Return to play after skull fractures and intra-cranial bleeds
Skull fractures

• Rare in sports
• More commonly occur in recreational sporting activity without protective headgear
  – Helmets are good at preventing skull fractures
  – Scalp soft tissue protect as well
    • 10x more force when intact on cadaveric skull
Anatomy

- The skull is prone to fracture at
  - thin squamous temporal and parietal bones over the temples and the sphenoid sinus,
  - the foramen magnum
  - the petrous temporal ridge
Types and Etiology

- Simple linear fracture
  - Most common
  - Particularly in children
- Temporal bone fractures
  - 15-48%
- Basilar skull fractures
  - 19-21%
- Depressed fractures relatively uncommon
  - frontoparietal (75%)
  - temporal (10%)
  - occipital (5%)
  - Most of the depressed fractures are open fractures (75-90%).
- Children
  - Falls
  - Bicycle
  - Abuse
- Adult
  - MVA
  - Violence
Table 2. Fracture Distribution for All Sports

<table>
<thead>
<tr>
<th></th>
<th>Skull (%)</th>
<th>Orbit (%)</th>
<th>Naso-Orbitoethmoid (%)</th>
<th>Maxillary (%)</th>
<th>Zygomatico-maxillary Complex (%)</th>
<th>Nasal (%)</th>
<th>Mandible (%)</th>
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</thead>
<tbody>
<tr>
<td>All sports</td>
<td>51 (30.5)</td>
<td>56 (33.5)</td>
<td>2 (1.2)</td>
<td>21 (12.6)</td>
<td>7 (4.2)</td>
<td>60 (35.9)</td>
<td>12 (7.2)</td>
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<td>Baseball</td>
<td>16 (21.6)</td>
<td>31 (41.9)</td>
<td>1 (1.4)</td>
<td>13 (17.6)</td>
<td>3 (4.1)</td>
<td>30 (40.5)</td>
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<tr>
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<td>10 (71.4)</td>
<td>7 (35.7)</td>
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<td>1 (7.1)</td>
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<tr>
<td>Soccer</td>
<td>3 (21.3)</td>
<td>2 (15.4)</td>
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<td>2 (15.4)</td>
<td>1 (7.1)</td>
<td>6 (46.2)</td>
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<tr>
<td>Skiing/snowboarding</td>
<td>2 (22.2)</td>
<td>6 (66.7)</td>
<td>1 (11.1)</td>
<td>2 (22.2)</td>
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<td>4 (44.4)</td>
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<td>0 (0.0)</td>
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<td>2 (33.3)</td>
<td>0 (0.0)</td>
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<td>3 (50.0)</td>
<td>0 (0.0)</td>
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<td>Football</td>
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<td>0 (0.0)</td>
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<td>1 (20.0)</td>
<td>2 (40.0)</td>
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<td>Rollerblading</td>
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<td>Swimming</td>
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</tr>
</tbody>
</table>

BMX, bicycle motocross.
Return to play

- Most skull fractures will heal within 3-6 months
- No evidence based return to play guidelines
- Return to play will depend on fracture, age and sport
- Underlying vascular injury may delay RTP longer than fracture

- Simple linear fractures may return to exercise as soon as symptoms allow
- High risk activity should be delayed at least 12 weeks
  - Consider CT for return to higher risk sports sooner than 24 weeks
- Comminuted, surgically treated fractures or base of the skulls fractures may need 6 months or longer
  - CT scan for healing
Intracranial hemorrhage
ICH

• Fortunately rare in sporting activity
  – Most commonly reported in
    • Alpine skiing
    • Motor sports
    • Football
      – Subdural hematoma

• Prognosis and RTP varies based on
  – Injury pattern
  – Provider preferences
  – Sport

• Very little evidence to help guide decision making
  – Expert opinion would suggest no return to collision sport
Return to Play

• Normal function and neurological examination
  – No brainer (pun intended)
  – Many patients with ICH will have residual neurological deficits that may affect return to play decisions
  – Isolated SAH in mTBI generally does not cause persistent issues

• Imaging
  – Expert opinion
    • Resolution of hemorrhage
    • Subdural
      – Re-expansion of brain tissue
      – No hygroma
    • ? What to do with residual scar or hemosiderin deposits
      – No evidence
Return to Play

• When?
  – Expert opinion
    • 1 year minimum
    • Discourage collision sports
    • ? Protect with soft padded helmet for contact sports
      – Not for concussion protection!

• Other considerations
  – May consider coagulopathy work up for ICH with no trauma or minimal trauma
    • Also consider evaluation for vascularmalformations
  – Craniotomy performed
    • Burr Hole
      – Most would allow
    • Full craniotomy
      – Unclear but case reports of return to collision sport without complication
      – 1 year as well for full boney healing
Isolated Subarachnoid Hemorrhage

• In the presence of mTBI isolated SAH does not appear to worsen outcomes compared to mTBI alone

• ? Does this mean it is okay to return to sports when SAH has resolved
  – Unclear but most athletes likely return to some level of sporting activity
    • Younger patients
Selected references


• Intracranial hemorrhage. Naidech AM. Am J Respir Crit Care Med. 2011 Nov 1;184(9):998-1006