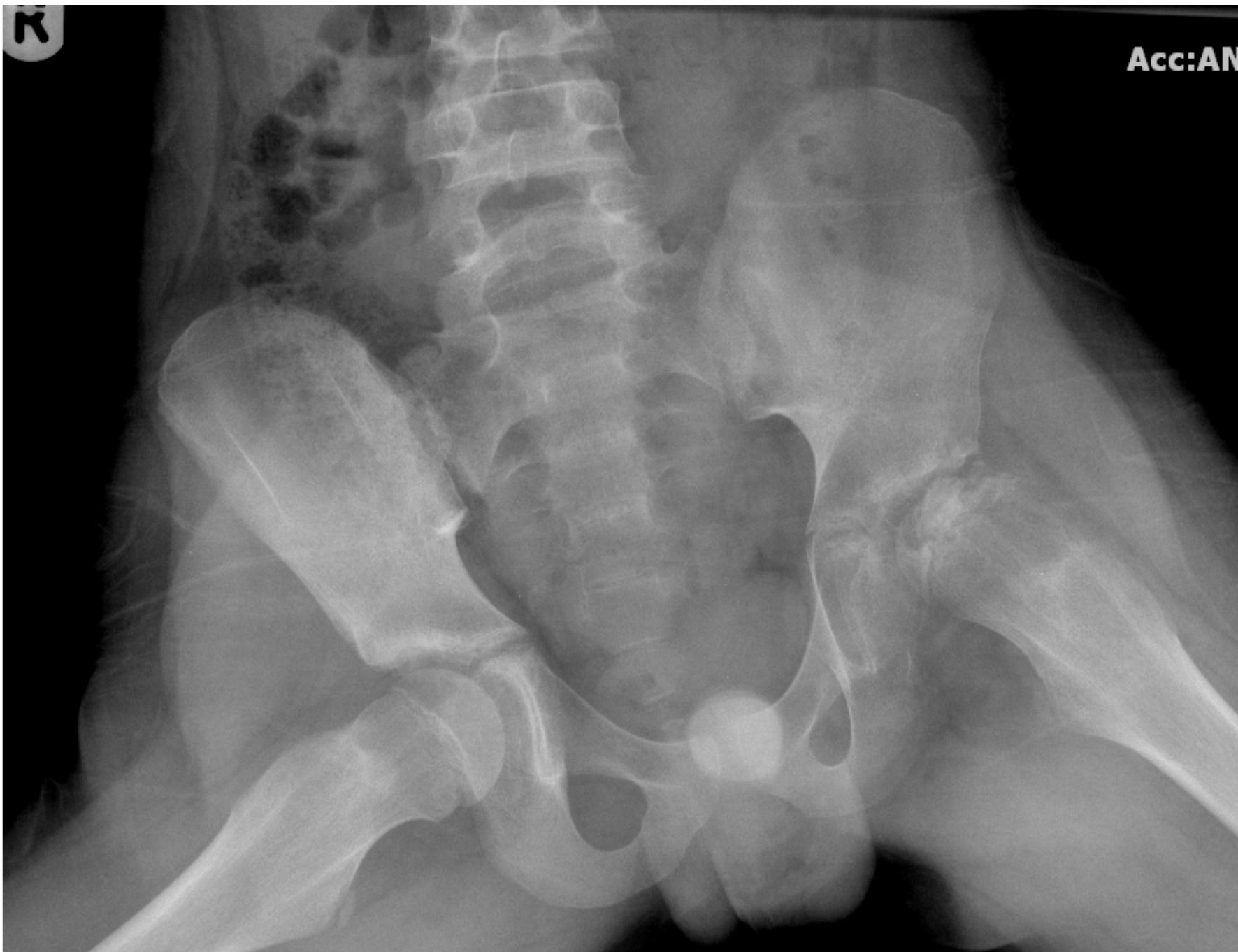
