Fists, Falls, Cars and Much More—
Contemporary Management of Facial Injuries

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Fists, Falls, Cars and Much More—Contemporary Management of Facial Injuries

Thursday, March 19

Explore the common causes of facial injury — many of which are preventable. Dr. Daniel Meara will discuss clinical examples, and surgical reconstruction, as well as prevention strategies.
The presentation will explore the common causes of facial injury, many of which are preventable.

Clinical examples, prevention strategies and surgical reconstruction will be discussed and illustrated.
Objectives

1/OMFS at CCHS

2/Overview of Facial Injuries
Oral and Maxillofacial Surgery
Specialty Definition

Oral and Maxillofacial surgery is a specialty of dentistry which includes the diagnosis, surgical and adjunctive treatment of disease, injuries and defects involving both the functional and esthetic aspects of the hard and soft tissues of the oral and maxillofacial region.

It is a recognized international surgical specialty and merges medicine, dentistry and surgery.
OMFS Training

- 4 Years Undergraduate Study (BS, BA, or equivalent degrees)
- 4 Years Dental Study (DMD or DDS)
- 4 - 6 Years Residency Training (additional time for acquiring medical degree/MD)
- 1 - 2 Years Fellowship
- After completion of surgical training most undertake final specialty board certification examinations: ABOMS
- Many dually qualified oral and maxillofacial surgeons are now also obtaining Fellowships with the American College of Surgeons (FACS)
- Average total length after Secondary School: 12 - 14 Years + fellowships, of 1-2 years in duration
OMFS--Fellowships

- Head and Neck Oncology
- Cosmetic Facial Surgery
- Craniofacial Surgery
- Facial Trauma
- Temporomandibular Joint Disorders
First Face Transplant

Dr. Bernard Devauchelle is a French Oral and Maxillofacial Surgeon. He is most well known as the first surgeon to successfully complete the first face transplant in November 2005 at Amiens University Hospital.
Before and After Transplant
Evolution of the Specialty
OMFS Scope of Practice

- Treatments may be performed on the craniomaxillofacial complex: mouth, jaws, neck, face, skull, and include:

  - Facial Fractures
  - Cosmetic Surgery
  - Obstructive Sleep Apnea via Maxillomandibular Advancement
  - Orthognathic Surgery
  - Temporomandibular joint disorders (TMJ)
  - Congenital/Craniofacial Surgery
  - Cutaneous Malignancy
  - Pathology, Benign and Malignant
  - Dental Implants
  - Dentoalveolar
  - Anesthesia
Oral and maxillofacial surgeons: The experts in face, mouth and jaw surgery®
Oral and Maxillofacial Surgery

@ Christiana Care Health System
Facial Fractures
Anesthesia

Administration of Anesthesia

Oral and maxillofacial surgeons are extensively trained to appropriately administer local anesthesia, all forms of sedation and general anesthesia.
Dentoalveolar Surgery
Odontogenic Infections
Ludwig’s
Osteomyelitis
Pathology
Pathology

Jaw Tumor
Oral Cancer

Cancerous oral lesions
Cleft/Craniofacial Surgery
Orthognathic Surgery

https://www.youtube.com/watch?v=iKTbW3wd3AY
Facial Deformity Correction – Orthognathic Surgery
Obstructive Sleep Apnea

**Normal Breathing**
- Airway is open
- Air flows freely to lungs

**Obstructive Sleep Apnea**
- Airway collapses
- Blocked air flow to lungs
Maxillo-Mandibular Advancement
MMA – Maxillomandibular Advancement

Pre advance

Post advance

Prediction advance

Actual advance—how much to advance?
Posterior Airway Space Changes

Preop

Postop
TMJ Disorders
TMJ-Joint Replacement
Palatal Defect & Palatoplasty vs Tongue Flap
Facial Cosmetic Surgery

- Cheekbone Implants
- Chin Surgery
- Ear Surgery
- Eyelid Surgery
- Facelift
- Facial and Neck Liposuction
- Forehead/Brow Lift
- Lip Enhancement
- Nasal Reconstruction
- Skin Treatments
- Botox® Injections
- Chemical Peel
- Dermabrasion
- Laser Treatment
- Injectable Fillers (Restylane®, Collagen, etc.)
Right Malar Implant
Oral and maxillofacial surgeons: The experts in face, mouth and jaw surgery®

- Administration of Anesthesia
- Dental Implant Surgery
- Wisdom Teeth Management
- Dental and Soft Tissue Surgery
- Treatment of Facial Injury
- Head, Neck and Oral Cancer
- Corrective Jaw Surgery
- Obstructive Sleep Apnea
- Facial Cosmetic Surgery
- Cleft Lip/Palate and Craniofacial Surgery
- TMJ and Facial Pain
Facial Trauma Course 101
History of Facial Fractures

5000 B.C. the Sumerians, who occupied the present-day country of Iraq:

'If a physician set a broken bone for a man, or cure his diseased bowels, the patient shall give five shekels of silver to the physician.'

