Double Drain Continuous Irrigation in Spinal Post Instrumentation Deep Wound Infection

Ahmed El Fiki and Omar Youssef*
Department of Neurosurgery, School of Medicine, Cairo University

ABSTRACT

Background: Deep wound infection is a serious complication in spinal surgeries especially if instrumentation was done or when associated with other risk factors. In many cases, debridement steps include removal of fixation system and reoperation after subsidence of infection. Objective: Evaluation of the use of a new technique after debridement in spinal post instrumentation deep wound infection to increase the chance of fixation system retention.

Patients and Methods: During the period from June 2012 to August 2014, nine cases with different spinal fixation techniques were operated for debridement due to deep wound infection. The fixation system was not removed. After debridement, double wide bore drains were inserted from upper and lower parts of the wound. The upper drain was connected to continuous saline irrigation with added antibiotics and the lower drain was used for drainage. The upper drain was removed when the wash became clear. The lower drain was left in place for an additional one to two days to insure drainage. Patients were followed up for a period of 6 months.

Results: Eight cases were clean within 5-7 days indicated by the clinical state and clearance of the drained fluid with no instrumentation removal thus avoiding another surgery. This technique failed to avoid removal of the fixation system in one case of post traumatic anterior cervical fixation.

Conclusion: Continuous irrigation double drain system can be considered an efficient and safe technique that facilitates hardware retention, thus avoiding recurrence of symptoms and redo surgeries and decreases the expenses in the management of spinal post-instrumentation recent onset deep wound infections.

INTRODUCTION

Deep wound infection after spinal instrumentation represent a serious problem that has been reported to range from 2.2 to 8.5% of cases. Treatment of deep wound infection in spinal fixation is difficult especially if fusion was not insured. After initial debridement and specific antibiotic according to culture and sensitivity, fixation system can be retained safely with incidence from 40 to 100%1,3,5,8,11,13,14,16,17. This can be achieved although the biofilm on the fixation system hardware can limit antibiotic effect2. Fixation system removal as a step for better control of deep wound infection can result in recurrence of symptoms, neurologic deficit especially if the unstable spinal segment didn’t reach appropriate bony fusion.

When surgeons are going to confront this decision, many factors should be taken into consideration. For example, immunity which is affected by associated chronic illnesses and general medical condition of the patient, bone condition with risk of osteoporosis with age or initial spinal pathologies6. Our study will evaluate the use of a technique after debridement in deep wound infection to increase the chance of fixation system retention.

*Corresponding Author:
Omar Youssef
Lecturer of Neurosurgery, Cairo University
E-mail: omaryoussef@gmx.com; Tel: +201223123322

PATIENTS AND METHODS

The present prospective study was conducted during the period from June 2012 to August 2014 in the Neurosurgery Department, Cairo University, Egypt. Nine patients who suffered from deep wound infection following spinal instrumentation surgeries were included. Timing of presentation of all patients was early (within 30 post-operative days) following the spine surgery.

Data collected include: Demographic data, type of pathology which lead to fixation surgery, associated co-morbidities, days needed to remove the drains, hospital stay, wound follow up in the outpatient clinic for 6 months, X-ray spinal images at 3 and 6 months.

After clinical confirmation of the presence of deep wound infection, surgical debridement was done and samples of the infected tissues were sent for cultures. The fixation system was not removed and two subfascial drains were left in the infected wound. Continuous nonstop wash and drainage of the wound with saline antibiotics were done until the wash was clear. Intravenous antibiotics were given during the hospital stay (range 7-10 days) starting with broad spectrum antibiotics, a combination of Ceftriaxone 2gm/day and Vancomycin 2gm/day, which was changed after an average of 3 days according to the results of the culture and sensitivity. After hospital discharge, patients...
continued on oral antibiotics for another two weeks according to the results of culture and sensitivity or broad spectrum antibiotics (Amoxicillin clavulanic acid 2gm/day for one week and Ofloxacin 400mg/day for the other week) if no organisms were detected in the cultures.

Surgical technique:
Intra-operative full exposure of the previous surgical wound was done. Dissection of adherent tissues around the fixation system was insured with adequate inspection for any local septic focus especially around the hardware. Suspected tissue or pus was taken for culture and sensitivity. After saline wound cleaning, two wide bore suction drains (size 18 french) were inserted, one coming out lateral to upper part of the wound while the other passed lateral to lower part of the wound on the opposite side of the upper drain. Both drains were parallel to each other (Fig. 1). Limited prolene sutures were used in wound closure.

