Abstract  
Background: In this study, a simple and reliable radiographic method is described to determine the torsional profile of the humeral head.  
Methods: First, by using a specially developed frame, the humeral head retroversion angles (HRAs) of 20 dry humeri were measured by an anatomist and an orthopedist. Then the HRA of these humeri were measured by two orthopedists on radiographs taken in semi-axial view when the humeri were in 20° abduction. Results: The results were assessed with the SPSS 9.05 program, and the repeatability coefficient of both methods was 98%. The average difference in angle determination between the two methods was 0.9°; the maximum difference was 3°. After that, posteroanterior semi-axial radiographs of both humerus bones of 40 healthy volunteers were taken by positioning their arms in 20° abduction to the X-ray axis. The mean HRA difference between the right and left sides was 0.4° (maximum difference 3°) and is of no clinical significance. It was determined that left and right HRAs can be taken as a reference to each other. For measurement of the HRA in the planning of proximal humeral rotation osteotomy and prosthesis replacement arthroplasty, the presented radiographic method can be used with a high rate of accuracy.  
Keywords  Humerus · Torsion · Radiography  

Introduction  
The humeral head retroversion angle (HRA) can be defined as the angle between the axis of the proximal articular surface and the axis of the distal articular surface (or interepicondylar line) of the humerus [4, 6]. The HRA value shows a significant variance between individuals and different ethnic groups [5, 7].  
In measuring HRA, although computed tomography (CT) is the most reliable method, a simple radiological method is required in practice. Several radiological methods have been described in the literature [2, 4, 6, 9, 10], but the HRA values obtained in these studies have not been confirmed by concurrent anatomical measurements. In this study, a simple radiographic method is described and its reliability evaluated by an anatomical study.
between the two axes was the HRA (Fig. 3). These measurements were taken independently by two orthopedists twice at 2-week intervals. The results obtained from both studies were assessed using the SPSS 9.05 program, and the repeatability coefficient (interclass and intraclass correlation coefficient) was calculated for both studies.

After informed consent for the protocol (approved by local ethics committee), posteroanterior semiaxial radiographs of both humerus bones of 40 right hand-dominant healthy volunteers were taken. This method was performed while the subject was standing with their shoulder in 90° forward elevation and 20° abduction. The beam was positioned 1 m away from the shoulder and centered to the humeral head, and the fully supinated forearm was placed on the cassette (Fig. 4). The average exposure was 75 kV and 40 mAs (Siemens, opti, 150/30/50c). HRAs were measured on radiographs as described in the radiographic study of dry humeri (Fig. 5).