



## The relationship between length of the iliotibial band and patellar position in Asians



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### ABSTRACT

**Background:** Tightness of the iliotibial band (ITB) has been documented as a major factor in lateral patellar translation because the ITB inserts into the lateral border of the patella through the iliopatellar band. The aim of this study was to compare the patella–condyle distance (PCD) between subjects with and without ITB tightness. We also investigated the relationship between ITB length and lateral patellar translation in hip adduction.

**Methods:** In 40 healthy volunteers, we measured the ITB length with Ober's test and the PCD at two hip positions (neutral and 20° adduction) using ultrasonography. Lateral patellar translation in hip adduction was calculated by subtracting the PCD at the adduction position from the hip neutral position.

**Results:** Twenty-three of the 40 subjects had ITB tightness; these subjects had a significantly laterally positioned patella at 20° adduction of the hip ( $p = 0.044$ ). Patients with ITB tightness also had greater lateral patellar translation in hip adduction than patients without tightness ( $p = 0.000$ ). The ITB length was moderately correlated with the PCD at 20° adduction of the hip ( $r = 0.427$ ,  $p = 0.042$ ) and strongly negatively correlated with lateral patellar translation ( $r = -0.717$ ,  $p < 0.000$ ).

**Conclusions:** These findings support the hypothesis that increasing ITB tension has a significant effect on the position of the patella and therefore affects translation of the patella. However, these findings do not indicate that ITB length is the only cause of lateral patellar translation; further studies are needed to assess the relative importance of different factors that could affect patellar position.

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### 1. Introduction

Patellar malalignment implies a disruption of the patellar position and the tracking pattern within the femoral trochlear groove, which can be due to skeletal abnormalities, altered femoral rotation, weak quadriceps, or a change in the length of surrounding tissues [1,2]. In addition, iliotibial band (ITB) tightness has been considered a major contributing factor to patellar malalignment due to its potential anatomical influence on the patella position. The insertion part of the ITB separates into two distinct bands at the knee: the iliotibial tract and the iliopatellar band. The iliotibial tract, which is the continuation of the ITB, attaches into Gerdy's tubercle on the lateral proximal aspect of the tibia. The iliopatellar band inserts into the lateral border of the

patella and is an integral part of the lateral retinaculum of the knee [3]. Therefore, shortness of the ITB increases lateral tracking of the patella [4]. Furthermore, in subjects with ITB tightness, repetitive knee movements increase the relative load on the contacting surfaces between the lateral patellar facet and the lateral femoral condyle, which contributes to the development of iliotibial band friction syndrome and patellofemoral pain syndrome [5,6].

Herrington investigated translation of the patella in various laboratory situations and found weak to poor relationships between ITB length and patella position measured with tape in the neutral hip position [8]. Thereafter, he introduced a new measurement method for patellar position, in which ultrasonography was used as a cost-effective and non-invasive alternative to MRI [9]. He estimated the patella position by measuring the patella–condyle distance (PCD) on ultrasonography in a neutral hip position and found a strong correlation between the patellar positions measured with ultrasonography and MRI [9]. In addition, he found that the PCD decreases in electrically induced vastus lateralis contraction [10] and in the hip adduction position [1], which means the patella displaces laterally in both situations. However, no previous studies have compared the PCD between subjects with and without ITB tightness or assessed the relationship between ITB length

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