



A simple positioning device for radiographic imaging of the patellofemoral joint: a technical note

Patellofemoral eklemin radyografik görüntülemesi için basit bir pozisyon cihazı: Teknik not

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Patellofemoral eklem aksiyel grafilerinin sunduğu bilgiler, çekim tekniği ve diz pozisyonuna ileri derecede bağlıdır. Bu yazıda, kolay ve uygun pozisyon verip, standart grafi çekmek için tasarlanan basit bir pozisyon cihazı sunuldu. Bu pozisyon cihazıyla diz 30 derece fleksiyonda iken patellofemoral aksiyel grafi çekilebilmektedir.

Anahtar sözcükler: Femur/radyografi; patella/radyografi.

The informative value of axial radiographs of the patellofemoral joint is highly dependent on application techniques and knee positioning. We developed a simple device that enables an appropriate and easy positioning. With the use of this device, patellofemoral axial radiographs can be obtained at 30 degrees of knee flexion.

Key words: Femur/radiography; patella/anatomy/radiography.

Axial radiographs of the patellofemoral joint provide useful information about patellofemoral problems only when obtained with adequate and standardized techniques. However, these radiographs are frequently ignored or remain useless because of inadequate imaging techniques.^[1-3] Herein, we aimed to present a simple positioning device which was designed to standardize the tangential radiographs of the patellofemoral joint.

Method

The design of the device was based on the idea of providing constant knee flexion angle and definite cassette position during the exposure of the axial radiographs. For this aim, a triangular wooden piece to give the knee 30 degrees of flexion with two sledge pieces for placing film cassette was mounted together. The cassette sledge pieces were designed

and mounted to let to place a 24x30 cm standard film cassette at a point 38 cm distal to the device top line and consecutively to the knee joint line (Figure1).

During the exposure of the radiographs, patient is asked to lie down supine comfortably and the positioning device is placed under the knee. The placement of the knee joint line over the device top line and full contact of the posterior side of the cruris with the less sloping surface of the device is particularly provided. The tube of x-ray device (Hofmann DMT GmbH, Germany) is directed with 15 degrees to the horizontal line and with a distance of 2 meters from the cassette. After the x-ray guide light is focused over the center of patellofemoral joint, the film is exposed using 66 kV and 13 mAs settings (Figure 2a, b).

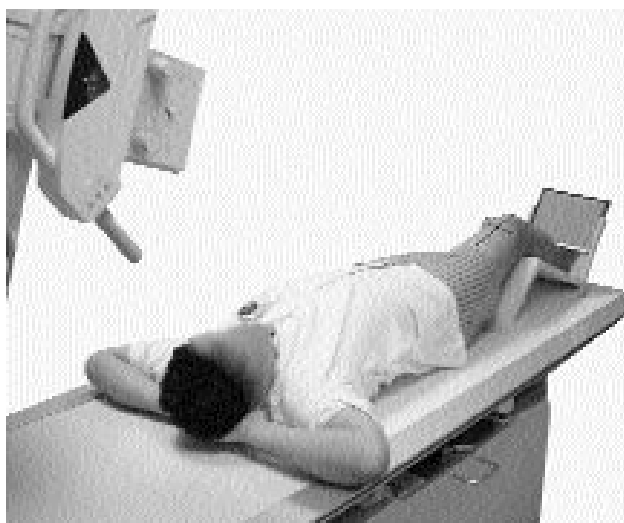


Figure 1: Patellofemoral imaging while the positioning device is placed under the patient's knee with a knee flexion angle of 30 degrees.

Discussion

The axial radiographs of the patellofemoral joint provide valuable information about the morphology of the constituting structures of the joint, patellar tilt, and patellofemoral congruency. There are a lot of described methods for this aim. However, positional factors or technical difficulties complicate obtaining standard radiographs containing valuable information. The techniques described by Settegast, Ficat and Hungerford, Merchant, and Laurin are the most frequently used ones.^[1-3]

In Settegast's method, the patient lies prone with acutely flexed knees. In this position, since

the patella overlaps with the femoral condyles rather than the femoral sulcus, the evaluation of the patellofemoral congruency is not possible using this radiograph.^[1,2]

In the technique of Ficat and Hungerford, the patient sits at the edge of the x-ray table. The tube is directed from the patient's feet toward the cassette, which is held over the thigh. Technical difficulty and high x-ray exposure of the patient's body are the disadvantages of this method.^[1,2]

In Merchant's technique, while the knee is flexed 45 degrees at the end of x-ray table, the cassette is held over the cruris of the patient, and the tube is kept proximally over the body of the patient.^[1,2] Disadvantages of the technique are too much flexion position of the knee, technical difficulty, and requirement of a second person to hold the cassette.

In Laurin's technique, the patient holds the cassette proximally over the thigh while the knee is flexed 20 degrees. The tube is positioned distally between the feet.^[1] Although this radiograph provides valuable information about patellofemoral malalignment, superimposition of the images, technical difficulty and high exposure of the patient's body are its disadvantages.^[2,3]

The positioning device presented here, can be produced at a very low cost. During patellofemoral imaging it provides the following advantages:

a. Imaging can be done at an appropriate and constant flexion angle of the knee (Figure 2a, b).

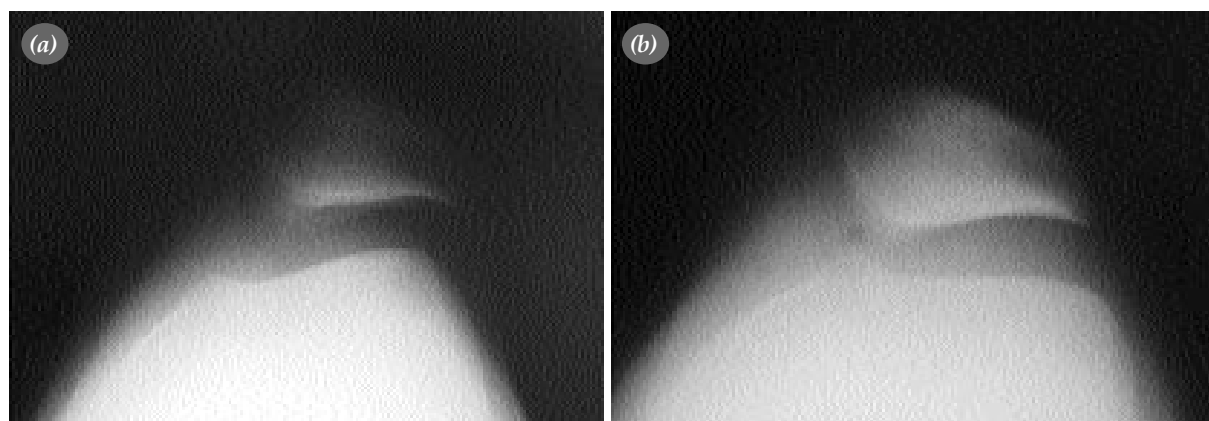


Figure 2. Pre-operative (a) and post-operative (b) patellofemoral axial radiographs of a patient with chronic patellar subluxation, who underwent lateral retinacular release and proximal realignment operations.

b. The position of the cassette and tube-knee-cassette distance can be standardized as much as possible.

c. Comfortable positioning and relaxation of quadriceps muscles are provided.

d. A single technician can take the radiograph alone, thus there is no need for a second person to hold the cassette.

e. Direction of the tube and narrowing its window enables less patient's body exposure to x-ray.

f. The cooperation between the technician and the patient can be easier during positioning.

g. The need for repeated radiographs, as well as, the cost and unnecessary x-ray exposure decrease.

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