Research Article

JESS under local anesthesia: a minimally invasive technique for proximal humeral fractures

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Abstract

Background: Fractures of the proximal humerus, which account for 4% to 5 % of the total fractures,[1] are usually classified as per Neer's classification. These fractures are treated by modalities from "just a sling" to "open reduction and internal fixation"(ORIF) by locking contoured dedicated plates for the proximal humerus, with results varying from satisfactory to good.

Objective: To propose a minimally invasive technique, of managing fractures of the proximal humerus, which can be done under local anesthesia.

Materials and Methods: Sometimes, patients with the proximal humerus fractures are not fit for general anesthesia. Moreover, the regional block may or may not always work for shoulders; hence, we operated 18 patients and fixed the fractures with the Joshi's External Stabilization System (JESS) under local anesthesia.

Result: Of the 18 patients, all of them tolerated the procedure well except three of them, whom we supplemented with intravenous tramadol as well. While the stability with "K-wires" and "just screws" is questionable,[2] ORIF entails a big exposure and blood loss, along with all other risks of open reduction.[3] Moreover, all these techniques offer a debatable quality of fixation in osteoporotic fractures.[4]

Conclusion: To combat the aforesaid issues, external fixation is in popularity for a period more than a decade now. The JESS, happens to be "today's best option," which we attempted performing under local anesthesia.

KEY WORDS: JESS, proximal humerus fractures, ORIF (open reduction internal fixation), K-wire, local anesthesia

Introduction

Fractures of the proximal humerus shaft are the third most common fractures in persons aged above 65 years. These elderly people are usually osteoporotic, showing comorbid conditions, making them not so fit or unfit candidates for general anesthesia. Moreover, brachial plexus anesthesia does not always include shoulder in its effect; hence, the patients in need of open reduction internal fixation (ORIF) are held captive in the hands of unfavorable circumstances, because they need a sound fixation of the fracture fragments to allow early shoulder movements and avoid adhesive capsulitis. Hence, we in this initial study, attempted stabilizing the fracture fragments by external fixation device, popular as JESS viz., Joshi's External Stabilization System, under local anesthesia.

JESS requires thin K (Kirschner)-wires, easy to assemble couplings, and offers a stable construct,[5] thereby allowing early movements to these group of patients who are very prone to adhesive capsulitis. Although there are no long-term studies to compare the results of JESS with other established modalities of treatment, the initial results seem promising, offering an easy, safe, effective, and economical alternative for the treatment of the proximal humerus fractures.

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JESS

Link joints are the basic clamping unit of JESS. They have cross holes at different levels: one oval hole and the other round hole lies perpendicular to it, which are available in three sizes—2×2, 3×3, and 4×4. They can hold wires of very small sizes. Tightening of the grub screw with Allen key or a hex wrench clamps the rods and wires. The connecting rod is placed through the lower hole, and the wire is placed in the upper hole. The wire experiences pressure from both the sides; hence, it has the least chances of loosening.

Universal link joints contain a tightening screw on both the ends; hence, these link joints can hold all size rods up to 4 mm diameter. They present an advantage over the other joints as, when part of the assembly is removed, other components are not affected, because they clamp both the rods.

Connecting rods are smooth steel rods of diameter varying from 2 mm to 4 mm, available in different lengths, and can be bent as indicated but still stiff enough to support.

Materials and Methods

A total of 18 patients were selected, with fracture proximal humerus where ORIF was indicated but who were either:

Inclusion Criteria

- unfit for general anesthesia;
- where brachial block was attempted but not successful, which may be owing to obesity, edema, disorientation, or any other reason; and
- patients who complained of pain, mid-way in brachial block because of inadequate effect.

Exclusion Criteria

- patients with uncontrolled diabetes; and
- patients with known allergy to xylocaine;

Of the total 18 patients included, 13 of them were ladies aged between 28 and 80 years, all medically investigated as per the usual protocol. Sensitivity to xylocaine was checked, while booking the patient for surgery. Plain xylocaine (2%) was always used.

The patient was taken supine on the operation table with an intravenous line secured in the other arm. The head was tilted to the other side and a flat, thin, sandbag placed under the shoulder to make it flat, leaving the posterior part accessible. The sandbag can be replaced with a cloth sheet-roll to avoid any interference with viewing under C-arm. The C-arm was brought in, from the other side, to leave enough space for the surgeon and assistants.

One assistant was essential to hold the affected arm at an appropriate angle and the other assistant preferably at the instruments' trolley. The assistant giving traction helped the surgeon reduce the fragments to an acceptable alignment (i.e., less than 1 cm gap and less than 45° angulation) between them.

Tentative K-wire or schanz screw entry points were marked with a marker pen. Those spots were injected with 1–2 mL 2% xylocaine, beginning hypodermal to gradually injecting till the bone.

We used K-wires to fix the greater tuberosity, traversing obliquely medially, to emerge at the upper medial shaft. This wire was bent as close to the skin as possible to prevent its future inadvertent migration medially, in the axilla.

