A NEW METHOD OF MEASURING PATELLAR HEIGHT

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To measure the patellar height the ratio of the articular length of the patella to the height of the lower pole of the articular cartilage above the tibial plateau is measured on a lateral radiograph of the knee, flexed beyond 30 degrees. Normal values lie between 0·54 and 1·06. The subluxing patella is at the upper end of the normal range, but, in chondromalacia, the male patellae were lower than average, but the female patellae were normal.

The level of the patella in relation to the femoral condyles has been correlated with many pathological conditions of the knee and in particular with dislocation and with chondromalacia of the patella.

A method commonly used is that of Blumensaat (1938), in which a lateral radiograph is taken with the knee flexed 30 degrees. In the normal state the lower pole of the patella should lie on or just above a line projected forward from the intercondylar notch. Not only does this method depend on an exact angle of knee flexion, but it has also been found to be inaccurate.

Insall and Salvati (1971) described a method in which, when the patellar tendon was under tension, the ratio of the length of the patella to the length of the patellar tendon (as measured on a lateral radiograph of the flexed knee) was about 1·0. Lancourt and Cristini (1975) applied this method to patients with dislocating patellae, chondromalacia patellae and Osgood-Schlatter's disease. They found that patients with chondromalacia patellae and dislocating patellae had significantly low ratios (0·86 and 0·87 respectively), whereas in Osgood-Schlatter's disease the ratio was significantly greater (1·21).

There are drawbacks to this method of measuring the height of the patella, for it depends on the tibial tubercle being at a standard distance below the tibial

![Fig. 1](image1.jpg)

With the knee flexed 30 degrees the slack in the patellar tendon is taken up.

![Fig. 2](image2.jpg)

A diagram to show the method used to measure 'A' and 'B'.


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plateau. We have not found this to be so, and furthermore, measurement of the length of the patellar tendon may be difficult when the tibial tubercle is not prominent or when there has been a traction apophysitis of the tibial tubercle distally (Osgood-Schlatter's disease) or of the lower pole of the patella proximally (Larsen-Johansson's disease).

**PROPOSED NEW METHOD**

To avoid these difficulties an alternative method is proposed. A lateral radiograph is taken of the knee flexed to at least 30 degrees, which ensures that the slack in the patellar tendon is taken up (Fig. 1). A line is then projected forward along the tibial plateau and two measurements are made. “A” is the perpendicular height of the lower end of the articular surface of the patella from the tibial plateau line, and “B” is the length of the articular surface of the patella (Fig. 2). The ratio A/B provides a measure of patellar level.

**OBSERVATIONS**

Measurements were made on normal and abnormal knees in men and women. The normal included those used as controls to compare with symptomatic knees and those with meniscal injuries alone. The abnormal knees suffered from chondromalacia patellae and recurrent subluxation.

**Normal knees**—A total of 121 knees in men and fifty knees in women were studied (Table I). The ratio in 67 per cent lay between 0-66 and 0-94, and in 95 per cent between 0-54 and 1-06.

**Recurrent subluxation**—Fifty-eight knees were studied, twenty-five in males and thirty-three in females (Table II). The results were significantly different from the normal (p<0.01 in both sexes). The patellae lay in a position at the upper limit of normal.

**Chondromalacia patellae**—Forty knees were studied—twenty in females and twenty in males (Table III). The male knees had significantly lower patellae (p<0.05) but the female knees showed no significant difference from normal.

We are grateful for the help given by Mr E. L. Trickey, who suggested this method of measurement.

**REFERENCES**


**DISCUSSION**

We believe that this method of grading the level of the patella in relation to the tibial plateau is both simple and accurate. The distance can be measured on any lateral radiograph of the knee so long as the patellar tendon is under tension. It measures the important components of the patello-femoral joint, namely the height of the lower articular surface of the patella above the tibial plateau and the length of the patella articular surface. Unfortunately this method, like others, is not applicable to children, in whom a large proportion of the femur and tibia is of cartilage and not visible on radiographs.

We define the normal ratio as 0-8. In patellar alta it is greater than 1-0.

**TABLE I**

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<tr>
<th>Number</th>
<th>Ratio A/B</th>
<th>Standard deviation</th>
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<td>Male</td>
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<td>0.805</td>
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<tr>
<td>Female</td>
<td>50</td>
<td>0.806</td>
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</tbody>
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**TABLE II**

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**TABLE III**

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<tr>
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