

Management of Ipsilateral Terrible Triad Injury of Elbow and Concomitant Proximal Humerus Fracture: A Case Report and Literature Review

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Learning Point of the Article:

It highlights the necessity of responding to potentially fatal injuries quickly, implementing a surgical intervention plan that is phased following the patient's overall health, and completing open reduction with internal fixation and ligament repair.

Abstract

Introduction: A difficult pattern of injuries is Hotchkiss's terrible triad, which includes elbow dislocations with fracture of the coronoid and head of radius. It is uncommon to have a concurrent proximal humerus fracture, which makes clinical care even more difficult.

Case Report: An injured worker, 33 years old, claimed to have fallen from a height and received several injuries when he arrived at our emergency center. On physical examination, the patient showed signs of deformity and had an open injury over his left elbow. The radiographic evaluation showed that the patient had a posterior elbow dislocation along with a fracture of the left coronoid, head of radius, and proximal humerus. Following the reduction in a closed manner, computed tomography of the left elbow was carried out for additional assessment. The patient had both the proximal humerus and elbow fixed, and then the elbow was immobilized for 2 weeks.

Conclusion: Complex musculoskeletal injuries resulting from high-energy trauma require a thorough, multidisciplinary strategy to address since long-term results and any consequences will require ongoing monitoring and rehabilitation.

Keywords: Lateral collateral ligament, multidisciplinary approach, proximal humerus fracture, terrible triad.

Introduction

The phrase "terrible triad" implies a devastating set of injuries that usually include fractures to the radial head, elbow dislocation, and coronoid fracture. When it comes to functional outcomes and management, this intricate damage pattern poses serious issues [1, 2]. It is quite uncommon for there to be a simultaneous proximal humerus fracture added to this trio, which further complicates the clinical presentation and treatment choices.

One of the more frequent traumatic injuries seen in orthopedic emergency rooms is elbow dislocations. First reported by

Hotchkiss in 1996, the "terrible triad" injury is a severe dislocation of the elbow. The traditional symptoms include elbow dislocation, head of radius fracture, and fractured coronoid [3, 4]. To treat this complicated injury, surgical intervention is required to correct the fractures and instability that are a part of this injury pattern. An injury to an extended arm typically results in a valgus strain on the elbow, which dislocates the elbow posterolaterally [5-7].

Nonetheless, it is uncommon for a proximal humerus fracture to occur alongside the ipsilateral dreadful triad of the elbow, and managing such a condition presents special clinical and surgical difficulties. When one considers the awful triad of elbow injuries,

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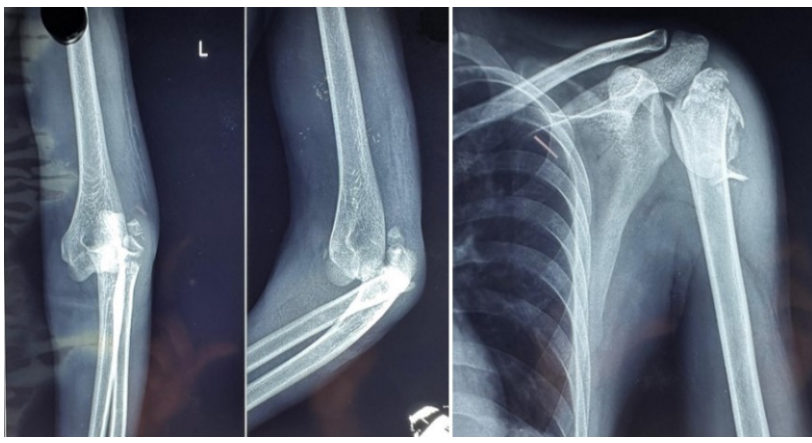


Figure 1: X-ray of the left elbow shows terrible triad injury and left proximal humerus with dislocation.

such as this one, treatment considerations must take into account the possibility of complications and long-term disability, as well as the need to restore function in both the elbow and shoulder.

This study is a case report of a polytrauma patient with an ipsilateral Hotchkiss triad of the elbow accompanied by a Neer's Type 4 proximal humerus fracture. We discuss the patient's clinical presentation, diagnostic workup, surgical intervention, and post-operative course.

