Parameters on Plain Radiographs Correlate Poorly with a Magnetic Resonance Imaging (MRI) Proven Discoid Lateral Meniscus

Khai Cheong Wong[1], Merrill Lee, Xunqi Cheow, Paul Chee Cheng Chang[2], Joyce Suang Bee Koh, Tet Sen Howe[2], Meng Ai Png[2]
[1]Orthopaedic Surgery, Singapore General Hospital, [2]Singapore General Hospital

INTRODUCTION: Previously described parameters on plain radiographs suggesting the presence of a discoid lateral meniscus include squaring of the lateral femoral condyle (LFC), widened lateral femorotibial joint space, cupping of the lateral tibial plateau (LTP), obliquity of the lateral tibial articular surface, high fibular head, as well as hypoplasia of the lateral intercondylar spine. However, related studies have only involved arthroscopic proven discoid lateral menisci, with no existing study examining the relationship between these radiographic findings and asymptomatic, intact discoid lateral menisci confirmed on MRI in adults. The aim of this study is to determine the correlation between these radiographic findings and MRI-proven discoid lateral menisci. We hypothesise that most of these historical radiographic findings correlate poorly with discoid lateral menisci seen on MRI scans.

METHODS: A retrospective review of knee MRI scans performed in our institution was conducted with approval from our institutional review board. We searched through our database of MRI results, reported by fellowship-trained radiologists, between 2015 to 2017 for the keywords “discoid lateral meniscus”. We included both complete and incomplete discoid lateral menisci and excluded skeletally immature patients (less than 16 years of age) and patients without available plain radiographs of the ipsilateral knee. We also included a control group matched for age and gender, which consisted of randomly selected patients with lateral menisci of normal configuration confirmed on MRI scans. Subsequently, plain radiographs of both groups were reviewed with the various radiographic parameters measured. Cut-off values used, as described in current literature, included: more than 10 mm squaring of the LFC, lateral femorotibial joint space of more than 5 mm, more than 1 mm cupping of the LTP, height of fibular head of less than 13 mm from the tibial joint line, as well as height of lateral intercondylar spine of less than 6 mm. Measurements were analysed using Student’s t-test as well as Pearson’s chi-squared test to determine any differences between the 2 groups.

RESULTS: We analysed 36 patients with MRI-proven discoid lateral meniscus (Group A) and 36 age- and sex- matched patients with MRI-proven lateral meniscus of normal configuration (Group B). There were 7 incomplete and 29 complete discoid menisci in Group A. In both groups, the mean age was 46±15 years and there were 22 males. As seen in Table 1, there were no significant differences in terms of LFC squaring, cupping of LTP, height of fibular head and height of lateral intercondylar spine.

In Group A, lateral joint space was significantly larger (6.4±1.2mm vs 5.72±1.2mm; p=0.014) with a greater proportion meeting the cut-off value of more than 5 mm (88.9% vs 69.4%; p=0.042). Normalized ratio (NR) of the lateral joint space, calculated using each patient’s interepicondylar distance of the distal femur, was significantly higher in Group A (0.073±0.013 vs 0.066±0.012; p=0.013), but both groups had similar proportions which met the cut-off value of more than 0.06.

Similar results were achieved when comparing the subgroup of complete discoid menisci with the control group.

DISCUSSION AND CONCLUSION: Our study shows that most radiographic features previously described correlate poorly with discoid lateral menisci confirmed on MRI scans. Widened lateral joint space is the only significant finding common to MRI proven, asymptomatic and intact lateral discoid menisci, when compared to previous studies involving arthroscopically proven discoid menisci, which tend to include only symptomatic patients. This is the first study based on MRI proven discoid lateral menisci to report on all five commonly described radiological parameters. We conclude that apart from a widened lateral tibiofemoral joint space, other parameters not consistent radiographic findings in a discoid lateral meniscus.

Table 1. Measurements of various radiographic features in study cohort			
	Group A (Discoid)	**Group B (Control)**	**p-value**
Squaring of LFC (mm)	6.3±3.3	7.2±2.3	0.18
Squaring of LFC > 10mm (n)	5 (13.9%)	2 (5.6%)	0.233
Lateral joint space (mm)	6.4±1.2	5.7±1.2	**0.014**
Lateral joint space >5mm (n)	32 (88.9%)	25 (69.4%)	**0.042**
Lateral joint space (NR)	0.074±0.013	0.066±0.012	**0.013**
Lateral joint space NR >0.06 (n)	29 (80.6%)	24 (66.7%)	0.181
Cupping of LTP (mm)	0.8±0.8	1.2±1.0	0.103
Cupping of LTP >1mm (n)	13 (36.1%)	14 (38.9%)	0.808
Height of fibular head (mm)	12.4±3.6	13.0±4.2	0.542
Height of fibular head <13mm (n)	22 (61.1%)	16 (44.4%)	0.157
Height of fibular head (NR)	0.142±0.037	0.152±0.049	0.362
Height of fibular head NR <0.153 (n)	23 (63.9%)	18 (50%)	0.234
Height of lateral intercondylar spine (mm)	7.9±1.4	8.0±1.7	0.908
Height of lateral intercondylar spine <6mm (n)	2 (5.6%)	5 (13.9%)	0.233