

Success of Posterior Malleolus Fracture Fixation with Open Reduction and Internal Fixation (ORIF) with Screw Associated with Unstable Ankle Injury

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ABSTRACT

Background: Ankle fractures are among the common lower extremity injuries. Treatment for displaced fractures often involves surgery to align the surfaces of the joints, lessen tibiotalar contact stress, and prevent posttraumatic arthritis. There are currently no well-established operational criteria for surgical management of posterior malleolar fractures related to distal fibular and tibial fractures. **Objective:** To determine the success of posterior malleolus fracture fixation with open reduction & internal fixation (ORIF) with screw associated with unstable ankle injury. **Study Design:** Descriptive study. **Settings:** Orthopedic Unit-II, Mayo Hospital, Lahore Pakistan. **Duration:** From years 2015 to 2018. **Methods:** Patients of age 20-70 years of either gender with diagnosis of malleolus fracture with ankle fracture (on X-ray) ASA I & II presenting within 48 hours of injury were included. Patients were operated under general anesthesia. Fractures were openly reduced and fixed with screw (ORIF) and syndesmosis was reconstructed. All surgeries were performed by a single surgical team. Patients were followed till one on monthly follow-up on 1st, 2nd, 4th and 6th month after surgery. Patients were interviewed for AOFAS score and success was labeled. Data was analyzed using SPSS 21.0. **Results:** The patients' mean age was 39.17 ± 13.07 years. The study results showed that 73% patients were males whereas 27% patients were females. The mean AOFAS score at 1st Month of the patients was noted as 50.55 ± 5.23 , at 6th Month of the patients was noted as 93.27 ± 4.64 . Success achieved at 6th month was observed in 94(94%) patients whereas it was not observed in only 6 (6%) patients. **Conclusion:** The success of open reduction and internal fixation with screw for posterior malleolus fracture fixation in unstable ankle injury was observed to be high.

Keywords: Posterior malleolus fracture, Screw, Open reduction and internal fixation, ORIF, Unstable ankle injury.

INTRODUCTION

Ankle fractures are among the common lower extremity injuries. Typically, displaced fractures are treated surgically to decrease tibiotalar contact stresses, prevent post-traumatic arthritis & to restore the anatomic alignment of joint surfaces.¹ Ankle fractures frequently result in syndesmotic injuries. The traditional fixing of the syndesmosis can be associated with secondary surgery. The posterior syndesmotic ligaments may be intact & connected to the fragment when the posterior malleolus fractures.² Ankle fractures occur in roughly 187 out of every 100,000 people each year. Ankle fractures are most

commonly malleolar fractures, which account for 60.0 to 70.0 % of all fractures, 15.0 - 20.0% of bimalleolar fractures & 7.0 to 12.0% of Tri malleolar fractures.³

Diagnosing posterior malleolar fractures is typically more challenging than diagnosing other ankle fractures. Ankle fractures from trauma usually include the lateral malleolus, medial malleolus or a combination.⁴ There are currently no well-established operational criteria for surgical management of posterior malleolar fractures associated to distal fibular and tibial fractures.^{5,6} One study reported the frequency of normal radiological outcome (no degeneration) in 80% cases and good to

excellent AOFAS score (success) in 64.4%.⁷ While another study reported success in 92.2% after posterior malleolus fracture reconstruction.⁸

The rationale of this study was to determine the outcome of posterior malleolus fracture reconstruction associated with unstable ankle injury. Through this study we wanted to see the pattern of outcome using AOFAS scoring criteria. There is ambiguity in results from previous literature that which confuse the surgeons whether it is good technique for management of posterior malleolus fracture or not or to search for another technique to manage such complication cases. Through this study we wanted to confirm the success of posterior malleolus fracture reconstruction when presented with ankle fracture.

METHODS

This descriptive case series was conducted in Orthopedics, Unit II, Mayo Hospital, Lahore. Study duration was from 2015 to November 2018.

Sample of 100 cases were calculated with 5% level of significance with 9.5%, margin of error and taking expected percentage of success i.e., 64.4% in patients underwent posterior malleolus fracture reconstruction associated with unstable ankle injury.

Patients of age 20-70 years of either gender with diagnosis of malleolus fracture with ankle fracture (on X-ray) ASA I & II presenting within 48 hours of injury were included.

Fractures involving open physal plates (on clinical evaluation), Open fractures (on clinical evaluation), pathologic fractures (osteomalacia, osteoporosis, or malignancy) tibial Pilon fractures (on clinical evaluation) & neglected ankle fracture / dislocation were excluded.

Informed consent was obtained and demographic of patients (name, age & gender sex) was obtained. Patients were operated under general anesthesia. Fractures were openly reduced and fixed with screw (ORIF) and syndesmosis was reconstructed. All surgeries were performed by a single surgical team. Patients were followed till one on monthly follow-up on 1st, 2nd, 4th and 6th month after surgery. Patients were interviewed for AOFAS score and success was labeled.

Data was entered and analyzed using SPSS 21.0. Mean + SD was calculated for quantitative variables like age & AOFAS score. Frequency & percentage were calculated for qualitative variable like gender and success.

