

Epidemiology and Medical Treatment of Chemical Assault by Hydrochloric Acid in Mohammed VI University Hospital of Marrakech: 13-Year Study

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Abstract

Original Research Article

Acid burns from assault represent a substantial and neglected proportion of burn injuries in low income countries. A retrospective study was conducted to assess the frequency of acid burns in relation to total burns requiring admission in Marrakech, Morocco. The medical records of 73 patients treated for acid assault burns injury from January 2008 to January 2021. All patients were younger than 45 years old, with a mean age of 30.2. Most of them (86%) had sustained full thickness burns ranging from 5% to 18% of their body surface area. All cases were result of assaults. The male to female ratio was 2:31 and the average duration of hospitalization was 24 days. The face was affected for all patients. Prevention through public awareness campaigns, legislation for control of corrosive substances, and severe punishment for perpetrators of assaults using these substances will go a long way in reducing the incidence of chemical burns in our context.

Keywords: Chemical, Burn, Assault, Morocco.

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INTRODUCTION

Chemical burn refers to the aggression of the skin by an irritant usually a strong acid or a base. It differs from thermal burning by the fact that the lesions continue to deepen as long as the active component of the chemical is in contact with the skin [1].

The aim of this research is to study the characteristics of chemical burns by aggression in patients admitted in our service over a period of 13 years.

PATIENTS AND METHODS

We conducted a retrospective, observational study of all patients admitted for chemical burn by aggression in the Department of Plastic Surgery and Burns, Mohammed VI university hospital of Marrakech

between January 2008 and January 2021. All patients who were exclusively victims of chemical burns by aggression were included. We then gathered the informations through an exploitation record related to the age, the sex of the patients, the context of the occurrence of the burn, the responsible agent, the location, the extent and the depth of the burns, the percentage of hospitalization and its duration, and the administered treatment based on patient records.

RESULTS

1- Epidemiological data

73 patients were admitted to the Mohammed VI university hospital of Marrakech for a chemical burn by aggression during the 13 years, with an average of 5 patients per year (Figure 1).

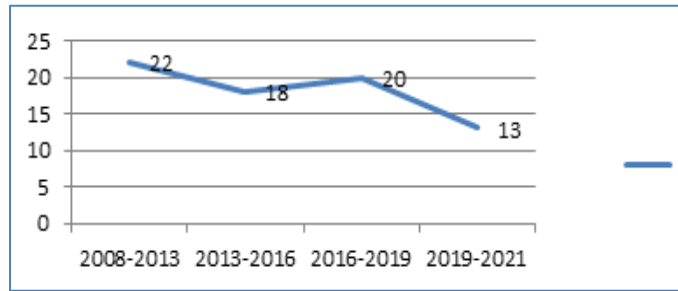


Fig-1: Average of chemical burns by period

2- Sex

69.8% of patients were males. With a male: female ratio of 2:31 (Figure 2)

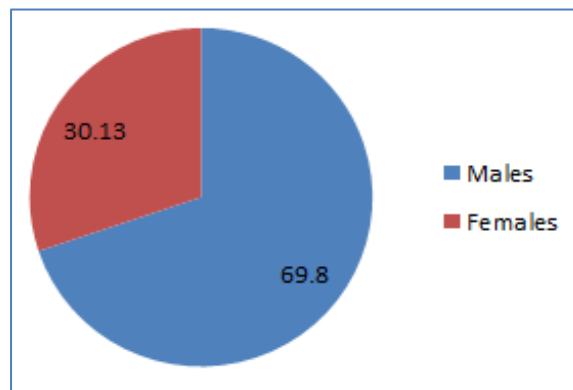


Fig-2: Distribution of chemical burns by sex

3- Mechanism

Chemical burn by aggression represents about 3.25% compared to other burning mechanisms (Figure 3).

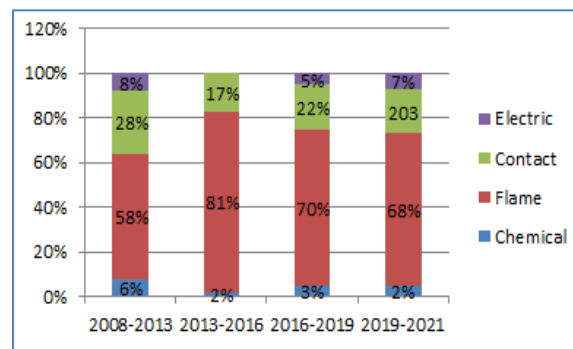


Fig-3: Mechanism of chemical burns

4- Average age

The average age is 30.2 years with extremes ranging from 9 years to 45 years (Figure 4)

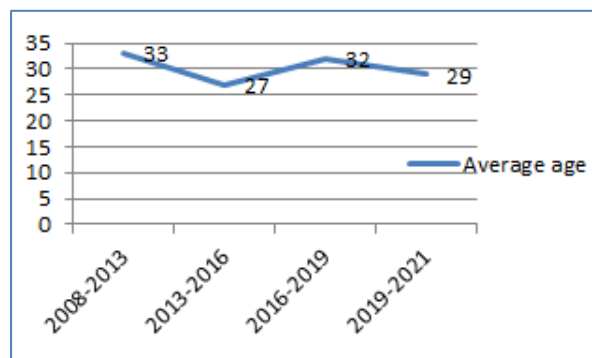


Fig-4: Average age in our study

5- Location of the burn

100% of the patients had a facial burn of which 57% exclusively on the face (Figure 5)