'If a physician shall make a severe wound with a bronze operating knife and kill him . . . his hands shall be cut off.'
Early Maxillomandibular Fixation

In A.D. 1492 B.C. Salicetti's treatise, *Praxeos Totius Medicinae*: precise instructions upon the treatment of fractures of the mandible:

'This done, tie the teeth of the uninjured jaw to the teeth of the injured jaw in this way.'
'If the teeth at the wound be distorted and loosened when the bone is adjusted, they should be connected together, not only two but more of them, with a gold thread if possible, but otherwise with a linen thread, until the bone be consolidated.'
Military Trauma
Transformation and Surgical Evolution

1865 photo of a private injured in the American Civil War by a shell two years previously
Key elements include 24-hour in-house coverage by general surgeons and prompt availability of care in varying specialties such as orthopedic surgery, neurosurgery, plastic surgery, anesthesiology, emergency medicine, radiology, internal medicine, oral and maxillofacial surgery, and critical care, which are needed to adequately respond and care for various forms of trauma that a patient may suffer.
An Analysis of Maxillofacial Trauma at a Level-1 Trauma Center with Associated Public Health Prevention Strategies and Cost Analysis

Jeffrey Burgess MSII, Matthew Krieger DMD, Daniel Meana MD DMD

Christiana Care Health System, DE

INTRODUCTION

The Christiana Care Hospital Department of Oral and Maxillofacial surgery evaluates and manages patients sustaining these trauma from all over the state of Delaware, as well as surrounding states. The majority of these patients are seen in the Emergency Department by way of trauma alerts and code, followed closely by referrals from local Emergency Department visits, and a small percentage are seen for initial examination in the outpatient setting.

Each year, the hospital spends thousands of dollars on both surgical and non-surgical management of facial trauma. Assessing trends associated with the primary mechanism and treatments of facial fractures may aid in directing preventive efforts to improve patient health and cut down on costs to CCCHS.

OBJECTIVES / PURPOSE

The aim of this study was to assess:

- 1) The top three most common mechanisms of maxillofacial fractures at CCCHS;
- 2) The primary method of treatment for the top three mechanisms, with attention paid to open reduction, closed reduction, and non-surgical management; and
- 3) Associated health care costs for treatment and management.

METHODS

For the purposes of this study, the CCCHS Trauma Registry was utilized.

This database provided a record of patients whom the Trauma Surgery Service consulted, Oral and Maxillofacial surgery for evaluation and treatment of facial trauma.

Patients were recorded who were either trauma codes, alerts, or consults, with initial assessment by the Trauma Surgery Team. This database does not include ED consultations and care in patients.

The data was reviewed to include only those patients with at least one facial fracture during the period of July 1, 2011 - June 30, 2012.

RESULTS

- 41% of the facial trauma patients in the trauma registry database (which may include soft and hard tissue injuries) involved facial fractures between July 1, 2011 - June 30, 2012.
- 14% of these patients received surgical treatment, 17% were treated non-surgically and the remaining 25% refused treatment or did not return with follow-up.
- Assault and MVC comprised the number of surgical interventions as compared to falls, accounting for 25% and 24%, versus 12% respectively.
- Assault had the greatest total cost ($65,477) as well as the highest cost per procedure ($2,312), and average cost per patient who received treatment ($833), followed closely by MVC.

DISCUSSION

The high impact mechanisms including assault and MVC accounted for the greatest operative numbers and had a smaller percentage of patients requiring surgical management when compared to a lesser number non-surgical management, as shown in the chart.

- Assaults accounted for both the highest number of procedures and gross total cost. This may be due to an increased interest in microseconds on the local level.

LIMITATIONS

- Time constraints,
- The small number of total billing information and patient costs associated with CCCHS services, limited the research in only comparing the cost of the procedure, not accounting for other potential factors or time of treatment.
- Analysis of only trauma registry patients with facial fractures as a representative sample versus using all ED visits and outpatient clinic appointments.

