NASO(ORBITO)ETHMOIDAL (NOE) FRACTURES

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OVERVIEW

- Anatomy
- Aetiology
- Clinical presentation
- Assessment
- Management
- Treatment
- Complications

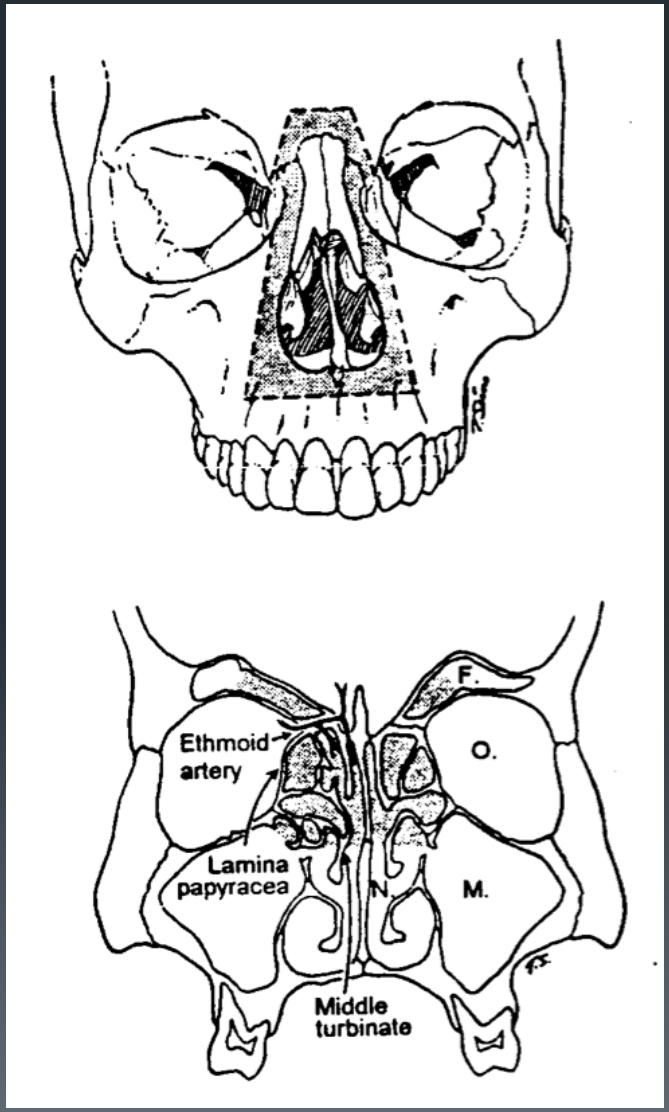
ANATOMY

Interorbital space – borders:

- Anteriorly the frontal process of the maxilla, spine of the frontal bone
- Laterally by the lamina papyracea and lacrimal fossa
- Inferiorly by the lower border of the ethmoidal labyrinths

Medial orbital wall

- Ant: thin lamina papyracea (orbital plate of ethmoid) behind lacrimal fossa
- Post: body of sphenoid immediately before optic foramen



