

Survey of management of open fractures

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Abstract

Background and objective: Initial proper management of open fracture makes a paramount difference to the outcome. The current survey was carried out to evaluate the local practice of the management of open long bone fractures.

Methods: A questionnaire was distributed on 17 doctors who were involved in the management of 42 open fractures in the previous year. Timing to debridement, type of anesthesia, antibiotic administration, number of normal saline liters used for washout, photo taken and other issues were studied.

Results: After analyzing the data collected, it turned out that wound management takes place within nine hours, antibiotics given immediately upon admission, and photo of the wound taken in most but not all of the patients. Some of the wound management was performed under local anesthetics (11%), but the majority was done under general anesthesia. A variety of implants were used, mainly external fixation. The infection rate was 23%.

Conclusion: Auditing the practice of open fracture is crucial to improve outcome. The use of Gustilo classification should be followed to predict outcome and decide on the amount of saline used, the latter was underrated in the current study. Local anesthesia is not adequate for proper wound debridement where the two ends of the bone should be delivered in the wound for washout. Antibiotics for more than 3-5 days will result in the development of resistance, which should be avoided.

Keywords: Open fracture, Management, Outcome, Antibiotics, Saline

Introduction

The objectives of the management of open fracture are to prevent sepsis, achieve union and restore function. The outcome is mostly affected by severity of soft tissue and neurovascular injury.¹⁻⁹ The incidence of the complications following open fracture is related to the severity of injury and the grade of open fracture. The extent of soft tissue damage is classified according to Gustilo-Anderson classification. The Gustilo classification has been the most widely used system and is generally accepted as the primary classification system for open fractures. This classification is based on soft tissue damage, the energy of fracture and the degree of contamination.¹ Classification of open fractures is important because it allows comparison of results in

scientific publications, but more importantly because it gives the surgeon guidelines for prognosis and permits us to make some statements about methods of treatment. There, however, is inter and intraobserver errors using this classification relying entirely on the wound size. The initial wound size may change after debridement. There is too much emphasis on wound size in the Gustilo-Anderson classification.¹⁻¹² The critical factors in their classification system are the degree of soft tissue injuries, and the degree of contamination. The size of skin wound is therefore a poor guide to the classification. A devastating crush injury of the leg necessitating amputation may be associated with only a small skin wound. Additionally, the classification does not take into consideration the size of the

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patient. Children have a smaller surface area, yet the grading of the wound size has not been modified for this age group.¹⁰ It is suggested that the classification is performed after wound debridement in the operative theatre¹¹ and further suggestions were made using video based assessment of the wound in the operative theatre to reduce the incidence of errors.¹² The aim of the current study was to scrutinize the initial management of open fracture especially of the soft tissue.

Methods

A survey was conducted in 2012 for patients with open long fracture treated between 2011-2012. The routine followed for the management of open long bone fracture among orthopedic surgeons in three cities of the northern province of Kurdistan in Iraq, was evaluated. A group of orthopedic surgeons from the city of Kirkuk, Sulaimani and Erbil were taken. A questionnaire given to the doctors to complete, Table 1.

Factors like the timing for debridement and the policy followed for in regards to the amount of fluid washout, antibiotic administration and the fixation method was studied. All these patients were immune to tetanus, through vaccination; they also received a booster of tetanus toxoid, when needed.

Results

Forty two cases were treated among the random participants chosen to complete the questionnaire. Around 52% of the participants were orthopedic residents and the remainders were consultant orthopedic surgeons. The average number of cases managed among the surgeons during the year was nine cases for each of them. Around 24% of these cases were managed in the private sector, the remaining were treated in the government hospitals. The tibia was the commonest bone affected

Table 1: Questionnaire about management of open fractures.

ID	Questionnaire	
1	What is your status?	1- Orthopedic resident() 2- orthopedic surgeon()
2	How often you have seen open fracture in the last one year?	
3	How many litters of normal saline (or alternatives) did you use for irrigation of open fractures?	
4	Did you do it under local or general anesthesia?	
5	How many hours after injury the wound debridement was carried out?	
6	What fixation if any was used?	
7	For how long you give antibiotics?	
8	Did you take a photo of the wound prior to debridement?	
9	Which bone was commonly affected?	
10	Are you aware of infection following the management of open fracture?	
11	Did you use Gustilo classification, which type commonly seen?	

and treated. The following points were explored after studying the response of the treating doctors to the questionnaire, Table 2. There were some variations among different hospitals in the Kurdistan region, Table 2. Photograph of the wound was taken in all hospitals; however the percentage of this was different. The mean period to wound debridement in all patients

was 8.5 hours following injury, and all received antibiotics on admission. The mean duration of antibiotic use was 8.5 days, intravenous when in hospital (2-3 days) and oral when discharged from hospital. Debridement was carried out under general anesthesia, 11% of wound washout was carried out under local anesthetics. Mean liters of saline used for washout was three liters.

