clock was trimmed because donor cornea was too large for proper placement (Fig 2D). The 16 interrupted sutures between donor and recipient cornea were conducted using 10-0 non-absorbable suture material. Flieringa ring was removed; routine lateral canthotomy closure was performed. Ofloxacin (Telvit<sup>®</sup>, Daewoo Pham, Korea, 8/day), cyclosporine (Optimmune<sup>®</sup>, Schering-plough Animal Health, Belgium, 2/day), and prednisolone (Predforte<sup>®</sup>, Samil Pharm, Korea, 4/day) was instilled on left eye for 17 days. Cefazolin 20 mg/kg (TID) and meloxicam 0.1 mg/kg (SID) were injected systemically for 7 days. Sutures of cornea were maintained well at post-operative 1 day (Fig 3A), third eyelid flap was conducted for healing of wound due to low secretion of tear. Mild periocular edema was observed at post-operative 2 days. Cold pack (TID, each 10 minutes) was applied for 3 days, and edema disappeared. Third eyelid flap was removed at post-operative 17 days. Mild vascularization on limbal cor-



**Fig 2.** Evisceration and intrascleral silicone ball prosthesis thorough corneal ulcer and penetrating keratoplasty. A: Marking of resection line using 7.0 mm corneal trephine. B: Evisceration is performed thorough corneal resected site. C: Image after insertion of prosthesis. D: The proper placement of donor cornea after trimming of recipient cornea.



**Fig 3.** Postoperative images. A: POD 1. Corneal sutures are maintained well. B: POD 17. Image after removal of third eyelid flap.

nea was observed, corneal suture site was healed without inflammation, and there was mild edema on donor cornea (Fig 3B). Ofloxacin and prednisolone was discontinued. Cyclosporine was instilled continuously for KCS treatment. However, exposure of silicone ball occurred at the 9 months after the surgery due to the irritation of implant, thus enucleation was performed.

## Discussion

Immunosuppressive treatment such as cyclosporine is mostly required in KCS while monitoring for tear production by STT (5). If KCS is not treated, it would progress to keratitis, and perforated corneal ulcer with iris prolapse can occur in severe cases (4). In such cases, primary closure with or without a conjunctival graft is successful in saving 40% of eye vision; however, complications such as phthisis bulbi, extensive keratomalacia, and endophthalmitis could occur (2). In the presence of bacterial or fungal contamination, the numbers of neutrophils greatly increase, and leakage of neutrophil enzymes into the surrounding stroma may lead to stromal malacia and increase the risk of corneal perforation and iris prolapse (3).

Corneal ulcer occurred because of KCS treatment without cyclosporine use, and subsequently induced corneal perforation in this case. Direct suture and conjunctival flap was attempted for treatment of perforated corneal ulcer. Penetrat-

ing injury and lens capsule rupture are common causes of uveitis and endophthalmitis in dogs (1). Escaped lens outside the orbit caused re-perforation of cornea and suspected endophthalmitis.

Removal of the intraocular contents leaving a scleral and corneal shell through a limbal incision is performed for evisceration (6). Evisceration was performed through recipient cornea hall while PK in this case.

To reconstruct the 6 mm corneal ulcer with perforation, PK was planned. PK is indicated for corneal ulceration, excision of a mass lesion, reconstructive procedures, therapeutic indications, optical restoration, and cosmetic purposes (9). Although evisceration with silicon ball insertion is contraindicated in case of suspected endophthalmitis, it was planned to prevent phthisis bulbi from endophthalmitis (8). However, owner didn't want enucleation even in case of failure in outcome. Although temporary periocular edema and permanent donor corneal edema were observed postoperatively, a more cosmetically satisfying eye was achieved. There are some complications after silicone ball implantation such as bleeding and infection in short term risks, and discharge and exposure of the silicone ball by irritation of implant in long term complication. Unfortunately, exposure of the silicone ball which one of the long term complications related to silicone ball implant occurred at 9 months after the surgery. In conclusion, in perforated large corneal ulcer with mild endophthalmitis, evisceration with silicone ball insertion with PK could be an alternative treatment choice to prevent enucleation.

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## 개의 건성각결막염에 의한 각막천공을 안구내용물적출술과 실리콘볼 삽입 후 각막이식을 적용하여 치료한 증례

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**요 약** : 큰 크기의 각막천공에 안내용물 손상이 된 눈을 안구적출술을 시도하지 않고, 안구내용물적출술과 실리콘볼 삽입후 각막이식을 적용하여 치료하여 안구적출술보다 미용상 만족한 눈의 외관을 얻은 증례를 소개 하였다.

**주요어** : 각막이식, 개, 안구내용물적출술, 실리콘 볼, 건성각결막염