CONCLUSION

Due to the high impact mechanisms of facial fractures among the patient base seen at Christiana Care:
- Of those, assaults and MVC lead to the highest operative costs and total cost to the hospital.
- Therefore, public health policies and new initiatives should be aimed at fracture prevention, education, and system redesigns to minimize the prevalence and associated sequelae from the three main mechanisms of injury occurring in 39% of facial fractures in Delaware.

DISCLOSURES: There are no financial conflicts of any of the authors.

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Background Image from UT Health and Science Center San Antonio
## Mechanisms of Injury

<table>
<thead>
<tr>
<th>Mechanism of Injury</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>132</td>
<td>36.6%</td>
</tr>
<tr>
<td>Assault</td>
<td>84</td>
<td>23.3%</td>
</tr>
<tr>
<td>MVC</td>
<td>72</td>
<td>19.9%</td>
</tr>
<tr>
<td>MCC</td>
<td>24</td>
<td>6.6%</td>
</tr>
<tr>
<td>PD</td>
<td>16</td>
<td>4.4%</td>
</tr>
<tr>
<td>GSW</td>
<td>9</td>
<td>2.5%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>9</td>
<td>2.5%</td>
</tr>
<tr>
<td>Animal</td>
<td>5</td>
<td>1.4%</td>
</tr>
<tr>
<td>Misc</td>
<td>4</td>
<td>1.1%</td>
</tr>
<tr>
<td>Falling Object</td>
<td>3</td>
<td>0.8%</td>
</tr>
<tr>
<td>Sports Collision</td>
<td>3</td>
<td>0.8%</td>
</tr>
</tbody>
</table>
Be aware of...

- Slips
- Trips
- Falls

Over a third of all injuries reported each year are caused as a result of a slip, trip, or fall. This is the single most common cause of injuries at work.

Fatal falls rising among the elderly

The death rate for elderly people falling has risen 55.3 percent from 1993-2003.

Rate of fatal falls for people 65 or older, age-adjusted to 2000 population

- 33% of people aged 65-80 fall annually
- 40% of people aged 80+ fall annually
- 50% of these falls go unreported

SOURCE: Centers for Disease Control and Prevention
TOP 5 CAUSES OF FALLS

**Medication**—Many drugs (i.e., sedatives, anti-depressants) reduce mental alertness, affect balance and gait and cause drops in systolic blood pressure while standing. Mixing certain medications increases these effects, causing falls. **Solution:** Have a home care professional carefully monitor medications and interactions.

**Impaired Vision**—Cataracts and glaucoma alter depth perception, visual acuity, peripheral vision and susceptibility to glare. **Solution:** Add color and contrast to identify objects, such as grab bars and handrails.

**Weakness, Low Balance**—Weakness and lack of mobility leads to many falls. **Solution:** Exercise regularly to boost strength and muscle tone.

**Home Hazards**—Most homes are full of falling hazards. **Solution:** Add grab bars in the bathroom, install proper railings on both sides of stairways, improve the lighting, remove loose rugs and fix uneven or cracked sidewalks.

**Chronic Conditions**—Parkinson’s, heart disease and other conditions increase the risk of falling. **Solution:** Enlist specially trained caregivers to ensure that patients follow their treatment plans, assist them to doctor appointments and recognize red flags.

30%—30% of people who fall suffer moderate to severe injuries. These injuries can make it hard to get around or live independently. **Solution:**

1 IN 3—adults age 65 and older fall each year, yet less than half talk to their healthcare providers. **Solution:**

15—Every 15 seconds across America, a senior citizen is sent to the E.R. for a fall-related injury. **Solution:**

[Logo: BrightStar]
Assaults
Motor Vehicle Collisions
Sports
To The Laboratory
External Anatomy

- Overall shape
- Forehead
- Eyes
- Cheeks
- Nose
- Chin/Jaw
- Lips

Features:
- Forehead: Smooth and wrinkle-free
- Eyes: Lashes and brows
- Cheeks: Even and symmetrical
- Nose: Symmetrical and well-proportioned
- Chin/Jaw: Rounded and well-defined
- Lips: Full and well-balanced

Tips for enhancing:
- Forehead: Use lotions
- Eyes: Keep clean
- Cheeks: Use various lotions
- Nose: Natural and proportional
- Chin/Jaw: Natural and well-defined
- Lips: Natural and well-balanced
Characteristics
Bony Anatomy

[Diagram of the human skull with labeled parts]

