FACIAL TRAUMA

VOLUME I

Seeing the Injured Face

Initial evaluation, imaging, triage, and the construction of a clinically useful injury map

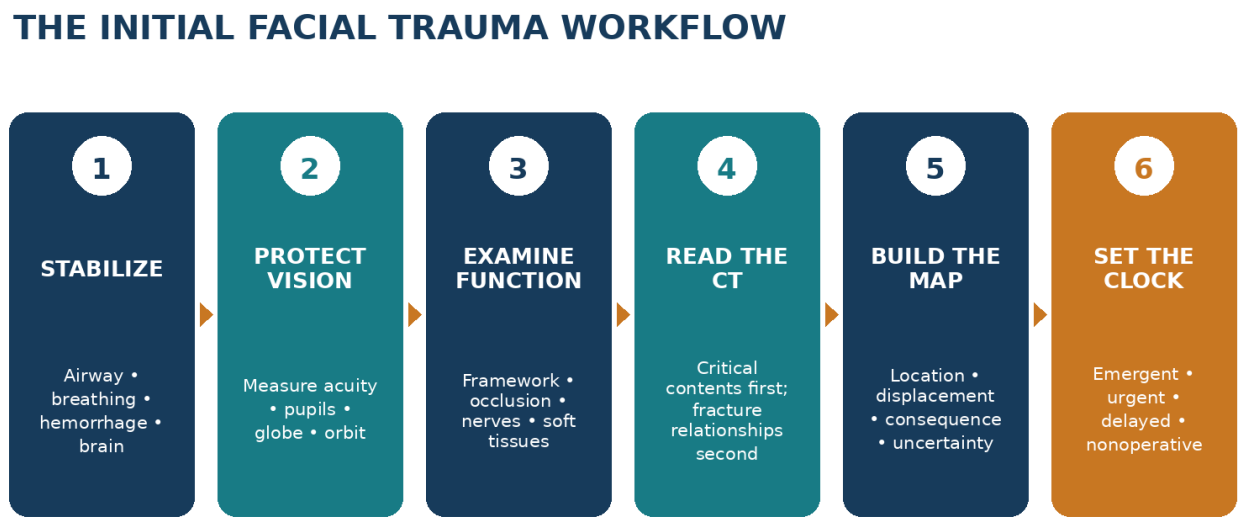


Figure 0.1. The organizing sequence for Volume I. The resident first protects physiology and vision, then localizes structural failure and assigns the correct timeline.

CENTRAL QUESTION

How do you convert a swollen, bleeding, anatomically distorted face into a prioritized assessment of immediate threats, structural injuries, and next steps?

Resident-level study guide • Revised July 2026

How to Use This Volume

Facial trauma becomes difficult when the learner approaches it as a catalog of fracture names. The practical problem is different: the face is swollen, the patient may be intoxicated or intubated, several injuries coexist, and not all abnormalities operate on the same clock. This volume therefore follows the sequence of a real consultation. It begins with physiology and vision, moves through a functional examination and independent CT review, and ends with an injury map that explains what is threatened, what is displaced, what remains uncertain, and what must happen next.

Use the guide in three passes. On the first pass, learn the five-question mental model and the ten-step resident workflow. On the second, work through the examination and CT chapters with images open beside you. On the third, answer the integrated cases aloud as if presenting to a senior resident, trauma surgeon, ophthalmologist, or oral-board examiner.

SCOPE

Volume I teaches recognition, stabilization, examination, imaging, triage, and initial management. It deliberately stops before detailed exposure, reduction, fixation, and reconstruction, which belong to the regional volumes.

Learning objectives

Recognize airway, hemorrhagic, ocular, neurologic, and skull-base threats before focusing on fracture repair.
Explain how the facial skeleton maintains airway patency, orbital support, occlusion, facial width, height, and projection.
Perform and document a reproducible facial trauma examination, including what could not be tested.
Review a maxillofacial CT systematically in bone and soft-tissue windows and in multiple planes.
Convert examination and imaging findings into a concise functional injury map.
Assign an emergent, urgent, delayed-operative, or nonoperative timeline and justify disposition.
Present common facial trauma scenarios in a written-boards and oral-boards format.

