

Acid burns from personal assault in Uganda

J. Asaria^a, O.C. Kobusingye^b, B.A. Khingi^b, R. Balikuddembe^b,
M. Gomez^c, M. Beveridge^{c,d,*}

^a University of Toronto, School of Medicine, Toronto, Ont., Canada

^b Department of Surgery, New Mulago Hospital, Makerere University, Kampala, Uganda

^c Ross Tilley Burn Centre, Sunnybrook and Women's College Health Sciences Centre, 2075 Bayview Avenue, Room D738, Toronto, Ont., Canada M4N 3M5

^d Office of International Surgery, University of Toronto, Toronto, Ont., Canada

Accepted 14 August 2003

Abstract

Acid burns from assault represent a substantial and neglected proportion of burn injuries in the developing world. A retrospective chart review was conducted to assess the frequency of acid burns in relation to total burns requiring admission in Kampala, Uganda. Seventeen percent of the adult burns admitted at New Mulago hospital over an 18-month period resulted from acid assault. Patients had a mean age of 33.1 years, with a male to female ratio of 1.1:1. The average extent of injury was 14.1% total body surface area (TBSA), commonly involving the face (86.7%), head and neck (66.7%), upper limbs (60.0%) and chest (53.3%). Thirty-three percent of patients suffered partial or complete blindness. Mean length of stay in hospital was 49.5 days and all patients survived. Patterns of assault followed two common trends: attacks during robberies (46.7%), and attacks associated with domestic disputes (33.3%). The Ugandan pattern is contrasted with patterns reported from Bangladesh, Cambodia and Jamaica with a view to understanding the social context underlying such assaults. Prevention of these hideous injuries will require further understanding of their underlying social and cultural determinants. Serious questions remain whether public education programs will reduce the incidence of acid assault or increase it by giving potential assailants an idea they did not have before.

© 2003 Elsevier Ltd and ISBI. All rights reserved.

Keywords: Wounds and injuries; Burns; Chemical burns; Assault; Developing countries

1. Introduction

In North America [1–3] and Europe [4,5], acid burns are generally regarded as uncommon industrial accidents and they are rarely associated with assault [6–8]. In parts of the developing world, however, acid assaults constitute a significant burden of burn injuries and they appear to follow different patterns in different regions. Existing literature describes that in Bangladesh [9] and China [10], most acid assault victims are young women who have refused a suitor, while in Jamaica [11] the victim is most often an unfaithful husband. The incidence of acid burns from assault in East Africa has not been documented to date; however, in Uganda, a small East African nation with a population of 23 million [12], physicians have noticed a recent surge of acid assaults as a new pattern of injury in the region. The

purpose of this study was to determine the epidemiology of acid burns from assault in Uganda, and to understand the circumstances surrounding their occurrence.

2. Case study

Ms. J.N. is a 48-year-old housewife and mother of two children. Upon returning home from a neighbour's house, she confronted an unknown thief in her house who apprehended her and forced her to sit on the ground. He then poured a large bottle of acid over her head before fleeing the scene with the loot. A neighbour, hearing her screams, found J.N. in her house and drove her to Mulago Hospital. Neither J.N. nor the neighbour was aware that they should have immediately washed the site of the burn with copious amounts of water. One hour after incurring the acid burn, J.N. arrived at Mulago Hospital where she received a water lavage and was assessed to have deep partial and full

* Corresponding author. Tel.: +1-416-480-5260; fax: +1-416-480-5261.
E-mail address: massey.beveridge@sw.ca (M. Beveridge).

thickness burns to her face, neck, chest, back, and upper limbs amounting to 45% total body surface area (TBSA). She was admitted to the general surgical ward where she received routine dressing changes with silver nitrate, antibiotics, and analgesics. In association with the burns, J.N. developed Curling's ulcers which resulted in profuse bleeding per rectum and necessitated the transfusion of five units of blood. Further complications included infection of the burn wounds with *Staphylococcus aureus*. Due to a shortage of operating theatre time, she had to wait until her 21st day of admission to the hospital before an escharectomy could be performed. At the conclusion of the study period, she was still an in-patient awaiting skin grafting and will likely require multiple reconstructive operations in the future.

3. Methods

The New Mulago Hospital is a public tertiary care and teaching facility in Kampala serving a population of 1.5 million. The 1200-bed hospital is the largest in the country. Patients admitted to Mulago Hospital for burn injuries over the 18-month period between March 2001 and September 2002 were identified from the surgical admissions registry. All patients with existing charts were included in the study. A retrospective chart review was undertaken to select patients who had specifically incurred burns with acid in the setting of an assault. Data were collected on a specially designed medical form and were transferred to a Microsoft Excel Spreadsheet. Recorded information included the hospital identification number, age, sex, location and extent of



(a)



(b)



(c)

(photographs acid burn victim, J.N., at day 12 post-burn).

burns, number and nature of operations, date of admission and discharge, infections, complications, final outcome, as well as a detailed description of the assault. Data were analyzed using Microsoft Excel. Descriptive statistics were performed. In addition, five patients, who were currently receiving treatment for their burns were interviewed about their injuries and one patient was selected for the case report.