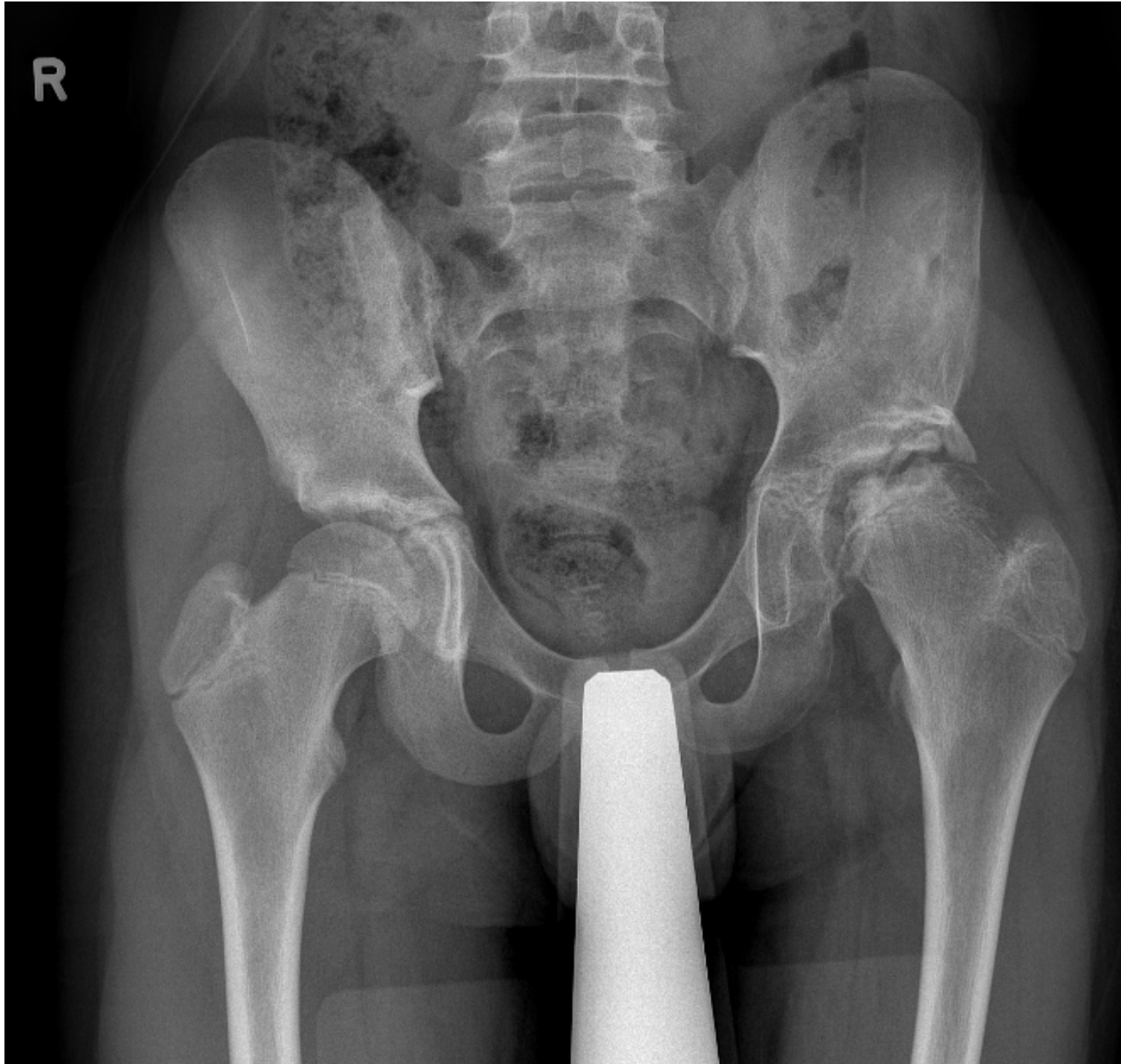


