BEDAH FLAP KONJUNGTIVA SEBAGAI TATALAKSANA ALTERNATIF PADA PERFORASI ULKUS KORNEA : LAPORAN KASUS

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ABSTRAK

Secara global, sekitar 39 juta orang mengalami kebutaan dan 246 juta mengalami gangguan penglihatan sedang hingga berat, dengan sekitar 80% kasus sebenarnya dapat dicegah. Kelainan kornea menyumbang sekitar 5,1% penyebab kebutaan di dunia, dan salah satu penyebab tersering adalah ulkus kornea infeksius yang memerlukan penanganan cepat dan tepat untuk mencegah komplikasi serius. Prosedur *conjunctival flap* (Gundersen) merupakan salah satu pilihan bedah untuk ulkus yang tidak responsif terhadap terapi medis karena mampu melindungi permukaan kornea dan mendukung penyembuhan. Seorang laki-laki Jawa berusia 59 tahun datang dengan keluhan nyeri hebat, fotofobia, dan discharge purulen pada mata kiri setelah trauma okular satu bulan sebelumnya, dengan riwayat diabetes melitus tidak terkontrol, hipertensi, serta operasi katarak. Pemeriksaan menunjukkan ulkus kornea perforasi sentral berukuran besar dengan dasar nekrotik dan kekeruhan kornea, sehingga dilakukan *total conjunctival flap*. Perbaikan awal tampak pascaoperasi, namun pada kontrol lanjutan terjadi pelepasan flap yang menyebabkan kekambuhan gejala dan akhirnya memerlukan tindakan eviserasi karena prognosis visual yang buruk. Ulkus kornea sendiri ditandai oleh defek epitel yang menyebabkan nekrosis stroma, umumnya akibat infeksi bakteri, dan prosedur *conjunctival flap* diindikasikan pada ulkus yang tidak sembuh atau mengalami perforasi karena dapat memberikan perlindungan permukaan serta mengurangi nyeri, meskipun komplikasi seperti pelepasan flap dapat terjadi. Walaupun penatalaksanaan pada kasus ini tidak berhasil, berbagai studi melaporkan tingkat keberhasilan anatomi lebih dari 70% pada tindakan *conjunctival flap*. Secara keseluruhan, *conjunctival flap* tetap menjadi pilihan terapi yang sederhana, efektif, dan ekonomis untuk menangani ulkus kornea refrakter, terutama di daerah dengan keterbatasan sumber daya.

Kata kunci : conjunctival flap, penyakit permukaan okular, ulkus kornea

ABSTRACT

Globally, around 39 million people are blind and 246 million experience moderate to severe visual impairment, with 80% of cases being preventable. Corneal disorders contribute to approximately 5.1% of global blindness, and one of the common causes is infectious corneal ulcer, a condition requiring prompt and appropriate management to avoid severe complications. A 59-year-old Javanese male presented with severe ocular pain, photophobia, and purulent discharge in the left eye following ocular trauma one month earlier, with underlying uncontrolled diabetes mellitus, hypertension, and a history of cataract surgery. Examination revealed a large central perforated corneal ulcer with a necrotic base and corneal opacity, for which a total conjunctival flap was performed. Initial postoperative improvement was observed; however, flap detachment occurred during follow-up, leading to recurrence of symptoms and ultimately necessitating evisceration due to poor visual prognosis. Corneal ulcers generally involve epithelial defects leading to stromal necrosis, often caused by bacterial infection, and conjunctival flap surgery is indicated for non-healing or perforated ulcers because it provides surface protection and pain relief, although complications such as flap detachment may arise. Despite treatment failure in this case, previous studies report more than 70% anatomical healing success with conjunctival flap procedures. Overall, the conjunctival flap remains a simple, effective, and cost-efficient treatment option for refractory corneal ulcers, particularly in resource-limited settings.

Keywords *: conjunctival flap, corneal ulcer, ocular surface disease*

INTRODUCTION

Globally, around 39 million individuals experience blindness, while 246 million others have vision impairment ranging from moderate to severe. Of this number, approximately 80% of vision impairments are preventable. Developing countries tend to have a higher prevalence of blindness compared to developed countries. According to data from the World Health Organization (WHO), about 5.1% of blindness cases are caused by corneal disorders, making it the fourth leading cause of blindness after glaucoma, cataracts, and age-related macular degeneration (Fatma Asyari et al., 2023). Corneal disorders, one of which is infectious corneal ulcers, are a major cause of vision loss and long-term ocular morbidity in developing countries (Mulya et al., 2023). An ulcer is tissue damage characterized by a defect in the epithelial tissue, which in the case of corneal ulcers, occurs in the corneal epithelial tissue (Bowling, 2016). The incidence of corneal ulcers in Asia has been reported as 7990 per 1,000,000 in Nepal, 7100 per 1,000,000 in Myanmar, 3390 per 1,000,000 in Bhutan, and 1130 per 1,000,000 in India. The incidence of corneal ulcers in Indonesia, based on a study by Suharjo et al., is 5.2 per 100,000 population (Fatma Asyari et al., 2023). Risk factors for corneal ulcers include unhealthy ocular surfaces, contact lens use, trauma, chronic topical medication use, systemic immune suppression, and recent corneal surgery (Wiranata et al., 2021).