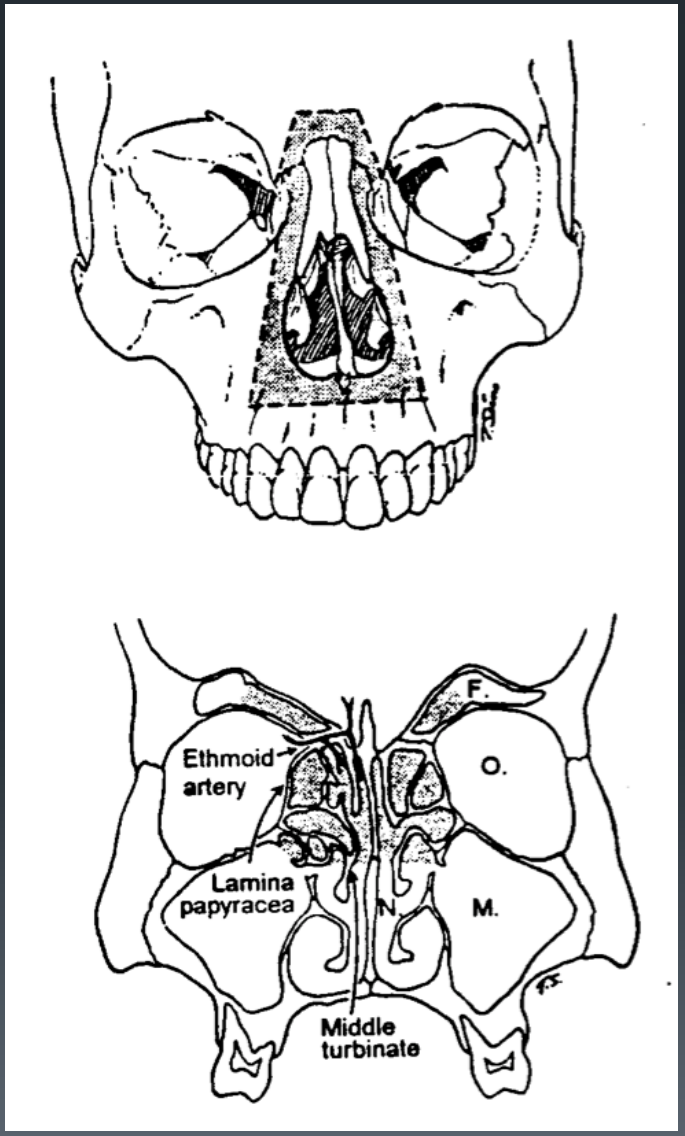
Anatomy

Contents or interorbital space:

- Two ethmoidal labyrinths
- Ethmoidal cells
- Superior and middle turbinates
- Perpendicular plate of the ethmoid

NOE Particularly vulnerable to injury because of its fragile framework only resists forces of 30G

- Associated fractures of the orbital floor, maxilla and zygoma are common
- Brain injury and CSF rhinorrhea