The idea was to continuously irrigate the wound from upper drain which was connected to a saline solution bottle (500ml). Slow infusion rate of 62.5ml/hour is guaranteed to change the bottle every 8 hours. The lower drain will be controlled on half the suction capacity of the draining bag to prevent the leakage of the irrigating saline through the wound. Antibiotics were added to the saline solution bottle. We used Vancomycin vial 1 gm & Amikacin vial 500 mg combination on every bottle which can be modified according to results of the culture and sensitivity. The upper drain was removed when the wash coming out from lower drain was clear. Clean wound, absence of fever and normal total leucocytic count in blood are signs of infection subsidence and thus irrigating drain removal. The lower drain was kept for another one or two days to insure drainage.

RESULTS
Our patients included six males and three females with age ranged from 23 to 60 years. Seven patients with lumbar instrumentation were included in the study. Traditional pedicle screws and posterolateral fusion were done in these cases. Single level lumbar fixation and decompression surgery was done in five patients for degenerative (3 patients) and lytic (2 patients) spondylolithesis. Two levels (one patient) and three levels (one patient) lumbar fixation and decompression surgeries were done due to lumbar instability and canal stenosis. Two patients with cervical instrumentation were included in the study. One patient with craniocervical fixation due to C1-C2 subluxation. The other patient was operated upon following post-traumatic C6 fracture by corpectomy and fixation by titanium cage and anterior cervical plate insertion.

Associated co-morbidities were reported and included diabetes mellitus (DM) in four cases, obesity in four cases, osteoporosis in two patients, two post-traumatic bed ridden patients and one patient was mechanically ventilated due to cervical spine fracture with phrenic nerve impairment.

In eight cases, the upper drains were removed after 5-7 days (mean 6 days), infection persisted in one case
of post-traumatic anterior cervical fixation where another debridement surgery and hardware removal was needed.

Hospital stay was shortened and all patients with hardware retention discharged within 10 days (range 7-10 days, mean 8.6 days). Follow up of the patients up to six months after surgery in the outpatient clinic showed satisfactory results regarding wound healing with no cases requiring another surgery. No screws loosening were reported in the X-ray images done in the follow up period.

In eight cases (89%) this technique was effective in hardware retention after adequate debridement.

**DISCUSSION**

There are many risk factors that may potentiate deep wound infections after spinal surgeries. For example, DM, bad general condition, longer time of operation, smoking and previous surgeries.

Since all our cases presented with early onset, so hardware retention was intended during debridement as reported by many series. However, some authors prefer removal of hardware in late onset presentation of deep wound infection occurring after several months or even years. This may be explained by documented bony fusion or difficulty in resolving infection.

Impaired immunity that may associate some of the co-morbidities like DM may decrease incidence of hardware retention. In our series, there were four diabetic patients, one of these patients who was operated by anterior cervical plating also suffered from other co-morbidities being mechanically ventilated and bed ridden, required another debridement surgery with hardware removal and autologous bone graft placement. Our results are excellent compared with outcome of Ishii et al. series where all the patients with diabetes mellitus (3 patients) were not able to retain their implants.

Failure of double drain continuous irrigation system to control deep wound infection and prevention of implant removal in the anterior cervical case may be also attributed to the narrow space available in anterior cervical spinal approaches. We kept aware in our study with the possibility of kinking of the drains especially in the supine position in posterior spinal approaches, which may result in inadequate function of the drains and poor results.

Our study had some limitations, for example the small sample size of only nine cases, the short follow up period of six months, and all the cases presented with recent onset deep wound infection. This technique needs to be evaluated if used in a patient with deep wound infection presenting months or years after surgery.

This study hypothesized that leaving double drain continuous irrigation system is a factor that facilitates hardware retention, with total implant retention rate reaching 89%.

**CONCLUSION**

Continuous irrigation double drain system can be considered an efficient and safe technique that facilitates hardware retention, thus avoiding recurrence of symptoms, redo surgeries and decreasing expenses in the management of spinal post-instrumentation recent onset deep wound infections.

**Declaration**

The author(s) declare no conflict of interest or any financial support and confirm the approval of the submitted article by the concerned ethical committee.

**REFERENCES**

6. Ishii M, Iwasaki M, et al: The management of post-traumatic anteri or cervical fixation where other co-morbidities being mechanically ventilated and bed ridden, required another debridement surgery with hardware removal and autologous bone graft placement. Our results are excellent compared with outcome of Ishii et al. series where all the patients with diabetes mellitus (3 patients) were not able to retain their implants.