BONE GROWTH AFTER FIXING SLIPPED FEMORAL EPIPHYES: BRIEF REPORT

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Early closure of the growth plate after fixing a slipped upper femoral epiphysis is often regarded as favourable since, if growth of the femoral neck continues, the metal may lose its grip on the epiphysis with the possibility of further slipping. However, in the young child early fusion may result in leg length discrepancy and limited motion. The hook-pin (Hansson 1982) permits continued growth of the femoral neck without the risk of further slipping, as illustrated in the following cases.

**Patients and methods.** Four boys with unilateral and two boys with bilateral slipping of the upper femoral epiphysis were treated. Those which had slipped were pinned without reduction; those which had not slipped were pinned prophylactically. In all cases the hook-pin was used (Fig. 1). Two of the boys were aged 12 years at operation, three were aged 13, and one 14 years. The boy aged 14 had a bilateral chronic severe slip; the other five all had slipping of less than a third of the diameter of the femoral head. During the operation one or two tantalum balls were inserted into the epiphysis, into the base of the femoral neck, and into the top of the greater trochanter in both hips. The children were followed-up with repeated roentgenstereophotogrammetric examinations until the growth plate of the femoral neck had closed; the error of this method is less than 50 μm (Selvik, Alberius and Arondon 1983).

**Results.** Ten hips showed a growth in length of the femoral neck of between 8.9 and 15.2 mm (Table I and Fig. 2). These ten hips also showed a growth of the greater trochanter ranging from 8.1 to 13.5 mm. There was no significant difference in growth between the slipped and the unslipped hips. In the boy aged 14 years at operation no significant growth of the femoral neck or the greater trochanter occurred. None of the hips showed segmental collapse or chondrolysis. At re-examination three to six years after growth plate closure, all the boys had pain-free hips, with normal function and a normal range of movement apart from slightly reduced medial rotation.

<table>
<thead>
<tr>
<th>Case number</th>
<th>Age at operation (years)</th>
<th>Side of slipping</th>
<th>Growth of femoral neck (mm)</th>
<th>Growth of greater trochanter (mm)</th>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>Right</td>
</tr>
<tr>
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<td>12</td>
<td>L + R</td>
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<td>13</td>
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<tr>
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<td>L</td>
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<td>14</td>
<td>L + R</td>
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<td>0.3</td>
</tr>
</tbody>
</table>

Table I. Growth of the femoral neck and the greater trochanter after slipped capital femoral epiphysis in six boys.

Fig. 1

Fig. 2

A boy (case 3) with a slipped left epiphysis at 13 years of age treated by hook-pinning. Prophylactic pinning of the right hip. Figure 2 – The same boy at 16 years of age showing the pins retracted in their channels.

**Discussion.** Pinning is nowadays the standard method of treating at least mild slips of the upper femoral epiphysis. However, several complications, especially pin penetration after multiple pinning or lost epiphyseal grip with continued growth, have led to the consideration of...
alternative methods, such as epiphysodeisis by inserting a bone peg (Weiner et al. 1984). The hook-pin has eliminated the risk of lost epiphyseal grip: it cannot slide back and it is retracted in its channel with the growth of the femoral neck. Inserted in a pre-drilled hole there is only minimal trauma to the growth plate; and as only one pin (inserted under fluoroscopy) is used, there is very little risk of joint penetration. Our investigation has shown considerable growth of the femoral neck after pinning. As slipping occurs through the hypertrophic layer of the growth-plate, there is usually no damage to the germinative layer before treatment, and consequently a potential for further growth. In our oldest patient no growth of the femoral neck or of the greater trochanter was recorded. This boy had a bilateral chronic slip with onset of symptoms at least one year before pinning and the absence of growth in his case could be due to normal cessation of growth.

In children with endocrine disorders or severe trauma a slipped capital femoral epiphysis is sometimes seen under the age of ten, when there is still considerable potential for growth of the femoral neck. The hook-pin allows growth to continue so that the hips develop normally.

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REFERENCES


RADIAL HEAD REDUCTION AFTER A MISSED MONTEGGIA FRACTURE: BRIEF REPORT

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It has been suggested that Monteggia fracture-dislocations missed for more than three months are best left alone. There have been occasional reports of successful late reduction of the radial head (Bell-Tawse 1965; Lloyd-Roberts and Bucknill 1977) but none of successful treatment after three years, by which time overgrowth of the radius has occurred. We report successful treatment of severe functional disability six years after a missed Monteggia fracture-dislocation.

Case report. A 12-year-old boy complained that he was unable to use his dominant arm normally. Six years previously he had injured the arm and been treated for six weeks with an above elbow plaster. He never regained full use of the arm and had persistent discomfort and instability at the elbow. He could use the arm for light tasks such as eating and writing, but not for strenuous ones.

Examination revealed a cubitus valgus of 20° with an additional 20° of valgus instability. There was a full range of movements except for 10° loss of extension. The radial head was lying anteriorly in a dislocated position, and could not be reduced. Radiographs (Fig. 1) showed an old Monteggia fracture-dislocation, with overgrowth of the radius and residual ulnar angulation. In view of his disability it was decided to attempt reduction of the radial head to restore stability to the elbow.

![Fig. 1](image)

The elbow was approached anteriorly. The radial head was subcutaneous and surrounded by thick capsule; this was opened after identifying the neurovascular structures. It was covered by dense adhesions, but even after these had been divided the radial head could not be reduced. Dividing and re-aligning the ulna also failed to effect reduction: only after shortening the radius could reduction be achieved. This was not stable until the radial notch had been deepened to accept the radial head in its normal position. The annular ligament was not repaired.

Postoperatively the arm was immobilised in full supination for six weeks. At review one year later the