



**LAVAGE BY TUR IRRIGATION SET AND THREE LITRE SALINE BOTTLES AS ADJUNCT TO DEBRIDEMENT IN COMPOUND FRACTURES**

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**ABSTRACT**

The lavage of the wound in compound fractures is a undisputable principle to be applied in all the cases. The method of lavage may vary from one surgeon to another. We are using the TUR irrigation set as adjunct to debridement since 2005 and are presenting our results on the patients dealt in year 2015, 2016.

**KEYWORDS** : TUR irrigation set, compound fractures, debridement

**INTRODUCTION**

The debridement and irrigation is an absolute necessity in the management of the compound wounds. The debridement involves excision of all dead and devitalised tissue and thorough lavage of the tissues with copious amount of saline (1,2,3,4).

The different methods used for irrigating and lavage the wound is the irrigation with syringe and pulse lavage and various pressure devices (5). The author resorted to usage of TURP set for lavage of the wound in compound fractures. The versatility of the TURP set can control the amount and pressure of the fluid to be used, the direction of the jet can be controlled. The antiseptic solution put in the three litre bottle provides even supply of the antiseptic solution the tissues while being lavaged.

This method has been under utilisation for since 2005. The study has been conducted for the period from January 2015 to Dec 2016.

**MATERIAL AND METHODS**

All the patient having the compound fractures and dealt by the author in years 2015 and 2016 were included in the study. All the compound fractures who presented to the author were subjected to debridement . The debridement was undertaken under Anaesthesia. All the wounds were extended, and thorough lavage with normal saline was done. Three litre normal saline solutions hung on the IV stand and connected trough TUR irrigation set were used during the procedure. 6 to 15 litres of the normal saline was used for the lavage. Pre debridement and post debridement culture was sent. The fracture was stabilised with intramedullary fixation, internal fixation with plate or external fixation depending upon the site and fracture.



Using wide bore needle



Packing of TUR irrigation set

The patients were followed up and any evidence of infection was noted in subsequent followup.

**RESULTS AND OBSERVATIOS**

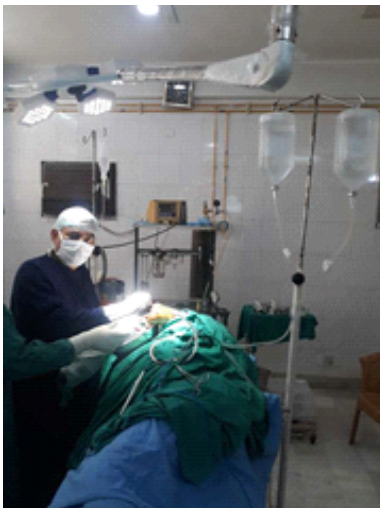
There were 65 compound fractures dealt by the author during the period from January 2015 to Dec 2016 . The following were the injuries as per Gustillo Anderson classification(8):

- Type I: 24 patients
- Type 2: 33 patients
- Type 3: 8 patients.

Compound tibia fracture : 44 patients ( proximal tibia fracture in 6, fracture dislocation of ankle in 4 and midshaft fracture in 34 patients)

Compound femur fractures : 14 patients ( Mid shaft in 10 and distal femur fracture in 4 patients)

Compound upper limb fractures : 07 patients ( compound intercondylar fracture in 2, compound fracture both bones forearm midshaft 3 , compound humerus fracture in 2 patients



TUR irrigation set with 3 litre of bottle

There were 52 males and 13 females with average age of male patients being 37 years (12 – 64 years) and of females the average age was 43 years (18 – 56 yrs) 6 patients had more than one fracture.

The time of reporting was:

Within 24 hours: 30 patients

After 24 hours one and before 48 hours: 25 patients

After 48 hours: 10 patients

All the patients were prepared for earliest possible debridement and fixation. The preoperative cultures were positive in 35 patients.

Amount of fluid used for irrigation and lavage of wound

6 litres: 20 patients

9-12 litres: 37 patients

12-15 litre: 8 patients

The time taken for completion of debridement

45 minutes – 60 minutes: 20 patients

60 - 90 minutes: 40 patients

90 – 120 minutes: 8 patients

The debridement and lavage was stopped once there was no dead and devitalised tissue visible and all the dirt was not visible to the naked eye.

The fractures were fixed with intramedullary nails in 40, plating in 22 and hybrid multiplanar fixation in one patient. 6 patients had suffered more than one fracture.

The patients wound were inspected every 48 hours for next one week. On the first inspection the suction drain was removed and its tip again sent for culture sensitivity. The patients were discharged after second inspection.

The patients were clinically and radiologically evaluated for any sign of infection on periodic followup in form of increased total leucocytes number, ESR and C reactive proteins. They were radiologically evaluated for any sign of osteoporosis or loosening of the implant.

30 patients in this series had established preoperative contamination of the wound as reported by the culture reports. Other series has reported contamination from 1.4% to 22.7%. This figure of positive preoperative culture is higher, possibly because of delayed presentation after 24 hours in 35 patients and the majority of injuries being occurring in contaminated environment.

5 patients were positive for the post procedure culture from the wound or from the drain. The wounds of these patients were continuously inspected, and antibiotics were continued till wound dried up. Two of these patients had developed discharge and were taken for repeated debridement. One patient didn't settle and the fixation of the fibula failed, this patient later developed arthritis of the ankle and was further treated by removal of implant and ankle arthodesis. Another patients humerus fracture has united but a collection developed around the implant at 9 months and the patient settled after removal of implant.

Of the remaining 63 patients in this series none has any sign of the infection till the latest followup. In 10 patients fractures has not shown any progressive sign of healing by three months and they were considered for autologous bone grafting. All fractures has subsequently united.

In compound fractures, the dead and devitalised tissue has to be excised. There is a role of lavage of the wound which help by decreasing the colonies of the bacterias and also wash out the dead and devitalised tissue which is a substrate for microorganisms to proliferate (4,5,6,7). The lavage also removes the chemical mediators and proteolytic enzymes in the tissues responsible for more damage of tissues and spread of infection.

The usage of TUR irrigation set for the supply of normal saline helps by having ready availability of saline, the pressure can be adjusted by raising the height of the the bottles or by applying pressure over them. The Wide bore needle attached to the TUR irrigation set helps the water jet to remove the dirt from very small crevices of the edges of fracture.. The other options which are used for lavage at various centres are pressure pumps, balloon pumps and pulse lavage, or 50 ml syringes. The TUR irrigation set is the cheapest of them all and the modularity to change pressure and direction of the flow increases its utility. There is no dependence on the assisting nurse to repeatedly load the syringe for irrigation, which becomes a cumbersome job considering the large volume needed for irrigation. There is no study which does not lay emphasis on need of copious amount of irrigating solution, though type of solution has been scrutinised in various studies, but the normal saline solution has remained the preferred choice of the majority (1,2,3,4,5,6,7,8).

We in this series had 2 infections despite having subjected to thorough debridement and lavage. One of the patient who developed infection had suffered compound femur fracture and a compound fracture dislocation ankle. In this patient, possibly the management of compound fracture of femur had drawn more time and attention, and the compound ankle injury might have received suboptimum attention. The compound humerus fracture who developed infection was diabetic and her late appearance of collection can also be because of other intrinsic causes.

## CONCLUSION

The low post operative infection in this series can be attributed to the copious amount of the fluid used for irrigation through the TUR irrigation set and three litre saline bottles, which perhaps is not the commonly used method as the search for similar usage of TUR irrigation set could not be found in the literature. The TUR set being cheaper, readily available and modular in use is very useful adjunct for carrying out debridement.

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