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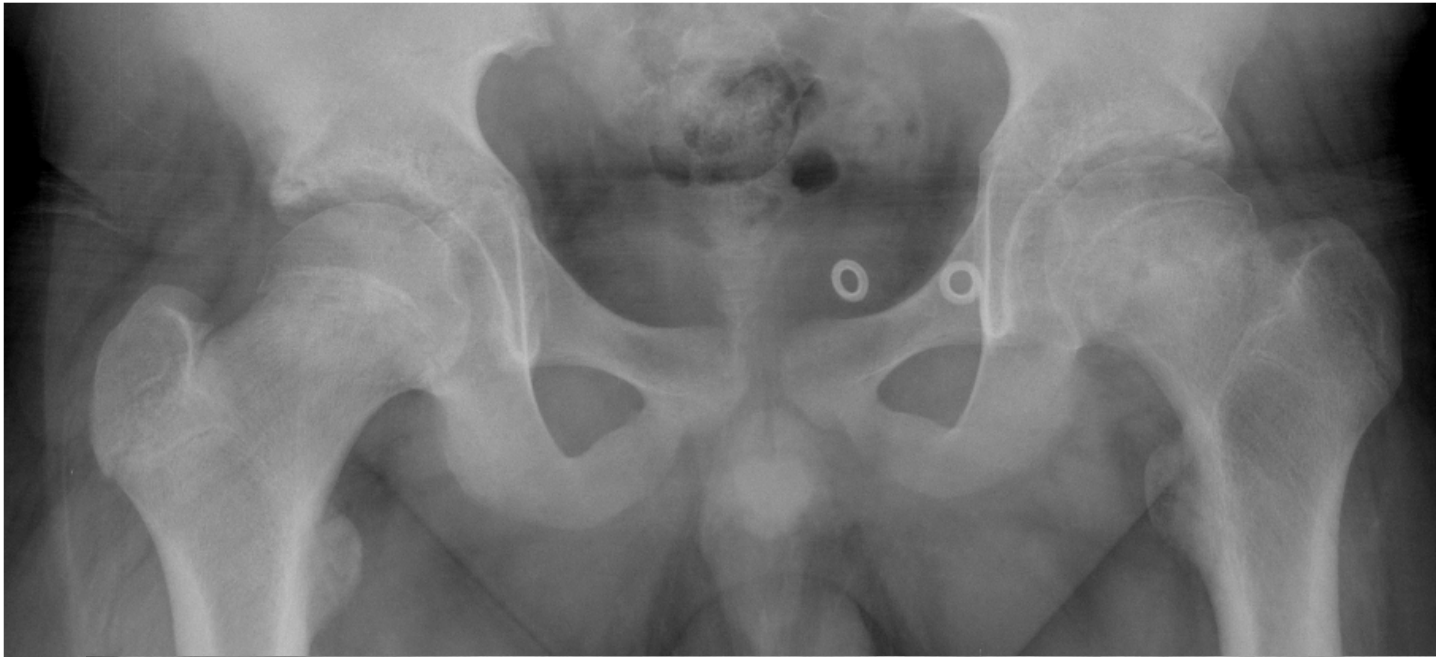




