

Original Article

Human bite facial wounds in Bouaké (Côte d'Ivoire): development of a therapeutic algorithm in underdeveloped countries

Eric Kouassi Zegbeh-N'guessan^{1,*}, Pornan Issa Jules Béréte¹, Tahib Arnaud Salami², Camille Assouan², Romaric Evrard Assi Yapo², Grébéret Emmanuel Crezoit¹

¹ Service d'odontostomatologie et chirurgie maxillo-faciale du Centre Hospitalier Universitaire de Bouaké [Odontostomatology and Maxillofacial Surgery Department of the University Hospital Center of Bouaké], Côte d'Ivoire

² Service de stomatologie et chirurgie maxillo-faciale du Centre Hospitalier Universitaire de Treichville [Stomatology and Maxillofacial Surgery Department of the University Hospital Center of Treichville], Côte d'Ivoire

(Received: 20 July 2019, accepted: 8 December 2019)

Keywords:
facial / traumatism /
human / bite

Abstract – Introduction: The treatment of facial wounds by human bites is difficult, especially in under-developed countries. We aimed to distinguish the epidemiological and clinical aspects to describe the therapeutic methods and evaluate their effectiveness. **Materials and methods:** This was a descriptive and retrospective study over a period of 6 years. Patients who consulted regarding a human bite wound and were surgically treated were included. **Results:** Eighteen patients with a hospital prevalence of 0.008% were enrolled. The ratio of men to women was 2 (12 men for every 6 women). The average age was 32.77 years (range, 23–45 years). The lesions were labial in 11 cases (61.11%). The wounds were type III in eight cases (44.44%) and type II in nine cases (50%). Surgical treatment was primary in 12 cases (66.67%) and delayed in 6 cases (33.33%). The evolution was favorable in 16 cases (88.89%). **Discussion:** The wounds on the face created by human bite can be effectively treated via primary repair while reserving systematic secondary closure to an initially necrotic wound.

Introduction

Facial wounds caused by human bites are infrequent but serious [1–3]. Compared with canine or feline bites, this type of wound is infrequent and may affect the lips, nose, eyelids, forehead, and ears [4]. Facial wounds caused by human bites most often involve males between 20 and 30 years of age [2,5].

There is significant morbidity with aesthetic implications associated with the facial location of these wounds. This is all the more serious when it comes to substance losses leading to severe disfigurements and sometimes functional disorders. Social and psychological consequences are often associated. In addition, facial wounds caused by human bites often occur due to interpersonal violence, murder or attempted murder, rape, sexual assault, abuse, and abduction [2]. The potential complications occur primarily due to bacterial infections that are more severe than those caused by animal bites. This is primarily due to the aerobic and anaerobic human oral flora [2,6]. It should also be noted that there is a risk of tetanus and viral infection (hepatitis B, hepatitis C, herpes simplex,

and HIV) [4]. Consequently, the treatment of human facial bites poses a challenge for the maxillofacial or plastic surgeon [2,5]. Previous conceptions recognized that because of the infection risk, particularly in the event of a therapeutic delay of several hours, it was preferable to treat wounds caused by human bites after a period of time during which the wound remained open. In cases where primary repair was considered, it was recommended that the entire boundary of the wound be excised beforehand [4]. Treatment options become more difficult when economic factors are added to the list of parameters to be considered. Therefore, some practitioners in underdeveloped countries have to adapt medical and surgical procedures to their socioeconomic context [4]. The limited amount of information available on the subject in sub-Saharan Africa makes it difficult to envisage therapeutic coding or even an epidemiological–clinical trend specific to the African socioeconomic context. Bouaké is a city in central Côte d'Ivoire that was the epicenter of a 10-year military-political crisis, with highly damaging socioeconomic consequences [7]. In this resource-limited context, the authors of this study aimed to deepen the epidemiological–clinical knowledge on facial wounds caused by human bites and provide additional

* Correspondence: zndes@yahoo.fr

Table I. Classification of facial bite wounds.

TYPE	Description of the wounds
TYPE I	Superficial wound without muscle involvement
A	Deep wound with muscle participation
TYPE II	Total cheek or lip wound with oral mucosal involvement
A	Deep wound with tissue defect
TYPE III	Deep avulsion wound exposing nasal or auricular cartilage
A	Deep wound with severed facial nerve conduit and/or parotid facial cut
TYPE IV	Deep wound with concomitant bone fracture

arguments for the development of a possible therapeutic algorithm better adapted to local conditions. The objective was to distinguish epidemiological and clinical aspects, describe therapeutic methods, and evaluate their effectiveness.

