

# AMSER Case of the Month: November 2023

55 y.o. female with facial pain after motorcycle accident

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# Patient Presentation

- **HPI:**
  - 55 yo female patient helmeted driver involved in a motorcycle accident. She was pinned for 30 minutes until EMS arrived. It was unknown whether she lost consciousness. During transport, she was alert and oriented to person, place, and time. On intake she complained of mid-facial pain and dizziness.
- **Vitals:**
  - Vital signs demonstrated tachypnea and a pulse oximetry of 94%.
- **Physical Exam:**
  - Physical exam revealed visible blood in her mouth with an 8 cm laceration involving the upper lip with extension across the midline to the level of the right nasal ala and malocclusion of the jaw with intact dentition.

What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Variant 3:** Major blunt trauma. Hemodynamically stable. Suspected facial injury. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
CT maxillofacial without IV contrast	Usually Appropriate	☢☢
CT head without IV contrast	Usually Appropriate	☢☢☢
Radiography trauma series	Usually Appropriate	☢☢☢
CT whole body with IV contrast	May Be Appropriate (Disagreement)	☢☢☢☢
CT whole body without IV contrast	May Be Appropriate	☢☢☢☢
CT head with IV contrast	Usually Not Appropriate	☢☢☢
CT head without and with IV contrast	Usually Not Appropriate	☢☢☢
CT maxillofacial with IV contrast	Usually Not Appropriate	☢☢
CT maxillofacial without and with IV contrast	Usually Not Appropriate	☢☢☢

This imaging modality was ordered by the ER physician

# Findings (unlabeled)



Fig. a) Non-contrast maxillofacial CT coronal reconstruction.

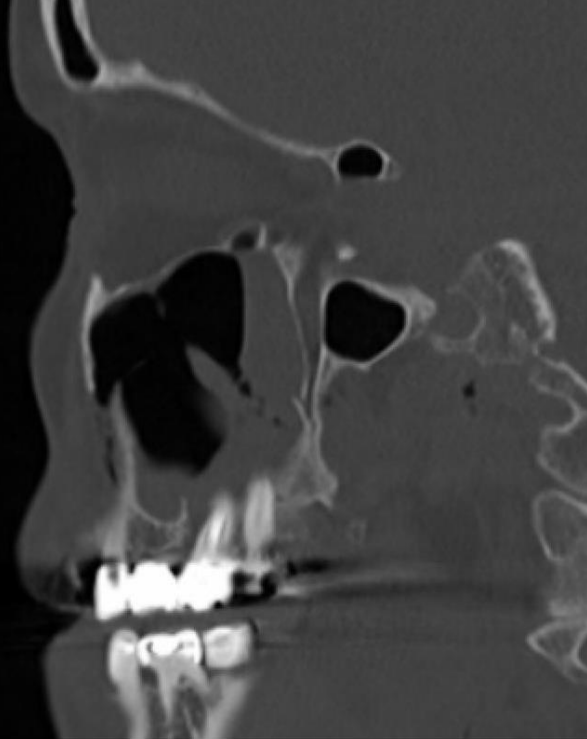


Fig. b) Non-contrast maxillofacial CT sagittal reconstruction.

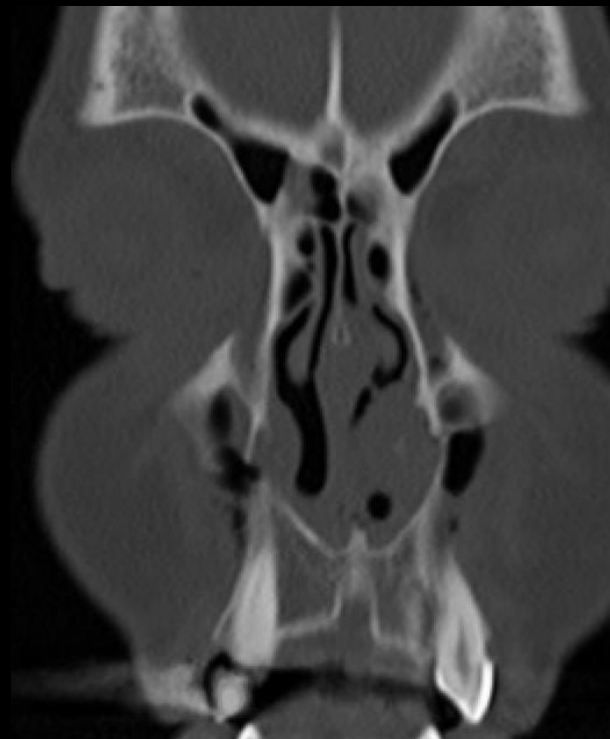


Fig. c) Non-contrast maxillofacial CT coronal reconstruction.