Case Report

A male patient, age 33, was brought into our emergency room. In addition, to allegedly having a history of falls from a height of

roughly 20 feet, he also reportedly suffered injuries to his left elbow, left shoulder, left leg, head, abdomen, and spine. On inspection, the patient's overall health was satisfactory. The patient was conscious and aware of time, place, and people. He had stable vitals at the presentation. The patient was bleeding profusely from an open wound covering his right cheek, left elbow, and left ankle. The physical examination revealed a distorted appearance in the left arm and elbow. There was noticeable moderate swelling in the left ankle and arm. The left ankle, bilateral hips, left elbow, and left shoulder all had limited range of motion. On vascular and neurological evaluation, the patient's extremities were found to be unharmed.

According to the radiographic evaluation, the patient suffered a left coronoid and head of radius fracture with posterior elbow dislocation (Fig. 1), a left superior and inferior pubic rami fracture, a fracture of the L2 to L5 transverse process, and a left proximal humerus fracture (Fig. 1). After a thorough cleansing of the wound, the patient was sewn up. Instability was found, closed reduction was attempted, and repeated elbow examinations were done. An above-elbow slab was placed on the patient. Following closed reduction, a computed tomography scan was carried out for additional assessments. There were found to be an ipsilateral coronoid, ipsilateral radial head, and ipsilateral humeral fractures (Fig. 2 and 3). The patient was ordered to remain under careful immobilization and

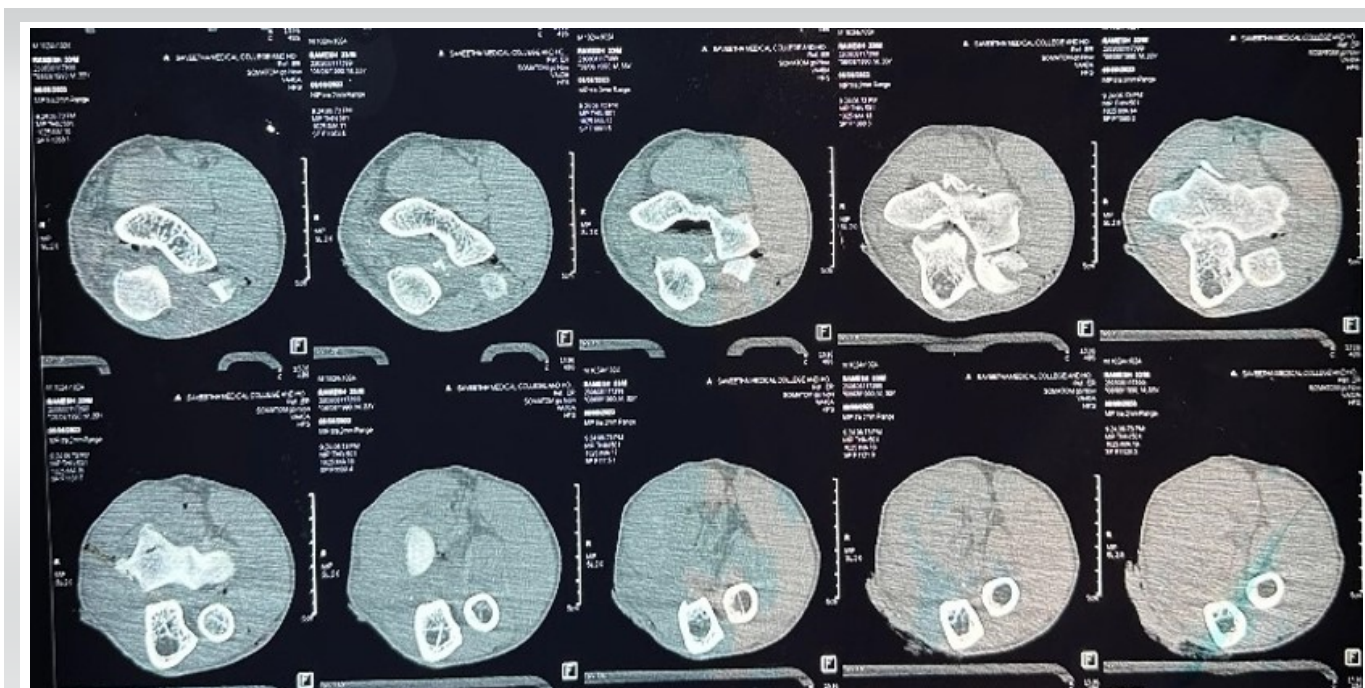


Figure 2: CT scan (axial) of the left elbow shows terrible triad injury.



Figure 3: CT scan (coronal) of the shoulder shows a proximal humerus fracture with dislocation.

observation in the intensive care unit due to splenic damage. Therefore, until the patient was fit, the decisive treatment was postponed. Treatment for pelvic and spinal injuries was conservative.