EVIDENCE NOTE

Facial trauma practice contains areas of strong consensus, areas supported mainly by retrospective series, and areas dominated by institutional custom. This guide labels major controversies—especially prophylactic antibiotics, traumatic optic neuropathy, steroids, and the timing of nonemergent repair—rather than disguising uncertainty as precision.

Abbreviations

Abbreviation	Meaning	Clinical use
BCVI	Blunt cerebrovascular injury	Screen according to institutional trauma criteria; facial fractures are only one part of the risk assessment.
IOP	Intraocular pressure	Measure only when an open globe has been reasonably excluded.
MCT	Medial canthal tendon	Central structural reference in naso-orbito-ethmoid trauma.
NOE	Naso-orbito-ethmoid	Central midface injury involving nasal, medial orbital, and ethmoid structures.
OCS	Orbital compartment syndrome	Clinical emergency requiring prompt decompression when vision is threatened.
RAPD	Relative afferent pupillary defect	Localizes asymmetric retinal or optic-nerve dysfunction.
TON	Traumatic optic neuropathy	Vision loss from optic-nerve injury; distinguish from OCS.
ZMC	Zygomaticomaxillary complex	Lateral midface unit controlling malar projection, width, and part of the orbit.

Contents

1 The Face Is More Than a Collection of Bones 4

A functional mental model for every consultation

2 The Structural Logic of the Facial Skeleton 6

Dimensions, buttresses, rings, occlusion, and orbital volume

3 The First Minutes: Life Before Reconstruction 8

Airway, hemorrhage, neurologic threats, and examination reliability

4 The Threatened Eye 11

Open globe, orbital compartment syndrome, optic neuropathy, and entrapment

5 The Functional Facial Examination 16

A reproducible bedside assessment and documentation system

6 Reading the Facial Trauma CT 19

An eight-pass method for turning fracture lines into structural information

7 Building the Injury Map 25

From disconnected findings to a management-centered problem representation

8 The Initial Management Plan 27

Urgency, consultations, supportive care, antibiotics, and disposition

9 Integrated Trauma-Bay Cases 30

Application, oral-board reasoning, and the final resident workflow

A–E Practical Appendices 35

Examination, CT, note, discharge, and presentation templates

References 37

Corrected source list, DOI links, image credits, and educational disclaimer

CHAPTER 1

The Face Is More Than a Collection of Bones

CENTRAL QUESTION

What is facial trauma actually disrupting?

OPENING CASE

A young adult arrives after an assault with dramatic left periorbital ecchymosis and a visibly flattened cheek. In the adjacent bay, a child has little bruising but is vomiting, bradycardic, and will not look upward after being struck by a ball. The first face looks worse. The second may be more time-sensitive.

The first error in facial trauma is to begin with the fracture list. A useful consultation begins one level higher: what functions are at risk, what structures sustain those functions, and how quickly will harm occur if the problem is not corrected? The same fracture line can be clinically trivial in one patient and consequential in another because displacement, soft-tissue incarceration, ocular injury, contamination, and the reliability of the examination differ.

