ABSTRACT INTRODUCTION:
Kager’s fat pad is a mass of adipose tissue that is situated in Kager’s triangle - between the Achilles tendon, flexor hallucis longus, and the calcaneus. Like other fat pads, Kager’s fat pad has received relatively little attention from clinicians, although recently a highly mobile distal tip of this fat pad was reported to protrude into the retrocalcaneal bursa on plantarflexion [1]. This general lack of anatomical and biomechanical knowledge regarding Kager’s fat pad is likely, however, to be a key factor in the decision of many surgeons to excise parts of this tissue if it obscures the arthroscopic view of the synovial joint.

This study aims to highlight the potential importance of Kager’s fat pad in lubricating the conjoint surfaces of the Achilles tendon insertional region (the ‘enthesis organ’). The magnitude of friction—the ratio of the frictional force and the applied load between two mating surfaces—in association with the Stribeck curve defines 3 distinct modes of lubrication; boundary, mixed and fluid-film (Figure 1). In boundary lubrication the surfaces are coated with lubricant, although still contact and thus are expected to wear. Mixed and fluid film conjunctions typically experience less wear as a degree of surface separation is achieved. This is most prevalent in fluid film lubrication—and thus in such environments wear is minimal.

The coefficient of friction values presented in Figures 2 and 3 are approximately equal to those obtained with the glass disc, although the rising coefficient of friction at the lowest Sommerfeld number suggests a transition to some mixed lubrication.

RESULTS:
Figures 2-3 shows how the coefficient of friction at the fat pad-disc conjuncture depended upon the reduced Sommerfeld number (i.e. ratio of speed to load). The glass disc results show a small positive gradient which, by comparison with the Stribeck curve, (Fig.1) is indicative of fluid film lubrication. The Perspex disc exhibits similar levels of friction coefficient to those obtained with the glass disc, although the rising coefficient of friction at the lowest Sommerfeld numbers suggests a transition to some mixed lubrication.

DISCUSSION:
The coefficient of friction values presented in Figures 2 and 3 are relatively low and generally indicate the presence of a film of synovial fluid separating the 2 surfaces. However, when considering physiological loading at the conjuncture during ankle flexion (dorsiflexion: speed → 0 mm/s, load > 10 N; plantarflexion: speed → 0 mm/s, load = 0 N; unpublished data), it can be estimated that a fluid film layer develops on plantarflexion, before becoming boundary lubrication on dorsiflexion. A similar break down in the synovial fluid film has previously been reported in the synovial joint [9-11], and is believed to cause an increase in wear at the conjuncture as the 2 surfaces contact. As relative movement between the conjoining surfaces is required for the development of the synovial fluid layer, it is suggested that the protrusion of Kager’s fat pad– which coincides with the generation of the layer - is important in the lubrication of the enthesis organ. The replenishment of this layer with every step is likely to minimise the wear – and thus potentially injury - of the conjoining surfaces. Therefore, it appears important that Kager’s fat pad is retained during surgery.

REFERENCES:

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