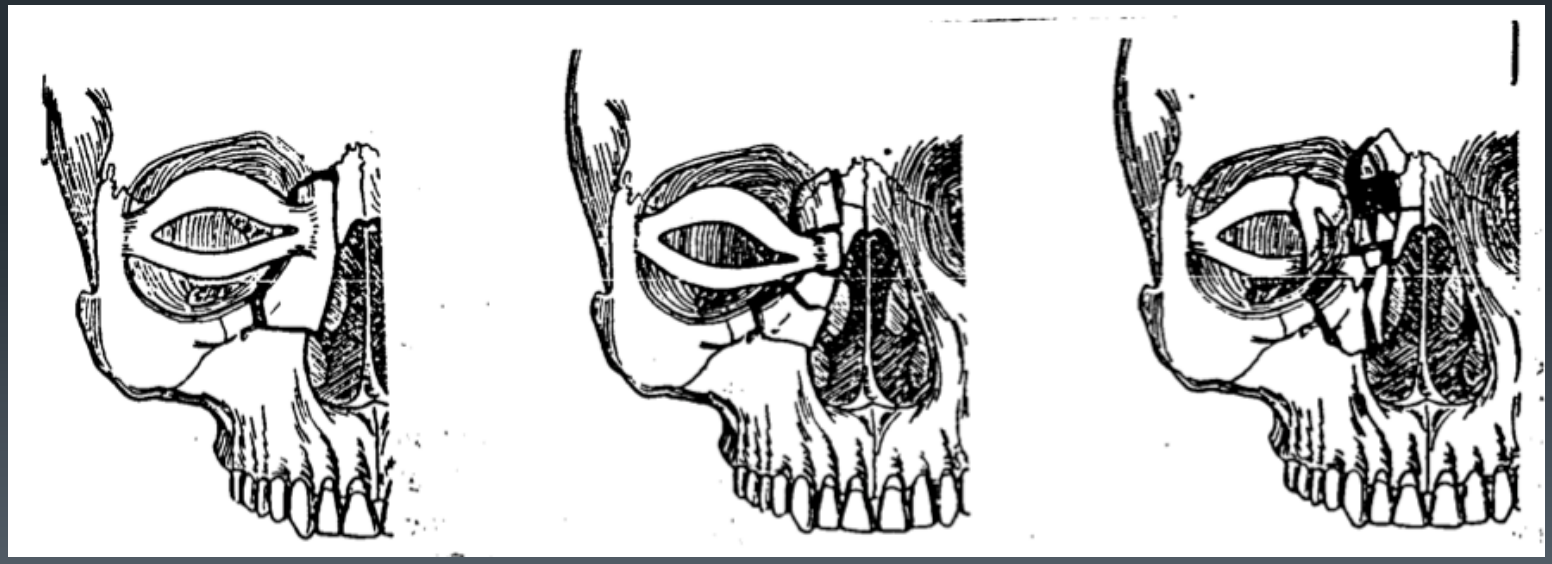
AETIOLOGY

- Blow to upper nasal dorsum
  - Eg; steering wheel/dashboard

Clinical presentation

- Flattened nose
- Swollen medial canthal areas
- Septal #/ haematoma
- Telecanthus (12-20%)-maybe masked by oedema
  - Test by pulling on lower lid
- Anosmia
- CSF rhinorhorrea from # cribriform plate & dural tear
  - >30mg glucose
  - ‘halo’ sign
  - ß2 ‘tau’ transferrin
- 50% orbital floor fractures also have medial wall of the orbit #

Classification NOE

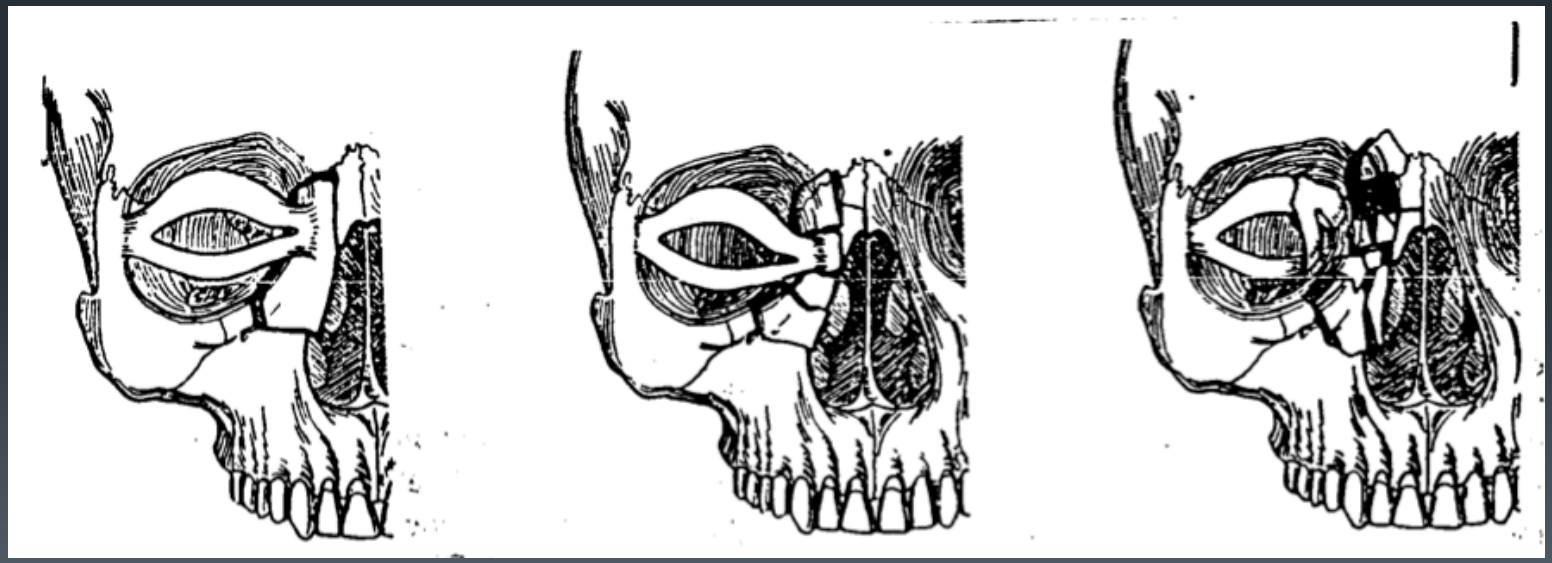


TYPE I: central segment is single

TYPE II: comminuted

TYPE III: attachment of the medial canthal tendon is avulsed

Classification NOE



Type I stabilization of bone fragments may suffice
Type II (some) / Type III (all) need transnasal canthopexy

Assessment

- EMST principles, C Spine, other injuries
- Opththalmology- globe, lacrimal system injury
- Neurosurgery
- Imaging: fine cut CT required

Management

- EMST principles
- Involve neurosurgeons if CSF leak
- ORIF as soon as general condition allows

Converse, Smith, and Wood-Smith listed 4 critical elements in the repair of NOE:

1. Correction of the epicanthal folds
2. Restoration of the bony contour
3. Reestablishment of the continuity of the lacrimal system
4. Medial canthoplasty and canthopexy

ORIF: Access

- Coronal incision mandatory
- Need to release soft tissues periorbital/score periosteum overlying radix to improve access/visualization
- Be careful not to strip medial canthal tendon off bone fragments
- May add infraorbital (transconj) incision to better access medial/inferior orbital rim/wall

- Landmarks for dissection:
  - F-N suture = cribriform plate
  - Follow –N suture to reach lacrimal fossa (medial canthal tendon attaches either side)
  - A&P ethmoidal vessels along F-ethm suture mark inferior limit cranial cavity
    - Transnasal procedures should stay below this
  - Post ethmoid is close to optic foramen so stop dissecting

General NOE # management

- Use of bone grafts as well as ORIF may be required; stabilize with miniplates/k wires/lag screws etc
- Nasal bones stabilized with wires or plates
- Nasofrontal separation Rx by elevation of the nasal bones and stabilization
- May require dorsal nasal bone graft
- Stabilize the nasomaxillary buttress
- transnasal medial canthoplasty to correctl ateral displacement of the medial canthal ligament
- Soft tissue bolster medial canthal valley prevents subcut fluid/blood; leave 7-10d, watch for skin necrosis

ORIF: Operative

Type I

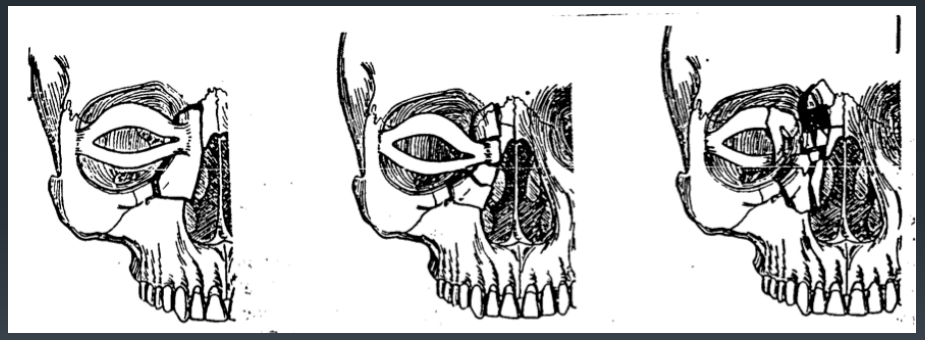
- Large bony fragment so can fix to surrounding bones

Type II

- More comminuted but tendon still attached to a bone
- If fragment too small for direct fixation, transnasal wire +/- bone graft

Type III

- Avulsionof tendon from bony insertion
- Fix other bones +/- bone graft
- Transnasal fixation tendon



Transnasal canthopexy

- Drill 2 holes from contralateral side through nasal bones, exit @ sup aspect lacrimal fossa
- Grasp tendon from coronal incision or make 2nd incision medial to medial canthal angle
- Loop tendon with 4-0 surgical steel leaving long ends
- Pass blunt drawing up needle through each drill hole
- Pass an end of steel wire through each hole & twist firmly on contralateral side (over a plate reduces cut-through), to elevate & secure tendon
- Direction of pull on canthal tendon is posterior & superior (common mistake is too anterior leads to-persistant telecanthus)
- Should look overdone

Complications

- TELECANTHUS
-
- DISRUPTION OF THE LACRIMAL SYSTEM
-
- MENINGITIS
-
-

Complications: Secondary to inadequate or delayed primary treatment

- Telecanthus; Increased intercanthal distance (caucasian 33-34M, 32-33F)
  - best to compare with N if unilat
- Flattened nasal root
- Dysfunction lacrimal system
- Rounded medial canthus
- Narrowed palpebral opening
- Epiphora
- +/- Epicanthal fold

Treatment of telecanthus

- Same principles as primary treatment:
  - Coronal incision
  - completely release scar contractures
  - bone grafts to recreate contour
  - Transnasalcanthoplasty
- Results never as good as good primary repair

DISRUPTION OF THE LACRIMAL SYSTEM

- incidence <20%
- disruption of medial canthal tendon / orbicularis pump or direct obstruction of collecting ducts
- routine exploration not justified (only 20% incidence)
- If persistent dacrocystitis or obstruction a dacrycystorhinostomy can be performed with repair of the ligament

QUESTIONS?