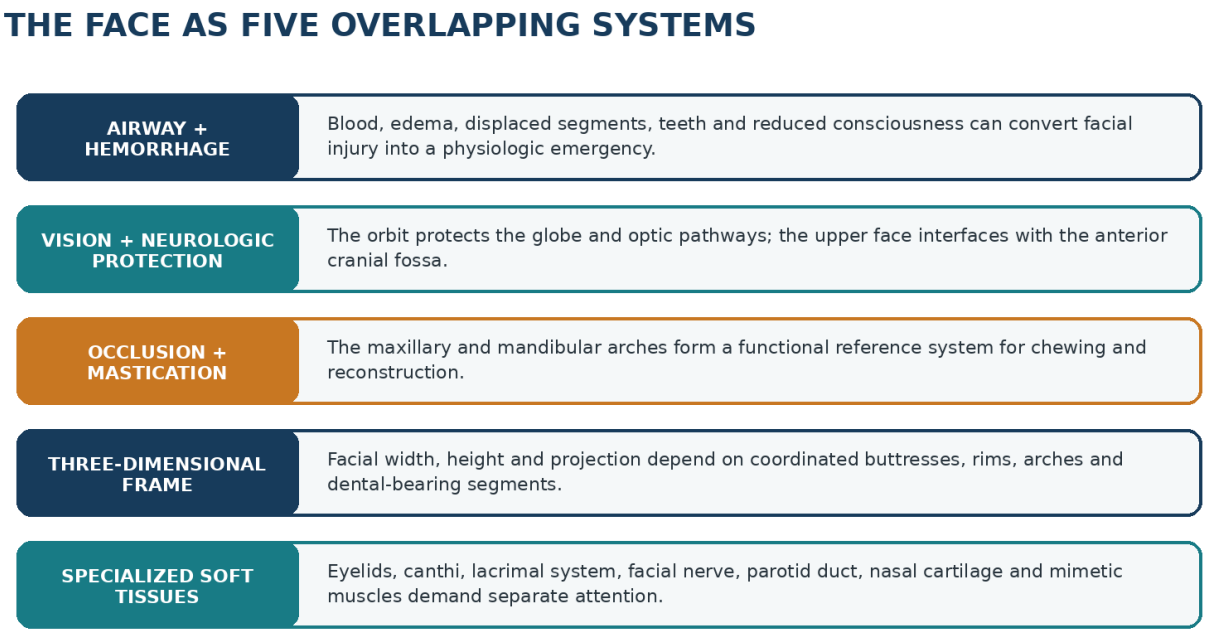


Figure 1.1. The five systems disrupted by facial trauma. The systems overlap, so one injury pattern may create several independent management problems.

1.1 Five functions, five recurring questions

The face is an airway conduit and a potential hemorrhage source. It is also the bony housing for the globes and the anterior cranial contents; a mobile dental-bearing framework; a three-dimensional scaffold that maintains width, height, and projection; and a soft-tissue envelope containing structures whose injury is not captured by fracture nomenclature. This produces five questions that should recur in every consultation:

- Is the airway secure now, and is it likely to remain secure?
- Is vision or the globe threatened?
- Is there intracranial, skull-base, or vascular involvement?
- Has the facial framework lost stability, dimensions, occlusion, or movement?
- Are specialized soft-tissue structures—eyelid, canthus, lacrimal system, facial nerve, parotid duct, septum, or oral sphincter—injured?

FIRST PRINCIPLE

The word “fracture” describes a break in bone. It does not by itself describe the threatened function, the urgency, or the need for an operation.

1.2 Mechanism changes probability, not diagnosis

Mechanism is useful because force direction, velocity, contact area, and patient age change which structures are likely to fail. A focal blow to the malar eminence raises concern for ZMC and orbital injury; force to the chin can propagate to the condyles; a central high-energy impact can disrupt the nasal root, medial orbits, lacrimal system, and anterior skull base. High-energy mechanisms also increase the likelihood of intracranial, cervical-spine, and vascular injuries. But mechanism is only a probability modifier. A ground-level fall can still produce a vision-threatening orbital hemorrhage in an anticoagulated patient, and a child may sustain a trapdoor fracture after a relatively modest impact.

1.3 Diagnosis and management are different questions

Radiographic diagnosis asks what is broken. Management asks what the injury is doing. A nondisplaced orbital floor fracture with normal acuity, motility, and globe position is not equivalent to a subtle trapdoor injury with nausea and restricted gaze. A markedly displaced ZMC fracture may ultimately require repair but rarely outranks an open globe, OCS, airway threat, or intracranial hemorrhage. Conversely, many facial fractures are managed nonoperatively because function and three-dimensional relationships remain acceptable.

Table 1.1. Translate findings into threatened functions.