4. Results

One hundred twenty-five adults were admitted with burns to the general surgical wards of Mulago Hospital in Kampala, Uganda, during the study period. Eighty-eight (70.4%) had charts available for review. Fifteen (17% of adult burn patients) were identified as having injuries resulting from assault with acid.

The male to female ratio of the acid assault burn population was 1.1:1. Patients had a mean age of 33.1 ± 10.7 years with 73.3% falling between the ages of 20 and 39 years. The average extent of burn injury was 14.1% TBSA and sites most commonly affected included the face (86.7%), head and neck (66.7%), chest (53.5), and upper limbs (60.0%) (Fig. 1). The eyes were commonly injured (33.3%) leaving affected patients with partial or complete blindness. Fourteen patients (93.3%) were left with permanent scarring and seven (46.7%) developed cervical or axillary contractures. Other complications included ectropion (33.3%), nostril stenosis (13.3%), microstomia (20.0%), paraphimosis (6.7%), and Curling's ulcers (6.7%). Eight patients (53.3%) received skin grafting and these patients underwent an average of 2.4 ± 0.7 operations during their initial admission to the hospital. Mean length of hospital stay was 49.5 ± 59.4 (1–190) days, with 46.7% of patients developing burn sepsis during the course of their management. Only one patient received consultation from a psychiatrist or social worker in order to deal with the psycho-social impact of their injuries. All of the patients survived their burn injuries.

Regarding the circumstances of the acid assaults, 46.7% of patients were attacked by an unknown assailant during a robbery—26.7% of them in a car or motorcycle robbery, and 20.0% in a house robbery. An acquaintance known to the patient was implicated in 33.3% of the acid assaults—commonly in the setting of marital discord (Fig. 2).

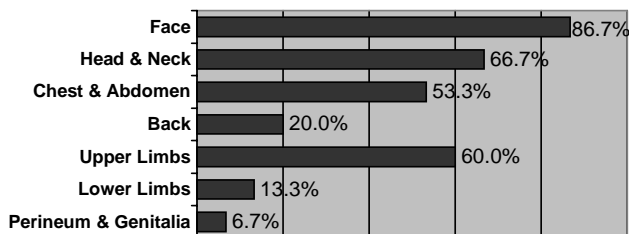


Fig. 1. Anatomical location of acid burn injuries.

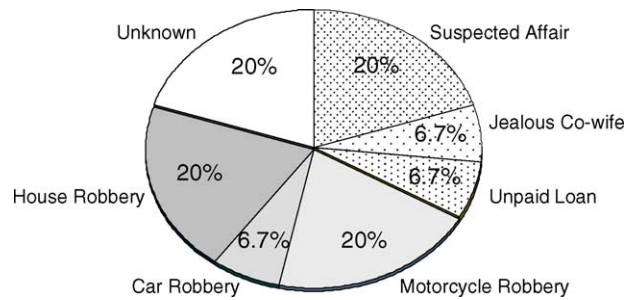


Fig. 2. Circumstances of acid burn assaults.

5. Discussion

Acid burns are regarded as uncommon industrial injuries in North America [1–3] and Europe [4,5] but evidence is emerging that acid burns attributed to assault are much more common than previously recognized in developing countries and that they appear to follow different patterns in different regions. In Bangladesh, acid assaults are often made by rejected suitors against very young women who have rejected marriage proposals [9], while in Jamaica the assailant is usually a female who attacks her unfaithful husband [11]. In Cambodia, acid burns comprise 20% of all burns in the only available series [13] and it is usually the wife who attacks her husband's young mistress. In China, the perpetrator of acid assault is most commonly a spouse embroiled in marital or financial discord [10]. This paper presents data from Mulago Hospital in Kampala, Uganda, which indicate that acid assault in the region is more common than previously known.

The most striking finding of this study is the large proportion (17.0%) of adult burn injury admissions comprised by acid assaults in Uganda. Clearly, acid assault burns constitute a serious and alarming burden of injury in the region. Also remarkable is the level of morbidity associated with the malicious attacks. Assault with chemicals contributes to devastating mutilation and functional impairment. 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.

Functional and aesthetic significance. Furthermore, one-third of patients suffered visual impairment or complete blindness. As a result of their injuries and disfigurement, victims endure severe psychological and social effects making the process of social re-integration extremely difficult. Inevitably, many patients have ended up living as recluses in their society, dependent on family members for daily support.

