Geriatric Odontoid Fractures

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Odontoid Fractures

- Biphasic Distribution
- Geriatric
  - Low Energy -- Fall
  - Male:Female 1:1
- Young patients
  - High Energy -- MVA
  - Male:Female 3:1
Anatomy of the Odontoid Process

Cortical Thinning
Decreasing Trabecular Bone Volume

Subdental synchondrosis and anatomy of the axis in aging: a histomorphometric study on 30 autopsy cases
Anderson and D’Alonzo / Grauer Classification

Figure 1

Type I

Type II

Type III

Figure 2

A

B

Odontoid Fractures: Update on Management
Hsu, Wellington K. MD; Anderson, Paul A. MD
Journal of the American Academy of Orthopaedic Surgeons:
July 2010 - Volume 18 - Issue 7 - p 383–394
Type II Odontoid Fracture
Why Type II Fractures Don’t Heal

- Fracture through thin cortical bone
- Lack of cancellous (highly vascular) bone
- Disrupted Blood Supply?
  - Angiogram study refutes
- Inadequate immobilization
- Lack of Bony apposition
  - Maximal displacement consistent with fx healing 20%

Fractures of the odontoid process
AN ANGIOGRAPHIC AND CLINICAL STUDY
S. Govender, J. F. Maharaj, M. R. Haffajee
JBJS. VOL. 82-B, NO. 8, NOVEMBER 2000
Type II Dens Fracture Mortality

156 Patients Average Age 82
3 years post injury 39 % Mortality
Operative 21 % Mortality at One Year
Non-Operative 36 % Mortality at One Year
Surgery protective in patients 65 -74 years

Type II Odontoid Fractures of the Cervical Spine: Does Treatment Type and Medical Comorbidities Affect Mortality in Elderly Patients?
Risk of Living With a Non-United Fracture

- **Type II Odontoid Fractures**
  - 130 Patients Average Age 79
  - 30% of Odontoid Fractures were chronic non-united, untreated fractures
  - 18% of Chronic non-united fractures had new neurologic deficit
  - 16% of Acute fractures had new neurologic deficit
  - Low energy injuries in a geriatric population
  - Selection bias toward more significantly injured patients referred to center

Neurologic injury because of trauma after Type II odontoid nonunion Christopher K. Kepler, MD, et al. The Spine Journal Volume 14, Issue 6, Pages 903-908 (June 2014)
Operative and Non-operative treatment in geriatric population have high risk of poor outcome – Meta Analysis

One year mortality after surgery for Odontoid Fracture

- 65 -74  21 %
- 75 – 84  29 %
- >85      45 %

Higher complication rate with Anterior vs. Posterior
- Nonunion, Revision, Hardware failure

6% Mortality in-hospital in surgically treated fxs

Treatment Options

- Cervical Collar
- Halo Vest
- Anterior Odontoid Screw
- Posterior C1-C2 Fusion
Rigid Collar Treatment

- Collar for 12 Weeks
- Most patients pretty miserable
- Skin breakdown
- Fibrous union in the majority
Rigid Collar Treatment

- 34 Patients Average 84 Years old
- <50 % Displacement
- Rigid Collar x 12 Weeks
- 15 month followup
  - 12 % Mortality
  - 6 % Healed (Bridging Bone)
  - 70 % Mobile Non-Union
  - 6 % Significant Skin Breakdown
  - Neck pain and disability scores not significantly different from controls

Halo Vest Complications

- 75 Patients > 65 Years old
- 8 % Mortality
- 23 % Significant Pulmonary Complications
  - Aspiration Pneumonia

Complications of Cervical Halo-Vest Orthoses in Elderly Patients
Lisa A. Taitsman, MD, MPH; Daniel T. Altman, MD; Andrew C. Hecht, MD; Frank X. Pedlow, MD Orthopedics May 2008 - Volume 31 · Issue 5
Halo Vest Complications

- 78 Patients Average Age 80 years old
- Complications of Halo Vest
  - Aspiration Pneumonia 34%
  - Cardiac Arrest 26%
- In-Hospital Mortality
  - Halo Vest 42%
  - Other Non-op tx 20%

Posterior Fusion
Posterior Fusion

- PSF for Type II Odontoid Fx
- 26 Patients Average Age 79 Years
- 19 % Mortality at 13 Months
- 66 % Fracture Non-Union Rate
  - All stable non-unions
- No Difference in Disability / Neck Pain to Age Matched Cohort

Anterior Odontoid Screw Fixation
Anterior Odontoid Screw Fixation

- 57 Patients > 70 Years old
- Stable fixation with 2 screws in 96%
- 25% Required Feeding Tube
- 19% Aspiration Pneumonia

What We Do

- Level 1 Trauma Center
- HUGE Geriatric population
- Very common injury
- Fall >> MVA
What We Do

- Vast majority of Type II fractures treated with Cervical Collar
- Anterior Odontoid screw fixation in selected patients with fracture pattern and body habitus amenable to procedure
- C1 – C2 PSF for markedly displaced fractures
- Can’t remember the last time I put a halo on an elderly patient.