Finding	System disrupted	Why it matters
Objective visual decline or RAPD	Vision / neurologic protection	May represent globe injury, OCS, retinal injury, or optic neuropathy; delay can cost vision.
New malocclusion	Occlusion / framework	Suggests disruption of the mandible, maxilla, palate, dentoalveolar segment, or condylar height.
Telecanthus after central impact	Framework / specialized soft tissue	Raises concern for NOE injury and loss of stable MCT support.
Progressive floor-of-mouth swelling	Airway	The airway can deteriorate after the initial survey despite acceptable oxygen saturation.
Clear unilateral rhinorrhea with pneumocephalus	Skull base	Suggests communication with the intracranial compartment and changes consultation and precautions.
Cheek laceration along the parotid duct course	Specialized soft tissue	A normal CT does not exclude duct or distal facial-nerve injury.

DIAGNOSTIC TRAP

“The patient says vision is normal” is not a visual examination. “Occlusion intact” is not meaningful unless each dental arch and the patient’s usual bite were actually assessed.

1.4 The consultation as a time-to-harm problem

A practical way to control complexity is to ask what will fail first. Airway obstruction and uncontrolled bleeding operate on a minute-to-minute timeline. OCS and open-globe pathways are time-sensitive ocular emergencies. Entrapment with an oculocardiac reflex, evolving neurologic findings, and contaminated injuries may require expedited action. Most definitive skeletal reconstruction occurs only after resuscitation, adequate examination, imaging review, and operative planning. This hierarchy is not neglect of the fractures; it is the prerequisite for repairing them safely.

RESIDENT SYNTHESIS

Begin with function and time to harm. Name the fracture only after you have stated airway status, objective vision, neurologic concerns, occlusion, framework stability, and examination reliability.

CHAPTER 2

The Structural Logic of the Facial Skeleton

CENTRAL QUESTION

How does the normal facial framework maintain width, height, projection, orbital support, and occlusion?

The facial skeleton is not a uniform shell. Thick regions transmit force and provide fixation stock; thin regions partition the orbit and sinuses; dental-bearing segments create an occlusal reference; and the upper face forms the boundary between sinonasal spaces and the anterior cranial fossa. Understanding these relationships makes CT review and reconstructive reasoning possible.

2.1 Facial dimensions are clinical variables

The face is commonly divided into upper, middle, and lower thirds, but the useful concept is three-dimensional. The upper face provides a stable cranial reference. The midface establishes nasal and malar projection, orbital support, facial width, and the position of the maxillary arch. The mandible establishes lower facial height, width, projection, and the mobile counterpart of occlusion. Trauma may shorten one side, widen the midface, rotate a zygoma inward, flatten the nasal root, or decrease ramal height. These are not merely cosmetic observations: they predict diplopia, malocclusion, trismus, airway difficulty, and the difficulty of finding reliable operative landmarks.

