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Rare acute bilateral iliac crest avulsion fractures in an adolescent athlete: A case report

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Abstract
Case: A healthy 15-year-old male baseball pitcher sustained a right iliac crest avulsion fracture, and then fractured his left iliac crest in the same manner less than 6 weeks into his initial treatment protocol.
Conclusion: General nonoperative guidelines for pelvic apophyseal avulsion fractures encompass a period of rest, followed by protected weightbearing, and then progressive stretching and strengthening exercises with a gradual return to sport. Due to the timing of the injuries, the treatment protocol was greatly delayed to 6 months to ensure proper healing and resolution of symptoms prior to return to sport.

Keywords: adolescent, pediatrics, baseball pitcher, iliac crest avulsion fracture, rare, physical therapy, sports medicine

Introduction

Pelvic apophyseal avulsion fractures are an uncommon injury accounting for 10% to 24% of hip and pelvis injuries in athletic adolescents [1]. Out of all of the pelvis apophyseal avulsion injuries, iliac crest avulsion fractures are the rarest at 10%[2]. A recent review of 228 cases of pelvis apophyseal injuries showed an even greater scarcity of bilateral injuries at a total of 6% including only ischial tuberosity, anterior inferior iliac spine (AIIS), and anterior superior iliac spine (ASIS) [2]. The ossification of the iliac apophysis starts from anterolateral and gradually grows posteromedial. The cartilage becomes fully ossified around 14 and 15 years of age for girls and boys, respectively. Fusion, on the other hand, occurs around 16 years of age and can continue until 25 years of life [3, 4]. Currently, there are no documented cases of acute bilateral iliac crest avulsion fractures. The most common mechanism is an indirect injury with forceful concentric or eccentric muscular contraction on the apophysis during running, jumping, or kicking [5]. The main muscle attachments along the iliac crest include the tensor fascia lata, gluteus medius, transverse abdominal muscle, and internal/ external oblique abdominal muscles. The counteracting forces between the fascia lata and the abdominal muscles occur when the hip and knee are in extension. A fracture of the iliac crest may occur from increased strain along the growth cartilage during the sudden lateral flexion contracture of the abdominal muscles combating the counteracting force of the tensor fascia lata and gluteus medius musculature [6, 7].

Statement of Informed Consent

Institutional Review Board (IRB) approval/exemption to report the case without consent was obtained for this study. The IRB letter of approval has been submitted to the publisher.

Case

The patient is a 15-year-old male, right-handed baseball pitcher, who reports sudden onset right hip pain after performing sprints during baseball practice one week ago. The patient felt a pop around his right hip area. The patient admits that he was running as fast as possible during the sprinting exercise. On exam, he demonstrated tenderness to palpation along his right iliac crest and increased pain with hip hyperflexion. The rest of his exam was unremarkable. Pelvis radiograph revealed a right iliac crest avulsion fracture (Figure 1). The plan was to pursue conservative management by making the patient weight bearing as tolerated with crutches and prescribe anti-inflammatories for pain control. The patient was educated on advancing his activities slowly while using the crutches. Four weeks later, the patient reported no pain while weight bearing with crutches. Physical therapy was started and the crutches were discontinued. Patient was allowed to start running six weeks after the injury. However, just prior to the six-week mark, the patient felt a pop about his left (contralateral) hip area while attempting to jog; similarly to what he experienced on his right side during the initial injury. Repeat pelvis radiographs revealed a contralateral iliac crest avulsion fracture (Figure 2). His activities were deescalated to using crutches PRN while continuing physical therapy on his right side. The patient was instructed to start gait, strength, and stretching exercises to his left side in the following two-to-three weeks.
At his ten-week follow up visit from the initial injury, he was pain

free bilaterally with weight bearing and no longer requiring crutches for ambulation. He also expressed no issues with light pitching exercises that he had started with his baseball coach. At that time, he had not started running and his physical exam was benign. The patient was prescribed the Thrower's Ten Program and a set of shoulder exercises for a slow return to pitching. He continued physical therapy with a goal to gradually get back to running exercises. At his four-month visit from initial injury, he was pain free with light pitching but still encountered mild pain with long distance running. Radiographs demonstrated great healing of the bilateral iliac crest avulsion fractures (Figure 3). The patient was instructed to continue physical therapy along with low impact activities, including the elliptical, stationary bike, and low speed treadmill. The patient was pain free with all running and pitching activities at his six-month follow-up visit. Final pelvis radiograph showed well-healed iliac crest avulsion fractures bilaterally (Figure 4). The patient was cleared to return to all activities without limitations and told to follow up on as needed basis.

Fig 1: Initial AP pelvis radiograph demonstrating an acute right iliac crest avulsion fracture

Fig 2: AP pelvis radiograph demonstrating an acute contralateral (left) iliac crest avulsion fracture at 6-weeks from initial injury

Fig 3: AP pelvis radiograph during 4-month visit demonstrating healing bilateral iliac crest avulsion fractures

Fig 4: AP pelvis radiograph during 6-month visit demonstrating well-healed bilateral iliac crest avulsion fractures

Discussion

Our case depicts bilateral iliac crest avulsion fractures secondary to abrupt sprinting motions performed by a teenage baseball player. Patients typically present with tenderness to palpation along the iliac crest and hip pain with range of motion in the extremes of flexion and extension. Radiographic images, including an AP pelvis, are enough to diagnose acute iliac crest avulsion fractures. The majority of pelvis apophyseal avulsion fractures are treated nonoperatively. Various protocols have been described using a brief period of rest, followed by protected weightbearing, and then progressive stretching and strengthening programs leading to gradual return to sports [3, 4, 8-14]. Operative treatments have been recommended for greater than 2cm displacement of ASIS and AIIS avulsion fractures specifically[8]. However, nonoperative management has demonstrated to yield a 98% healing rate [2]. To the best of our knowledge, no other

bilateral iliac crest avulsion fracture has been reported, making our case unique. The patient's full return to sport was greatly delayed due to the new onset of his contralateral iliac crest avulsion fracture occurring approximately 6 weeks into the initial treatment protocol. This further complicated the decision-making in regards to allowing him to return to full pitching exercises. Although the patient showed radiographic signs of healing 2-3 months after his injuries, he was still experiencing pain with running activities. The decision to allow gradual return to running was made by accessing his progression while using the elliptical and stationary bike. The idea was to eliminate some of the explosive forces generated during normal running and sprinting mechanics. The use of a throwing program often used for pitchers returning from injuries was also implemented to help restore proper mechanics. Due to ongoing pain with running activities, the patient was not fully cleared to return to play until 6 months after his initial injury along with the completion of the thrower's program.

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