**Original article:**

**Complications of treating distal radius fractures with jess**

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**ABSTRACT**

**Background:** External skeletal fixation has been popular for the treatment of open displaced, unstable fractures of the distal part of the radius.

**Objective:** To analyze the immediate postoperative complications associated with JESS fixator.

**Method:** A retrospective chart review of data obtained from 50 consecutive patients who were treated with JESS in 3 years (2017 – 2020), study was carried out in the trauma centre, department of Orthopaedics, Sardar Patel Medical College Bikaner.

**Results:** fifteen of the 50 patients had complications: 7 with pin track infections, 4 with pin loosening, 4 with malunion, and 5 patients each with radial shortening, loss of radial tilt.

**Conclusions:** Postoperative complications are common and their effect on long term functional results and patient satisfaction is negligible.

**Keyword:** JESS, Complications

**Introduction**

The distal radius fracture has been an orthopaedic conundrum since its description by Colles1 in 1814. External fixator use for distal radial fracture stabilization, which began over a half century ago in the United States, has provided improved anatomical and clinical results in 80-90 percent of patients as shown by several studies.2,3 The literature concerning early postoperative complications, however, gives variable information.4,5 The overall complication rate has been reported as high as 61 percent5 to as low as 9.6 percent.6 Such complications include pin track infection, pin loosening and fracture, neuropathies involving the radial and median nerves, tendon rupture, metacarpal fractures, reflex sympathetic dystrophy and nonunion. This study is meant to serve as an analysis of the postoperative complications associated with treating distal radius fractures with one type of external fixator in a community setting.

**Aim:** To analyze the postoperative complications associated with JESS fixator.

**Method:** The records of fifty consecutive patients, who were treated with JESS fixator in 2017 - 2020 were reviewed, study was carried out in the trauma centre, department of Orthopaedics, Sardar Patel Medical College Bikaner. The patients’ charts were reviewed to document: if an open technique was used for pin placement; if augmentation was used; patient demographics; additional operations; and complications. Male female ratio was found to be 9:1.The age of patient ranged from 18 to 65 years. Maximum number of cases seen in 18- 25 years of age group. The mean duration of follow up was 6 months. We found that Maximum percentage of fracture fall under Type VIII(50%) followed by Type VII(30%), Type III (16%), Type IV(4%).( according to Frykman’s classification). Thirty five (70%) fractures were the result of a road traffic accident, followed by fall from height (20%) and 10% had FOOSH. RTA was maximum in 18-30 yrs age group (young age) whereas FFH and FOOSH were maximum in older age group (>40 yrs).

**Results:**

Out of fifty patients, fifteen (30%) had some complication. The following complications were documented:1) pin track infection; 2) pin loosening; 3) malunion; 4) radial shortening; 5) loss of radial tilt. The most common complication documented was pin track infection, occurring in nine patients (18%). All, however, resolved quickly with local and oral antibiotic treatment. Pin loosening occurred with six patients (12%). Malunion occurred in five patients (10%). The following occurred in one case each: 1) radial shortening; 2) loss of radial tilt. Four patients (8%) had two of the aforementioned complications. One patient (2%) had three complications (pin tract infection, malunion, and radial shortening). One patient (2%) had four complications (pin track infection, pin loosening, loss of radial tilt, and malunion). No patients experienced neuropathies. Reflex sympathetic dystrophy was not documented in any of the fifty patients.

Table 1 Distribution of Case Based on mode of injury

|  |  |  |  |
| --- | --- | --- | --- |
| Age Group | Mode of Injury | | |
| RTA | FFH | FOOSH |
| 18- 30 yrs | 22 | 1 | 0 |
| 31-40 yrs | 5 | 2 | 1 |
| 41-50 yrs | 5 | 5 | 2 |
| >50 yrs | 3 | 2 | 2 |
| Total | 35 | 10 | 5 |

**Table 2** Mean ± SD of Postoperative Radiological Parameters in Normal and Affected Upper Limb

|  |  |  |  |
| --- | --- | --- | --- |
| Parameters | Normal (Mean ± SD) | Affected (Mean ± SD) | P value |
| Radial Inclination | 19.66±2.454 (160-240) | 18.86±4.206 (80-280) | 0.03 |
| Radial Length | 9.14±1.384 (7-12mm) | 8.3±2.380 (4-14mm) | 0.04 |
| Dorsal Angulation | 7.2±1.914 (-40-(-100)) | 0.36±1.997 (-80-160) | 0.0001\* |

In normal limb mean value of radial Inclination was 19.66±2.4540, radial length was 9.14±1.384 mm and Dorsal Angulation was 7.2±1.9140 whereas in affected limb Radial deviation was 18.86±4.2060, radial length was 8.3±2.380 mm and Dorsal Angulation was 0.36±1.9970 after procedure. The difference were statistically significant (p<0.05).

