Multiple Unilateral Upper Limb Fractures in the Pediatric Setting – A Case Report

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Learning Point of the Article:
Importance of secondary survey in the context of even minor trauma to rule out concurrent injuries in pediatrics.

Abstract

Introduction: Lateral condyle fractures and both bone forearm fractures account for 10–15% and 13–40% of all elbow fractures in children, respectively. About 5% of forearm fractures in children have associated supracondylar fractures; hence, any forearm fractures warrant a careful examination of the elbow, and any radiographs taken should visualize the elbow joint above and wrist joint below for other injuries. We report a case of multiple upper limb fracture in a child, comprising lateral condyle and both bone forearm fractures.

Case Report: A 5-year-old boy was admitted through the emergency department at our district general hospital having fallen from a ladder approximately 1.5 m high in a playground. The limb was significantly deformed, with no evidence of an open injury, and remained neurovascularly intact throughout. Radiographs demonstrated a minimally displaced lateral condyle fracture of the left elbow, a midshaft ulna fracture, and a displaced off-ended distal third radius and ulna fracture of the left wrist. Any metabolic bone disease and non-accidental injury was ruled out. The patient was initially managed in an above elbow plaster cast, with elevation and monitoring for any neurovascular compromise. Computed tomography imaging was performed to completely assess the fracture pattern and for discussion with our local regional trauma center. Given the minimal displacement of the lateral condyle fracture, a conservative course of management was decided for this. The displaced distal radial fracture was managed with open reduction and internal fixation with a plate and the ulna shaft fracture with manipulation and plaster cast application. By 12 weeks after surgery, there was a full range of movement of the elbow, wrist, and forearm with complete radiological union.

Conclusion: This case emphasizes the importance of a secondary survey in the context of even minor trauma to rule out concurrent injuries. We found that minimally displaced lateral condyle fractures can be managed conservatively, and single-bone fixation in both bone forearm fractures can lead to very satisfactory outcome, with preference for plate and screw fixation for unstable fractures within the metaphyseal/diaphyseal junction.

Keywords: Pediatric, multiple fracture, upper limb, fixation, lateral condyle.

Introduction
Lateral condyle fractures and both bone forearm fractures account for 10–15% and 13–40% of all elbow fractures in children, respectively [1, 2]. Approximately 18% of pediatric forearm fractures occur in the middle third, and these are the most common sites for re fracture and pediatric open fractures [3, 4]. Kocher et al. demonstrated that 5% of forearm fractures in children have associated supracondylar fractures; hence, any forearm fracture warrants a careful examination of the elbow, and any radiographs taken should visualize the elbow joint above and wrist joint below for other injuries [5].

The mechanism of both bone forearm injuries tends to be fall onto an outstretched hand, whereas lateral condyle fractures are usually due to sudden traction of the common extensor origin by the extensor muscles, or when an axial load is transmitted through the forearm during a fall, resulting in the radial head crushing onto the lateral condyle [6, 7].

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Case Report

Specifically a lateral condyle fracture, as the majority of lateral condyle fracture occur in isolation [7]. Even though there is widely published literature on the management of both bone forearms and lateral condyle fracture, respectively, there are limited studies on the management of concurrent forearm and lateral condyle fractures in children [2, 7, 8, 9].
100°. A 80° of pronation was retained, but supination was restricted to 20°. No neurovascular deficit was identified and X-rays demonstrated good fracture union (Fig. 6, 7). At the 8 weeks post-operative follow-up, elbow ROM further improved, with almost full extension, 120° flexion, 70° of pronation and supination passively but achieving 90° actively on pronation and supination. By 12 weeks after surgery, there was a full ROM of the elbow, wrist, and forearm with complete radiological union (Fig. 8, 9). At 13 weeks post-injury, the plate was removed uneventfully and at 2 weeks after the procedure, his wound was well healed, and limb was neurovascually intact with a full ROM of his elbow, wrist, and forearm at which point he was discharged from our care.

Discussion

To the best of our knowledge, this combination of fractures in the upper limb has not been described in the literature. Multiple studies have been done for both bone fractures in children, describing methods such as hybrid fixation, elastic stable intramedullary nail (ESIN), K-wire fixation, and plate-and-screw constructs [10, 11, 12, 13]. Evidence in literature is conflicting, with studies stating ESIN as a superior fixation method, whereas other studies found no significant difference between ESIN and plating constructs [8, 13, 14, 15, 16]. In our case, there was significant instability demonstrated on initial image intensifier screening perioperatively and the fracture was not amenable to fixation with flexible nails, due to the metaphyseal-diaphyseal junction location of the fracture. In addition, the angulated ulna shaft fracture was able to be completely anatomically reduced; therefore, we did not proceed to performing an ESIN. An ESIN would have allowed for potential quicker recovery time and earlier removal of the plaster, but due to the presence of the ipsilateral lateral condyle fracture, immobilization in an above elbow plaster would still have been required.

Even though studies have shown single-bone fixation to be more unstable, we decided to plate only the radius, as the ulna achieved stable reduction after fixation of the distal radius [17, 18]. Evidently, fixation of the radius alone in this case has proven satisfactory, as follow-up demonstrated normal ROMs of all joints in the left arm. This correlates with findings from Yong et al., which showed that single-bone fixation does not compromise on functional outcomes compared to both bone fixations in children [19].

Tan et al. found that lateral condyle fractures should be treated conservatively unless there is a displacement of >2 mm [9]. As such, we opted for conservative treatment. The fracture has healed without any complications as shown in our follow-up X-rays.

Conclusion

This case emphasizes the importance of a secondary survey in the context of even minor trauma to rule out concurrent injuries – in our case, multiple fractures affecting a unilateral upper limb in the pediatric setting. Through this case, we found that minimally displaced lateral condyle fractures can be managed conservatively with good outcome. Single-bone fixation in both bone forearm fractures can lead to very satisfactory outcome, and plate and screw fixation is preferable over ESIN when fractures are within the metaphyseal/diaphyseal junction and unstable.

Clinical Message

The importance of a secondary survey in the context of even minor trauma to rule out concurrent injuries, minimally displaced lateral condyle fractures can be managed conservatively, and single-bone fixation in both bone forearm fractures can lead to good outcome.
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