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### Clinical Grading of Corneal Ulcer and Its Management in Dr. M. Djamil General Hospital, Padang, Indonesia

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#### A B S T R A C T

**Background:** Infectious corneal ulcer (CU) occurs due to an agent, which may be a bacterial, fungal, or viral microorganism. A detailed examination of the ulcer was needed to determine the severity grading of the ulcer. Based on the size, depth of ulcer, density of infiltrate, and scleral involvement, it's divided into mild, moderate, and severe grades and may be used to objectively monitor the progress of the ulcer and as a parameter for management. Medical management includes topical, systemic antibiotic, and periocular injection, while amniotic membrane transplantation (AMT), conjunctiva flap, fascia lata, and evisceration as surgical. This study aimed to assess the clinical grading associated with the management of CU in Dr. M. Djamil General Hospital, Padang, Indonesia. **Methods:** Observational analytics based on the medical record of corneal ulcer patients in Dr. M. Djamil General Hospital, Padang, Indonesia, in 2016-2017. A total of 191 research subjects participated in this study. Data analysis was carried out using SPSS univariately. **Results:** The fungal, bacterial, and viral CU was diagnosed clinically. The severity grading that we found is moderate (60,73%), mild (25,14%), and severe (14,13%). All of the cases used medical treatment. Surgical was performed in moderate (36,59%) and all severe cases. AMT was performed in severe cases with perforation  $\leq 4$  mm and perforation  $> 4$  mm conjunctival flap (3,7%), fascia lata (3,7%), and evisceration (61,53%), preferably. **Conclusion:** The clinical grading of corneal ulcers in our hospital is moderate, and it may be associated with our hospital as a referral hospital. Surgery was performed in all severe and moderate cases that don't respond well to medicine.

#### 1. Introduction

Corneal ulcers are caused by host cellular and immunologic responses to microorganisms such as bacteria, fungi, and viruses. The host cellular response plays a major role in infection, corneal damage, and corneal maceration. During the infection process, immunological mechanisms also play a role. The process of corneal ulceration occurs in three stages, namely the progressive stage, the regressive stage, and the healing stage.<sup>1-5</sup>

The degree of corneal ulceration can be determined by slit lamp examination. Corneal ulcers were classified as mild, moderate, and severe. The location,

size, and depth of the corneal ulcer, the large of the epithelial defect, the infiltrate, and the surrounding conditions of the cornea and endothelium become standard for determining the degree of corneal ulcer. Corneal ulcers may perforate (severe degree), which can be followed by prolapse of the ocular tissue. In developing countries, cases of corneal ulcers with perforation are quite high. Corneal perforation can cause corneal morbidity and vision loss, so that it requires further management. Medical therapy is the main therapy but, in many cases, requires surgical intervention. Surgical action in cases of corneal perforation depends on the size of the perforation,

including amnion membrane transplantation, conjunctival flap, fascia lata, corneal transplantation, and even evisceration.<sup>6-10</sup> This study aimed to assess the clinical grading associated with the management of CU in Dr. M. Djamil General Hospital, Padang, Indonesia.

## 2. Methods

The study was a descriptive observational study and used secondary data sourced from medical record data of Dr. M. Djamil General Hospital, Padang, Indonesia. A total of 191 research subjects participated in this study, where the research subjects met the inclusion criteria. The inclusion criteria are patients with a diagnosis of corneal ulcers in Dr. M. Djamil General Hospital, Padang, Indonesia, from January 2016 - December 2017 and who have complete medical record data. This study has received approval from the medical and health research ethics committee of Dr. M. Djamil General Hospital, Padang, Indonesia.

This study made observations on sociodemographic and clinical data. The data includes data on corneal ulcer patients in outpatient and inpatient settings. Data on cases of autoimmune corneal ulcers were not included. Records were made of gender, age, characteristics of the size and location of the ulcer, and the surgical procedures performed. Intravitreal, intracameral and subconjunctival injections of antibiotics are included in the medication. Data analysis was carried out using SPSS software version 25 univariately. Univariate analysis is performed to present the frequency distribution of data for each test variable.

## 3. Results

Table 1 presents the baseline characteristics of the study subjects. The majority of the study subjects were male. The majority of study subjects had the age of 51-70 years. The majority of study subjects experienced moderate corneal ulcers. All cases of corneal ulcers were given medical therapy. Of 191 cases, there were 41 cases underwent surgery, namely in cases of

corneal ulcer with moderate severity, as many as 15 cases (36.59%), and 26 cases (63.41%) with severe severity. Surgical procedures include conjunctival flap, amnion membrane transplant (AMT), fascia lata, and evisceration. It was found that the size of the perforation <3mm was 8 cases that underwent AMT procedures, while the size of the perforation >3mm was mostly performed by evisceration, conjunctival flaps, and fascia lata can also be performed with large perforations in 1 case each.

## 4. Discussion

Corneal ulcers are discontinuities of the normal surface of the corneal epithelium characterized by infiltrates and necrosis around the cornea. Corneal ulcer etiology is divided into infectious and non-infectious (autoimmune). Infections that cause corneal ulcers include bacteria, fungi, viruses, and protozoa. The cause of the corneal ulcer must be found immediately because it will be related to the next treatment. The diagnosis can be made based on the clinical picture and microbiological examination for ancillary examination. Typical clinical signs for bacterial corneal ulcers include blepharospasm, chemosis, a grayish-white yellowish infiltrate, and stromal edema, often with hypopyon and corneal perforation. Compared with fungi, the characteristic clinical features are the presence of satellite lesions and endothelial plaque, and hypopyon, which are dirtier and more convex surfaces. Clinical features of viral corneal ulcers include punctate epithelial keratitis, dendritic ulcers, and decreased corneal sensibility. For protozoa, the most typical clinical features are radial keratoneuritis and pseudodendritic epithelium. In addition to finding clinical signs of the causative microorganism, simple laboratory examinations such as Gram, Giemsa, and KOH examinations were also performed. After the culture results come out, therapy is given according to these results.<sup>11-13</sup>

Table 1. Baseline characteristics.

