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CHIRURGIE  
DE LA **main**

Chirurgie de la main 33 (2014) 137–143

Original article

## Management of the complications of traditional bone setting for upper extremity fractures: The experiences of a French Forward Surgical Team in Chad

*Prise en charge des complications du traitement traditionnel des fractures du membre supérieur :  
expérience d'une antenne chirurgicale de l'avant française au Tchad*

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Received 5 October 2013; received in revised form 12 January 2014; accepted 31 January 2014

Available online 15 February 2014

### Abstract

The practice of traditional bone setting (TBS) in sub-Saharan Africa often leads to severe complications after upper extremity fracture. The purpose of this study was to evaluate the management of these complications by a French Forward Surgical Team deployed in Chad. An observational, prospective study was conducted over a six-month period between 2010 and 2011. During this period 28 patients were included. There were 20 males and 8 females with a mean age of 30.6 years (range 5–65 years). Thirteen patients (47%) had mal-union of their fracture, nine had non-union (32%), three children (10.5%) presented gangrene and three patients (10.5%) suffered from other complications. Fifteen (54%) patients did not undergo a corrective procedure either because it was not indicated or because they declined. Only 13 (46%) patients were operated on. Twelve of these patients were reviewed with a mean follow-up of 2.4 months. All of them were satisfied with conventional treatment. The infection seemed to be under control in every septic patient. Bone union could not be evaluated in most patients because of the short follow-up. Management of TBS complications is always challenging, even in a deployed Western medical treatment facility. Surgical expectations should be low because of the severity of the sequelae and the uncertainty of patient follow-up. Prevention remains the best treatment.

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*Keywords:* Traditional bone setting; Fracture; Upper extremity; Chad; Africa

### R sum 

Le traitement traditionnel des fractures (TTF) en Afrique sub-saharienne conduit souvent   des complications s v res au membre sup rieur. L'objectif de cette  tude  tait d'analyser la prise en charge de telles complications au sein d'une Antenne Chirurgicale de l'Avant fran aise d ploy e au Tchad. Une  tude prospective observationnelle a  t  men e sur une p riode de 6 mois entre 2010 et 2011. Durant cette p riode, 28 patients ont  t  inclus. Il y avait 20 hommes et 8 femmes, d' ge moyen 30,6 ans. Treize patients (47 %) pr sentaient un cal vicieux, 9 (32 %) pr sentaient une pseudarthrose, 3 (10,5 %) enfants pr sentaient une gangr ne et 3 (10,5 %) patients avaient d'autres complications. Quinze (54 %) n'ont pas  t  op r s en raison de l'absence d'indication ou d'un refus du traitement propos . Seulement 13 (46 %) patients ont  t  op r s selon diverses techniques. Douze patients ont  t  revus avec un recul moyen de 2,4 mois, et tous  taient satisfaits du traitement conventionnel re u. L'infection semblait contr l e dans tous les cas de complications septiques. La consolidation osseuse n'a pu  tre  valu e chez la plupart des patients en raison d'un recul insuffisant. La prise en charge des complications du TTF est toujours d licate, m me dans une structure de soins occidentale projet e. Les ambitions chirurgicales doivent  tre modestes, car les s quelles sont s v res et le suivi des patients incertain. La pr vention reste le meilleur des traitements.

  2014 Publi  par Elsevier Masson SAS.

*Mots cl s :* Traitement traditionnel ; Fracture ; Membre sup rieur ; Tchad ; Afrique

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## 1. Introduction

In sub-Saharan Africa, the traditional care of disease and trauma existed long before the introduction of conventional Western medicine [1]. In Chad, traditional bonesetters have existed for decades and still continue to treat most fractures. One of the main reasons is that access to modern health care services in rural areas is limited. Patients have to travel hundreds of kilometers under poor conditions (lack of road and transportation) to receive specialized surgical care [1–4]. Other reasons include quicker and cheaper services with the possibility of payment in kind, or the fear of amputation at a conventional hospital [1,4]. In addition, cultural and spiritual aspects explain the every strata of the African society continue to seek the help of traditional bonesetters [4–6].

