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JESS in Gap Non-union Patella Fractures Management: A Case Report and Review of the Literature

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Introduction: Gap non-union patella fractures are rare but can be particularly challenging for the orthopedic surgeon. We report a case of a 9 cm gap non-union patella fracture in a patient and its surgical management and functional outcome.
Case Report: A 33-year-old fully independent male was referred to our outpatient clinic. He reported a fall from stairs following an initial soft-tissue injury to the right knee 18 months prior. He has had progressive decline in mobility since the injury and was restricted to a wheelchair when he was seen in the clinic. On examination, he had significant wasting of the quadriceps on the right side. Her range of movement was from 45° extensor lag to 90° flexion actively. Passive movements of the knee were preserved. He was unable to raise his leg straight. Plain radiographs revealed a 9 cm fracture gap non-union of his right patella. The patient was managed operatively in a two-staged approach. The first stage involved application of a JESS (JOSHI EXTERNAL STABILISATION SYSTEM) fixator device to achieve gradual compression of fragments at the rate of 4mm/day (four times daily) over a period of 21 days. The second stage involved conventional tension band wiring.
Conclusion: At 6 months follow-up, the patient achieved full independent mobility. This case highlights the efficacy of a two-staged approach with JESS application in the management of gap non-union patella fractures.
Keywords: JESS fixation, Gap Non-union, Patella fracture

I. INTRODUCTION

The management of Gap non-union patella fractures continues to be a challenge in orthopedic practice. It is often quoted in the literature that the incidence of these cases ranges between 2.7 and 12.5% [1, 2]. The particular challenges relate to soft-tissue contractures, proximal migration of the bony fragment with associated extensor lag and knee stiffness [3]. In addition, if the extensor retinaculum is torn, the quadriceps tendon will pull the superior fragment proximally which becomes impossible to manage by conventional TBW method in a single stage. There is limited evidence to help guide clinicians in the management of these complex cases which is clear from the various treatments offered by orthopedic surgeons in different centers [4]. There are several case series in the literature that describe surgical techniques involving single-staged versus two-staged approaches to reconstruction of the extensor mechanism with variable functional outcomes. Our case demonstrates a novel technique of a two-staged surgical management of a 9 cm gap non-union of the fracture patella.

II. CASE REPORT

A 33-year-old fit and active male presented to our outpatient clinic following a fall from stairs after an original soft-tissue injury to the right knee 18 months prior. He reported progressive decline in mobility with difficulty extending the right knee. The patient did not want to seek medical attention (managed by quack) and was referred by the general practitioner when his mobility became restricted to a wheelchair. On examination, the patient was dependent on a wheelchair. There was significant wasting of the quadriceps on the right. His right knee range of movement was from 45° extensor lag to 90° flexion actively. Passive movements of the right knee were preserved. He was unable to perform a straight leg raise (SLR). Plain radiographs of the right knee demonstrated a 9 cm gap non- union of the right patella (Fig. 1). A decision was made to proceed with a two-staged reconstruction of the extensor mechanism. The first stage involved application of JESS on the both proximal and distal fragments (Figs. 2). Two wires were passed through each fragment and a distractor was applied on both sides. Following this, progressive compression was applied over a period of 21 days (Fig.3 & 4). Once adequate mobilization of the patella fragment was achieved, we proceeded to the second stage which involved a conventional tension band wiring to achieve definitive fixation (Fig.5). At 6 months follow-up, the patient had

achieved full independent mobility. He demonstrated full extension of the knee joint with preserved activeness.

III. DISCUSSION

The biggest challenge with gap non-union patella fractures is the difficulty of joining the displaced fragments due to soft- tissue contractures from long-standing injury [5]. Patients with high functional demands depend on the patella's function as a lever for knee extension to supplement the force of the quadriceps [6]. In these groups of patients, surgical management is advocated. A study by Garg et al. compared the various surgical methods of treating patellar non-union [7]. They compared v-y quadriceplasty and tension band wiring, patellar traction and tension band wiring (without v-y quadriceplasty), and patellar traction followed by partial or total patellectomy [7]. In terms of best functional outcome, their results showed that patients who had patellar traction followed by tension band wiring had the best results. The group of patients who had a patellectomy had the second- best outcomes. However, patients who underwent a v-y quadriceplasty had the worst outcomes with poor functional results and higher complication rates [7]. Another study by Uvaraj et al. compared tension band wiring to patellectomies in neglected fractures of the patella. They noted that the function of the quadriceps after a patellectomy was significantly compromised. They reported a reduction of the efficiency of the extensor mechanism by about 30% [8]. In addition, it is believed that calcifications of the quadriceps tendon following a patellectomy also contribute to poor functional results [9]. They concluded that tension band wiring is superior to patellectomies in terms of patient functional outcomes [8]. There are several case reports that have tested both the one staged and two-staged approaches to the management of non- union patella fractures. In one case, Ilizarov technique was implemented to bring the fragment pieces together and allow union without definitive fixation with good results [5]. In another case, a two-staged approach was used and a compressing assembly was implemented followed by tension band wiring as the second stage for definitive fixation [3]. Our patient shared the morphology of fractures described in other studies but our technique of using a JESS fixator device to pass a wire through the patella fragment and compression of fragment is unique. From our experience, we advocate that these types of cases should be managed with a two-staged reconstruction of the extensor mechanism. The period of compression allows adequate stretching of the soft tissue to prevent the need for aggressive release in the form of a v-y quadriceplasty. But there is a risk of pin tract infection in JESS, which should be managed properly and carefully.

IV. CONCLUSION

The two-staged approach to the management of gap non-union patella fractures is an effective way of restoring the extensor mechanism. Use of a JESS fixator with wires passing through the patella fragments in the first stage allows for easy approximation of fracture fragments. This in turn facilitates the definitive fixation in the second stage. Our case shows that a good functional outcome is achievable without the need for a v-y quadriceplasty or a patellectomy.

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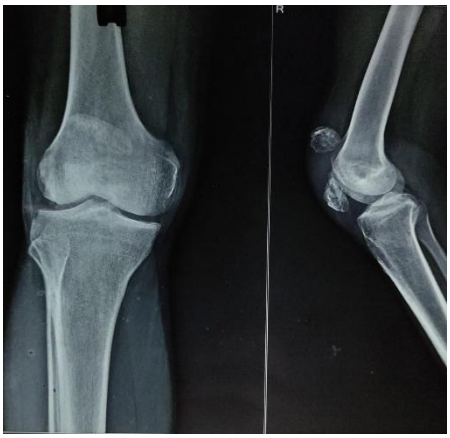

Fig-1, pre-op x-ray

Fig-2. Post-op

Fig-3, At 3 weeks

Fig-4, At 3 weeks

Fig-5, At 2nd staged surgery

Fig-6, At 6 months