41 year old female with right hip pain. Evaluate for labral tear. Oh yeah, she is also a runner.
About a month later
Superomedial Iliac Stress Fracture

• Relatively rare type of stress fracture.

• Associated with long distance running.

• More common in females.

• Look for classic “female athlete triad” of amenorrhoea, osteoporosis and eating disorders.

• Usually treated conservatively with rest and NSAIDS. May restart training gradually after several asymptomatic weeks.
Stress Fracture

Occur after repetitive stress that is insufficient to cause an acute fracture.

- **Fatigue Fracture** – *Abnormal stress on normal bone*.
  - Usually in athletes, especially runners and dancers.
  - Originally reported in military recruits.

- **Insufficiency (Fragility) Fracture** – *Normal stresses on abnormal bone*.
  - Predisposing conditions include metabolic disorders, inflammatory conditions, bone dysplasias, neurologic disorders and drug therapy.
Fatigue Fractures

Mechanism
- Repetitive stress responsible for accelerated bone remodeling (bone resorption prevails over bone replacement) and quicker increase in muscle strength relative to bone strength leads to mechanical imbalance and bone fatigue. Additionally, there may be decreased dissipation of bone stress by fatigued muscle.

Timing
- Most stress fractures occur 4 to 5 weeks after the onset of a new exercise, are usually relieved by rest, but progress if activity is continued.

Morphology
- Fractures may be primarily cortical or cancellous, depending on the fracture site.
  - In one series, 77% of fractures were cancellous and 23% cortical. Radiographs are more helpful with cortical fractures.
Common Sites of Stress Fracture

High risk sites of stress fracture:
- Posterior tubercle of calcaneus
- Base of 5th metatarsal
- Neck of 2nd to 4th metatarsal
- Great toe sesamoids
- Talar neck
- Tarsal navicular
- Anterior cortex of tibia
- Medial malleolus
- Superior side of femoral neck
- Femoral head
- Patella
- Pars interarticularis of the lumbar spine

Low risk sites of stress fracture:
- Pubic rami
- Sacrum
- Ribs
- Proximal humerus/humeral shaft
- Posterior medial tibial shaft
- 2nd to 4th metatarsal shafts

Adapted from https://radiopaedia.org/articles/stress-fractures
## Sites and Associations

<table>
<thead>
<tr>
<th>Site</th>
<th>Stress fractures [%]</th>
<th>Predominant sporting associations</th>
<th>Predominant bone type</th>
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</thead>
<tbody>
<tr>
<td>Metatarsals</td>
<td>8.0–24.6</td>
<td>Second and third metatarsal distal shaft and neck: long-distance runners&lt;br&gt;Jones fracture: long-distance runners</td>
<td>Cortical</td>
</tr>
<tr>
<td>Tarsals</td>
<td>7.0–25.3</td>
<td>Calcaneum: long-distance runners; jumpers&lt;br&gt;Navicular: track and field athletes; rugby and basketball players&lt;br&gt;Talus: long-distance runners; gymnasts</td>
<td>Trabecular</td>
</tr>
<tr>
<td>Tibia</td>
<td>16.0–49.1</td>
<td>Transverse (posterior): long-distance runners&lt;br&gt;Transverse (anterior): jumpers&lt;br&gt;Longitudinal: long-distance runners</td>
<td>Cortical</td>
</tr>
<tr>
<td>Fibula</td>
<td>1.3–12.1</td>
<td>Long-distance runners; jumpers&lt;br&gt;Neck: long distance runners</td>
<td>Cortical</td>
</tr>
<tr>
<td>Femur</td>
<td>4.2–48.0</td>
<td>Shaft: long distance runners; gymnasts&lt;br&gt;Sacrum: long-distance runners&lt;br&gt;Apophyseal: soccer players; gymnasts</td>
<td>Trabecular</td>
</tr>
<tr>
<td>Pelvis</td>
<td>1.3–5.6</td>
<td>Pubic rami: long-distance runners</td>
<td>Cortical</td>
</tr>
</tbody>
</table>

From the Literature

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Insufficiency Fracture

- Generally seen in the elderly and more frequently in women.

- Osteoporosis the most common predisposing factor.

- Less common but well documented types include calcaneus insufficiency avulsion in diabetics and proximal femoral fractures in bisphosphonate use.

*Case courtesy of Dr Matt Skalski, Radiopaedia.org, rID: 21011*
References


5. Radsourse.us/stress-fractures-foot-ankle/
6. Radiopaedia.org/articles/stress-fractures/
7. Radiopaedia.org/articles/insufficiency-fracture/