Unfortunately, this practice often leads to major complications that jeopardize limb function and sometimes lead to loss of the limb or death [3,5,7–9]. The various Traditional Bone Setting (TBS) methods have specific complications: tight splinting leads to compartment syndrome or extremity gangrene; massaging leads to non-union or heterotopic ossifications; and scarifications can induce osteomyelitis or systemic infection [5]. Major complications such as bonesetter's gangrene in children seem to mostly occur in the upper extremity, which has a poor tolerance to tight splitting [3,9–11].

After being first treated by a traditional bonesetter, patients are often referred to Western medical facilities for the treatment of these complications. Despite many publications warning against TBS, the morbidity associated with this practice is not well documented [2,11,12]. Furthermore, with the exception of limb amputation for gangrene, the management of TBS complications is seldom analyzed in the literature [3,7,8]. Even in Western hospitals, treatment of these complications may be challenging because the care is delayed and there is a lack of orthopedic surgeons and resources [8].

The purpose of this study was to analyze the management of TBS complications seen in patients with upper extremity fractures admitted to a French Forward Surgical Team (FST) deployed in Chad. The demographics, time to admission since the initial injury, types of complications, and type of surgical procedures performed were recorded.

## 2. Patients and methods

The *Epervier* FST is a French role 2 medical treatment facility deployed at the Kosei Air Force Base in N'Djamena (Chad) since 1986. This facility provides medical support for French military patients, but also provides care to the local population. Humanitarian surgery represents more than 95% of the activity. Basic medical and surgical equipment are used to perform both external and internal bone fixation in a dedicated orthopaedic operating room. Radiology and microbiology resources are also available. However, reconstructive surgery is performed with limited resources because of the small number of beds available (40 beds), no access to physical or occupational therapy, and unknown follow-up of patients from rural areas.

An observational prospective study was conducted over a period of six months between 2010 and 2011 during two consecutive deployments of one of the authors (LM). Inclusion criteria were: local patients, upper extremity fracture, primary treatment by a traditional practitioner, and complications due to TBS including infection, compartment syndrome, non-union, mal-union or osteomyelitis. Non-union was defined as a lack of bone healing four months after the injury. Patients who received delayed conventional treatment for closed fractures prior to this time were excluded.

The prospectively collected data included age, gender, body part injured, type of complication, and time to conventional management. Functional impairment was defined as limited, moderate or severe. Complications were managed conservatively or surgically based on the judgement and experience of the sole orthopaedic surgeon on duty. Conservative treatment mostly consisted of medical advice and the prescription of painkillers. All surgical procedures performed were analyzed including revision surgeries for complications or reconstruction. The outcome of surgical treatment was assessed using the following parameters: patient satisfaction, infection control and bone union. A study database was created using Excel software (Microsoft, Redmond, WA). Statistical analysis for demographic data or selected variables included means and extremes.

## 3. Results

During the study period, 355 Chadian patients were referred to the *Epervier* FST for an initial orthopedic consultation. Among them, 28 (7.9%) were included in this study. There were 20 males and 8 females with a mean age of 30.6 years (range, 5–65 years). Traditional bonesetter treatment had consisted of splinting or bandaging in 26 cases; two patients with closed elbow fracture underwent scarifications (Fig. 1). Four (14%) patients were referred within 2 months from the injury for three septic complications and one distal radius mal-union. Seven (25%) patients were referred between 3 and 5 months, 10 (36%) patients between 6 and 11 months, and seven (25%) patients after 12 months or more.

Injury types and complications are detailed in Table 1. Thirteen (46.5%) patients suffered from mal-union of their fracture, nine (32%) from non-union and three (10.5%) children had bonesetter's gangrene. Other complications included one Volkmann's ischaemic contracture, one infected open fracture of the forearm due to a camel bite, and one elbow arthrodesis. Functional impairment was limited in 12 (43%) cases, moderate in 11 (39%) cases and severe in five (18%) cases. The three children with gangrene all presented an associated systemic infection: one had typical gangrene with complete necrosis of the forearm and hand; the two others had localized necrosis with an extensive soft-tissue abscess and forearm osteomyelitis (Fig. 2).

Fifteen (54%) patients received no corrective procedures: seven were managed conservatively, four declined surgical treatment, three were lost to follow-up before surgery, and one patient was unfit for anesthesia because of a poor general health. Of the seven patients treated conservatively, four had mal-unions with limited functional impairment and three had

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