The pins were inserted in the following way:

- the first pin at the greater tuberosity toward glenoid;
- the second and third pins in the shaft humerus, in line with the first pin on the lateral upper arm;
- the fourth pin anterio-laterally, at the greater tuberosity, lateral to the bicipital sulcus; and
- the last pin in line with two head pins, posterio-laterally.

The pins were connected in the following way:

- the first pin was joined with the second and third shaft pins with a strong rod;
- the fourth and fifth pins were connected to the first pin with a bent semicircular rod; and
- the fourth and fifth pins were, in addition, connected to the shaft pins to provide better stability.

Fixation was checked under C-arm, for its stability in abduction, external and internal rotations, and for the lengths of pins; the pictures were saved for future reference.

An arm pouch if the patient was well-oriented or shoulder immobilizer, otherwise, was enough. Figures 1, 2, 3 and 4.

Postoperative Care

As the inflammation of trauma and surgery allows, initially, passive range of movements are begun to build the patients' confidence and to check for any impingement by the metal on the joint. Gradually, active movements are begun with low-dose analgesics and muscle relaxants to facilitate movements.

Postoperative X-ray was taken before starting the physiotherapy and, then, X-rays were repeated at fixed intervals.

The JESS was removed piecemeal if required, starting from 4 weeks onward to removal of the whole assembly in 8 weeks.

Result

Of the total 18 patients, aged between 28 and 30 years, the number of male and female subjects was 13 and 5, respectively. The mode of trauma included three cases of road traffic accident and 15 cases owing to fall. Of the 18 patients, two patients showed inadequate brachial block; two patients were not satisfied by the local anesthetic effect; six patients requested for sedation; and eight patients were under local anesthesia. Figures 5 and 6.

Figure 1: Post-trauma /injury-2/3/4 parts fractures of the proximal humerus.
Figure 2: Post-trauma/injury-2/3/4 parts fractures of the proximal humerus.

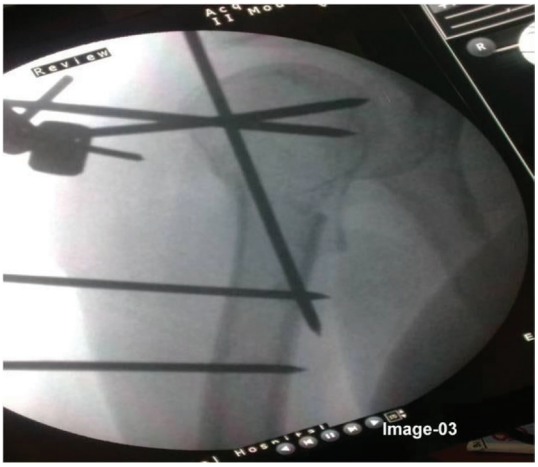

Figure 3: C-arm image just after the competition of surgical procedure to check whether the K-wires are at appropriate desired places.

Figure 4: Postoperative X-ray, after removal of JESS assembly, showing the perfect union of all the fractured segments.

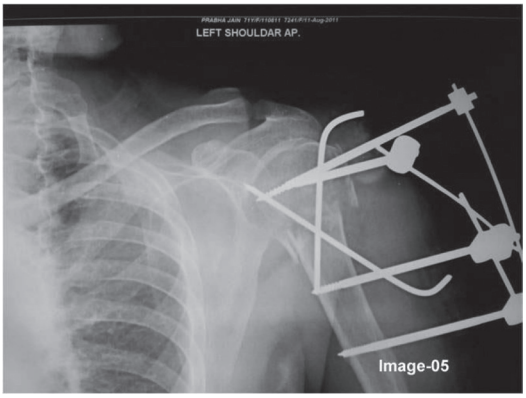

Figure 5: Postoperative X-ray image with the JESS.

Figure 6: Patient on follow-up with concurrent physiotherapy, who is now able to make overhead abduction of the operated shoulder, just after 8 weeks, postsurgery.

Discussion

Fractures of the proximal head humerus are very common in occurrence, in osteoporotic people, which are being managed by various methods. Although many patients show acceptable results with conservative treatment, they might also incur stiffness amounting to adhesive capsulitis. Hence, to start early mobilization, various methods of fixation are recommended, starting from K-wires, cannulated screws to open reduction, fixation with various types of plates, and the latest Philos (proximal humerus interlocking system). While the stability with "K-wires" and "just screws" is questionable, ORIF entails a big exposure and blood loss, along with all other risks of open reduction. Moreover, all these techniques offer debatable quality of fixation in osteoporotic bones. To combat the aforesaid issues, external fixation is in popularity for more than a decade now.[6]

Conclusion

The JESS happens to be a good option, to manage fractures of proximal head humerus, which we attempted inserting under local anesthesia and succeeded, in almost all, except in a few, where we supplemented with analgesia.

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