Corneal ulcers require prompt and precise therapy to prevent complications and further tissue damage. The goal of corneal ulcer management is to treat the underlying cause of the ulcer, accelerate the healing of the epithelial defect, suppress the inflammatory response, prevent or manage complications, and improve visual acuity (Farida, 2015). One of the therapies for corneal ulcers is the conjunctival flap (Gundersen), which serves to protect and assist in the healing of the corneal epithelial defect (Bowling, 2016). Currently, the use of conjunctival flaps has declined due to advances in topical therapy, amniotic membranes, tissue adhesives, therapeutic contact lenses, and earlier use of lamellar and penetrating keratoplasty techniques. However, the conjunctival flap procedure is still relevant and used in certain situations, especially in chronic unilateral disease with a poor visual recovery prognosis (Oostra & Mauger, 2020; Zemba et al., 2020; Gibralter & Hawn, 2021; Alam & Matin, 2025; Byrd et al., 2025).

In addition to its established role in managing refractory corneal ulcers, the conjunctival flap procedure provides several physiological advantages that contribute to ocular surface stabilization. By delivering a vascularized tissue layer over the compromised cornea, the flap enhances metabolic support, augments local immune defense, and facilitates epithelial remodeling, which is especially beneficial in severely diseased corneas (Zemba et al., 2020). These mechanisms make the procedure valuable in clinical scenarios where the healing capacity is impaired, such as in neurotrophic keratopathy or persistent epithelial defects, and where more advanced surgical technologies are not available or contraindicated (Gibralter & Hawn, 2021). Moreover, patient-related factors significantly influence corneal ulcer outcomes. Systemic comorbidities such as diabetes mellitus, autoimmune disorders, or chronic medication exposure are known to delay epithelial regeneration and amplify inflammatory responses (Byrd et al., 2025). In many low-resource regions, delayed clinical presentation, limited availability of microbiological diagnostics, and restricted access to ophthalmic subspecialty care further worsen the prognosis. These challenges underscore the importance of comprehensive public health strategies—ranging from patient education to early referral systems—to reduce preventable corneal blindness (Mulya et al., 2023).

Advancements in diagnostic modalities have also enhanced the ability of clinicians to detect the underlying etiologies of corneal ulcers with greater precision. Techniques such as confocal microscopy, polymerase chain reaction (PCR), and improved culture systems have increased diagnostic yield and allowed for more tailored treatment regimens (Bowling, 2016).

Early identification of microbial pathogens reduces the risk of ulcer progression and may prevent the need for surgical interventions such as conjunctival flaps or keratoplasty. However, in many developing settings, these diagnostic tools remain limited, making traditional clinical judgment and time-tested therapeutic options essential (Farida, 2015).

Despite its limitations, conjunctival flap surgery continues to play a meaningful role in preserving ocular integrity, particularly when visual restoration is no longer the primary therapeutic objective. The procedure offers rapid pain relief, creates a stable ocular surface, and can delay or prevent globe loss, thereby maintaining the possibility of future reconstructive interventions (Oostra & Mauger, 2020). In settings where donor corneas, amniotic membranes, or advanced surgical equipment are scarce, the conjunctival flap remains an effective, accessible, and cost-efficient option for managing severe, non-healing corneal ulcers.

CASE ILLUSTRATION

A 59-year-old male patient of Javanese ethnicity came to the Emergency Department of RAA Soewondo Regional Hospital in Pati Regency with pain in the left eye accompanied by severe headache, discharge of blood and pus from the left eye, and photophobia. The onset of the condition was reported to have occurred approximately one month ago when dust from the roof fell into the left eye,then patient rubbed it. After the incident, the patient began to experience intermittent pain in the left eye, which gradually became persistent and was accompanied by severe headaches. The patient has a history of diabetes mellitus and hypertension that is not routinely controlled. The patient also had a history of cataract surgery performed in 2017.

