

Corneal Trauma: An Epidemiological, Clinical and Therapeutic Study in CADES/O Donka

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Abstract

Introduction: Corneal trauma can be defined as any impact on the cornea following direct or indirect trauma by a traumatic agent. Due to its anatomical position, the cornea is the superficial membrane most exposed to ocular trauma. It is a frequent pathology in ophthalmology, especially in young active subjects. It is an important cause of poor vision or loss of the eyeball with a significant socio-economic impact. **Material and Method:** We conducted a prospective cross-sectional study of descriptive type with a duration of 5 months from November 01, 2020 to March 31, 2021 in order to study the epidemiological, clinical and therapeutic profile of corneal trauma. **Results:** During the study period, 179 patients consulted for corneal trauma, *i.e.* 64.9% of ocular trauma. The age group 20 to 29 years old was the most affected with a frequency of 29.1%. The average age of our patients was 26.6 years old, with extremes ranging from 1 to 75 years old. The majority of patients were male with a frequency of 68.2% and a sex ratio of 2.1. Decreased visual acuity was the most frequent reason for consultation in our patients with 93.2%. Perforation was the most frequent type of trauma with 80.3%. All of our patients were treated with medication (100%), 65.3% with physical treatment and 41.8% with surgery. **Conclusion:** Corneal trauma is a real public health problem. They are especially frequent in young active subjects. Prevention remains the most effective means of treatment.

Keywords

Cornéa, Trauma, CADES/O

1. Introduction

Corneal trauma is the set of affections of the cornea secondary to a trauma.

It is a frequent pathology in ophthalmology and constitutes a diagnostic and therapeutic emergency. Without the presence of our protective eyelids and our tears, the cornea would be permanently attacked. Unfortunately, it happens that these two protections are not enough [1].

The frequency of corneal trauma is quite high despite prevention efforts, especially in young active subjects. It is an important cause of visual impairment or loss of the eyeball. Its severity is variable and its functional prognosis depends on the site of the trauma, the precocity of the therapeutic management and the complications [2].

Several clinical and epidemiological studies of ocular trauma have been described in the United States [3] and developing countries revealing a high incidence, but the management and clinical aspect are still poorly known and studied in developing countries [4].

In the WHO blindness prevention program, it is estimated that 19 million people suffer from monocular blindness as a result of trauma [5].

In a study conducted by Vora GK *et al.* in the United States, corneal trauma accounted for 7% to 14% of ocular trauma seen in ophthalmic emergency units [6].

While for Hajar B *et al.* in Morocco, corneal trauma represented 66.4% of ocular trauma [7].

For Yacouba K *et al.* in Mali, corneal trauma represented 44.4% of ocular trauma [8].

The practice of certain high-risk activities and the lack of eye protection are the main factors that contribute to this.

The clinical diagnosis must be early; it is most often easy, depending on the circumstances of occurrence and notion of trauma. The traumatic agents are diverse and varied, hence the interest of an exhaustive investigation can be difficult but necessary.

The management is vast, associating topical or general treatment, surgery and physical means.

The severity of some cases and the sequelae most often caused have motivated the present study.

Objectives

General objective:

Study the corneal trauma.

Specific objectives:

- ✓ To determine the frequency of corneal trauma at CADES/O;
- ✓ Determine the sociodemographic profile of patients with corneal trauma at CADES/O;
- ✓ Identify the factors and circumstances of occurrence of corneal trauma at CADES/O;
- ✓ Identify the different types of corneal trauma at CADES/O;

- ✓ Describe the therapeutic modalities of corneal trauma at CADES/O.

2. Material and Methods

The center for the application of the diploma of specialized study in ophthalmology (CADES/O) served as the setting for this study. It is a reference service for the management of eye and eye-related pathologies.

As material for the realization of this work, the patients received for a trauma of the cornea, having benefited from a treatment during our period of study.

This was a prospective descriptive cross-sectional study with a duration of 5 months from November 01, 2020 to March 31, 2021.

We targeted all patients who consulted for ocular trauma at CADES/O during the study period.

The study focused on patients who were diagnosed with corneal trauma at CADES/O during the study period with informed consent.

Included in our study were all patients of any age and sex, regardless of their origin, in whom corneal trauma was diagnosed at the department, who received treatment and who consented or whose parents consented to participate in the study.

We excluded from our study, patients with ocular trauma without corneal involvement and patients who did not consent to participate in the study.

Recruitment was exhaustive and all cases registered during the study period constituted the sample size.

We used Kobocollect and KoboToolbox to facilitate data collection and epidemiological, clinical and therapeutic analysis. The consultation and operating room registers as well as the patient files were used as data carriers.

3. Results (Figure 1)

During this study period, we had received in consultation 3857 patients, only 276 patients consulted for corneal trauma or a frequency of 7.15%.