**Graph 1**

**Discussion**

This is a retrospective analysis of the complications encountered while treating fifty patients with distal radius fractures utilizing a JESS external fixator. The complication rate was 30 percent, but lower to the results obtained by Szabo and Weber.5 Sixty one percent of their thirteen patients treated with external fixation experienced complications. As in our study, pin track infection was the most common complication (18%). Pin track infections occurred in nine of our fifty patients (18%). These all resolved with antibiotics. This rate was consistent with other studies, which had a range of 0-27 percent.2,3,5,6 As in our series, peroxide pin site cleansing was utilized at other centers as well. Interestingly, Raskin and Melone4 reported no pin track infections in their study. They attribute this to their method of pin site care. Instead of exposing the pin sites daily, they covered the external fixator frame with sterile gauze at the skin contact interface, which obviated the need for daily pin site care. Rather, the pins were exposed only during scheduled dressing changes at the surgeon’s office, approximately four times during an eight-week period. Other authors have made recommendations that they felt would reduce the incidence of pin track infection. Graff and Jupiter7 recommend obtaining an adequate reduction prior to placing the pins; this is done to reduce the risk of skin necrosis and subsequent pin track infection. Other authors have advocated measures that reduce the amount of time the external fixator is worn, and thus, reduce the incidence of pin track infections.

Leung et al.8 recommend packing autogenous bone graft into the fracture site during the application of the external fixator. With this technique, the external fixator is worn for only three weeks, after which time a functional brace is used.

None of our fifty patients experienced neuropathies of either the median nerve or superficial branch of the radial nerve. It seems reasonable to assume that the incidence of superficial radial nerve irritation is largely dependent on the surgeon’s technique of pin placement. By using an open technique, the superficial branch of the radial nerve can be protected. It is unclear from the record whether the other patient had open or closed pin placement, but regardless, this patient did not experience symptoms of superficial radial nerve irritation. Other studies have also reported neuropathies in the distribution of the superficial radial nerve, despite using an open technique.2,3 Of the studies that utilized an open technique for pin placement, the incidence of superficial radial nerve irritation ranged from 0 percent to 16.7 percent.2,3,5

Pin loosening can certainly be problematic. Other studies have reported this complication in zero to 20 percent of their patients.2,3,5,6 Two studies reported no occurrences of pin loosening.9,10 In our study, pin loosening occurred in six cases (12%), but premature removal of the external fixator was not required in these cases. To avoid pin loosening, some investigators have discouraged external fixation for patients exceeding a certain age as Jenkins et al.11 believed this age limit to be sixty years, while Howard et al.12 set their limit at seventy-five years of age. Other studies do not seem to support the exclusion of patients on the basis of age, however. For example, in a study of thirty patients, aged 31 to 81 (mean=56), Edwards et al.9 reported no cases of pin loosening, despite ten (33.3%) of their patients being considered osteoporotic. Additionally, Rikli et al.3 experienced no occurrences of pin loosening in their study of forty-nine patients, ages eighteen to eighty-four (mean=55.6). In the study conducted by Szabo and Weber,5 two of their thirteen patients (15.4%) experienced pin loosening as a complication, but the mean age of their patient population was only 36.9 years. In our study, the six patients with pin loosening as a complication were 5 male and 1 female, age range between forty to fifty years. The incidence of malunion was surprisingly high (10%) in our study.

Other complications include: 1) radial shortening (one case); 2) loss of radial tilt (one case). In the cases involving radial shortening, the defect was noted prior to removal of the external fixator. In both cases, no augmentation was used. Perhaps these complications may have been avoided by employing the use of Kirschner wires, bone graft or some form of internal fixation such as suggested by Pennig and Gausepohl13 who commented that supplementary internal fixation is justified whenever there is significant comminution of two or more cortices in the anteroposterior and lateral radiographs.

In regard to restoring radial tilt or volar tilt, some authors5 have found this to be a difficult task. Complications documented in other studies but not encountered in ours include: deep pin track infection2,3 tendon rupture3,14 and fractured pins andintrinsic contracture of the hand.14

**Conclusion**

Postoperative complications are common, but in most instances, their effect on short term functional results and patient satisfaction is negligible except in nonunion and malunion.

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