We present here an unusual case of a sequential avulsion fracture of the anterior inferior iliac spine (AIIS), occurring first in the right and then the left AIIS, during long jump attempts. The case of a 17 year old boy with pain around his right groin, which first occurred during a long jump attempt, is presented. Radiographic examination revealed an avulsion fracture of the right AIIS. After conservative treatment, full athletic activity was allowed 2 months after the injury. However, 4 months later the patient returned with a similar pain in the opposite side of his groin. Radiographs revealed another fracture of the left AIIS. The boy underwent the same treatment protocol; he was examined with isokinetic dynamometry. No complication or re-injury occurred during the 2 year follow up period. In the present study, we introduce the first case of a sequential bilateral AIIS avulsion fracture caused by a long jump.

A 17 year old boy came to us with pain around his right groin, which had first occurred during the pre-take off phase of a long jump attempt. Examination revealed an oedema and localised hypersensitivity to the pain in the iliac spine region. Hip flexion and abduction were moderately limited. Radiograms indicated an avulsion fracture of the right anterior inferior iliac spine (AIIS) and showed approximately 1 cm displacement (fig 1). Conservative treatment consisting of bed rest, analgesia, and a five stage progressive rehabilitation program was employed as follows1:

- Phase 1: Rest and protection period. Isometric muscle exercises and weight protection are essential (week 1).
- Phase 2: Passive motion period. Patients are allowed to walk with crutches without weight bearing or with partial weight bearing (weeks 2–4).
- Phase 3: Active motion and strengthening period including isokinetic exercises and active joint movements including against gravity (weeks 4–6).
- Phase 4: Resistance exercises to improve muscle strength (weeks 6–9).
- Phase 5: Final period to prepare the athlete for competition. Isokinetic dynamometry may be used to aid decision to allow competition (after week 9).

The patient was able walk without crutches in the 3rd week with minimal discomfort and 6 weeks later bony union was observed without any complications. Full athletic activity was resumed 8 weeks after the injury and competition was allowed in the 4th month.

However, 4 months after the first injury had occurred, the patient returned with a similar pain in the opposite side of his groin after a long jump attempt. Physical examination revealed pain and soreness in the left groin. An approxi-
of this muscle is known to be the extension of the knee and flexion of the hip.

The long jump is a complex action consisting of accelerated running, a stabilised stride pattern, and a single take off to jump a distance. The long jump is known to be the cause of pelvic avulsion because of its complicated nature. During the last phase of the stride pattern and the pre-take off phase, maximal eccentric contraction of the rectus femoris muscle caused the injury in our case. The patient felt a severe groin pain during the pre-take off phase of a long jump during which the front leg was up and the other leg was on the ground in the position of full hip and knee extension and forward spine extension. Avulsions occurred at the ipsilateral side of the leg which was on the ground at the time.

Avulsion fracture of the AIIS is generally treated with bed rest and rehabilitation, which usually leads to a satisfactory outcome. Generally, displacement of the fragment in pelvic avulsions is no more than 1.5 cm, and hence most avulsions can be managed non-operatively. Returning to daily life and regular sporting activities is the main goal of the treatment. This length of this period is variable, ranging from 3 weeks to 4 months, and is directly related to the formation of a solid bony union and rehabilitation of the patient. Also, the age of the patient, his injury athletic level, and the degree of displacement of the fragment are other contributing factors. Some authors have suggested surgical treatment in conditions of lateral femoral cutaneous nerve entrapment with more than 1.5 cm displacement or severe rotational deformity and a high level of professional involvement in sport. In our case, after conservative treatment functional and radiological results were satisfactory. Solid bony union of the displaced fragments on both sides was achieved. Isokinetic measurements revealed that final force and muscular endurance were completely restored.

Only two cases of bilateral AIIS avulsion fractures have been reported so far, and both occurred during a 100 m dash event. In the present study, we introduce the first case of a sequential bilateral AIIS avulsion fracture caused by a long jump and managed effectively by conservative means.

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Table 1 Results of isokinetic dynamometry evaluating flexion and extension peak torque of both hips 1.5 and 6 months after last injury

<table>
<thead>
<tr>
<th></th>
<th>30°/s peak torque (Nm)</th>
<th>120°/s peak torque (Nm)</th>
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<tbody>
<tr>
<td></td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>CEXT</td>
<td>203</td>
<td>225</td>
</tr>
<tr>
<td>CFLE</td>
<td>139</td>
<td>160</td>
</tr>
</tbody>
</table>

CEXT, concentric extension; CFLE, concentric flexion; Nm, Newton meter; Pre, pre-treatment; Post, post-treatment. Pre-treatment indicates 1.5 month results and post-treatment indicates 6 month results.
REFERENCES