Table 1. Laboratory Results

Parameter	Result	Unit
White Blood Cell Count	7.5	10^3/µL
Red Blood Cell Count	4.77	10^6/µL
Hemoglobin	12.9	g/dL
Hematocrit	39.0	%
MCV (Mean Corpuscular Volume)	81.8	fL
MCH (Mean Corpuscular Hemoglobin)	27.1	pg
MCHC (Mean Corpuscular Hemoglobin Concentration)	29.6	g/dL
Platelet Count	146	10^3/µL
RDW-CV (Red Cell Distribution Width)	16.4	%
RDW-SD	40.5	fL
PDW (Platelet Distribution Width)	11.5	fL
MPV (Mean Platelet Volume)	9.5	fL
P-LCR (Platelet Large Cell Ratio)	23.0	%
Random / PP Blood Glucose	103	mg/dL
Urea	40,2	mg/dL
Creatinine	0,68	mg/dL
Blood Sodium	139	mmol/L
Blood Potassium	3,64	mmol/L
Blood Chloride	101,3	mmol/L
HbsAg	Non – reactive	-
Anti – HIV	Non – reactive	-
APTT	37,2	Seconds
PT	13	Seconds
INR	0,99	-

On physical examination, blood pressure was 144/94 mmHg, heart rate 100 beats per minute, respiratory rate 20 breaths per minute, temperature 39 degrees Celsius, and oxygen

saturation 96% on room air. On ophthalmologic examination of the left eye (oculus sinister), the patient had a baseline visual acuity of 1/∞, diffuse conjunctival hyperemia, ciliary injection (+), and a large central corneal ulcer (~6–7 mm) with an irregular shape, necrotic base, and dense yellowish infiltrate (pus). Blackish necrotic tissue was observed in the center of the lesion. The anterior chamber could not be clearly assessed clinically due to corneal opacity. The pupil and iris could not be assessed because of visual obstruction by the corneal ulcer. On ophthalmologic examination of the right eye (oculus dexter), the visual acuity was 6/60, the cornea appeared cloudy, but there were no abnormalities found in the conjunctiva bulbi, pupil, sclera, iris, or pupil. The patient was diagnosed with perforated corneal ulcer in the left eye with differential diagnosis of endophthalmitis based on history and physical examination. The patient was scheduled for conjunctival flap surgery and underwent supporting examinations as surgical preparation. The laboratory results are shown in table 1.

On thoracic X-ray imaging, cardiomegaly and aortic elongation were observed, with no abnormalities found in the lungs. The ECG results showed a normal sinus rhythm. The patient subsequently underwent conjunctival flap surgery on February 5, 2025. The preoperative and postoperative results are shown in Figure 1 and Figure 2. The patient was subsequently followed up after the operation and discharged on the second day post-surgery, with instructions to return for a follow-up visit one week later. During the follow-up, it was found that there was a detachment of the conjunctival flap, resulting in the re-exposure of the cornea and the recurrence of the patient's symptoms. Due to the failure of both medical and surgical treatments, the severity of the condition, and the poor visual prognosis, an evisceration procedure was ultimately performed.

Figure 1. The image shows a perforated corneal ulcer in the left eye pre-operation

Figure 2. The image shows post conjunctival flap surgery

DISCUSSION

The term ulcer refers to a defect in epithelial tissue, and corneal ulcer is a condition characterized by partial loss (discontinuity) of the corneal surface due to corneal tissue necrosis, resulting in an epithelial defect (Bowling, 2016; Farida, 2015). Corneal ulcers are commonly associated with tissue excavation, infiltration, and necrosis. Even with prompt management, patients may still experience significant complications and morbidity, including corneal scarring or perforation, cataracts, anterior and posterior synechiae, glaucoma, and vision loss. The etiology of corneal ulcers is most commonly infectious, particularly due to bacterial microorganisms. However, corneal ulcers can also result from viral, fungal, Pythium, or autoimmune diseases (Byrd et al., 2025). According to a report by the National Eye Center – Cicendo Eye Hospital, the most prevalent bacteria causing corneal ulcers in Indonesia are Gram-positive cocci, accounting for 56.6% of cases. Data from the Asia Cornea Society show that the incidence of bacterial corneal ulcers was 38% of all corneal ulcer cases from 2014–2015 (Fatma Asyari et al., 2023).

The pathogenesis of corneal ulcer begins with a corneal abrasion, which allows microbes to adhere to the corneal surface and begin replicating. These microorganisms subsequently invade the stromal layer and release enzymes and toxins that damage the tissue. In response, neutrophils are recruited to the site of infection and trigger the release of interleukins and cytokines, which further promote ulcer enlargement. The presence of proteolytic enzymes and free radicals leads to epithelial sloughing and necrosis of the epithelium, Bowman's membrane, and the stroma. Clinical manifestations of corneal ulcers include ocular pain, photophobia, blurred vision, redness, tearing, foreign body sensation, and swelling (Byrd et al., 2025). The principles of corneal ulcer management are to eliminate the source of infection, suppress inflammation, and support epithelial tissue recovery. The infectious source is addressed by administering antimicrobial agents as soon as preliminary investigations are completed. The choice of antimicrobial is guided by the most likely etiology based on clinical findings: broad-spectrum agents are used initially, then de-escalated to more selective agents if indicated. Topical steroids must be used with caution, since they can promote microbial growth; in certain situations such as autoimmune-mediated disease, systemic immunosuppressive agents may be employed. Re-epithelialization can be facilitated by instilling artificial tears and ophthalmic ointment and temporarily closing the eyelids with tape. Prophylactic antibiotic ointment may also be considered to prevent secondary infection (Bowling, 2016).