Materials and methods

This was a descriptive and retrospective study that took place over a period of six years from January 2011 to December 2016, in the Odontostomatology and Maxillofacial Surgery Department of the University Hospital Center of Bouaké. Patients who consulted for a facial wound caused by a human bite that was surgically treated were included in the study. The criteria for non-inclusion included facial wounds caused by self-inflicted bites, wounds caused by non-human bites, and those that were not surgically treated. Incomplete medical records were also excluded. The parameters studied were epidemiological (age and sex of the bitten person, sex and affiliation of the biting person, geographical location, and delay in consultation); clinical (wound site, wound type according to Stefanopoulos classification (Tab. I), wound size, initial appearance of the wound, and bacteriological study of the wound); and therapeutic (management delay, medico-surgical procedure, and evolution) [2,3,8]. The medical and surgical procedures were the same as those applied to all infected wounds treated in the Odontostomatology Department of the Bouaké University Hospital Center:

- An initial photograph of the wound
- Anti-tetanus prophylaxis and antibiotic therapy with amoxicillin clavulanic acid combined with metronidazole by parenteral route at D1. Antibiotic therapy was continued using the same oral or parenteral dosage regimens from D2 onward
- Appropriate analgesics
- A local, loco-regional, or general anesthesia
- A dressing

Table II. Distribution according to epidemiology.

Patient	Sex	Age	Geographic location	Delay of consultation
1	Male	41 years	Urban	4 h
2	Female	27 years	Rural	3 h
3	Male	41 years	Rural	16 h
4	Female	26 years	Rural	3 h
5	Male	22 years	Urban	9 h
6	Male	35 years	Rural	5 h
7	Male	38 years	Rural	2 h
8	Male	28 years	Urban	4 h
9	Male	31 years	Rural	3 h
10	Female	23 years	Rural	1 h
11	Female	45 years	Urban	3 h
12	Male	24 years	Rural	49 h
13	Male	43 years	Rural	15 h
14	Female	30 years	Rural	6 h
15	Male	29 years	Urban	4 h
16	Male	25 years	Rural	3 h
17	Female	36 years	Rural	10 h
18	Male	34 years	Urban	2 h

- Washing the wound with a saline solution and an antiseptic
- Primary reconstruction (in the 24-h period after admission) or delayed reconstruction (after 24 h after admission) of wounds by simple suture or local flap
- A Chlorhexidine mouthwash for labial mucosal wounds
- The wound left in the open air on D2 postoperatively with bi-daily application of topical fusidic acid
- Removal of the sutures on D7 in the absence of complications
- Follow-up on D10 and D30

The data were collected from a survey sheet developed for this purpose. The data processing was performed using the SPSS 20.0 software.

Results

During the study period, 2253 maxillofacial traumas were treated in the Odontostomatology and Maxillofacial Surgery Department of Bouaké University Hospital Center, 20 of whom were victims of facial injuries caused by human bites. In this population, data of 18 surgically treated cases were collected, representing a hospital prevalence of 0.008% for all maxillofacial trauma cases. The injuries were all caused by interpersonal violence. There were 12 men (66.66%) for every six women (33.34%), leading to a sex ratio of 2; the average age was 32.77 years (range, 23–45 years) (Tab. II). The biters were brothers in eight cases (44.44%) of whom two (11.11%) had psychiatric disorders, sexual rivals in four cases (22.22%),

Table III. Distribution according to clinical parameters.

Patient	Localization	Type	Size	Initial appearance
1	Upper lip	II B	2 cm	Clean
2	Right cheekbone	I	1 cm	Clean
3	Upper lip	II B	2 cm	Clean
4	Upper eyelid	II B	1 cm	Necrotic
5	Lower lip	II B	3 cm	Necrotic
6	Ear	III B	3 cm	Clean
7	Upper lip	II A	1 cm	Necrotic
8	Upper lip	III A	2 cm	Clean
9	Lower lip	III A	2 cm	Clean
10	Fronto-palpebral muscle	II A	3 cm	Clean
11	Lower lip	II B	2 cm	Clean
12	Nasal tip and alar wing	III B	2 cm	Clean
13	Lower lip	III A	4 cm	Necrotic
14	Upper lip	III A	2 cm	Clean
15	Upper lip	III A	2 cm	Clean
16	Nasal tip	III A	2 cm	Clean
17	Upper lip	II B	1 cm	Necrotic
18	Ear	II B	1 cm	Clean

Table IV. Distribution according to treatment and evolution.

