Naso-Orbital Ethmoid Fractures

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Objectives

1. Review relevant facial anatomy for NOE fractures
2. Review definition and classification of NOE fractures
3. Review surgical approaches and treatment of NOE fractures
Background
NOE Definition
NOE Region

https://www2.aofoundation.org/wps/portal/lut/p/c0/04_SB8K8xLLM9MSSzPy8xBz9CP0os3hng7BARydDRwN3QwMDA0zTzdvvxBjIwN_I_2CbEdFADI%M_QMl/?segment=Midface&bone=CMF&classification=92-Nasal%2FNOE%2C%20NOE&teaserTitle=&showPage=diagnosis&contentUrl=/srg/92/01-Diagnosis/noe.jsp
Anatomy of NOE Region

Right orbit: frontal and slightly lateral view
Lacrimal Fossa

Orbital Anatomy - Important Distances to Know

Published in Grand Rounds given by AH Muir from UCSF
Medial Canthal Tendon
Relationship to Other Important Structures

http://oralmaxillo-facialsurgery.blogspot.com/2010/05/nasoorbitoethmoid-fractures.html
Midface Buttress System

http://oralmaxillo-facialsurgery.blogspot.com/2010/05/nasoorbitoethmoid-fractures.html

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Nomenclature

NOE - naso-orbital ethmoid
NEC - naso-ethmoid complex
Naso ethmoid orbital
Naso-orbital ethmoidal
Mechanism Of Injury


Pathophysiology of NOE
Classification
Markowitz Type I
Markowitz Unilateral Type II

https://www2.aofoundation.org/wps/portal/lut/p/c0/04_SB8K8xLLM9MSSzPy8xBz9CP0os3hng7BARydDRwN3QwMDA0zTzdvxBjlwN_I_2CbEdFADiM_QM!/?segment=Midace&bone=CMF&classification=92-Nasa%2FNOE%2C%20NOE&teaserTitle=&showPage=diagnosis&contentUrl=/srg/92/01-Diagnosis/noe.jsp
Bilateral Type II Fracture
Markowitz Type III
Why So Difficult?
Management
Management: Clinical Presentation in the Trauma Bay

Linnau et al 2003
Management: Diagnosis by Exam and Imaging
Physical Exam: Telecanthus

http://dentoclub.webs.com/apps/photos/photo?photoid=66406077
Physical Exam: Loss of nasal dorsal Height

Pigsnout Deformity

Sargent 2007

Sargent 2007
Physical Exam: Epicanthal Folds

http://www.technologybloggers.org/science/is-your-computer-damaging-your-eyes/
Physical Exam: Globe

Imaging
Plain Films

Caldwell View

Water’s View

http://www.bcm.edu/oto/index.cfm?pmid=15481
Coronal CT

http://radiographics.rsna.org/content/26/3/783.figures-only
Axial CT

Nguyen et al 2010
Axial CT - Finding the lacrimal Fossa

-http://www.ajnr.org/content/22/5/845/F4.expansion.html

Management-Acute Management of Related Problems: Intracranial trauma

Management-Acute Management of Related Problems: Epistaxis
Planum Sphenoidale

Superior orbital Fissure Syndrome

Blindness

Epistaxis
-internal carotid

Nasolacrimal Duct Injury

http://care.american-rhinologic.org/epiphora
CSF Leak

http://www.drpaulose.com/general/csf-leak-from-the-nose-how-to-treat
Management: Surgical Planning Once Stabilized
Timing of Operation
Picking a Surgical Approach
Open Sky Approach
Midface Degloving
Bicoronal Flap
Layers of the Scalp

Video - Bicoronal Approach

http://youtu.be/gVWGkIBtZTA
Additional Incision to approach inferior orbit

Surgical Repair
General Principles

Which fractures need surgery?  ***Almost all- (type I)

Goals of Surgery:  Restore pre-injury appearance/function (if possible)

Other fractures:  Treat other fx first
Type I Repair

Plating Only

Sargent 2007
Type II Repair

Sargent 2007

Plating and trans-nasal wiring
Type II Repair - Trans-nasal wiring

Sargent 2007
Type II Repair - Trans-nasal wiring
Type II Repair - Trans-nasal wiring

Pitfall- don’t drill into the brain
Type II Repair - Trans-nasal wiring
Type II Repair - Trans-nasal wiring

Unilateral Repair
Type II Repair - Trans-nasal wiring

Bilateral Repair
Type II Repair - Trans-nasal wiring

Pitfall: Placement of wires
Type III Repair - Trans-nasal wiring
Type III Repair

Modified Kessler
Nasal Reconstruction

Papadopolous et al 2009
Nasal Reconstruction: Cantilevered Bone Graft
Soft tissue bolsters

Sargent 2007
Sources

AO Foundation. “Nasal/NOE”. https://www2.aofoundation.org/wps/portal/utc1/04_SB8K8xLLM9MSSzPy8xBz9CP0os3hng7BARydDRwN39yBTAyMvLwOLUA93I4MQE6B8JJK8haGFgYFnqKezn7GTn4GBgQkB3X4e-bmp-gW5EeUAmUJP3w!!/dl2/d1/L2dJQSEvUUt3QS9ZQnB3LzZfQzBWUUFCMUEwRzFFMTBJREZMVUIRUDwMDA!/?showPage=diagnosis&bone=CMF&segment=Midface

Kellman RM. Maxillofacial Trauma. Cummings Otolaryngology 5th Edition. Ch 23


Donald PJ. Frontal sinus and nasofrontoethmoidal complex fractures. SIPAC. 2002.