In addition to medical therapy, corneal ulcers that fail to respond to conventional medical treatment require surgical intervention to promote healing and prevent further complications. One such procedure is the conjunctival flap (CF). The CF technique was re-introduced and popularized by Gundersen in 1958, before surgical techniques and materials improved, most perforating corneal injuries were treated by removing any protruding uveal tissue and covering the wound with a hood-shaped conjunctival flap. Gundersen's method expanded the use of conjunctival flap (CF) surgery, initially used for traumatic injuries, to also treat a variety of other ocular surface conditions. Although procedures like therapeutic penetrating keratoplasty, amniotic membrane transplantation, and epithelial transplantation have become more common in developed countries, conjunctival flap surgery still remains an important option in certain carefully chosen cases (Alam & Matin, 2025; Zemba et al., 2020). The conjunctival flap procedure is generally performed for corneal ulcers that fail to improve, are at risk of perforation or have already perforated, and cause severe pain and discomfort. Indications for this procedure include infectious keratitis, corneal ulcers, neurotrophic keratitis, and other similar conditions (Gibralter & Hawn, 2021).

The conjunctival flap (CF) procedure can lead to complications both intraoperatively and postoperatively, although such occurrences are relatively rare. One of the most critical stages

of the procedure is suturing, which must be performed carefully to avoid the flap being too tight, which could cause it to tear, or too loose, which may prevent proper adhesion and result in postoperative detachment. Commonly reported complications include flap retraction, small holes in the conjunctiva (buttonholes), erosions, and epithelial ptosis. Additionally, placing a conjunctival flap over the cornea presents certain limitations, such as obstructing visualization of intraocular structures, reducing the effectiveness of topical medication penetration, and producing poor cosmetic outcomes, particularly if the flap is too thick. The removal of limbal epithelium containing stem cells may also compromise ocular surface stability, which should be carefully considered in patients scheduled for flap removal followed by keratoplasty. Moreover, persistent infection beneath the flap and the possibility of perforation, as previously reported in cases of herpetic stromal keratitis, represent serious complications. Therefore, these potential drawbacks must be weighed thoughtfully against the significant therapeutic benefits offered by CF surgery (Zemba et al., 2020).

In this case, the patient was diagnosed with a perforated corneal ulcer in the left eye, with endophthalmitis considered as a differential diagnosis based on clinical history and physical examination. The patient underwent conjunctival flap surgery using the total flap technique, which involved covering the entire corneal surface. Initial postoperative follow-up showed symptom improvement, with eyelid pain and headache significantly reduced by the second day after surgery. However, at a subsequent follow-up, the conjunctival flap was found to have detached, resulting in the re-exposure of the cornea and recurrence of the patient's symptoms. Due to the failure of both medical and surgical treatments, the severity of the condition, and the poor visual prognosis, evisceration was ultimately performed. The procedure was carried out successfully without complications. Although the conjunctival flap procedure was unsuccessful in this case, a study by Kibria Alam and Abdul Matin involving 47 patients found that 72.34% of cases resulted in anatomic healing, with only three eyes requiring evisceration due to complications. This supports the role of conjunctival flap surgery as a viable treatment option, particularly because it is a simple, efficient, and cost-effective method for managing ocular surface diseases that are unresponsive to medical therapy (Alam & Matin, 2025; Zemba et al., 2020).

CONCLUSION

This case underscores both the potential and the limitations of conjunctival flap (CF) surgery in managing severe corneal ulcers. While CF initially provided symptomatic relief, flap detachment led to ulcer re-exposure and ultimately necessitated evisceration due to the patient’s poor visual prognosis. However, evidence from Alam and Matin demonstrates that CF achieves anatomic healing in over 70% of cases, with very few eyes requiring evisceration. Therefore, despite the risk of failure in individual patients, CF surgery remains a valuable, simple, and cost-effective option for refractory ocular surface disease, especially in resource-limited settings where alternative surgical interventions may be less accessible. Further studies particularly in Indonesia, it is recommended to systematically record outcomes of conjunctival flap procedures, including success rates and any complications encountered, to better inform clinical decision-making and optimize patient care.

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