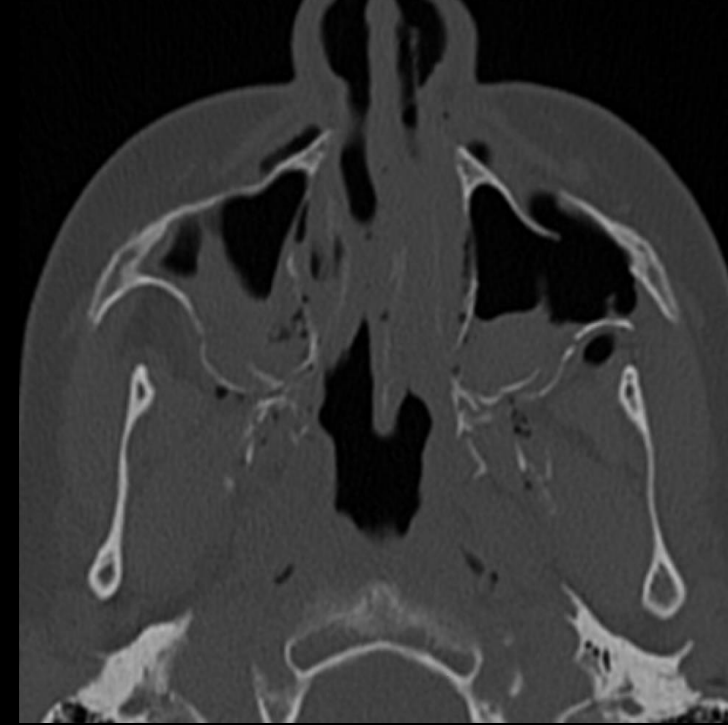


Fig. d) Non-contrast axial maxillofacial CT.

