



Idiopathic Avulsion Fractures of the Lesser Trochanter in Pediatric Patients

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Introduction

Lesser trochanter avulsion fractures are a rare injury in childhood. This injury has not recently been well-described in the literature, and standard of care and expected outcomes remain unclear. In adult populations, this fracture has been considered pathognomonic for metastatic oncologic disease.^{1,2} More recently, it has been associated more broadly with chronic disease states, particularly endocrine and renal disorders which may impact bone health.³ In pediatric patients, on the other hand, it is our clinical impression that these fractures occur in otherwise healthy, athletic children and adolescents without underlying disease. The purpose of this study is to describe the current presentation of this injury and to report our experience with these avulsion fractures in a larger series with more current data.

Methods

After obtaining approval from our institutional review board, we queried our outpatient database for ICD-9 codes consistent with a lesser trochanter fracture (820.20). Patients aged 0-18 years who presented to our institution between 2003 and 2013 with an avulsion fracture of the lesser trochanter were included in the study. Patients with underlying syndromic pathology were included in the initial review, but their epidemiologic and follow-up information was not included in the aggregate data of otherwise healthy patients. Diagnosis was confirmed for each potential case by radiographic evidence of lesser trochanter avulsion fracture and by supporting clinical documentation. We then performed a retrospective review of medical records to determine patient characteristics, injury mechanism, treatment methods, time of protected weight-bearing on crutches, time until return to full activity, and clinical outcomes. Injury radiographs were used to determine initial fracture displacement on an anteroposterior (AP) radiograph of the pelvis or hip.

Results

Between 2003 and 2013, we identified 36 documented lesser trochanter avulsion

fractures. Of these, 35 were idiopathic, occurring in otherwise healthy individuals. One injury occurred in a 12 year old male with spastic quadriplegic cerebral palsy (ambulatory in a walker). Of the 35 otherwise healthy patients with this injury, 33 were male and 2 were female. The average age at time of presentation was 13.7 years, with a range of 9-17 years. Of note, all subjects were 12-17 years of age, with the exception of three 9 year-olds. Two of the 9 year-olds were obese males, and one was a normal weight female.

All injuries occurred during athletic activity. Nine (25.7%) were by contact or fall, and 26 (74.3%) were by non-contact mechanisms. Of the 26 injured by non-contact mechanisms, 24 (92.3%) occurred during vigorous running, sprinting or skating, and 2 (7.7%) occurred during a pivoting move. Of the contact/fall injuries, 4 were from tackles or hits, and 5 were from falls. The most common sports involved were basketball (9 patients, 25.7%) and football (8 patients, 22.9%) followed by baseball/softball (5 patients, 14.3%), hockey (3 patients, 8.6%), and soccer (1 patient, 2.9%). Other activities associated with injury were running/sprinting and jumping. Ten patients were documented as feeling a pop at the time of injury. One patient had an associated injury, an avulsion fracture of the contralateral anterior inferior iliac spine. Twenty-six patients had initial injury films available. On AP pelvic radiographs, average fracture displacement for these patients was 10.9 mm (range of 4.0-24.7 mm).

All patients were treated nonoperatively, with protected weight bearing (non weight-bearing or toe-touch weight-bearing) and crutches for an average of 5.6 weeks (range: 1 week 4 days - 9 weeks 2 days). All patients were then referred to physical therapy and instructed to return to full weight bearing as tolerated. Release to full activity occurred after an average of 12.1 weeks (range: 5 weeks 3 days - 19 weeks).

Two patients returned, one at 8 months and the other at 1 year post-injury, for evaluation of ipsilateral hip pain, but in both cases the cause of symptoms was determined to be unrelated to the original fracture. No long-term sequelae of

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Figure 1. (A) AP pelvis X-ray of a 12 year old male who presented with right groin pain of acute onset while sprinting during football. He was diagnosed with a right-sided avulsion fracture of the lesser trochanter. (B) He presented to clinic again 1 year later for an unrelated complaint, but was found to have excellent radiographic healing of his lesser trochanter avulsion fracture.

the avulsion fracture were documented in any patients (Figure 1A and 1B).

Discussion

To the best of our knowledge, the largest previous report of pediatric patients with lesser trochanter avulsion fractures is a 26 patient series published by Dimon in 1972.⁵ In the four decades since this series was published, few updates have been reported, with most available data coming in the form of case reports and series of up to 3-4 patients.^{4,6,7}

Similar to Dimon's study, we found that idiopathic avulsion fractures of the lesser trochanter occur in otherwise healthy adolescents, particularly males. This fracture is strongly associated with athletic activity in this population. Most patients were managed successfully with approximately 6 weeks of protected weight-bearing on crutches, followed by approximately 6 additional weeks of progressive weight-bearing and physical therapy. After this, gradual return to full activity can be expected.

A major limitation of our study was lack of follow-up. In most cases, patients were asked to follow-up only as needed once they achieved clinical healing and were released to athletics. The two patients that did return with symptoms in

the ipsilateral hip were both found to have pain unrelated to the previous avulsion injury.

In spite of its limitations, our report is the largest series to date on isolated lesser trochanter fractures in adolescents. As such, this series provides important information for caregivers managing these injuries and potentially offers important information with which to counsel patients and their families.

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