Odontoid Peg (Process) Fracture

- **Anderson D/Alonzo classification:**
  - 1 = through the tip of the odontoid process, usually representing an oblique avulsion fracture of the alar ligament, and usually remain stable.
    - Can represent a mild form of craniocervical dissociation and attempt to measure Basion-Dens and Basion-Axis intervals.
    - Indication for surgery is if BDI and BAI > 12mm
    - If highly suspicious can reassess with axial distraction/traction.
  - 2 = through the waist of the odontoid peg. Type 2A is a highly unstable variant with segmental comminution
  - 3 = extending into the cancellous body of C2 with a broad base, which usually allows for better healing.

- **Conservative treatment:**
  - The use of cervical collar alone achieves union in 100% of Type 1 injuries.
  - Type 2 fractures have only 55% union rate, and Type 3 fractures manage 60% union rate with a collar along.
  - In type 3 fractures, adding traction increases union to 90%.
  - age > 50 increases non-union rate 20 fold
  - displacement >6mm reduces union from 80% to 20%

- **Surgical options:**
  - Type 1 – consider craniocervical stabilisation if BDI & BAI > 12mm
  - Type 2:
    - Indications include initial displacement > 4mm or angulation > 10°, multiple injuries (closed head, thoracoabdominal, spinal cord, associated upper cervical injuries), inability to treat with halo (2° body habitus or advancing age)
    - Anterior odontoid screw fixation if non-comminuted with good obliquity
    - If comminuted – atlanto-axial fusion with a transarticular screw or segmental C1-C2 fixation
  - Type 3:
    - Rarely required operative surgery unless in association with spinal cord injury, or displacement > 5mm, or inability to comply with halo traction
    - Posterior C1-C2 arthrodesis preferred, as anterior odontoid screw fixation has high failure rate (55%) in type 3 injuries

- **Outcomes:**
  - 25% are these are fatal and never present. 25% associated with neurological injury.
  - Up to 40% in hospital mortality in elderly patients with Type 2 injuries, usually associated with immobilisation.
  - Non-union with odontoid screw fixation 10%, and with C1-C2 posterior fusion 4%
  - Halo treatment of type 3 injuries have a pseudoarthrosis rate of around 10%
  - Repeat CT at 6 weeks to assess for union ± again at 12 weeks.