Patient	Closure technique	Time between admission and repair	Evolution
1	Suture in three planes	26 h	Good
2	Suture in three planes	4 h	Good
3	Suture in three planes	40 h	Good
4	Suture in three planes	5 h	Good
5	Nasolabial flap	38 h	Infection
6	Suture in one plane	2 h	Good
7	Suture in three planes	5 h	Good
8	Suture in three planes	3 h	Good
9	Suture in three planes	22 h	Good
10	Suture in two planes	1 h	Good
11	Mucosal flap	2 h	Good
12	Forehead flap	120 h	Good
13	Karapandzic flap	72 h	Necrosis
14	Suture in three planes	2 h	Good
15	Suture in three planes	35 h	Good
16	Suture in three planes	2 h	Good
17	Suture in three planes	3 h	Good
18	Suture in one plane	3 h	Good

sexual aggressors known to the victim in three cases (16.67%), and unidentified individuals in three cases (16.67%). All the perpetrators were of the same sex as their victims and none of them could be tested for any blood-borne diseases. One of the victims was HIV-positive. The clinical presentation of the treated wounds has been recorded in [Table III](#). Associated non-facial bites were located on the upper limbs in one case and on the buttocks in one case. Bacteriological examination of the wounds revealed the presence of microbes in seven cases (38.89%). These were *Streptococcus* sp. in three cases (16.67%) and *Staphylococcus aureus* in four cases (22.22%). The treatment time was on average 21.39 h, with a range of 1–120 h ([Tab. IV](#)). Different surgical techniques were used to repair wounds. Patients were treated under local anesthesia and on an outpatient basis in 16 cases (88.89%). In the other two cases (11.11%), the treatment was provided under general anesthesia with hospitalization for the implementation of frontal and Karapandzic flaps. The average healing time was 9 days with a range of 7–14 days. The outcome was favorable in 16 cases (88.89%).

Discussion

Facial wounds caused by human bites most often affect males. This is associated with the natural tendency of men to have confrontations [1]. Such actions are also linked with

people in their 20s, which was in line with most of the data present in the literature [1,4,9]. The majority of the attackers were known to the victims. Clearly, these facial wounds caused by human bites would be facilitated by the possibility for the attacker to get close enough to the victim, especially if the victim trusted them. Consequently, the victim, being caught by surprise, would not reflexively protect their face. In the case of sexual rivalry, the wounds inflicted are justified by the desire to create facial damage to possibly aesthetically damage the rival to degrade them in the eyes of their intended partner [4]. The fact that all biters are of the same sex in this study and in many others supports the implication of the notion of gender rivalry in the genesis of facial human bites [4]. The lips were the most frequently damaged body part in this study. This may occur due to several factors, including the prominence of the lips in black African patients [1,4,6]. Bacterial germs usually found in facial wounds caused by human bites most often come from the bacterial flora of the mouth cavity of the person being bitten or biting [1,2,6]. In this study, there was only one case of postoperative infection. None of the biters could be tested for possible blood-borne viral diseases because most of the aggressors were hostile to the victim, making it unlikely that the biter would voluntarily assist the bitten person in their recuperation. The possibility of forcing an aggressor to carry out examinations implies that the victim must initiate legal proceedings. This has not been easy given that most perpetrators are relatives of the victims and the cumbersome

legal procedures can discourage complainants. For caregivers, the health status of the abuser is of little interest during immediate care. On the other hand, a serological examination of the victim in the weeks or months following the injury would be useful since the seroconversion of hepatitis B, hepatitis C, and HIV has been established several times after being infected through a human bite [10,11]. This procedure should be part of a standard protocol for the treatment of human bites. As the majority of wounds are located at the facial level, they probably benefited from good anastomotic vascularization, which reduces the infection risk. Broad-spectrum antibiotic prophylaxis should be combined as a factor in reducing the occurrence of infections [4,12]. The two postoperative complications observed had occurred on wounds that were initially necrotic. This tends to corroborate Koesh *et al.*'s assertion that necrosis leads to infection [1]. The notion of initial necrosis could be a decision-making factor in favor of delayed closure after cleansing the wound. In addition, three other initially necrotic wounds had nevertheless progressed well after primary closure. This implies that the quality of the dressing certainly has an impact on the progression. Other authors mention the possibility that a thrombotic process may develop in the postoperative period, with the possibility of secondary tissue necrosis. This leads to the possibility of the use of anticoagulants during the surgical procedure. However, it appears that this precaution is only useful for free flap or tissue grafting procedures [13]. In addition, there is no information on local additive care that some patients, treated on an outpatient basis, could have used through self-medication without the practitioner's knowledge. Indeed, practices such as the local application of hot water or alcoholic beverages as self-medication have already been described. It is also necessary to associate non-compliance with antibiotic treatment as a potential complication factor [4]. This opens the prospect of further investigation of other factors that may influence the outcome of surgical treatment. Primary wound repair, *i.e.* within 24 h of admission, was performed in 66.66% of cases. And all cases treated via primary repair favorably progressed, although half of the wounds repaired by this procedure were of a type greater than or equal to III. All patients treated under local anesthesia and in outpatient care have favorably progressed. However, cases of delayed wound repair, *i.e.* beyond 24 h after admission, were justified either by the need to prepare a good vascular bed for the correct setting of a flap, or by a delay due to plate technique failures. Gupta *et al.* proposed hospitalization and surgery under systematic general anesthesia for all Stefanopoulos Type III and IV injuries [2]. This treatment protocol would be more appropriate in settings where access to medical and surgical equipment is relatively easy for local populations. This is not necessarily the case in underdeveloped countries [4]. Some authors have mentioned contraindications to primary wound closure as follows: infection, treatment time exceeding 24 h, punctiform, avulsion, or suturable wounds under tension, and demonstrated comorbidity or immunocompromised condition [11]. The notion of initial wound necrosis is not included among these

