

# Osteoarticular Lesions of the Shoulder Girdle by Hippopotamus Bite: Highly Septic Lesion

Jr Pierre Germain Ochou<sup>1</sup>, Achié Jean Régis Akobe<sup>1\*</sup> ,  
Yao Aboh Ganyn Robert Arnaud Assere<sup>1,2</sup>, Kouamé Jean-Eric Kouassi<sup>1</sup>,  
Adelaïde Aya Natacha Kouassi<sup>1</sup>, Ibrahim Soumahoro<sup>1</sup>, Zolopégué Marcel Soro<sup>1</sup>,  
Sédi Loues De Randolphe Akpro<sup>1</sup>, Gbalé Yannick Blé<sup>1</sup>, Kouamé Innocent M'bra<sup>1</sup>,  
Loukou Blaise Yao<sup>1</sup>, Bada Juste Léopold NiaoréSery<sup>1</sup>, Koffi Léopold Krah<sup>1</sup>, Michel Kodo<sup>1</sup>

<sup>1</sup>Department of Orthopaedic and Traumatological Surgery, Bouaké University Hospital, Bouaké, Ivory Coast

<sup>2</sup>Raoul Follereau Institute, Manikro Centre, Bouaké, Ivory Coast

Email: \*akoberegis@gmail.com

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## Abstract

Hippopotamus bites are rare in medical consultations, despite several studies exposing their aggressive character. A case of a hippopotamus bite on the shoulder of a fisherman has been reported. In addition to the osteoarticular aspect representing a therapeutic problem, the infectious aspect was marked by sepsis, with a death in less than 48 hours. Based on this observation, a protocol for the initial management of large animal bites was submitted.

## Keywords

Bite, Hippopotamus, Septic Shock

## 1. Introduction

Animal bites are not frequent in consultations in general and in particular hippopotamus bites are rare, as they are dominated by domestic animals [1]-[8]. In Côte d'Ivoire, it is the species Hippopotamus amphibious that is encountered [9] [10]. In several countries, conflicts between humans and these herbivores have also been reported, with cases of loss of human life [5] [7] [9] [11] [12]. In the literature, osteoarticular injuries are rarely associated with animal bites. Sternoclavicular dislocations are even less common in current practice. This is due to the quality and strength of the stabilising elements requiring a direct, high-velocity injury mechanism. It usually results from compression on the shoulder stump and may therefore be accompanied by injuries to the shoulder girdle and thoracic, pleuropulmonary and or neurovascular complications, particularly of

the brachial plexus [13] [14] [15]. Animal bites are an important therapeutic problem and there is still a lack of clarity regarding therapeutic attitudes. There remains much controversy about the risk of infection, wound closure or the usefulness of antibiotic prophylaxis [2] [16] [17]. The present observation presents an unusual case of a hippopotamus bite resulting in injuries to the shoulder girdle and thorax with death of the patient due to septic shock. This case is reported with emphasis on the infectious nature of the bite in order to provide a protocol for initial appropriate management.

## 2. Observation

This was a 42 year old patient, right handed and a fisherman. He was admitted with open trauma to the right shoulder following a hippo bite that occurred 42 hours prior to admission. The patient was allegedly attacked by a hippopotamus while fishing with a pirogue. The patient was reportedly bitten and grabbed at the right shoulder stump and thrown into the water about six metres from his dugout canoe. He reportedly had severe pain in the right shoulder girdle, heard cracking sounds and had absolute functional impairment of the right upper limb. He had bleeding wounds on his right shoulder. He reportedly received treatment 7 hours after the attack, consisting of dressings and sutures of the wounds, injectable paracetamol 1 g, injectable tramadol 100 mg, ceftriaxone 2 g and an elbow-to-body immobilisation. On admission, the patient was in septic shock with normal consciousness, temperature 38°C, blood pressure 99/66 mmHg, pulse 124 beats/minute and respiratory rate 21 cycles/minute. The pleuropulmonary examination noted an effusion syndrome on the right. The abdomen was painful in the right hypochondrium. The osteoarticular examination revealed a large 10 cm sutured wound in the right shoulder, with whitish infarcted areas, a warm and painful swelling. There was also a superficial wound on the posterior aspect of the right shoulder and four sutured wounds on the anterior, superior and posterior aspects (**Figure 1** and **Figure 2**). There was a warm, painful swelling over the entire homolateral hemithorax, with a painful curvature of the right sternoclavicular region, which palpated like a piano key. There was absolute functional impotence and loss of sensation in the right upper limb. There was a thoraco abdominal respiratory asynchrony on the right.

Paraclinical examinations before admission to the intensive care unit consisted of a standard X-ray of the right shoulder which noted a fracture of the right scapula (base of the acromion, coracoid apophysis, surgical neck creating a floating shoulder) and an acromioclavicular disjunction (**Figure 3**). The frontal chest radiograph noted a sternoclavicular disjunction, thus a floating clavicle. There was also an elevation of the right diaphragmatic hemi-cupola, suggesting a hiatal hernia, probably responsible for the effusion syndrome found at the clinic. There was no rib fracture (**Figure 4**).

The biology had noted a hyperleukocytosis of 43.96.103/uL including 90.8% neutrophils; a haemoglobin level of 10.7 g/dL. Uremia was 1.09 g/L and



**Figure 1.** Lateral and posterior views of the right shoulder.



**Figure 2.** Superior and anterior view of the right shoulder.



**Figure 3.** Frontal X-ray of the right shoulder.



**Figure 4.** Chest X-ray of the face.

creatinine 98 mg/L. The C-reactive protein was 192 mg/L.

