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Results of operative treatment of avulsion fractures of the iliac crest apophysis in adolescents

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ABSTRACT

Background: Avulsion fracture of the iliac crest apophysis is a rare condition that commonly occurs in adolescent athletes. Conservative treatment for this injury can produce excellent functional outcomes. However, the rehabilitation process requires a rather long immobilisation period. This study aimed to evaluate the use of cannulated screws for fixation of avulsion fractures of iliac crest apophysis.
Methods: Ten patients with avulsion fractures of iliac crest apophysis were treated by open reduction and internal fixation using cannulated screws.
Results: The mean age of patients was 14.6 years (range, 13–15 years). The mean intraoperative blood loss was 14.9 ml (range, 10–25 ml). The mean operative time was 40.3 min (range, 33–52 min). The mean follow-up period was 11.2 months (range, 6–20 months). At the 4-week follow-up, all patients returned to previously normal activity without pain and had no evidence of lower extremity muscle weakness. At the final follow-up, all patients resumed their athletic activity without any complications.
Conclusion: Open reduction and internal fixation for the treatment of avulsion fracture of iliac crest apophysis can be recommended for patients requiring rapid rehabilitation.

Introduction

Avulsion fracture of the iliac crest apophysis is a rare condition that commonly occurs in adolescent athletes [1]. As the cartilaginous growth plate of iliac crest apophysis during adolescence remains weaker than the attached musculotendinous unit, a sudden forceful contraction or repetitive actions of the sartorius and the tensor fasciae latae may result in avulsion fractures of the iliac crest apophysis [2].

The characteristic presentation of avulsion fractures of the iliac crest apophysis is a suddenly sharp pain localised to the anterior pelvic area, and the injured area is usually swollen and tender to pressure. Despite patients are able to walk, any active extension of the hip, especially against resistance causes severe pain [3]. Currently, the mainstay of treatment for this injury remains conservative, including analgesics, bed rest, immobilisation of the lower extremity in a Bohler Braun splint, and physical rehabilitation [4–6]. However, this process of clinical recovery is time-consuming, generally lasting for a period of 6–10 weeks or even 12 weeks [7], which do not meet some active cases' rehabilitation requirements.

In this study, we present a series of 10 patients surgically treated at our institution for avulsion fractures of the iliac crest apophysis. The rehabilitation period is considerably shortened, patients can begin active exercise of the hip 2 days after surgery, and return to their full athletic activities 4 weeks after the injury.

Patients and methods

From January 2009 to February 2011, the authors' institution had 10 patients with avulsion fractures of iliac crest apophysis who had been treated with internal fixation using cannulated screws only. All of the 10 fractures, involving nine men and one woman, were unilateral. The mean age of these patients at surgery was 14.6 years (range, 13–15 years). All patients were injured while taking part in running sports.

Preoperatively, patients were evaluated with one anteroposterior pelvic radiograph and computed tomography with three-dimensional reconstruction (Fig. 1a–c). Surgery was performed 2–5 days after injury. Patients were positioned supine with the affected hip in flexion (Fig. 2). A 6-cm incision was made at the region of the broken iliac crest apophysis, and the fractured fragment was exposed. During the operation, an avulsed bony fracture of iliac crest coexisting with part of the apophysis was commonly noted (Fig. 3). The size of the entire mass was larger than that of the fractured fragment initially measured on