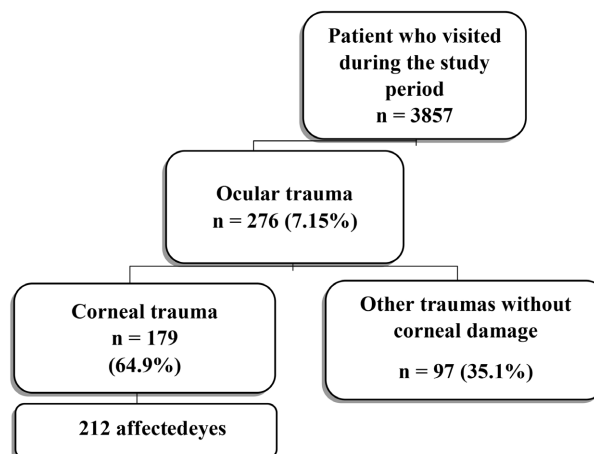


Figure 1. Flow chart of corneal trauma patients at CADES/O from November 01, 2020 to March 31, 2021.

The 20 - 29 age group was the most represented at 29.1% with extremes ranging from one to 75 years. The average age was 26.6 years.

We noted a male predominance at 62.2% (n = 122 cases) against 31.8% for the female sex (n = 57 cases). The sex ratio was 2.1.

In the vast majority of cases, our patients did not have health insurance, *i.e.* 93.9% (n = 168), only 6.1% had health insurance (n = 11 cases).

In the socio-professional category, pupils and students were the most represented, *i.e.* 34.2%, followed by administrators at 11.4%, and those not practicing any profession at 10.7%.

The most frequent reason for consultation was decreased visual acuity, 93.2% (n = 167 cases), followed by ocular pain at 79.3%; ocular redness at 29.6%; sensations of foreign bodies at 22.9%; and minor cases of lacrimation at 11.17% and bleeding at 6.7%.

The ophthalmological history without particularities in 150 cases, and mainly represented by 1 case of cataract surgery, 1 case of contact lens wearing, and 9 cases of ametropia.

According to the minimum time of consultation, 73.7% of the patients consulted within 24 hours after the trauma (late to more than 24 hours); 15.6% within 6 hours after the trauma (early) and 10.6 between 6 hours and 24 hours (medium time).

According to the circumstances of occurrence, 27.4% of the cases were secondary to domestic accidents, in 24% to work accidents, in 17.9% secondary to fights or aggression, in 11.7% of the cases in a school environment and in 7.8% of the cases in a sports accident (**Table 1**).

Table 1. Frequency of 179 patients with corneal trauma at CADES/O from November 01, 2020 to March 31, 2021 by traumatic agent.

Traumatizing agents	Headcount	Percentage %
Punch, head, claw	43	24
Metal	43	24
Pieces of wood	31	17.3
Pebbles, dust, sand	17	9.5
AVP, polytrauma	14	7.8
Insect	7	3.9
Acid	2	1.1
Caustic soda	5	2.8
Anchor	4	2.2
Mead	1	0.6
Hot water	4	2.2
Liquid glue	2	1.1
Other	6	3.7

Before their admission to the department, the majority of our patients had not received any treatment (73.2%).

According to laterality, the right eye was predominant at 44%, followed by the left eye at 38% and bilateral forms at 18% (**Table 2**).

Depending on the location of the trauma in relation to the corneal surface, it was pericentral in 75 cases, central in 62 cases, involving the entire corneal surface in 42 cases, superior in 19 cases and inferior in 14 cases.

Fluorescein testing was performed in all patients.

According to the depth of the lesion, the damage was epithelial in 57% of cases, stromal in 22.2% of cases, descemetal in 14.2% of cases and endothelial in 6.6% of cases.

The type of trauma was corneal perforation in 67.9% of cases, contusion in 40.6% of cases, extraocular foreign body in 19.3% of cases and burns in 4.7% of cases.

In 71 cases, the lesion was penetrating, lacerated in 65 cases, ruptured in 6 cases and secondary to foreign bodies in 2 cases.

We listed 18 cases of corneal trauma by burns; mainly due to caustic soda in 5 cases, ink in 4 cases, 4 cases of hot water projection, battery acid projection in 2 cases and 2 cases of liquid glue projection.

Superficial burns predominated in this series, *i.e.* 19.3% (**Table 3**).

In this series, the majority of patients received medical treatment, only 75 cases received surgery (**Table 4**).

We also recommended general medical treatment with analgesics, antibiotics, anti-inflammatory drugs and sometimes an intramuscular injection of anti-tetanus serum.

In the physical treatment, we performed foreign body removal in 21.8% of cases, recommended bed rest in 17.3% of cases, rinsing in 15.1% of cases and an occlusive dressing in 11.7% of cases.