Table 2: The overall outcome to the questionnaire

Factors	
The timing to debridement:	Majority of patients (94%) had debridement within 24 hrs (among this group, 64% had their debridement in the first 6 hours).
The anesthesia used	83% of the debridement was done under General anesthesia however 17% of patients had a simple washout under local aneshthesia.
The number of normal saline bottles used for irrigations:	41 % of them used up to 2 Liters of normal saline. 11.7% used it according to the type of the wound. The amount of fluid irrigation was not sufficient in most of the cases.
Antibiotics used	88% of surgeons administered paranteral antibiotics at the time of admission. Surprisingly in 75% of patients antibiotics was used for more than 10 days. cephalosporin was used (73%) and 27 % of patients received combined antibiotics (cephalosporin, + metronidazole, + aminoglycoside).
The stabilization method:	For the fracture stabilization 70.5% of the surgeons used external fixations, 5 % use intramedullary nail or plate and 24 % of them used combinations of (external fixation, plaster of Paris, or plate).
Taking photograph of the wound	29.5% of the doctors do not take photo of the wound.
Infection rate	23.5 % of open fracture fractures were complicated by infection following management of open fractures.
Gustilo classification	17 % of the doctors did not use Gustilo classification. 53% of the open fractures seen were Gustilo type II

Table 3: Results of the survey in different cities of Kurdistan

	Kirkuk	Hawler	Silemani
No of participants	4	8	5
No of cases – mean	15	6	21
No of Liter of NS	4	3 Lt	2.5L
Hrs before debridement	8	7	9.5
Start of antibiotics on admission	100 % immediately	100%	100%
Duration of antibiotics (mean)	7days	9 days	9 days
Type of fixation	75% external 25% nail/or plate	100% external	100% external fixation
Anesthesia used for debridement	100 GA	89% GA 11% LA	80 % GA, 20% Local anesthesia
Photo taking	50%	50%	100%

Discussion

The current audit of the practice of management of open fracture was conducted to improve the service; few issues of importance were explored. The time to wound debridement of open long bone fracture is debated.² In a study, no infection occurred when wound debrided within two hours.³ The six hour rule, thought not to be making a difference, however in a study, wound debridement was associated with fewer chance of infection when performed within 13 hours. The infection rate increased when the debridement was carried out after 13 hours.³ It is therefore recommended that routine delay of wound debridement to the second or the third day after injury, be avoided. The results support the Gustilo grading system of open fractures as a significant prognostic indicator for infectious complication.³⁻⁶ It is fair to assume, that the debate is about the timing of debridement but there is a universal agreement that the earlier debridement is carried out, is the better. In our study debridement was carried out within 9 hours, unfortunately most of the debridement is carried out in literature were after the first golden 6 hours as well.⁷ It is evident that delay of the first operative procedure beyond the day of admission appears to be associated with a significantly increased probability of amputation in patients with open tibia fracture.⁸ It is recommended that all practitioners involved in the management of these patients should seek a solution for any barrier, other than medical stability of the patient, to achieving early operative intervention.⁸ Future research and education are paramount to better prepare orthopedic surgeons.⁹ The soft tissue management was carried out in the current study under local anesthetics in 11% of cases. This is not an ideal situation; presumably it was a washout without debridement. Wound debridement can only be carried out under general anesthesia when the two ends of the broken bone are exposed and debrided. The practice of

wound debridement under local anesthesia should be abolished to reduce the current incidence of 23% infection rate following wound open fracture management. It was also evident in the current study that the amount of normal saline used was also fewer than recommended 3 liters need to be used for grade I, 6 liters for grade II and 9 liters for grade III.^{8,13} The period of antibiotics use in the current study was rather longer than recommended, for the fear of developing antibiotic resistance. This practice should be changed to a period of 3-5 days of prophylactic antibiotic use and not more. It is also a good practice to photograph the wound in the causality and avoid repeated wound exposure prior to debridement. The management of open fracture in the context of multiple injured patients has changed over the past decade to that of damage control orthopedic techniques. The available literature indicates that the true orthopaedic extremity emergencies include compartment syndrome and vascular injuries associated with fractures and dislocations. Orthopaedic urgencies include open fracture management, femoral neck fractures in young patients treated with open reduction and internal fixation, and talus fractures that are open or those with impending skin compromise. Patient survival rates have improved with current resuscitative protocols. Definitive fixation of extremity injuries should be delayed until the patient's physiologic and extremity soft-tissue status allows for appropriate definitive management while minimizing the risks of complications.¹⁴

Conclusion

It is reassuring that most of our orthopaedic colleagues are aware of the importance of early debridement and management of open long bone fractures. However, the care is not standardized across Kurdistan and there is no strict policy for the management of open fractures in our emergency hospitals.

Kurdistan Orthopaedic Association should rise up to the challenge, in collaboration with local health and academic units, start putting a strict policy in regards to the management of open fracture in the public hospitals within 24 hours of presentation. The 23% incidence of infection following open fracture is high, further studies should monitor the complications of open fracture and improve on this. Wound debridement should be done down to bone, with copious normal saline washout, and under general anesthesia. The duration of antibiotic has to be until the open wound has healed; the temptation for the long usage of antibiotics in order to avoid the emergence of antibiotic resistance. When resources for bone fixation are deficient, the goal should be to debride the wound in the first 24 hours; the bone fixation can be performed at a different stage. The local health authorities should address the defects within the system in regards to anesthesia and surgery outside working hours. Combined care with plastic surgeon is to be encouraged. Wound classification need to be performed after debridement, small wounds should not be considered innocuous.

Conflicts of interest

The authors report no conflicts of interest.

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