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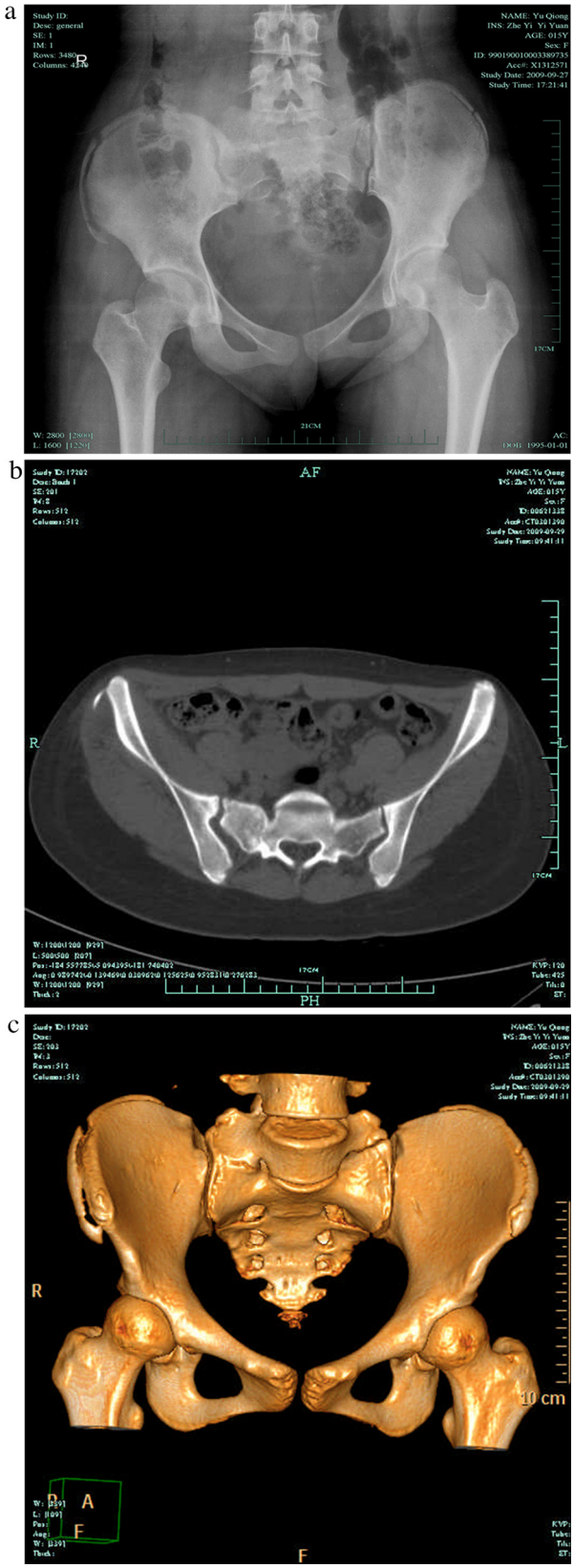

Fig. 1. A 15-year-old girl injured while sprinting. Preoperative anteroposterior radiograph (a) and CT scan with three-dimension reconstruction (b) and (c) showed an avulsion fracture of right avulsion.

Fig. 2. Positioning of patient in the operation theatre.

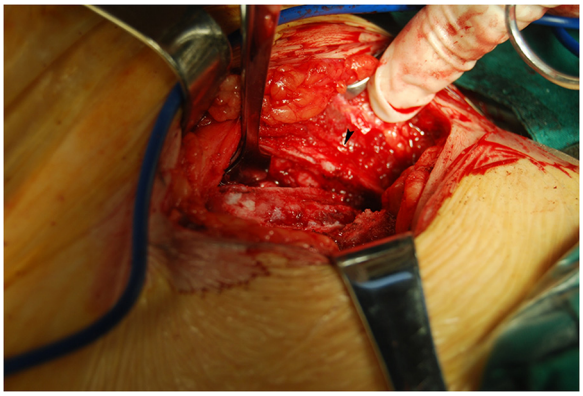

Fig. 3. Intraoperative findings showed an avulsed bony fracture coexisting with part of the apophysis (arrow head).

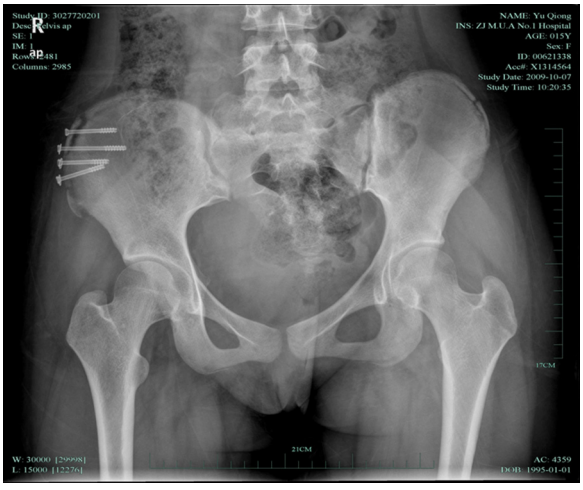

Fig. 4. The patient underwent the operation by open reduction and internal fixation using cannulated screws.

computed tomography. Then the avulsed fragments were reduced with minimal stripping of the soft tissue and temporarily fixed with Kirschner wires. Two to four 4.0 mm cannulated screws with washers (Stryker Trauma AG, Selzach, Switzerland) were ultimately inserted to fix a fracture according to the size of the fragment (Fig. 4). Intraoperative fluoroscopy was used to check the screw length and position. Drains were inserted, and the surgical wound was closed in layers.

On the second day after surgery, the drains were removed, and patients began to get up and walk with partial weight bearing after