In the setting of domestic disputes, acid is used by an embittered acquaintance in an act of punishment or revenge with intent to inflict severe pain and cause permanent disfigurement. Although such domestic scenarios are consistent with a large proportion of acid assault burns in Uganda, there is also an alarming trend of acid assaults

being perpetrated by unknown assailants, similar to those reported in Jamaica [11]. In fact, the majority of acid assaults in this series occurred during a robbery. In motorcycle and car hijackings, acid is splashed on the driver and the vehicle is stolen. Presumably, the acid acts as a convenient means of immobilizing the victim during a robbery—its consequences are permanent and devastating.

When interviewed, acid burn patients commonly described that their assailants obtained the acid used in the attack from mechanics or battery suppliers. Currently, there are no regulations or restrictions on the sale or purchase of sulphuric acid in Uganda. One liter of sulphuric acid, such as that used to restore exhausted car batteries, is readily available at most garages and costs the equivalent of US\$ 10. In addition to its low cost and easy accessibility, acid can also be carried quite inconspicuously and used as a weapon without attracting as much attention as a firearm. The authors of this paper believe that strict regulation of sulphuric acid is paramount in combating acid assaults in the region.

Currently, there is neither a dedicated burn facility nor a specialized multi-dimensional burn team in Uganda to deal with burn injuries. At New Mulago Hospital, patients with burn injuries receive care on the general surgical units, which are shared wards with 20–30 beds. The hospital, however, is in the process of creating its first isolated burn facility with individual rooms and plans for a dedicated operating theatre, and a dedicated burn surgeon. The large volume of patients requiring specialized care, and particularly the high rate of burn sepsis, highlights the importance of a designated burn unit in this hospital.

One of the limitations of this study is that of data retrieval. Burn patients could only be identified as far back as 18 months. Furthermore, only 70.4% of the requested burn patients' charts could be found. Another shortcoming of a retrospective study is that for some patients, the exact circumstance of injury was either unclear or unrecorded.

It is hoped, however, that the findings in this study will help to emphasize the magnitude of the problem in Uganda and will stimulate the development of further investigations, education programs, and preventative strategies. Acid assault burns comprise a substantial proportion of burn injuries in Uganda and they certainly deserve increased recognition and attention. A serious concern is that public education

campaigns against acid violence may actually give potential assailants the idea to carry-out such attacks. Another serious question, not addressed in our study, concerns the legal environment, and the possibility of deterrent legal action against the assailants.

Acknowledgements

This study was supported by the University of Toronto Office of International Surgery and funded by the Injury Control Center Award from the Canadian Network for International Surgery.

References

- [1] Leonard LG, Scheulen JJ, Munster AM. Chemical burns: effect of prompt first aid. *J Trauma* 1982;22:420–3.
- [2] Sykes RA, Mani MM, Hiebert JM. Chemical burns: retrospective review. *J Burn Care Rehabil* 1986;7:343–7.
- [3] Mazingo DW, Smith AA, McManus WF, Pruitt BA, Mason AD. Chemical burns: retrospective review. *J Trauma* 1988;28:642–847.
- [4] Tremel H, Brunier A, Weilemann LS. Chemical burns caused by hydrofluoric acid: incidence, frequency, and current status of therapy. *Med Klin* 1991;86(2):71–5.
- [5] Munnoch DA, Darcy CM, Whallett EJ, Dickson WA. Work-related burns in South Wales 1995–1996. *Burns* 2000;26(6):565–70.
- [6] Brozka W, Thornhill HL, Howard S. Burns: causes and risk factors. *Arch Phys Med Rehabil* 1985;66:746–52.
- [7] Krob MJ, Johnson A, Jordan MH. Burned-and-battered adults. *J Burn Care Rehabil* 1986;7:529–31.
- [8] Purdue GF, Hunt JL. Adult assault as a mechanism of burn injury. *Arch Surg* 1990;25:268–9.
- [9] Faga A, Scevola D, Mezzetti MG, Scevola S. Sulphuric acid burned women in Bangladesh: a social and medical problem. *Burns* 2000;26(8):701–9.
- [10] Yeong EK, Chen MT, Mann R, Lin TW, Engrav LH. Facial mutilation after an assault with chemicals: 15 cases and literature review. *J Burn Care Rehabil* 1997;18(3):234–7.
- [11] Brandy J, Arscott GDL, Smoot EC, Williams GD, Fletcher PR. Chemical burns as assault injuries in Jamaica. *Burns* 1996;22(2): 154–5.
- [12] World Health Organization [Online]. Available: <http://www.who.int/country/uga/en/> [accessed 2 September 2002].
- [13] Ly H, Sarom N, Gollogly J, Beveridge M. 88 Burns operated at the ROSE rehabilitation Centre, Phnom Penh, Paper read at the 7th annual Cambodian Surgical Congress, November 2001.