Surgical Procedure

Following a pre-operative assessment, the patient was scheduled for proximal humerus and elbow fixation after 17

days of observation, they were deemed fit for the surgery. Regional anesthesia was used for the operation of the patient. The first to be operated on was the elbow. With the elbow completely pronated and bent to 90°, the patient was placed in a supine posture to protect the posterior interosseous nerve. By taking a lateral approach and applying Kaplan's method (Fig. 4), the head of the radius was reached. The avulsed coronoid fragment with the capsule was sutured to the ulna using bone tunnels. The extracted radial head fragments were first secured in vitro using a Herbert screw (Fig. 5), and subsequently, the major component was secured using an additional Herbert screw. Over its original location, LCL was partially torn and remained intact. The LCL was repaired and the elbow was reduced. The deltopectoral technique was then used to operate on the proximal humerus (Fig. 4). The reduction of fracture was first maintained using k-wires and then fixed with a PHILOS plate (Fig. 5 and 6). The elbow was immobilized in 90-degree flexion for 2 weeks using a posterior slab, followed by elbow and shoulder range of motion exercises. The patient was able to do elbow flexion 30–70°, shoulder flexion 0–100°, extension 0–20°,

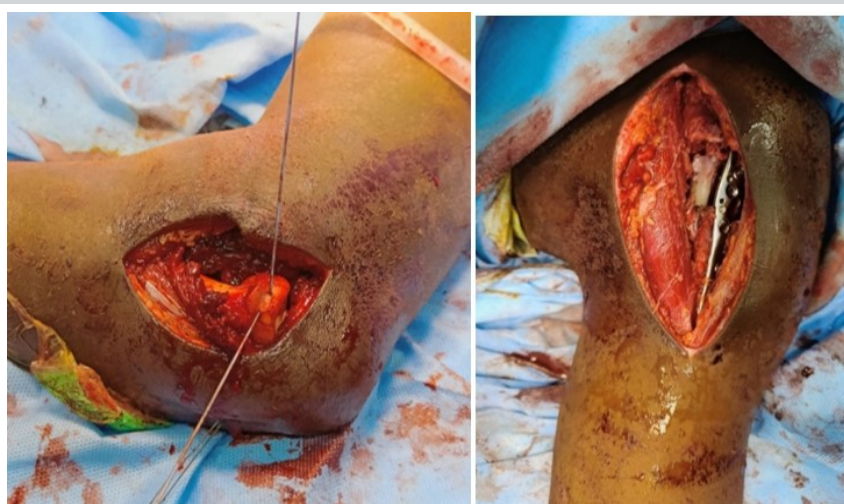


Figure 4: Intraoperative reduction of the radial head with K-wires and PHILOS plate applied for fracture proximal humerus.

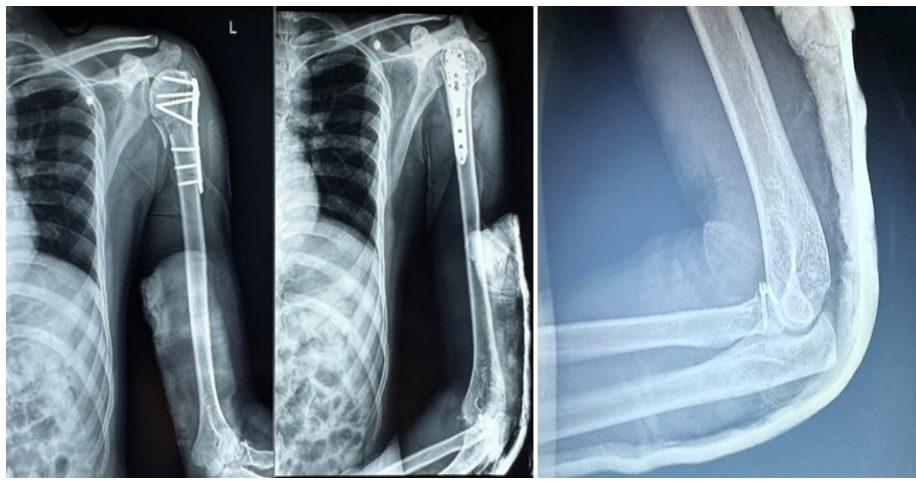


Figure 5: Post-operative X-ray of the fracture proximal humerus with PHILOS plate and radial head fracture with Herbert screw.

abduction 0–90°, internal rotation 0–20°, and external rotation 0–30°.