- Frontal bone
- Glabella
- Frontonasal suture
- Supraorbital foramen (notch)
- Supraorbital margin
- Superior orbital fissure
- Optic canal
- Inferior orbital fissure
- Middle nasal concha
- Perpendicular plate
- Ethmoid bone
- Vomer bone
- Mandible
- Mental foramen
- Mandibular symphysis
Orbital Anatomy
Paranasal Sinuses
Muscle
Vessels

Superficial arteries and veins of face and scalp

- Parietal emissary vein
- Frontal branch of superficial temporal artery and vein
- Parietal branch of superficial temporal artery and vein
- Superficial temporal artery and vein
- Anterior auricular artery
- Occipital artery and vein
- Middle temporal artery and vein
- Posterior auricular artery and vein
- Retromandibular vein
- External jugular vein
- Internal carotid artery
- External carotid artery
- Internal jugular vein
- Zygomatico-orbital artery
- Supraorbital artery and vein
- Supratrochlear artery and vein
- Angular artery and vein
- Infraorbital artery and vein
- Transverse facial artery and vein
- Facial artery and vein
- Lingual artery and vein
- Common carotid artery
Salivary Glands
Composite
Clues

- Avulsion flap and deep laceration
- Ear hematoma
- Fractured zygoma
- Nasal deformity and fracture
- Mandibular fracture
- Laceration
- Subconjunctival hemorrhage
- Periorbital ecchymosis
- Nasal contusion
- Facial contusion
**TABLE 3** - Type and localization of facial fractures.

<table>
<thead>
<tr>
<th>Site of fracture</th>
<th>%  (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible total*</td>
<td>39.97  (530)</td>
</tr>
<tr>
<td>Coronoid process</td>
<td>0.60   (8)</td>
</tr>
<tr>
<td>Mandibular angle</td>
<td>5.88   (78)</td>
</tr>
<tr>
<td>Mandibular condyle</td>
<td>12.75  (169)</td>
</tr>
<tr>
<td>Mandibular body</td>
<td>9.58   (127)</td>
</tr>
<tr>
<td>Parasympyysis</td>
<td>6.94   (92)</td>
</tr>
<tr>
<td>Mandibular ramus</td>
<td>0.90   (12)</td>
</tr>
<tr>
<td>Symphysis</td>
<td>3.32   (44)</td>
</tr>
<tr>
<td>Zygomatic complex</td>
<td>20.97  (278)</td>
</tr>
<tr>
<td>Nose</td>
<td>15.91  (211)</td>
</tr>
<tr>
<td>Dento-alveolar</td>
<td>6.41   (85)</td>
</tr>
<tr>
<td>Zygomatic arch (isolated)</td>
<td>5.96   (79)</td>
</tr>
<tr>
<td>Le Fort type</td>
<td>4.98   (66)</td>
</tr>
<tr>
<td>Orbit</td>
<td>2.49   (33)</td>
</tr>
<tr>
<td>Frontal</td>
<td>1.73   (23)</td>
</tr>
<tr>
<td>Median maxilla suture</td>
<td>0.75   (10)</td>
</tr>
<tr>
<td>FNOE***</td>
<td>0.45   (6)</td>
</tr>
<tr>
<td>Hard palate</td>
<td>0.23   (3)</td>
</tr>
<tr>
<td>Unknown**</td>
<td>0.15   (2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.00 (1,326)</td>
</tr>
</tbody>
</table>

*Sum of mandibular condyle, parasympyysis, angle, body, symphysis, coronoid process, and ramus. **Not recorded in the medical files. ***Fronto-naso-orbito-ethmoidal fracture.
Trauma Categories

- Hard tissue
  - Dentoalveolar
  - Maxillary/Mandibular
  - ZMC
  - NOE
  - Nasal
  - Orbit
  - Frontal Sinus

- Soft tissue
  - Midface
  - Perioral
  - Intraoral
  - Ear
  - Neck
Primary Survey

• Airway maintenance with cervical spine stabilization

• Breathing with adequate ventilation

• Circulation with hemorrhage control
Airway Compromise in the Maxillofacial Trauma Patient

• Blood and secretions
• Mandibular fractures that result in loss of tongue support
• Midface fractures that force the maxilla into the nasopharynx
• Foreign debris such as avulsed teeth or dentures
Secondary Survey

- Evaluation for soft tissue injury
  - Laceration debridement
  - Examination for disruption of vital structures
  - Evaluate facial symmetry
Secondary Survey

- Palpate bony landmarks
  - Orbital rims
  - Malar eminence, zygomatic arches
  - Nasal bones
Secondary Survey

• Oral cavity examination
  – Lost teeth (must be accounted for)
  – Lacerations
  – Alterations in occlusion
  – Maxillary or mandibular mobility
Immediate vs. Delayed Treatment