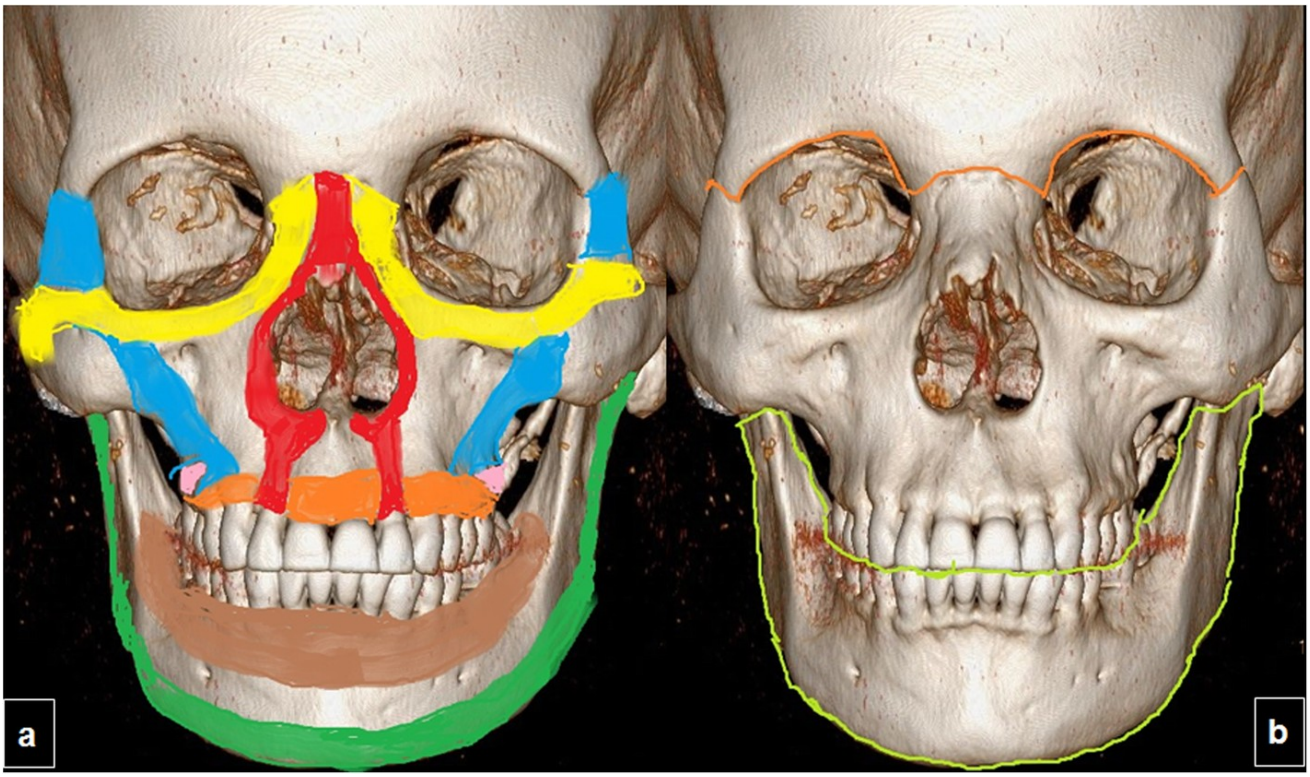


Figure 2.1. Facial buttresses and facial thirds. Thicker struts transmit forces and provide structural reference points; thin intervening regions house the orbit and sinuses. Source: Gómez Roselló et al., Insights Imaging 2020, CC BY 4.0; reproduced without alteration.

Color key in the source image: vertical buttresses—medial maxillary (red), lateral maxillary (blue), posterior maxillary (pink), and posterior mandibular (green); horizontal buttresses—upper transverse maxillary (yellow), lower transverse maxillary (orange), upper transverse mandibular (brown), and lower transverse mandibular (green).

2.2 Buttresses: a useful model, not a complete doctrine

The buttress model simplifies the face into vertical and horizontal load-bearing pathways. Vertically, the nasomaxillary and zygomaticomaxillary regions connect the maxillary dental arch to the frontal bone and skull base; posterior maxillary support and the mandibular rami complete the framework. Horizontally, the frontal bar, orbital rims and zygomatic arches, maxillary alveolus

and palate, and mandibular body resist deformation and maintain width. The model matters because reconstruction seeks stable bone along these pathways. It is not a substitute for evaluating the orbit, canthal support, skull base, dentition, or soft tissues.

2.3 Rings and paired failures

Several facial units behave like rings. The bony orbit is a ring around a volume-sensitive compartment. The mandible forms a mobile U-shaped ring; a fracture at one site should prompt a deliberate search for another, especially a contralateral condylar injury. The dental arches and palate are also ring-like: loss of arch width or segmental continuity creates malocclusion even when the remaining face appears symmetric. The practical rule is simple: when force breaks a ring, search the entire ring and its attachments.

Table 2.1. Structural unit–function–failure pattern.

Structural unit	Normal job	Failure pattern to seek
Orbit	Protects globe, maintains volume and muscle pathways	Rim plus internal-wall injury; soft-tissue herniation; apex or globe injury.
ZMC	Sets malar projection and part of facial width; forms lateral and inferior orbit	ZF, ZM, arch and sphenozygomatic interfaces; rotation may enlarge orbital volume or impinge the coronoid.
Maxillary arch and palate	Supports upper dentition and transverse width	Segmental mobility, palatal split, open bite, crossbite, Le Fort-level mobility.
Mandible	Maintains lower arch, ramal height, airway support and mastication	Second fracture, condylar injury, loss of height, floor-of-mouth hematoma.
Central midface	Supports nasal projection, medial canthi and lacrimal drainage	NOE comminution, telecanthus, septal injury, anterior skull-base extension.