Surgical treatment consisted of wound trimming in 39.6% of cases, evisceration in 1.1% and foreign body extraction in 1.1%.

However, we encountered some complications after treatment, such as corneal scarring in 16.2%, nephelioma in 5.6% and ptyse in 2.2%.

Table 2. Distribution of 179 patients with corneal trauma at CADES/O from 01 November 2020 to 31 March 2021 by initial visual acuity N = 212.

Visual acuity	OD		OG	
	Headcount	%	Headcount	%
Not realized (small child)	6	5.4	2	2
<1/10	22	19.8	18	17.8
1/10 à 2/10	32	28.8	29	28.7
≥3/10	51	45.9	52	51.5
Total	111	100	101	100

Table 3. Incidence of 179 patients with corneal trauma at CADES/O from 01 November 2020 to 31 March 2021 according to other associated ocular injuries in the left eye.

Associated OG injuries	Headcount	Percentage %
Orbit injury	2	1.1
Conjunctival hyperhaemia	59	32.9
Palpebral edema	40	22.3
Impairment of the lacrimal voice	0	0
Hyphaema	14	7.8
Iridial lesion	12	6.7
Crystalline (dislocation, post traumatic cataract)	8	4.5
Pupil lesion	2	1.1
Sclera lesion	4	2.2
Intravitreal haemorrhage	0	0
Choroidal lesion	1	0.6
Choroidal lesion	1	0.6

Table 4. Repair of 179 patients with corneal trauma at CADES/O from 01 November 2020 to 31 March 2021 according to the topical treatment administered.

Topical medicines	Headcount	Percentage
Analgesic	53	29.6
Antibiotic	164	91.6
Anti-inflammatory	154	86
Corneal healer	89	49.7
Gel or artificial tears	35	19.5
Corticoid	29	16.2

4. Discussion

The interest of our work lies in the fact that it focused on a condition that can jeopardise the functional prognosis of the eye, but also in the fact that there are few studies on the subject in our setting.

We found few studies similar to ours, most of them dealing with cases of ocular trauma in general.

The difficulties encountered during the study period included:

- The COVID 19 pandemic, which considerably reduced the use of health facilities and the number of staff;
- Incorrect listing of the circumstances of occurrence, the traumatic agent and

previous treatment and history;

- Insufficient technical and therapeutic means available to the medical staff (absence of corneal transplantation in the treatment, availability of antifungal eye drops).

In our study we found that corneal trauma patients represented more than half of the patients who consulted for trauma at the CADES/O of the Donka National Hospital from 01 November 2020 to 31 March 2021.

Our results according to patient flow are comparable to those reported by Hanane K *et al.* [8] who observed in their study in Morocco that frank corneal wounds represented 65.73% of ocular trauma. This variability in frequency can be explained by the difference in methodological and clinical approach.

In this series, our results according to age group are comparable to those of Hajar B *et al.* carried out in Morocco [7] for whom the average age was 27.8 years and the 20 to 29 year old age group was the most concerned with a rate of 22.29% with more than half (76%) of the patients being under 40 years old. Another similar study conducted by H Khalidi *et al.* in Fez [9] showed an average age of 24.36 years with a peak in the age group 10 to 19 years.

Children between 1 and 15 years of age represented a significant portion in our series. Values close to ours were found in HAJAR B *et al.* [7] 27.6%.

The results of our study are not far from the observations of other authors. This allowed us to conclude that it is a pathology of the young subject under 40 years of age, coinciding with the age when professional activity is intense, leading to functional and aesthetic prejudices on the one hand and considerably impacting the quality of life on the other.

In this study, more than half of the patients were male. This male predominance is consistent with the literature.

The predominance of males may be explained by the fact that males are predominantly employed in traumatically risky occupations in order to provide for their families in adults; as well as in children, small boys because of their turbulence and tendency to engage in violent sports and dangerous games.

In this series, pupils and students were the majority socio-professional category. This is explained by the fact that pupils and students belong to an active age group that is on the move and exposed to practices where the risk of trauma is high.

The close relationship between injuries and the patient's occupation makes it essential to study the latter. Accidents at work were found in less than half of our patients, whereas the study by Kamate S. *et al.* [10] on work-related injuries found that housekeepers were in the majority. Fong L.P. and Taouk Y. [11] found frequent cases among manual workers.

More than half of our patients consulted beyond the 24 hours of the trauma.

Management would be considered correct if the trauma patient was managed within the first 6 hours after the trauma.

The delay in consultation in developing countries is justified by the fact that at

the level of the patient, the trivialization of the trauma by the patient and/or his parents to avoid shame or mockery; the lack of knowledge of the seriousness of the trauma; the importance given to traditional care in rural areas and poverty; at the care centre, the poor clinical evaluation of the trauma, the quality of care and the referral system; the distance that separates the patient from the care centre, this is a low incidence when we know that the functional prognosis depends on it, justifying the rate of blindness noted in this area.

