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A Rare Acromioclavicular Joint Injury in a Twelve-Year-Old Boy

A Case Report

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Injuries to the lateral part of the clavicle in a child with an immature skeleton are more likely to be physeal fractures than true acromioclavicular separations^{1,2}. Nevertheless, lateral physeal separations of the clavicle and acromioclavicular joint dislocations do occur in children, and Dameron and Rockwood have classified these injuries according to six distinct types³. The combination of a physeal fracture with a ligamentous injury is even rarer and seems to violate the basic principle that a bone will fracture before a ligament will rupture in a child². The aim of this case report is to remind the

reader that, although this type of combined lesion can occur, it is often misdiagnosed or overdiagnosed; thus, an appropriate and careful evaluation must be performed so that unnecessary treatment can be avoided².

We report the case of a twelve-year-old boy who sustained an injury to the left acromioclavicular joint as a result of a fracture of the lateral part of the clavicle and a complete rupture of the coracoclavicular ligaments. This type of injury could not be categorized as any of the types in the classification system of Dameron and Rockwood³. This



Fig. 1

Standard anteroposterior radiograph of the left shoulder. Note the increased distance between the clavicle and both the acromion and the coracoid process.

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Fig. 2

The three-dimensional reconstruction of the computed tomography scan confirmed the fracture of the clavicle and the increased distance between the clavicle and both the acromioclavicular joint and the coracoid process.

study was approved by the scientific review board at our hospital and was conducted in accordance with the World Medical Association Declaration of Helsinki of 1964, as revised in 1983. The parents of our patient were informed that data concerning the case would be submitted for publication, and they consented.

Case Report

A twelve-year-old boy fell from his bicycle onto his left shoulder. An anteroposterior radiograph of the shoulder (Fig. 1) demonstrated a fracture of the lateral part of the clavicle with an increased distance between the clavicle and both the coracoid process and the acromion. Because a rupture of the periosteum of the clavicle or of the coracoclavicular and/or the acromioclavicular ligaments was strongly suspected, the patient was admitted to the hospital for further evaluation. A magnetic resonance imaging scan was suggested, but the patient was afraid of it and refused to undergo the scan, and the patient's parents refused to consent to have the scan performed with the boy anesthetized. Therefore a computed tomography scan was performed, which showed the same results as seen on the radiograph (i.e., the fracture of the clavicle, the increased distance between the lateral part of the fractured clavicle and the acromioclavicular joint and the increased distance between the medial part of the clavicle and the coracoid process) (Fig. 2). Because of the extreme likelihood of a concomitant serious ligamentous injury and because we were not able to acquire additional diagnostic information by means of magnetic resonance imaging, the patient underwent surgery one day after the injury. At the time of the operation, the fractured medial

portion of the clavicle (a Salter-Harris type-II epiphyseal fracture) was found to be partially denuded from the periosteum, and the conoid and trapezoid ligaments were completely ruptured, even though the lateral part of the clavicle (the epiphysis) was firmly attached to the acromion without any signs of disruption or dislocation of the acromioclavicular joint (Fig. 3). The clavicular fracture was reduced and stabilized with use of two smooth Kirschner wires (Fig. 4), and the ruptured ligaments were repaired with nonabsorbable sutures. The arm was immobilized in a sling for a period

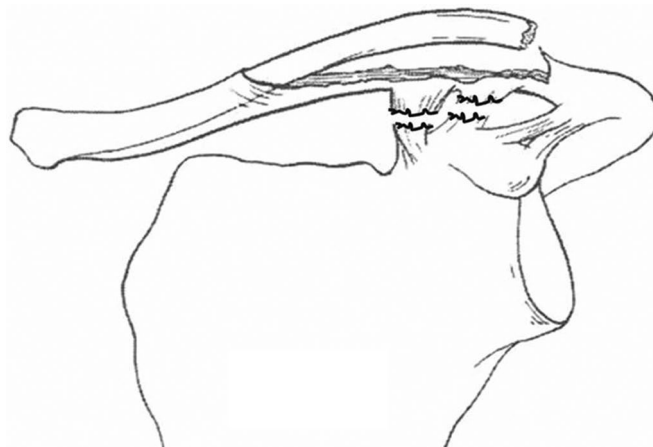


Fig. 3

Drawing showing the injury that was encountered at surgery. Note the rupture of the periosteal sleeve and complete rupture of the trapezoid and conoid ligaments. Also, note that the acromioclavicular joint is intact.

