Fabella Size: A Marker for Specific Compartment Osteoarthritis and Mechanics

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Introduction: Fabella presence has been associated with an increased prevalence of osteoarthritis and the size of the fabella subjectively observed to increase with osteoarthritis. With articular cartilage on its anterior surface, the fabella is embedded in the lateral head of the gastrocnemius muscle tendon and frequently articulates directly with the lateral femoral condyle. The fabella is thought to impart a lever arms mechanical advantage to the lateral gastrocnemius muscle. The purpose of this study was to verify increased fabella size in osteoarthritic subjects, quantify fabella shape change with osteoarthritis, and associate fabella size with osteoarthritis grade, knee compartment involvement, and knee alignment.

Methods: 927 subjects’ knee radiographs were reviewed, 136 had a fabella, a prevalence of 14.7%. Two observers independently quantitatively measured medial, lateral, and patellofemoral compartment joint space width and osteophyte size, SI,AP, and ML fabella dimensions, knee alignment, and lateral condyle diameter. From the quantitative measurements, an individual Kellgren-Lawrence (KL) scale for the medial, lateral and patellofemoral knee compartments was calculated as well as an overall knee KL scale. Fabella area was calculated from dimension measurements. Linear regression correlated fabella size to individual compartment and overall knee KL scales, knee alignment, age, gender, and ethnicity. Inter and intra-observer measurement reliability was calculated. Linear regression correlated fabella area to age. Pearson Chi square and two-tailed, unpaired t-tests were performed to determine significance of difference for fabella area, KL grades, knee alignment, gender, and ethnicity. Fabella area shape (bisected ellipse) was further defined by dividing all knees into two quantiles (groups) based on fabella area and using two-tailed unpaired t-tests to compare the SI and AP dimensions between the two quantiles.

Results: Fabella AP, SI, and ML dimensions averaged 5mm + 2 (range 2-9mm), 8mm + 3 (range 4-15mm), and 7mm + 3 (range 4-12mm) for non-osteoarthritic knees and 7mm + 3 (range 2-14mm), 10mm + 18 (range 4-34mm), and 8mm + 3 (range 3-22mm) for osteoarthritic knees. Fabella size was greater in osteoarthritic knees (p=0.02). Fabella size was highly associated with lateral compartment and patellofemoral compartment knee arthritis as well as valgus alignment (p values < 0.01). Larger fabellae increased their AP dimension to a greater degree than their SI dimension (p=0.001).

Discussion: Statistically larger fabellae were associated with the presence of osteoarthritis. Fabella enlargement was associated with lateral and patellofemoral compartment osteoarthritis and valgus alignment. Fabella AP dimension enlargement was greater than SI.

Significance: We speculate that fabella enlargement reflects an attempt to increase the mechanical effectiveness of the gastrocnemius muscle in response to altered knee adduction moments, changing lateral compartment morphology, and modified lateral gastrocnemius tendon alignment.
Figure 1. Knee without osteoarthritis (left column); knee with osteoarthritis and large fabella (middle column); knee with osteoarthritis and large fabella with 3mm superior osteophyte (right column).