In our series, domestic accidents were in first place, followed by work accidents, and then fights.

Gaboune L *et al.* [12] found a similar result to ours and thus placed domestic accidents as the first cause of trauma.

Hajar B *et al.* [7] found that aggression is the first cause of trauma in Fez, Morocco with a rate of 48.2%.

This variability in the first circumstances of occurrence can be explained by the difference in the activities carried out by the populations.

In our series, solid agents are predominant, followed by chemical agents.

Our results are comparable to those of Bakari A *et al.* [13] who found 70.1% of the cases by metal object.

This predominance of solid agents can be explained by the circumstances of occurrence.

Direct or indirect shocks with or without foreign bodies, responsible for open or closed globe trauma, are the main etiopathogenic mechanisms of corneal trauma, and of ocular trauma in general.

In our series, the right eye was the most affected. Bilateral involvement was present in less than half of our patients.

Our study reveals a traumatic unilaterality in line with the literature.

Our results are similar to those of Bakari H *et al.* in Antananarivo in 2018 with a predominance of 52.1% of the right eye, as well as for Moustaine M. *et al.* in 2010 in Fez [14] with a predominance of the right side 68%.

However, for other authors, the left eye was predominant, as in Seck S. *et al.* in Dakar [15].

It is not easy to explain the predominance of one eye over the other, but in our situation we can link it to the instinctive projection of the right eye by the right hand of the patient, who is often right-handed.

In practice, the side affected is of little interest since, in terms of prevention, the eyes must be protected.

In our series, perforation was present in more than half of our patients, followed by contusion in almost half of the cases.

It should be noted that several types of lesions can be associated and that it is sometimes difficult to classify them as contusion or wound, knowing that in some cases the limit between the two is not obvious. Also, any corneal laceration is associated with the presence of foreign bodies until proven otherwise.

Corneal perforations were the dominant lesions in our study. Our results were

not far from the data in the literature attesting to the predominance of open globe trauma. Thus, for Gaboune L *et al.* [16], trauma by wound predominated with a rate of 63.6%; Seck *et al.* [16] found a predominance of 53% and for Lam *et al.* [17] 63.2%.

Contusions in our series occurred in most cases during fights and assaults, which were predominant in the results of Kaya G *et al.* [18]; and Tchabi *et al.* [19] with a rate of 56%. There were 6 cases of rupture by blunt object, *i.e.* 4.1%, which is close to the results of Boutaharar H *et al.* [7] who found 6.14%.

The percentage of burns in our series is in the minority, which can be explained by the non-availability of certain toxic products at home.

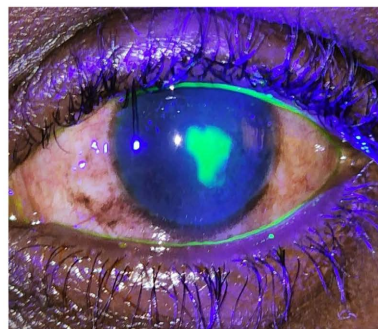
Thus, the frequent lesions of the cornea during trauma can be explained by its degree of exposure but also by the quality and speed of the traumatic agent despite the presence of protective eyelids and tears which are sometimes insufficient.

All the patients in our series received medical treatment, as in the study by Hajar B *et al.* [7] in Morocco. Our results are different from those of Merle H *et al.* [20] where 39% of cases were treated medically and 10% of cases were put under observation.

Surgical treatment was performed in less than half of our patients. Our results are close to those of the study by Merle H *et al.* [20] where 48% of cases required surgical treatment.

Iconography

See **Figure 2** and **Figure 3**.



25 year old patient; Student;
living in Matam
Complaints (trauma by OG pain)
Progression: 24H
Diagnosis central traumatic ulcer
Treatment Antibiotic therapy,
antihistamine, corneal healing,
analgesic

Figure 2. Ulcère central post-traumatique OG.



Patient 9 years old; Student;
resident in Dubréka
Complaints (OD sand projection,
OD pain, OD AVB)
Progression: 24H
Diagnosis CEIO with corneal
entrance hole and iris hernia
Treatment Extraction of CE,
suture of the wound, reintegration
of the iris, antibiotic therapy,
analgesic

Figure 3. Intraocular foreign body with corneal entry hole and iris herniation.

5. Conclusions

At the end of this study, it appears that corneal trauma is a real public health problem and a frequent pathology in ophthalmology. They are especially frequent in young active subjects.

Domestic accidents are the first cause in our series and thus represent the main risk factor in many situations.

The male sex was the most exposed with a sex ratio of 2.1 and the average age was 26.6 years old.

Perforation trauma was the primary type of trauma.

However, we did note some complications such as corneal scarring.

Prevention by wearing adapted equipment during certain high-risk activities remains the most effective means of treatment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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