2.4 Occlusion is a diagnostic and reconstructive reference

Occlusion is the relationship between the maxillary and mandibular teeth when the patient closes in the usual bite. It is often the most informative functional marker of lower and middle facial alignment. Ask the patient whether the bite feels normal before manipulating the face or inducing anesthesia. Look for premature contact, open bite, crossbite, dental-step deformity, missing teeth, wear facets, restorations, and preexisting asymmetry. In an edentulous patient or someone with poor dentition, the skeleton loses a major reference, so old photographs, prior dental records, dentures, and intact facial landmarks become more important.

CLINICAL BRIDGE

A right condylar fracture can shorten the right ramus and produce premature right posterior contact with contralateral open bite. A widened palatal fracture can produce transverse malocclusion even without a dramatic external deformity.

2.5 The orbit is a volume-sensitive container

The orbital rim is thick and mechanically protective, whereas the floor and medial wall are thin and adjacent to aerated sinuses. The globe is suspended within fat and connected to muscles, nerves, vessels, and fascial supports. Trauma may change orbital volume, incarcerate soft tissue, disrupt the globe, compress the optic nerve, or alter the path of an extraocular muscle. The imaging question is therefore not only “Is there a wall fracture?” but “What happened to the contents, volume, apex, and globe?”

2.6 The soft-tissue envelope has its own anatomy

A laceration can sever a canaliculus, eyelid margin, facial-nerve branch, parotid duct, nasal cartilage framework, orbicularis oris, or vermilion border without causing a major fracture. These injuries are easy to underweight when the CT is impressive. Examine facial movement before local anesthetic or operative paralysis when feasible; inspect wounds along the parotid duct and canthal regions; identify whether a laceration crosses the eyelid margin, oral commissure, alar rim, or vermilion border. Specialized structures often determine which consultant and repair technique are required.

OPERATIVE BRIDGE

Definitive reconstruction is the restoration of relationships: premorbid occlusion, orbital volume, facial width, height, projection, canthal position, and stable boundaries between the sinonasal and intracranial compartments. Hardware is a means, not the endpoint.

RESIDENT SYNTHESIS

Think of the face as dimensions connected by buttresses and rings, with occlusion and the orbit acting as high-value functional references. The greater the comminution, the fewer reliable landmarks remain.

CHAPTER 3

The First Minutes: Life Before Reconstruction

CENTRAL QUESTION

Which threats must be addressed before a detailed fracture plan?

OPENING CASE

A patient with panfacial fractures arrives sitting forward, spitting blood, and answering in short phrases. Saturation is 98% on oxygen. The temptation is to call the airway “stable.” The more useful question is whether this patient can protect and maintain the airway through supine positioning, transport, CT, analgesia, and progressive swelling.

Facial trauma fits inside the standard trauma primary survey. The face does not receive a separate exemption from airway, breathing, circulation, disability, exposure, cervical-spine protection, and associated-injury assessment. The resident’s special role is to anticipate how facial anatomy, bleeding, secretions, dental debris, and swelling may make the next deterioration harder to rescue.