Variable	Frequency	Percentage (%)
Gender		
Male	132	69
Female	59	31
Age		
0-10 years	7	3,6
11-20 years	11	5,7
21-30 years	14	7,3
31-40 years	25	13,09
41-50 years	37	19,3
51-60 years	49	25,6
61-70 years	39	20,41
> 70 years	8	4,1
Corneal ulcer		
Mild	48	25,14
Moderate	115	60,73
Severe	26	14,13
Surgical procedure		
No	150	78,53
Yes:	41	21,47
Corneal ulcer moderate	15	
Corneal ulcer severe	26	
Type of surgical procedure	N=26	
Conjunctival flap	1	3,8
AMT	8	30,77
Fascia lata	1	3,8
Evisceration	16	61,53

In this study, it was found that more males suffered from corneal ulcers. This demographic is similar to data from previous studies on the epidemiology of corneal ulcers, which showed that corneal ulcers were more common in males than females, possibly because males were more exposed to the external environment and trauma than females. Most of the patients in this study were aged between 40-70 years. In this study, cases of corneal ulcers with moderate severity were found, namely 60.73%. This shows that most cases of corneal ulcers are referral cases. Several important factors that contribute to why patients with corneal ulcers come to a tertiary eye center in advanced conditions include inappropriate previous medical care, use of traditional eye medicines, use of drugs without a doctor's prescription, unavailability of appropriate eye health services, and low socioeconomic status. This results in an increase in the size and severity of the ulcer.<sup>14-16</sup>

All cases were treated initially with medication. Medications are given according to the cause of the corneal ulcer obtained from the clinical picture and

laboratory examination. The drugs given were topical eye drops (antibiotics, antifungals, antivirals, anticollagenases, antiglaucomas, anti-inflammatory drugs), systemic as well as intravitreal, intracameral, subconjunctival and paracentesis injections. In moderate and severe cases, surgery can be performed if necessary. The procedures performed were AMT, conjunctival flap, fascia lata, and evisceration. The choice of action can be based on consideration of the location and size of the perforation as well as the presence or absence of prolapse of the contents of the eyeball. The choice of appropriate surgical procedure is generally based on the size of the perforation as well as the underlying disease status. Amnion membrane transplantation (AMT) is used as a surgical therapy in perforated corneal ulcers to improve corneal stromal thickness. AMT can repair epithelial defects by stimulating epithelial healing with a multi-layer technique. Cases of perforation <4mm in size can be performed AMT. Healing of 73% of cases with a perforation size <1.5mm was found to be very effective with AMT.<sup>17</sup>

Patients with mild and moderate corneal ulcers in this study were generally given medical therapy alone and responded well. However, 7 moderate-grade cases underwent a surgical procedure, namely amnion membrane transplantation (AMT), to accelerate the reepithelialization process so as to prevent perforation. After AMT was performed, there was an improvement in the patient, namely the presence of epithelialization. In this study, there were 8 cases of severe corneal ulcers performed by AMT, and 7 of them with a perforation size <3mm. Rodrigues et al. reported that healing occurred in 74% of eyes with corneal perforation that underwent multi-layer amniotic membrane transplantation within 6 weeks. Response to medical therapy combined with AMT showed improvement with the establishment of reepithelialization and no predisposition to graft rejection. Meanwhile, 1 case of severe corneal ulcer with perforation <3mm and also had AMT done, but still progressing after surgery. This may be due to the large size of the ulcer, resistance to antibiotics, and the unusual pattern of microorganisms, so evisceration was recommended, but the patient refused. There were two cases of perforation >3mm. Conjunctival flap and fascia lata were performed in 1 case each. The judgment is based on the location and size of the perforated corneal ulcer. Conjunctival flaps are used in cases of perforation >3mm. The advantage of the conjunctival flap is that it brings out the superficial blood vessels to help the corneal ulcer heal and can help reduce pain. The disadvantage is that it is easy to perforate again due to leakage under the flap.<sup>18</sup>

Fascia lata is a technique that uses a dermal graft that can cover large perforations >3mm and is stronger than a conjunctival flap. The advantage is that it provides epithelialization of the adnexal and conjunctival epithelium, has good power to prevent leakage, and is autogenous. Disadvantages are that it does not work on avascular tissue, its large size and lack of vascularization can cause necrosis, and it is not suitable for surgical indications in cases of infection. Evisceration is the removal of the contents of the eyeball, leaving the sclera and extraocular

muscles. Patients with a severe degree of corneal ulcer, extensive perforation, and poor vision. In this study, there were 26 cases of evisceration. Considerations for evisceration are the size of the large perforation, extensive maceration, prolapse of the contents of the eyeball, and poor vision to no light perception. This procedure aims to prevent further complications such as endophthalmitis. A corneal transplant is a procedure performed on perforated corneal ulcers. However, this action cannot be carried out in this hospital due to donor limitations.<sup>19</sup>

## 5. Conclusion

The clinical degrees of corneal ulcers in this study, which were most commonly found in this study, were moderate and severe corneal ulcers. In cases of mild corneal ulcers, the management is only with medication, while in moderate corneal ulcers, medication is also given, and there are some cases with indications for surgery. In cases of severe corneal ulcers, in addition to initial medical therapy, all cases require surgical management. Classification of a hospital as a referral hospital is one of the things that affect the clinical degree and management of corneal ulcers.

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