• **Immediate Treatment**
  – Airway compromise
  – Severe hemorrhage
  – Large open wounds
  – Coincidental surgical procedure being performed

• **Delayed Treatment**
  – Severe systemic trauma
  – Neurologic or cranial injuries
  – Should be performed within two weeks
  – Allows for proper planning, evaluation and necessary imaging studies.
Maxillofacial Imaging

- Plain films
  - Panoramic (Panorex)
  - Mandible series
    - Townes view
    - R/L lateral oblique
    - PA Skull
  - Submento-vertex
  - Waters view
  - Nasal (low kVp lateral)
Maxillofacial Imaging

- CT scan
  - Direct axial
  - Coronal reconstruction
  - 3 dimensional reconstruction
Injuries: Neck to Vertex
Hard & Soft Tissues
Neck Injuries
Penetrating Neck Trauma

Neck Zones Dictate Approach

Problem
Inaccessible Distal Carotid
Accessible
Explore or Selectively Manage?
Great Vessels

Solution
Angiography
?
Cricoid cartilage

Angiography
Zones of the Neck
Neck Pearls

- Know Zones of Neck
- Follow Neck Treatment Algorithm
- Do Not Forsake the ABCDE’s of ATLS
“Now open even wider, Mr. Stevens. ... Just out of curiosity, we're going to see if we can also cram in this tennis ball.”
Skateboarder vs Pavement
Dentoalveolar Trauma
Ellis Classification

- Ellis class I
- Ellis class II
- Ellis class III

Alveolar fracture
The Basics
Don’t be Afraid the Mouth!

1/ Control Hemorrhage

2/ Pain Control -- Local Anesthesia (Lidocaine w/ epi)

3/ Account for All Known Structures

4/ Reduce the Alveolus and Teeth

   - Rinse avulsed teeth with Saline only and avoid touching the tooth root
   - Do Not Replace avulsed Primary ‘baby’ teeth
   - Dycal (calcium hydroxide), Stomadhesive, or Dermabond over crown fractures to reduce sensitivity and protect tooth

4/ Wire or Arch Bar Stabilization or at least Zinc-Oxide (Coe-Pak) Dressing

5/Tetanus, Antibiotics, Peridex mouth rinse, Soft ‘non-chew’ diet, Avoid physical activities
Suggested Treatment of Dental Displacement Injuries

Subluxation (loosening): occlusal adjustment, observation, and vitality testing

Luxations (labial or lingual): reposition and splint, periodic vitality testing

Extrusion (partial avulsion): reposition and splint, periodic vitality testing, probable root canal therapy

Intrusion

- Incomplete root development: allow to re-erupt
- Complete root development: reposition and splint, calcium hydroxide root canal therapy
Dental Avulsion Guidelines

Within 2 Hours

General Guidelines

Minimize extraoral period, replant at accident site if possible
Do not remove periodontal ligament
Minimize handling, transport in Hank’s solution or whole milk
Do not remove blood clot from socket
Antibiotic coverage for 7–10 d
Chlorhexidine rinse
Analgesics
Oral hygiene
Need for tetanus prophylaxis
Maintain splint for 7–10 d
Save-A-Tooth
Subluxation/Alveolar Fracture
Semi-Rigid Splint
Local Anesthesia
Upper permanent teeth

- Incisive fossa
- Palatine process of maxilla
- Horizontal plate of palatine bone

Lower permanent teeth

- Central incisors
- Lateral incisors
- Canines
- 1st premolars
- 2nd premolars
- 1st molars
- 2nd molars
- 3rd molars

Green area: 3rd molars
24 Gauge Wire and Composite
Wires +/- Erich Arch Bar
Rule-Out Foreign Body Aspiration
Mandible Fractures
History

- Do your teeth line up?
- Does your ‘bite’ feel normal?
Concomitant Injuries

- As many as 10% of mandible fractures are associated with intracranial injury.