contraindications or among the standard classification parameters for human bites [8]. This opens the perspective of the realization of a therapeutic algorithm specific to the West African subregion including the initial necrotic or non-necrotic aspect of the wounds. However, although the primary closure reduces the treatment-related expenses, a postoperative complication could result in additional medical costs. Therefore, conventional treatment should be systematically chosen as soon as the wound's initial appearance shows necrosis.

Conclusion

At the completion of this study, it became clear that human bite wounds on the face primarily involve the lips and typically involve young adult men living in rural areas. Lip damage is most frequently observed, and the severity of the wound can reach Stefanopoulos Type III B. Primary repairs under local anesthesia and general or local antibiotic coverage adapted to the antibiotic susceptibility test could form the basis of a therapeutic algorithm better suited for facial wounds caused by human bites in resource-limited settings, with the exception of initially necrotic wounds to which the standard delayed closure protocol could be systematically applied.

Conflict of interest

The authors declare that they have no conflicts of interest in relation to this article.

References

1. Koech KJ, Chindia ML. Présentation and Management of Human Lip Bites at a Kenyan Center : A Case Series. *J Oral Maxillofac Surg* 2010;68:2701–2705.
2. Gupta A, Mehra P. Human bite – a rare case report. *Indian J Med Spec* 2015;6:73–75.
3. Stefanopoulos PK, Tarantzopoulou AD. Facial bite wounds: management update. *Int J Oral Maxillofac Surg* 2005;34:464–472.
4. Donkor P, Bankas DO. A study of primary closure of human bite injuries to the face. *J Oral Maxillofac Surg* 1997;55:479–481.
5. Sinwar PD. Auricle injury due to human bite – a rare case report and review literature. *Int J Surg Case Reports* 2015;6:5–7.
6. Olaitan PB, Uduezue AO, Ugwueze GC, Ogbonnaya IS, Achebe UJ. Management of human bites of the face in Enugu, Nigeria. *African Health Sciences* 2007;7:50–54.
7. Kra Krah KL, Yao LB, Séry BJLN, M'bra KI, Benié AC, Kouassi KJE, *et al.* Données épidémiologiques des accidents de moto aux urgences chirurgicales du chu de Bouaké. *Rev Int Sc Méd* 2013;15:161–164.
8. Stefanopoulos PK. Management of facial bite wounds. *Oral Maxillofac Surg Clin North Am* 2009;21:247.
9. Stierman KL, Lloyd KM, De Luca-Pytell DM, Phillips LG, Calhoun KH. Treatment and outcome of human bites in head and neck. *Otolaryngol Head Neck Surg* 2003;128:795–801.

10. Vidmar L, Poljak M, Tomazic J, Seme K, Klavs I. Transmission of HIV-1 by human bite. *Lancet* 1996;347:1762–1763.
11. Jenkins GW, Isaac R, Mustafa S. Human bite injuries to the head and neck: current trends and management protocols in England and Wales. *Oral Maxillofacial Surg* 2018;22:77–81.
12. Harrison M. A 4-year review of human bite injuries presenting to emergency medicine and proposed evidence-based guidelines. *Int J Care Injured* 2009;40:826–830.
13. Leach GA, Lundberg JN, Holcombe TC. Complications of Microvascular Upper Lip and Free Grafted Nasal and Eyebrow Replantation After Assault via Human Bite. *Cureus* 2019;11:e4631.