Beware the Bone Bruise

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Learning Objectives

▪ To be able to identify the vascular supply to the distal femur
▪ To be able to perform a physical evaluation
▪ To distinguish long term sequela of a bone bruise
▪ To describe imaging findings
▪ To develop a treatment plan
Vascular Supply of the Distal Femur
Intraosseous Blood Supply to Distal Femur
Layers of Cartilage

Articular surface
Tide mark
Calcified cartilage
Subchondral bone
Cancellous bone

Superficial tangential zone (10-20%)
Middle zone (40-60%)
Deep zone (30%)
History

▪ First identified in 1988 – Wilson

▪ Defined as
  – Microtrabecular fracture
  – Hemorrhage
  – Oedema

▪ Has to be an acute injury

▪ 20% of acute knee injuries, on MRI will have some sort of bone bruise
Diagnosis

- Increased signal on T2 MRI image due to water content
- Pain
- Swelling
Lateral Femoral Condyle Bone Bruise with ACL tear
• 77% of ACL injuries will have some type of LFC or LTP bone bruise
• Traumatic pivot shift
Prognosis

- MRI resolution in 6-12 months
- 67% demonstrate osteochondral injury on MRI
Histology in Acute Lesions

- Chondrocyte degeneration
- Loss matrix proteoglycan
- Increase protein degradation products
Delamination of femoral condyle
Medial Femoral Condyle Bone Marrow Oedema
Traumatic bone bruise patterns, mechanism, and injuries.

<table>
<thead>
<tr>
<th>No.</th>
<th>Location of Bone Bruise</th>
<th>Mechanism</th>
<th>Associated Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LFC above anterior horn LM</td>
<td>Anterior subluxation tibia impacting LFC</td>
<td>ACL tear</td>
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<tr>
<td>2</td>
<td>LTP below posterior horn LM</td>
<td>Anterior subluxation tibia impacting LFC</td>
<td>ACL tear</td>
</tr>
<tr>
<td>3</td>
<td>LFC lateral edge</td>
<td>Impaction LFC relocation lateral patellar dislocation</td>
<td>Patellar dislocation</td>
</tr>
<tr>
<td>4</td>
<td>Medial patellar facet</td>
<td>Impaction medial patella on LFC on relocation</td>
<td>Patellar dislocation</td>
</tr>
<tr>
<td>5</td>
<td>Anterior “lip” tibia</td>
<td>Hyperextension injury</td>
<td>Rule out ACL tear</td>
</tr>
<tr>
<td>6</td>
<td>Anterior tibia</td>
<td>Direct blow anterior tibia flexed knee</td>
<td>Rule out ACL tear</td>
</tr>
<tr>
<td>7</td>
<td>Linear fracture line LTP</td>
<td>Valgus overload</td>
<td>Occult fracture LTP</td>
</tr>
<tr>
<td>8</td>
<td>Matching bone bruise LFC + LTP</td>
<td>Valgus overload</td>
<td>Rule out MCL tear</td>
</tr>
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