Fat Pad Syndrome

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Background
• Do you believe in ...
• ...Fat Pad Syndrome?!

Definition?
• A. Hoffa: The influence of the adipose tissue with regard to the pathology of the knee joint. JAMA, 42 (1904)
• described an isolated impingement of the infrapatellar fat pad as an inflammatory hypertrophy of the articular adipose tissue and considered it relevant in causing knee pain and/or impairment of knee function.
• Under-representation in the medical literature has created a low level of knowledge of both normal and pathologic fat pad appearance.
• In most cases, the diagnosis of fat pad pathology is still made as an exclusion, rather than as a defined pathologic process.

Anatomy
• The infrapatellar fat pad (IFP) is an intracapsular, extrasynovial structure that fills the anterior knee compartment. Its posterior surface is covered with synovial lining. It’s a body of adipose tissue that occupies the space formed by the patella and patellar tendon, tibial plateaus, and the femoral condyles.
• The anterior interval has been defined as the space between the IFP anteriorly and the anterior tibia posteriorly.

Anatomy

Vascularization
• The IFP is vascularized by a rich anastomotic network. Branches coming from the inferior, superolateral and superomedial genicular arteries.
Pain generator

- Rich innervation and relationship with the highly innervated synovium.
  - Neurosensory mapping of the internal structure of the knee without anesthesia. Severe pain was reported during probing of the meniscal capsular margin, the infrapatellar fat pad, and the insertion site of the cruciate ligaments, whereas minimal pain was reported during probing of the capsule and the inner rim of the meniscus.
  - Hypertonic saline injections into the fat pad in healthy volunteers produced strong knee pain in regions similar to those in patients with anterior knee pain.

- The IFP produces different growth factors (bFGF, VEGF), as well as pro-inflammatory tumour necrosis factor-a (TNFa) and interleukin-6. In addition to the general promotion of inflammation, TNFa has been shown to induce matrix metalloproteinases and thus extracellular matrix breakdown, bFGF may promote fibrogenesis, and VEGF production could lead to angiogenesis and scarring within the IFP.

So?

- Regarding these data, it could be assumed that pathology of the fat pad could be an underlying cause of anterior knee pain and inflammation.
- In 1962, Smillie differentiated between primary hypertrophy, which is found rarely, and a more common secondary disease, which was thought to be caused by ligamentous or meniscal lesions.
- Today we know that several other diseases affect Hoffa’s fat pad:
  - Trauma with contusion or laceration,
  - repeated microtrauma, especially in sports activity,
  - arthritis and/or synovialitis,
  - femoropatellar joint dysplasia and/or dysbalances,
  - operatively or traumatically induced scar tissue or arthrofibrosis.

History and clinical examination

- Pain (burning or aching) in the infrapatellar or retropatellar tendon regions, which is exacerbated by movement or loading of the knee.
- The Hoffa test. Firm pressure is applied with the thumb inferior to the patella outside the margin of the patellar tendon with the knee in 30–60° of flexion. The knee is fully extended, and increased pain in the infrapatellar fat pad indicates a positive test. The test is repeated on both the medial and lateral side.
  - The IFP may be tender, firm or enlarged on examination.
  - Other signs: Extension block, decreased patellar mobility, especially in the proximal direction, and a positive patellar tilt test.

Imaging

- Sagittal MRI has been the most commonly used modality to assess pathologies in the IFP.

Diagnosis

- Patellar tendinopathy
- Chondropathy
- Synovial disorders
- Mass-like abnormalities
Nonoperative Treatment

- Physical therapy: "to restore the biomechanics of the patellar tracking"
- Muscle training: Quadriceps, Gluteals
- Gait training
- Taping: "the inferior pole of the patella must be lifted out of the fat pad to decrease the irritation of the fat pad"
- Injections: corticosteroids

Operative Treatment

- Fat Pad excision
- Complete or Partial?

Conclusion

- Primary Fat Pad Syndrome?
- Secondary pathology of Infrapatellar Fat Pad: Yes
- "Tetchy" and sensitive anatomical structure!