Discussion

The elbow is limited by both dynamic (muscle) and static factors (bone, ligament, and capsular). The three primary stabilizers are the joint between the ulna and humerus and the lateral and medial collateral ligament. To withstand the different patterns of instability, primary and secondary constraints operate in tandem. When the radioulnar joint dislocates externally relative to the humerus, it causes a posterolateral subluxation of the forearm complex, which is known as posterolateral rotatory instability. An additional pattern is a posteromedial subluxation of the forearm complex accompanied by an internal rotatory dislocation of the radioulnar joint due to posteromedial rotatory instability. There are two types of elbow dislocations: simple and complex. A dislocation without bony injury is a simple elbow dislocation while a complex dislocation has accompanying fractures of

bone. Due to their dismal prognosis following treatment, Hotchkiss dubbed complex dislocations of the elbow, with the head of radius and coronoid fractures, the “terrible triad.” They require surgical fixation to mobilize and give stability to the elbow. Surgical difficulties with associated proximal humerus fractures are additional. For improved results, meticulous surgical planning is also necessary. To prevent the proximal humerus implant from failing, the elbow was operated on before the latter.

A terrible triad injury was corrected in the order of the coronoid process ->

head of radius -> LCL. After reduction, a posterior above the elbow slab was applied. Plate osteosynthesis was then used to repair the proximal humerus. Elbow stability and early mobilization must be balanced in the post-operative rehabilitation plan for this complicated condition. Due to the continuously poor results of immobilizing the elbow for longer than 4 weeks [8, 9], our patient underwent 2 weeks of posterior splint at a 90° angle before beginning range-of-motion exercises with a hinged elbow brace. By 8 weeks following surgery, the patient was able to extend his elbow to its fullest. Adequate post-operative follow-up is crucial since it is difficult to treat the issues that arise after surgery. Redislocation, instability, stiffness, myositis ossificans, bursitis, malunion or non-union of fracture, post-traumatic arthritis, and nerve palsy are among the most common sequelae of dreadful triad injuries. The most difficult problem to manage is recurrent dislocation or subluxation [8-10].

Conclusion

The case highlighted how crucial it is to treat trauma systematically. Life-threatening wounds, including a Grade 2 splenic injury, were treated right away. Staged surgical intervention was undertaken immediately when the patient’s general condition improved. Surgical fixation of the head of the radius and coronoid and LCL repair were all accomplished effectively despite the difficult triad damage pattern. Then, in one session, a deltopectoral approach was used to treat the proximal humerus fracture.

Prospectively, further monitoring and rehabilitation will be necessary for the

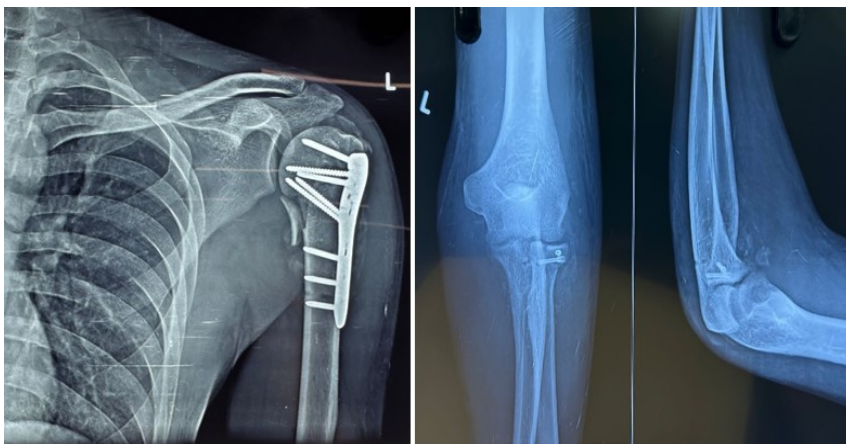


Figure 6: Post-operative X-ray after 2-week follow-up.

patient's functional outcomes, potential problems, and quality of life. This case emphasizes the complexity of musculoskeletal injuries brought on by high-energy trauma and emphasizes the value of an all-encompassing, multidisciplinary approach to improving patient recovery and clinical outcomes. Additional investigation and case studies in analogous settings could enhance our comprehension of the handling of such intricate musculoskeletal ailments.

Clinical Message

We propose that a detailed surgical strategy is necessary to address associated problems, emphasizing the particular order in which to treat the terrible triad components before reaching the proximal humerus. Furthermore, covered is the post-operative rehabilitation protocol, which emphasizes the need to strike a careful balance between early mobilization and elbow stability to prevent the negative effects of extended immobilization.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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