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Case Reports and Series

Atypical Chronic Ankle Instability in a Pediatric Population Secondary to Distal Fibula Avulsion Fracture Nonunion

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ABSTRACT

Chronic ankle instability is a disabling condition, often occurring as a result of traumatic ankle injury. A paucity of published data is available documenting chronic ankle instability in the pediatric population. Much of the data has been confined to the adult population. We present 2 cases of chronic ankle instability, 1 in a 12-year-old and 1 in a 9-year-old patient. Unlike the typical adult etiology, the cause of instability was a dysfunctional lateral ligamentous complex as a consequence of bony avulsion of the tip of the fibula. Both patients had sustained a twisting injury to the ankle. The fractures failed to unite. The nonunion resulted in dysfunction of the anterior talofibular ligament with consequent chronic ankle instability. At the initial clinical assessment, magnetic resonance imaging was requested for both patients. In patient 1 (12 years old), the fracture was fixed with 2 headless screws and was immobilized in a plaster cast for 6 weeks. In patient 2 (9 years old), because of the small size of the avulsed fragment, fixation was not possible. A modified Gould-Broström procedure was undertaken, facilitating repair of the avulsed fragment using anchor sutures.

Ankle sprains are very common, not only in the sporting population (1), but also in the general population (2). The acute symptoms often resolve relatively quickly. Persistent symptoms, such as pain and instability, are frequently reported (3). Chronic ankle instability (CAI) can be defined as the presence of recurrent sprains (4). The definition of a recurrent sprain has varied widely across studies. A review of the published data would indicate that the numerical definition of a recurrent sprain ranges from 2 to 8 sprains, with a range of time spans between sprains. Ankle sprain is a common occurrence, accounting for $\leq$37% of injuries in children's soccer (5). Also, published studies have reported that similar to adults, children with a previous ankle injury such as an ankle sprain are more likely to injure their ankles than those with no history of injury (6,7). To the best of our knowledge, we are not aware of a similar presentation of both nonunion and instability symptoms. We postulated that CAI has been underreported in published studies.

Case Report

We present 2 cases of CAI after nonunion of an avulsion fracture distal fibula.

Patient 1

The imaging studies and clinical photograph of a 12-year-old female presenting to a tertiary foot and ankle clinic for persistent pain of the ankle and recurrent "giving way" are shown in Fig. 1(*A–H*). The patient reported a history of an index injury 4 years before presentation. Examination showed a normal shaped foot. Investigations confirmed a nonunited distal fibula fracture, which was further investigated with magnetic resonance imaging arthrography. Previous attempts at nonoperative treatment, including immobilization and physiotherapy, had failed. Surgery, in the form of open reduction and internal fixation of the nonunited fracture, was planned. A direct lateral approach to distal fibula was used. Intraoperatively, the fragment was identified. The anterior talofibular ligament and calcaneofibular ligament were

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Fig. 1. (*A*) Anteroposterior view of nonunited fracture tip of lateral malleolus. (*B*) Lateral view of nonunited fracture tip of lateral malleolus. (*C*) Magnetic resonance imaging arthrogram of ankle showing nonunion. (*D*) Magnetic resonance imaging arthrogram with ligaments attached to nonunited fragment. (*E*) Weightbearing anteroposterior view at 6 weeks postoperatively (*continued*).

attached to their normal footprint on the avulsed fragment. The ligaments were macroscopically normal. The fracture site was debrided and fixed with 2 headless screws with compression. The ankle was immobilized for 6 weeks in a below-the-knee cast, and weightbearing was avoided. The patient then began protected weightbearing within the tolerance of symptoms and was monitored by a pediatric physiotherapist until discharge. The findings of the follow-up radiograph at 3 months postoperatively were satisfactory (Fig.1*I* and *J*). The fracture had healed. The patient was followed up in the clinic for 8 months and had returned to the preinjury level of normal activity.

Patient 2

Patient 2 was a 9-year-old female. The imaging studies are shown in Fig. 2. She had sustained a twisting injury right ankle approximately 18 months before presentation to our service. She reported a history of recurrent giving way of her ankle. The frequency of giving way was at least twice a week. She had had to be absent from school because of anterolateral ankle pain and instability. At her initial presentation to the emergency department, no imaging studies had been obtained. Her foot was a normal shape. A subsequent magnetic resonance imaging scan confirmed anterior talofibular ligament rupture and fibula avulsion. Nonoperative treatment was attempted, including physiotherapy and ankle strapping, with no benefit. After failed nonoperative management, the patient underwent modified Gould-Broström repair using GII anchors (DePuy Mitek; DePuy Synthes, Warsaw, IN). The avulsed fragment was loose but was too small to fix using compression screws. The instability symptoms resolved fully after the surgical treatment. The patient was