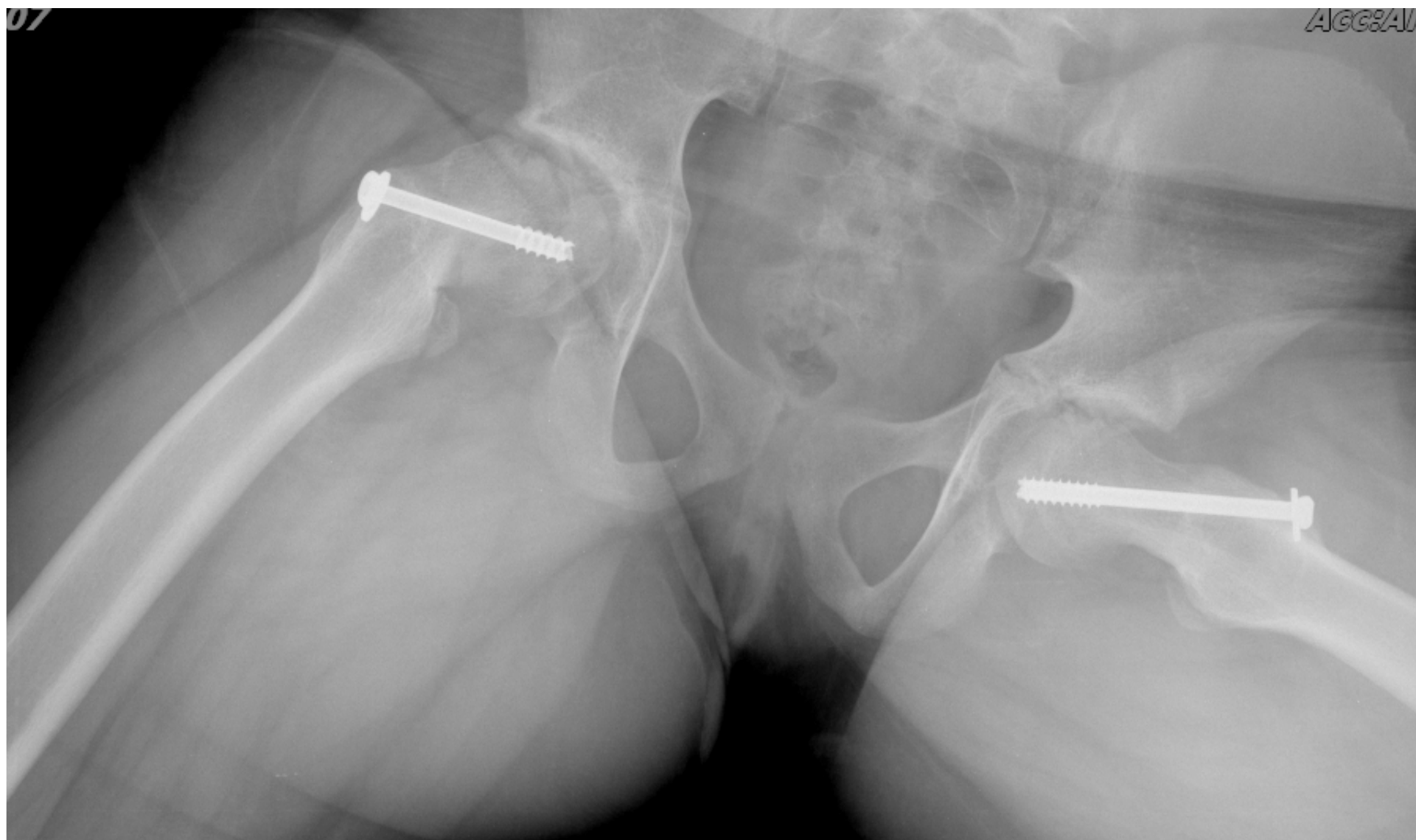












## Slipping of the capital femoral epiphysis

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### Summary

*Experimental and clinical studies have shown that the capital femoral epiphysis slips by rotating backwards and downwards around the curved surface of the metaphysis and remains in a plane that lies posteriorly at right angles to the anteversion plane of the neck of the femur. The relevance of these findings to the diagnosis and treatment of the condition is discussed. A geometric flexion osteotomy designed to correct the deformity is described.*

### Introduction

John Hunter is venerated primarily for the scientific way in which he consistently and honestly applied his genius to the study of the living world. His museum bears witness to the fact that his most rewarding enquiries were in the realms of anatomy and in particular its relation to function. It is therefore appropriate that the cornerstone of this lecture should be the anatomy of slipping of the capital femoral epiphysis. The successful correction of any orthopaedic deformity depends upon a clear understanding of the precise nature of that deformity. However, in the case of slipping of the capital femoral epiphysis there is no agreement concerning the direction of displacement of the epiphysis. On the basis of routine anteroposterior radiographs it is usually said<sup>1</sup> that the capital femoral epiphysis slips in a posteromedial direction, but some authors<sup>2</sup> describe slipping as being strictly posterior and there are reports<sup>3</sup> of posterolateral displacement of the epiphysis.

In the first part of this lecture I propose to describe an experimental and clinical investigation into the morphology of slipped epiphyses and in the second part I shall consider some of the clinical implications of these findings.

### Morphology

**Laboratory studies** The apparently normal proximal ends of the femora of 6 children aged 10–15 years dying of unrelated disease or trauma were removed at postmortem examination. The periosteum was divided circumferentially at the base of the femoral head. The epiphysis, together with the growth plate, were then easily levered off the metaphysis.

The metaphysial surface of the growth plate was the same shape in each specimen. In the coronal plane it was straight apart from a slight curve at its extreme medial and lateral ends. In the sagittal plane it formed an arc representing one-quarter of the circumference of a circle. Thus the metaphysial surface of the growth plate may be represented as one-quarter of a cylinder. The epiphysis was then displaced in different directions on the neck. The epiphysis could be easily rotated about the cylindrical metaphysial surface in a strictly posterior and downward direction and remain relatively stable. Because of the slight curve at the extreme medial and lateral ends of the metaphysial surface displacement in any other direction resulted in a very unstable position and any pressure on the epiphysis forced it into the position of strict posterior and downward displacement.

Radiographs were taken of the specimens with the epiphyses displaced in a strictly posterior and downward direction (Fig. 1). When the specimen was placed with the neck of the femur at right angles to the X-ray beam the epiphysis appeared on the radiograph to lie directly behind the neck. If the specimen was placed in relative external rotation with respect to the X-ray beam the epiphysis appeared to lie on the medial aspect of the neck. This appearance is due to the effect of parallax. The epiphysis lies some distance behind the exposed