# Findings (unlabeled)

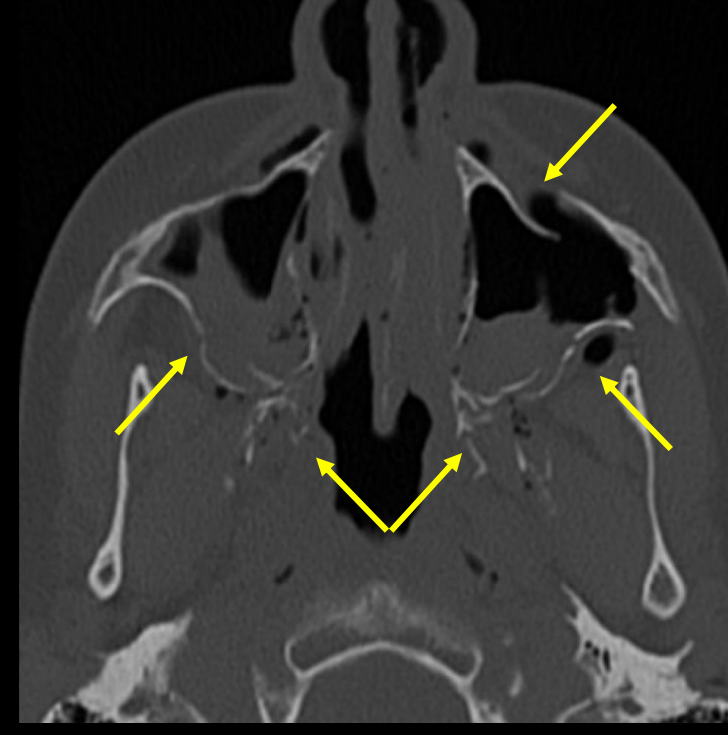
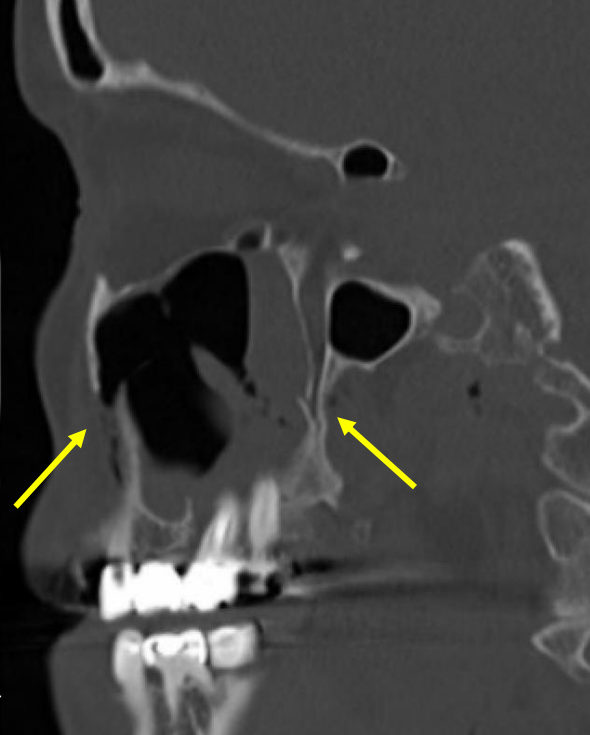
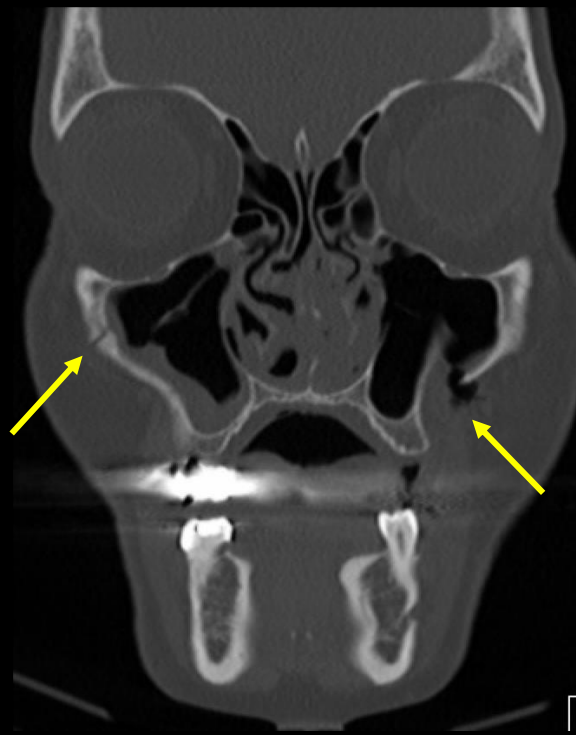


Fig. a) Non-contrast maxillofacial CT coronal reconstruction demonstrating **fractures** of the maxillary sinuses with intact orbits.

Fig. b) Non-contrast maxillofacial CT sagittal reconstruction demonstrating horizontally oriented **fracture** lines extending through the maxillary sinus.

Fig. c) Non-contrast maxillofacial CT coronal reconstruction demonstrating **fracture** lines disrupting the piriform aperture.

Fig. d) Non-contrast axial maxillofacial CT demonstrating comminuted **fractures** involving the bilateral pterygoid plates and the bilateral maxillary sinuses.

**Final Dx:**

LeFort Type I Midface Fracture

# Case Discussion

## Differential Diagnosis

### Le Fort I Fracture

- Horizontal fracture through the maxillary sinuses, maxillary alveolar ridge, and the piriform aperture causing separation of the hard palate with a “floating palate” appearance. Fracture of the pterygoid plate is a defining feature in all Le Fort fracture types. As demonstrated in the present case, Le Fort I fractures distinctively involve the lateral margins of the nasal fossa [1].

### Le Fort II Fracture

- Pyramidal fracture of the inferior orbital floor and rim, and nasofrontal suture causing midface separation with a “floating maxilla” appearance [1]. Fracture of the pterygoid plate is a defining feature in all Le Fort fracture types. This can be differentiated from the present case, as the lack of inferior orbital rim fracture excludes a Le Fort II fracture.