- Associated C-spine injuries, 0.2 - 6%
Exam--Occlusal Step, Mobility, Malocclusion
Flail Mandible = Airway Compromise
Treatment — Reduce the Fracture
*pretend it is a miniature femur*

Bridle Wire
Closed Reduction
Wires +/- Erich Arch Bar
New Technology
Intermaxillary fixation screws—Closed Reduction
External-Fixation
Open Reduction Internal Fixation
Non-union and Osteomyelitis
Open Reduction Internal Fixation
Soft and Hard Tissue Injuries
Special Circumstances:
multiple facial fractures including **atrophic** mandible fracture
Special Circumstances: Pediatrics and Resorbable Fixation
TMJ Dislocation
If left untreated:
Facial Trauma can cause

- Infection
- Disfigurement
- Loss of Function

Or worse: all three
TMJ Ankylosis:
TMJ Ankylosis
TMJ Ankylosis
TMJ Ankylosis: Bilateral Gap Arthroplasty
Mandible Pearls

1/ Go back to basics — history and physical examination

2/ Bilateral Mandible fractures can result in airway compromise

3/ Reduce and Stabilize the Fracture

4/ Antibiotics, Peridex, Pain Control and Non-Chew diet

5/ Barton Bandage s/p TMJ dislocation reduction
My nose does not itch.
My nose does NOT itch.
Soft Tissue Injuries
Tongue Lacerations
Other Peri-Oral Soft Tissue Injuries
MOUNTAINBIKE VS TREE
Redundancy

Arm Wrestling?
Oral Cavity/Oropharynx FB
Oral Cavity/Oropharynx FB
20% to 30% mortality rate and 60% permanent neurologic residua have been reported with stroke by this mechanism.
ALGORITHM FOR PALATE LACERATION MANAGEMENT

Palatal Injury

Over 1-2 CM or contaminated?

Yes or no

Yes

Antibiotics

Hanging flap, penetrating?

Yes or no

Yes

Suture repair

Antibiotics

Evidence of neurovascular injury?

No

Yes

Hospitalize / imaging studies

Reliable home environment?

No

Yes

Hospitalize & observe

Outpatient observation with monitoring instructions
Oral Soft Tissue Pearls

1/ Tongue lacerations will develop significant edema and should be monitored closely in the hospital setting.

2/ Lip lacerations require precise realignment of anatomical structures.

3/ Palatal trauma can be devastating due to the proximity of the internal carotid and possible exsanguination or thrombosis.
Midface/Maxillary Fractures
In 1901 René Le Fort published a treatise called *Etude expérimental sur les fractures de la machoire supérieure* concerning his experiments with maxillary fractures of the skull.

To perform these experiments, Le Fort used the skulls of cadavers, and delivered blunt forces of varying degrees of magnitude, as well as from different directions.

From these tests, he determined that predictable patterns of fractures.
Examination
Radiographic Representation
Facial Buttresses of Strength
Any Guesses?
Detective Work Required
Titanium Fixation
Reconstruction
Zygomaticomaxillary Complex Fractures (ZMC)
Zygomaticomaxillary Complex Fractures (ZMC)
ZMC fx/Cheekbone fx
ZMC Basics

1/ Correct Imaging
2/ Sinus Precautions
3/ Antibiotics
4/ *Ophthalmology Consultation
Naso-orbito-ethmoid Fractures (NOE)
Naso-orbito-ethmoid Fractures (NOE)
Naso-Orbital Ethmoid Complex (NOE)

Telecanthus=intercanthal distance greater than 35-40 mm
NOE

Pre-OP

Post-OP
Telecanthus
Saddle Nose Deformity
Naso-orbital-ethmoid fracture
Special Circumstances: 
GSW
GSW
S/P ORIF, Wound Vac, HWR, & Advancement Flap
Reconstruction
Nasal Injuries
Septal Anatomy
H & P

1/ Congestion? Difficultly breathing out of the nose?
2/ Nasal Hemorrhage
3/ Septal Hematoma
Treatment

1/ Evacuate septal hematomas
2/ Control Epistaxis
Epistaxis
Instrumentation
Anterior Packing
Foley Technique for Posterior Packing
Tools
Septal Hematoma
Septal Hematoma Drainage
Nasal Ala Stenosis
Complex Nasal Wound
Cheerleader vs. Knee
Nasal Pearls

1/ Hemorrhage can be catastrophic — ‘over-engineer’ the packing and monitor closely
2/ Packing can cause pressure necrosis
3/ Always examine for septal hematomas
4/ Antibiotics to prevent TSS
5/ Stent nostril to avoid stenosis
Midface Soft Tissue Injuries

- Facial Nerve
- Parotid Duct
- Parotid Gland
Facial Nerve Anatomy
Diagnostics

1/ Wound Exploration
2/ Stensen’s Duct Cannulation with injection of saline/betadine solution
the parotid gland lies under the middle third of a line between the tragus of his ear and the commissure of his lips.

division of the branches of his facial nerve, anterior to this line will cause minimal deformity.