Emergency management consisted of vascular filling with isotonic saline and 1 g paracetamol. Massive antibiotic therapy was instituted: ceftriaxone 2 g, metronidazole 500 mg and gentamycin 160 mg. During the application of his protocol, *i.e.* 30 minutes after his admission, the patient had to present a respiratory distress of polypnoea type with fluttering of the wings of the nose, suprasternal and intercostal pulls for a respiratory frequency beyond 30 cycles per minute. There was a heat surge of 39.8°C. The pulse was thready and the blood pressure was impregnable. Tonic-clonic convulsions ensued. There was cardiac arrest during intubation. Despite resuscitation measures, the patient died. The urinary catheter that had been inserted to assess diuresis had not collected anything. An abdominal ultrasound, an unprepared abdominal X-ray, an abdomino-thoracic scanner and a blood culture were prescribed. These could not be carried out. The wounds were managed by trimming. The osteoarticular lesions posed a therapeutic problem. The patient was pronounced dead within one hour of admission and commencement of management, *i.e.* 43 hours after his trauma.

### 3. Discussion

Hippo attacks remain a common occurrence in areas with human presence [10] [12]. Their teeth are impressive, with canines ranging from 30 to 60 centimetres in length and an average weight of 1 to 3 tonnes, suggesting great chewing strength [7], which can inflict considerable injury on a human, as evidenced by the complex osteoarticular lesions in the shoulder girdle of this observation. The habitat of hippos (lakes, mud...) and their herbivorous diet (rich in Poaceae and Fabaceae) implies a very large number of anaerobic and aerobic parasitic and bacterial species [6] [7] [9] [12] [18]-[23]. The risk of developing an infection and its severity are related to the biting animal. In combination with the pa-

tient's local hygiene, hippopotamus bites have a high potential for systemic (sepsis) and non-local (pus, abscess) infection [2]. Their apparent good health should not be contrasted with their richness as a vector. They have a good immunity with their sweat which they secrete to annihilate diseases related to their environment. Disease has rarely been mentioned as a threat to survival in hippos [7] [20] [24] [25]. Some studies have found evidence of *Clostridium chauvoei* in hippos, which inoculated a female guinea pig and died within 20 hours [26]. There is also the presence of parasites such as *Syngamus hippopotami* n sp [27]. In this case, in addition to fulminant septicaemia and renal failure, *i.e.* sepsis, this bite resulted in death within 43 hours. The literature states that a wound size greater than 3 centimetres and a delay in management of more than 6 hours significantly increases the risk of infection. This observation noted a 10 centimetre wound, received 42 hours post-trauma. Initial management should therefore not be the same as for any other injury [2]. It was primary and should allow the patient to go to a more equipped centre. Ultimately, it was a patient who died during the management of sepsis 43 hours after septic inoculation. Patients with bites should be evacuated after simple wound dressings to centres better equipped to perform trimming, limiting the effect of contamination or even infection [1]. Sedation should ease the pain and allow the necessary initial care. The latter should first of all start with a thorough cleaning of the wounds. This is the most important step in preventing infection [16]. As a minimum, there should be a thorough washing with soap, water and bleach, followed by rinsing and local disinfection as soon as possible to reduce the bacterial inoculum. Abundant irrigation with isotonic saline under hyper-pressure by syringe would reduce the risk of wound contamination and thus the risk of infection [16]. Tetanus serotherapy and or without tetanus vaccination depending on vaccination status should be given. Anti-rabies prophylaxis should be compulsory, even if there is no written evidence of rabies in the hippopotamus, prevention would be preferable [1] [2] [3]. Antibiotic therapy should be systematic. It should be probabilistic, broad spectrum and then adapted according to the results of bacteriological samples. In view of its impact against beta-lactamase, amoxicillin-clavulanic acid is preferred. Ceftriaxone, although less effective against anaerobes, remains a valid choice [2] [3] [4] [16] [17]. Suturing of wounds without trimming can be considered an aggravating factor, as it is considered to be an anaerobic promoting act. Deep wounds, as well as clinically infected ones, should not be closed [16]. This observation is evidence that hippo bites should be considered as polymicrobial infections as outlined above.

Osteoarticular lesions related to hippopotamus bites posed a therapeutic problem [13] [14] [15]. It was a challenge to reduce a floating clavicle and an ipsilateral floating shoulder on a scapula fracture in a septic setting. The indication in a septic setting should be a two-stage treatment. After initial trimming and the disappearance of inflammatory and infectious phenomena, bone reconstruction is carried out in an aseptic environment.

## 4. Conclusion

This case study shows that the hippopotamus bite is polymicrobial and of high velocity. Delayed management is a poor prognostic factor. Initial treatment should be carried out within the first hour if possible, and should be prophylactic (serotherapy and vaccines, antibiotic prophylaxis) and therapeutic (dressings, antibiotic therapy and surgical procedures). Wound closure must remain contraindicated. Wound cleansing is the first step and must be meticulous. Animal bites should never be considered as harmless, especially in large animals where the risk of infection is high, but also the organic lesioning is high. They can lead to bacterial superinfection and major functional handicaps, or even to death.

## Authors' Contribution

All authors contributed to the writing of this manuscript and gave their approval to the final version.

## Conflicts of Interest

The authors declare no conflict of interest.

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