### Le Fort III Fracture

- Transverse fracture traversing the medial and lateral orbital wall, zygomatic arch, and nasofrontal suture that results in craniofacial dissociation with a “floating face” appearance [1]. Fracture of the pterygoid plate is a defining feature in all Le Fort fracture types. This can be differentiated from the present case, as lack of zygomatic arch fracture excludes a Le Fort III fracture.



# Case Discussion

## Differential Diagnosis

### Pterygoid plate avulsion fracture

- Often secondary to violent trauma to the mandible with associated mandibular fractures. The pterygoid plate fracture is due to avulsion at the attachment of the medial and lateral pterygoid muscles. It typically only involves the lateral pterygoid plate and spares the pterygoid process proper [2]. This can be differentiated from the present case, as additional midface fractures are present beyond an isolated pterygoid plate fracture.

### Nasoorbitalethmoidal (NOE) fracture

- Often secondary to high-energy trauma directed to the nose. This fracture pattern involves the nasal bones, ethmoid bone, medial orbital wall, and frontal process of maxilla [1]. This can be differentiated from the present case, as it spares the pterygoid plates.

# Case Discussion

## **Epidemiology**

Approximately 10-20% of all facial fractures are consistent with Le Fort fracture [3].

## **Mechanism**

Le Fort fractures 1 are typically the result of blunt trauma and high-speed deceleration crashes in which the face strikes a fixed object [4].

## **Presentation**

Patients can present with epistaxis, upper lip swelling and ecchymosis, oral mucosal lacerations, anterior open bite malocclusion with loosened teeth, pain and numbness in the midface, and difficulty using the muscles of the midface [4]. Associated life-threatening injuries such as airway obstruction are possible [4].

## **Stabilization**

In a trauma setting, interventions should begin with ensuring adequate airway with possible intervention for securement as needed [4]. Cervical spine stabilization may also be necessary because of the high probability of concurrent cervical spine injury [4]. Any active external hemorrhage must be controlled and antibiotic prophylaxis is necessary [4, 5]

# Case Discussion

## Physical Exam

Following examination for adequate airway, breathing and circulation, adequate assessment requires an ocular exam, evaluation of facial bone symmetry, assessment of dentition and malocclusion [4, 5]. Removal of broken fragments is necessary during airway evaluation [4]. A neurological exam should also assess for sensory deficits in the cranial nerve V2 distribution [5].

## Diagnosis

Early CT imaging must be obtained with non-contrast axial CT with thin slices (less than 2 mm) from the skull base to the mandible [5]. Coronal and sagittal reconstructions are routinely obtained [5].

## Definitive Treatment

Surgical management focuses on measures to reconstruct the facial bones, reestablish midfacial height, and restore dental occlusion [3]. The standard of care is intermaxillary fixation to realign the natural buttresses of the midface. In some cases, however, normal dental occlusion can be achieved with only interdental fixation [1]. Six weeks of surgical fixation is typically required to provide the best overall cosmetic and prognosis.

# References:

1. Dreizin D, Nam AJ, Diaconu SC, Bernstein MP, Bodanapally UK, Munera F Multidetector CT of Midfacial Fractures: Classification Systems, Principles of Reduction, and Common Complications. Radiographics 2018;38 (1):248-274

[Multidetector CT of Midfacial Fractures: Classification Systems, Principles of Reduction, and Common Complications - PubMed \(nih.gov\)](#)

2. Truong AQ, O'Brien DC, Strong EB, Dublin A. Lateral Pterygoid Plate Fractures Associated With Mandible Fractures. JAMA Facial Plastic Surgery, 16(6), 437–439. doi:10.1001/jamafacial.2014.645.

3. Kim HS, Kim SE, Lee HT. Management of Le Fort I fracture. Arch Craniofac Surg. 2017;18(1):5-8. doi:10.7181/acfs.2017.18.1.5

[Management of Le Fort I fracture - PubMed \(nih.gov\)](#)

4. Patel BC, Wright T, Waseem M, Le Fort Fractures. In: StatPearls [Internet]. 2021

[Le Fort Fractures - PubMed \(nih.gov\)](#)

5. Funk G. Facial Fracture Management Handbook - Lefort Fractures. In: Facial fracture management handbook [Internet]. 2019. <https://medicine.uiowa.edu/iowaprotocols/facial-fracture-management-handbook-lefort-fractures>