Cannulating the parotid duct.
Parotid Duct Cannulation
Repair and Sialocele
The Ear

- Helix
- Antihelix
- External auditory meatus
- Tragus
- Antitragus
- Lobule
Traumatic Ear Avulsion
Avulsive Ear Recon
Ear Lacerations
Venous Congestion
Cauliflower Ear/Wrestler’s Ear
Treatment of the Ear

• 1/Gentle cleansing
• 2/Minimize local anesthesia w/ epi to the ear (also, nasal tip)
• 3/Drain Perichondrial Hematomas to prevent ‘Cauliflower’ Ear
• 4/Realign anatomical landmarks including cartilaginous substructure
• 5/Stent open the EAC to prevent stenosis in canal lacerations
• 6/Gentle pressure dressing to prevent secondary trauma and prevent new hematoma formation
Orbital Injuries
Basics of the History

- 1/Double vision?
- 2/Blurred vision?
- 3/Glasses?
- 4/Eye pain?
Orbital Examination

1/EOM
2/Pupillary Reaction
3/Gross VA
4/Finger Tenometry
5/Evaluate for Corneal Abrasion

Proptosis

Subconjunctival Hemorrhage

Hyphema

Chemosis
Abnormal eye movements: always refer

Foreign body
Distorted pupil: beware penetrating injury

Basal tear of iris always refer

Deep laceration orbit: beware intra penetration and ret foreign body

Marginal laceration: always refer

Hyphaema: subconjunctival haemorrhage: if it is posteriorly beware of fracture

Epithelial loss—may be missed without fluorescein
Lacrimal System

Lacrimal gland
Puncta
Common canaliculus
Lacrimal sac
Canaliculus
Nasolacrimal duct

LACRIMAL SYSTEM
Lacrimal System

Fig. 9-1 The anatomy of lacrimal system.
Retrobulbar Hematoma

Primary indications
Decreased visual acuity
Intraocular pressure > 40 mm Hg

Lateral Canthotomy

Inferior Cantholysis
Orbital Injuries

“Blowout” fracture
Surgical Approaches to the Orbit
Orbital Trauma & Repair
Special Circumstances: Pediatric Blow-out Fracture
Orbital Pearls

1/ Immediately perform a lateral canthotomy, if orbital compartment syndrome is suspected
2/ Strict bedrest, head-of-bed elevation in patients with a suspected Hyphema
3/ Sinus Precautions
4/ Ophthalmology Consultation*
Frontal Sinus Fractures

1/Anterior Table — cosmetic deformity?
2/Nasofrontal duct involvement?
3/Posterior Table? Pneumocephalus?
Soft Tissue Injuries

Motocross Racer vs fence
Lid Margin Repair

Fig. 11-12  Lid margin repair: A, Align the lid margin using a 7-0 Vicryl suture throughout the meibomian gland orifices. B, Suture the tarsal plate with 5-0 Vicryl sutures. C, Complete the lid margin closure, creating eversion of the wound edges with vertical mattress sutures.
Scalp Injuries
s/p Repair
*One can quickly lose a significant portion of blood volume as a result of even simple appearing scalp lacerations—do not delay in gaining hemostasis
Dog Bites
Dog Bite w/ 6 mos P/O
Dog Bite
Cheek Wound and Repair
Dog Bites

- Likelihood of child sustaining dog bite is ~50%
- Most bites are from animals known to the family—German Shepard, Rotweiler, Pitbull
- M>F canines
- 70% of victims < 10 years old
- Peak incidence age 5 (15%)
- Significant physical and emotional sequelae
- Profuse pulse irrigation for wound cleansing with conservative debridement
- Unique microbiology:
  - Pasteurella multocida, Capnocytophaga canimorsus in ~25% + mixed anaerobes, Streptococci, and Staphylococcus aureus
- Tetanus immunization status and rabies exposure must be considered
- Rabies Treatment:
  - Passive immunization with human rabies immunoglobulin provides immediate protection with half-life of 21 days
  - Immunoglobulin (20 IU/kg) is dispensed in around the wound and remainder given intramuscularly
  - Active immunization via vaccination occurs within ~7 days and lasts 2 years
  - Vaccine to deltoid or deep thigh muscle with a dose of 1 ml at day 0, 3, 7, 14, and 28
  - Domesticated canines with known vaccination record should still be quarantined for around 10 days to monitor for development of rabies—prophylaxis may be withheld during this interval
- Antibiotic therapy should be for at least 7 days with Augmentin or Doxycycline, Erythromycin in PCN-allergic patients
- Anticipatory Guidance includes patient and family education regarding and intense inflammatory response and prolonged lymphedema
<table>
<thead>
<tr>
<th>ANATOMIC REGION INVOLVED</th>
<th>%</th>
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<tbody>
<tr>
<td>Cheek</td>
<td>34%</td>
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<tr>
<td>Chin</td>
<td>34%</td>
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<tr>
<td>Lips</td>
<td>28%</td>
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<td>Nose</td>
<td>20%</td>
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<td>Eyes</td>
<td>11%</td>
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<td>Ear</td>
<td>5%</td>
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<tr>
<td>Neck</td>
<td>2%</td>
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Distribution of Dog Bites
Dogbite—pre-op
Paramedial Forehead Flap
Auricular Cartilage Graft
Septo-mucosal flap
6 Months Post-op
Adjunctive Care