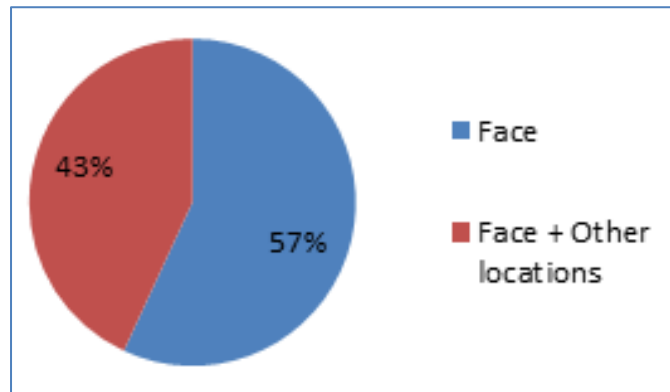


Fig-5: Distribution by burn area

6- The extent of the burn

The average TBSA was 7.5% ranging from 5% to 18% (Figure 6)

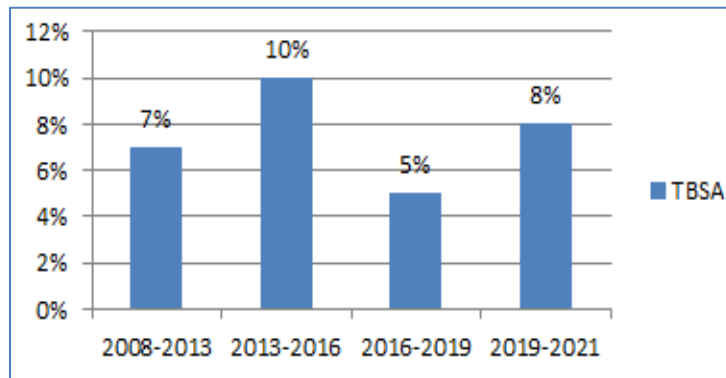


Fig-6: Average of Total Body Surface Area

7- The depth of the burn

86% of patients had a third degree burn over at least one area (Figure 7).



Fig-7: A case of third degree burn by chemical assault

8- Circumstances of the burn

All patients were victims of hydrochloric acid aggression because of a conflict, 7% of which was a marital conflict (Figure 8).



Fig-8: Case of a young patient assaulted by his brother

9- Medical care and evolution

Hospitalization was reported in 60% of patients and 40% were followed in an outpatient setting. All the patients in this series benefited from the admission of an abundant saline serum wash, a complete assessment, an ophthalmic assessment for ocular lesions in 79% of the patients. Hospitalization in the Burn Resuscitation Unit for an average of 24 days ranging from 4 to 62 days with clinical and biological monitoring and psychiatric follow-up for reintegration.

The biological assessments carried out in all the patients did not show any serious abnormalities, apart from the hypoprotidemia that was corrected before their discharge.

The evolution was favorable in all patients, 59% of whom spontaneously healed and 41% required a directed scarring and then coverage by skin grafting.

DISCUSSION

Chemical agents cause burns by various mechanisms; tissue destruction caused by acid results in coagulative necrosis while alkalis cause burns by liquefactive necrosis [2]. Tissue damage may continue for several minutes to hours after exposure. Since severity depends on the nature, concentration, volume and duration of contact with the chemical agent, it is difficult to assess the severity of injury immediately after exposure [3]. The use of these agents of destruction for assault is on the increase in some African and Asian countries, with incidence in Uganda as high as 17% of all burn patients [4].

The 3.25% prevalence of chemical burns among all cases of burn admitted to our unit is in keeping with the figures reported in the literature, which range from 1.4 to 8.5% [5]. Indeed, this mode of aggression is not common in Morocco, where as it is

much more widespread in some Asian countries. Males were more frequently burned than females, also in accordance with studies by other authors [6]. This male predominance has been attributed to men's different perception of risk and greater exposure to risky situations.

The face is the first area in attacks with the intent ruin the appearance of their victims [7]. The majority of patients were left with permanent scarring and contractures, particularly in the head and neck region, an area of high functional and aesthetic significance [8].

In our surrounding conditions the reason for attack was robbery, in Bangladesh, acid assaults are often made by rejected suitors against very young women who have rejected marriage proposals, while in Jamaica the assailant is usually a female who attacks her unfaithful husband [9] Almost 86% had deep burns, in comparison Xie *et al.* found 21% deep burns and Singer *et al.* found 42% [10].

The mean TBSA involved in our patients was 7.5%. This surface area is similar to the data reported by other series where the TBSA was ranging from 1.9% for Hardwicke *et al.* to more than half of the patients affected on more than 20% for Li *et al.* [8, 11].

Indeed, our hospitalization rate was 62%, which is similar to the results found in other series, also the average length of hospitalization was 24.6 days, our data are in line with those found in the literature where it ranges from 3.4 days to 44.1 days [10]. Ocular burns were the most common accompanying injury in 79% of cases, and operations for skin grafting and ectropion lower eyelid reconstruction were carried out on 41% of patients [12].

In summary chemical burns are even more difficult to assess because they are rare and their appearance depends on the product responsible. For this reason, it is frequently recommended that patients be followed regularly to verify the accuracy of the initial assessment.

Prevention through public awareness campaigns, legislation for control of corrosive substances, and severe punishment for perpetrators of assaults using these substances will go a long way in reducing the incidence of chemical burns.

CONCLUSION

Chemical burns represents a diagnostic and therapeutic problem, they are specific in their appearance and evolution however the resultant physical and psychological sequelae constitute significant morbidity. Our objective was to study the characteristics of chemical burns.

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