RESULTS

Total 100 cases were enrolled. The mean age was 39.17±13.07 years with minimum and maximum ages of

21 & 65 years. There were 73(73%) male and 27(27%) female. Table 1

Table 1: Age and gender of the patients (n=100)

| | | Frequency (%) |
|------------------------|---------------|---------------------|
| Age (Mean ± SD) | | 39.17 ± 13.07 years |
| Gender | Male | 73 (73.0%) |
| | Female | 27 (27.0%) |

In this study the mean AOFAS score at 1st Month of the patients was 50.55 ± 5.23 with minimum and maximum scores of 39 & 60. The mean AOFAS score at 2nd, 4th and 6th months was 66.65 ± 5.2, 83.82 ± 8.39 & 93.27 ± 4.6 respectively. Table 2

Table 2: Mean score of AOFAS at 1st, 2nd, 4th & 6th month

| | | |
|--|-----------|--------------|
| AOFAS score at 1st month | Mean ± SD | 50.55 ± 5.23 |
| AOFAS score at 2nd month | Mean ± SD | 66.65 ± 5.90 |
| AOFAS score at 4th month | Mean ± SD | 83.82 ± 8.39 |
| AOFAS score at 6th month | Mean ± SD | 93.27 ± 4.64 |

In this study the success of the patients was not achieved at 1st and 2nd month, however at 4th month the success was achieved in 64(64%) patients. The success achieved at 6th month was observed in 94(94%) patients whereas it was not observed in only 6(6%) patients. Table 3

Table 3: Distribution about success achieved at 1st, 2nd, 4th & 6th month

| | | Frequency (%) |
|--|------------|---------------|
| Success 1st month | | 0 |
| Success 2nd month | | 0 |
| Success 4th month | | 64 (64%) |
| Success at 6th month | Yes | 94 (94%) |

DISCUSSION

The treatment of ankle fractures & ligament injuries in the general population has been well documented. Depending on the type of injury & soft tissue concerns, treatments mentioned in the literature range from conservative therapy with non-operative immobilization to ORIF with hardware. There are numerous factors that affect how well an ankle injury therapy may work long-term.^{9,10} The lateral malleolus's decrease has a big impact on how the surgery turns out. In fact, as reported by other writers, an essential factor of the surgical management of these lesions is the morphological reduction of the lateral malleolus.^{5,11} In all cases reported in another study, we initially conducted the open reduction of the lateral

malleolus in accordance with this approach. A syndesmotic screw is recommended by several writers for use in Weber type C fractures.^{12, 13}

In our study the mean AOFAS score at 6th month was 93.27 ± 4.64 with minimum and maximum scores of 80 & 99 respectively as discussed by different authors as well. The average AOFAS score was 95.4, with an excellence rate of 99.5%, & the average VAS score was 0.17 By XU Hai-lin et al in their study which is similar to our study.¹⁴ One study reported the frequency of normal radiological outcome (no degeneration) in 80% cases and good to excellent AOFAS score (success) in 64.4%.¹⁵

While another study reported success in 92.2% after posterior malleolus fracture reconstruction.⁸ Our study results showed the maximum stability in unstable ankle fracture at 6th month using ORIF technique. Six male university players from different teams who had received ORIF treatment for a grade III syndesmosis sprain were assessed by Taylor and colleagues. At one week following surgery, patients were allowed to start ROM exercises, gradual weight bearing & progressive activity as tolerated. Although there were no complications, during removal one screw broke, and two patients experienced mildly degenerative changes on their lateral radiographs at the conclusion of their treatment.¹⁶

Recent studies on the surgical treatment of ankle fractures have improved our understanding of the stability spectrum for various injury patterns, and newer fixation approaches and techniques may allow us to improve fixation.¹⁷ One study reported five examples of internal fixation of the posterior malleolus using the posterolateral exposure, but provided scant information about the procedure or the results for the patients.¹⁸ Another study in 2018, series of three professional football players, who had pronation-external rotation injures. Without experiencing any discomfort or stiffness, all three were able to resume their pre-injury levels of play. However, these investigators failed to submit their reports in time to return their full involvement.¹⁹

A randomized trial assessing early mobilization following an ankle fracture. There were 30.0 patients treated with ORIF treatment, & all were immediately able to start bearing weight.²⁰ According to the authors, if athletes with one of the most unstable ankle injuries undergo rigid anatomic fixation followed by initial motion & the effective early weight bearing, they can resume their preinjury level of participation in 1 to 4.0 months with the least amount of functional morbidity and pain.²¹

CONCLUSION

As per the study conclusion success of open reduction & internal fixation (ORIF) with screw for posterior

malleolus fracture fixation in unstable ankle injury was observed to be high. Thus, the ORIF is useful and successful technique for management of unstable ankle fractures. Now in future we can apply this method for management of posterior malleolar fracture fixation.

LIMITATIONS

Limited sample size.

SUGGESTIONS / RECOMMENDATIONS

Further large scale and multicenter studies are recommended.

CONFLICT OF INTEREST / DISCLOSURE

None.

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