- Wound support concepts
  - Support tape (Steri-Strips)
  - Cyanoacrylate
  - Adsorbable sutures
  - Antibiotic ointments
  - Topical Steroids
  - Silicone sheets
  - Massage
  - Hydration
Pediatric Trauma Highlights
No ‘Golden Hour’ in Kids

Children have less reserves than adults

Platinum Half-Hour in Trauma Resuscitation in Children
Pediatrics account for 15-25% of total emergent care patients.

When a child is injured, the whole family is injured too!

Approximately 40% divorce rate within 1 year after a major pediatric trauma.
Anatomical Variations

Fig. 13.1 Analysis of 263 mandibular fractures in children admitted to the Royal Children’s Hospital, Melbourne, Australia during the 10-year period 1970-1979 (Reproduced by courtesy of Dr Roger K. Hall)

Fig. 11.17 Drawings to show shape, vascularity and osteogenic potential of mandibular condyle in child and adult
Kids are not just little adults but... can have similar facial injuries
Adjunctive Procedures
Cheek Implant

Pre-OP

Post-OP
Septorhinoplasty

Pre-OP

Post-OP
Exposed Hardware and Non-Union s/p remote GSW

Pre-Op

Intra-OP
Palatal Defect & Palatoplasty vs Tongue Flap
Temporal Implant

Pre-OP  Post-OP
Post-traumatic Ankylosis
Custom Orbital-Cheek Recon
Custom Implant
Antibiotics
Antibiotic prophylaxis in the management of complex midface and frontal sinus trauma

Conclusions:

The use of additional antibiotics outside the perioperative timeframe does not reduce the rate of postoperative infections; however, such antibiotic use may be warranted in cases of severe facial trauma with multiple open fracture wounds.

Laryngoscope, 2010
• Smoking was a major risk factor with a 3.7 times greater likelihood of procedures being unsuccessful per month than procedures among nonsmokers

• Treating infected fractures with hardware in place is less successful than widely believed
Timing of Surgery
Early versus delayed repair of facial fractures in the multiply injured patient.
Weider L, Hughes K, Ciarochi J, Dunn E.
Source: Department of Surgery, Methodist Hospitals of Dallas, Texas 75265, USA.

- Delayed repair did not increase length of ICU stay or hospital stay
- The wound infection rate was negligible
- Complication rate was similar in the two groups
- May be advantageous in decreasing operative risk and minimizing cost by coordinating multiple procedures with various surgical subspecialties.
A comparison of outcomes between immediate and delayed repair of mandibular fractures

Leland Shayne Webb, MD,1 Sumeet Makhijani, MD,2 Manish Khanna, MD,3 Mark J Burstein, MD,4 Arthur N Falk, MD,2 Dimitri J Koumanis, MD,2 and Jerome D Chao, MD2

- Complication rates did not increase when repair of mandible fractures was delayed beyond 72 h
- Substance abuse was a factor in increasing complications rates
- Outpatient triage with elective repair of isolated mandibular fractures appears to be more cost-effective than admission with inpatient management
Goals

The presentation will explore the common causes of facial injury, many of which are preventable.

Clinical examples, prevention strategies and surgical reconstruction will be discussed and illustrated.
Objectives

1/OMFS at CCHS

2/Overview of Facial Injuries — Surgery Course 101
Follow-Up
The Faculty Practice

- Former Employee Health Site near previous Health Center entrance at Wilmington Hospital
- Opened in April 2012 for all patients (including CCHS employees)

**Oral and Facial Surgery Center**
**Faculty Practice**
2W44
302-428-5730
Wilmington Hospital Campus
Christiana Care Health System
Are **YOU** Ready?
Doctor please pick up your pager…
Questions?