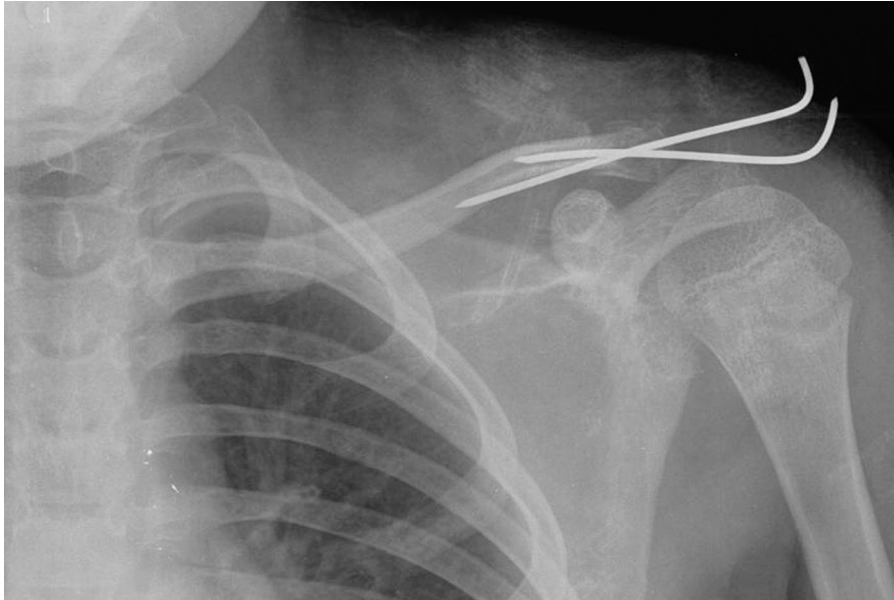


Fig. 4

Immediate postoperative radiograph. The fracture was reduced and fixed with two smooth Kirschner wires.



Fig. 5

Standard anteroposterior radiograph of the shoulder twenty-four months postoperatively. The healing of the clavicle is complete.

of six weeks, at which time the Kirschner wires were removed and active exercises were started. Two years postoperatively (Fig. 5), full range of shoulder motion was possible.

Discussion

Fracture of the clavicle is very common in children. An injury to the lateral part of the clavicle in a child is more likely to be a physeal fracture than a true acromioclavicular

separation^{1,2}, even though the radiographic findings may mimic the latter⁴. Physeal fracture occurs because, prior to epiphyseal closure, the physis is weaker than the ligaments; therefore, the conoid and trapezoid ligaments usually remain intact^{5,6}. Furthermore, the acromioclavicular joint is additionally stabilized by the trapezius and deltoid muscles. As a result of all these factors, a true acromioclavicular joint dislocation is extremely rare in patients who are younger than

thirteen years of age². Nevertheless, lateral physal separation of the clavicle and acromioclavicular joint dislocation do occur in children, as reflected in the classification system of Dameron and Rockwood, which includes six distinct types of injury^{1,3}. Type-I and type-II injuries are practically sprains of the acromioclavicular joint, whereas types III and IV represent a complete disruption. Type-V and type-VI injuries are caused by severe trauma that leads to the "migration" of the medial part of the clavicle either through the deltoid and trapezius muscles into the subcutaneous tissues (type V) or below the coracoid process (type VI).

The injury reported here (Fig. 3) was somewhat different from the previously mentioned types. The periosteum of the clavicle was ruptured, so the injury could not be classified as either type I or II. The acromioclavicular joint was not dislocated; therefore, the injury could not be classified as type III or type IV. Furthermore, both coracoclavicular ligaments (the trapezoid and the conoid) were ruptured. Although this injury appears to be extremely rare, it is possible that similar cases of this injury pattern may pass unnoticed because, in many cases, advanced imaging is not acquired and nonoperative treatment is chosen. Eidman et al.² were the first to report this type of injury, and these authors demonstrated later ossification at the region of the coracoclavicular ligaments (suggesting a possible combined osseous and ligamentous injury) in fourteen of twenty-five children who were thought initially to have a complete dislocation of the acromioclavicular joint.

It is theorized that the following mechanism may have caused this complex type of injury: The patient fell onto the left shoulder, resulting in complete (or partial) rupture of the trapezoid and conoid ligaments. Next, the clavicle sustained a direct blow that caused it to fracture (possibly completing the rupture of the trapezoid and conoid ligaments). Finally, the sternocleidomastoid muscle pulled upward on the medial part of the

fractured clavicle, leading to the rupture of the periosteum.

The treatment for this type of injury remains rather controversial. When total rupture of the coracoclavicular ligaments is suspected in a child, surgical repair can be justified to treat the deformity⁷. If this type of injury is left untreated, the formation of new bone from the ruptured periosteal envelope may lead to the development of a 'Y'-shaped clavicle that may become both uncomfortable and unsightly^{3,4,8}. Nevertheless, long-term follow-up of such patients after nonoperative treatment of this injury has also demonstrated excellent results⁴. Our patient underwent surgical treatment because it was initially believed that he had a complete acromioclavicular separation, although intraoperative findings revealed an intact acromioclavicular joint. If we had been able to acquire a magnetic resonance imaging scan preoperatively to evaluate the ligaments as well as the acromioclavicular joint capsule, the decision to operate might have been different. It is therefore very important to acquire magnetic resonance imaging scans as part of a careful evaluation of any injury to the lateral part of the clavicle in a child before deciding to proceed with operative treatment, as surgery may be unnecessary. ■

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