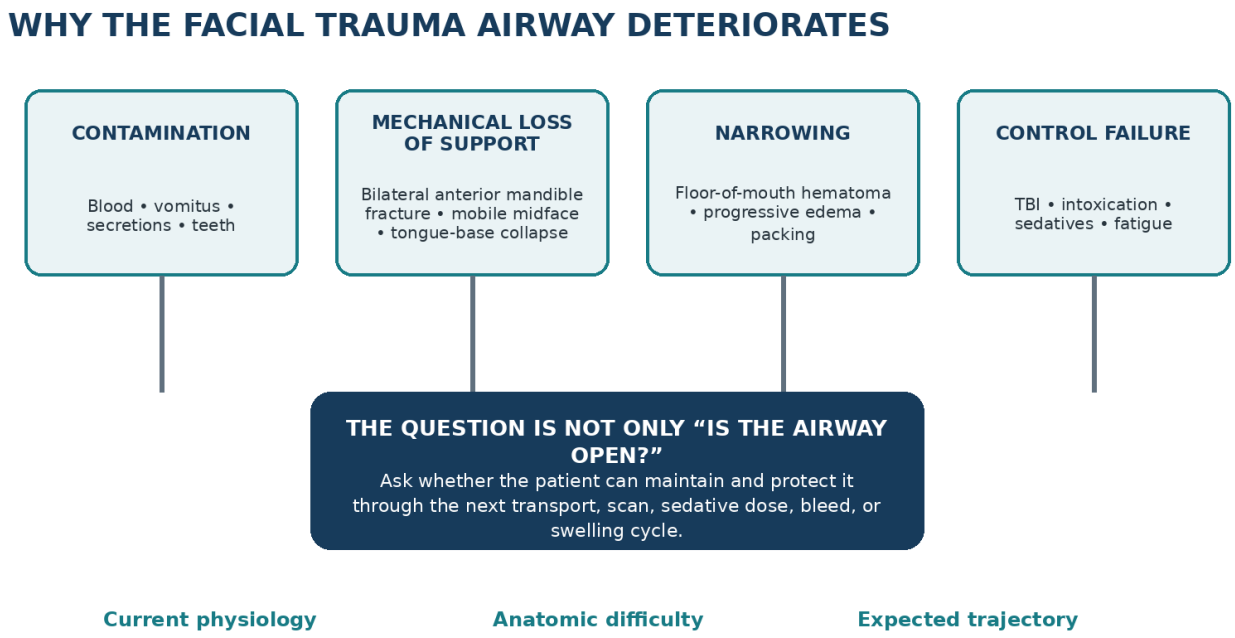


Figure 3.1. Airway deterioration is produced by contamination, loss of skeletal support, narrowing, or loss of airway control. Current oxygen saturation does not predict the next hour.

3.1 Assess the airway in three dimensions

Airway assessment should include current physiology, anatomic difficulty, and expected trajectory. Current physiology includes work of breathing, oxygenation, ventilation, voice, secretion handling, mental status, and fatigue. Anatomic difficulty includes blood, vomitus, loose teeth, limited mouth opening, mobile segments, cervical immobilization, edema, and altered landmarks. Expected trajectory includes ongoing hemorrhage, repeated transport, operative need, anticoagulation, fluid resuscitation, and the likelihood of progressive swelling.

Table 3.1. Airway findings and their consequences.

Finding	Mechanism	Immediate implication
Gurgling, pooling blood, repeated suction need	Contaminated upper airway	Aggressive suction and early definitive airway planning; oxygen saturation may remain deceptively normal.
Bilateral anterior mandibular fractures	Loss of tongue-base support	Anterior traction/manual support may

Finding	Mechanism	Immediate implication
Bilateral anterior mandibular fractures	Loss of tongue-base support	Anterior traction or manual support may transiently help, but deterioration remains possible.
Expanding floor-of-mouth hematoma	Progressive narrowing and tongue elevation	Do not wait for stridor; mobilize a difficult-airway and surgical-airway plan.
Mobile midface with heavy bleeding	Distortion, posterior displacement, contamination	Airway and hemorrhage control precede definitive reduction.
Reduced consciousness	Loss of protective reflexes	A structurally adequate airway may still be unprotected.
Severe trismus or distorted oral cavity	Difficult laryngoscopy or rescue	Plan primary and backup techniques with anesthesia or trauma; prepare surgical access.

3.2 Immediate airway maneuvers and definitive strategy

Initial actions are basic but high-yield: position when spinal precautions permit, provide oxygen, use two-suction readiness, remove visible loose debris, and maintain manual support of unstable segments when this improves patency. Definitive airway choice depends on urgency, cooperation, anatomy, available expertise, and the anticipated operation. Orotracheal intubation is commonly used for emergency control. Awake or flexible techniques may be useful in selected cooperative patients when time and anatomy permit. Blind nasal instrumentation should be avoided when central midface or skull-base injury is suspected; the definitive operative airway plan is a separate decision from emergency rescue. When intubation or ventilation cannot be accomplished safely, a surgical airway must not be delayed by repeated unsuccessful attempts.

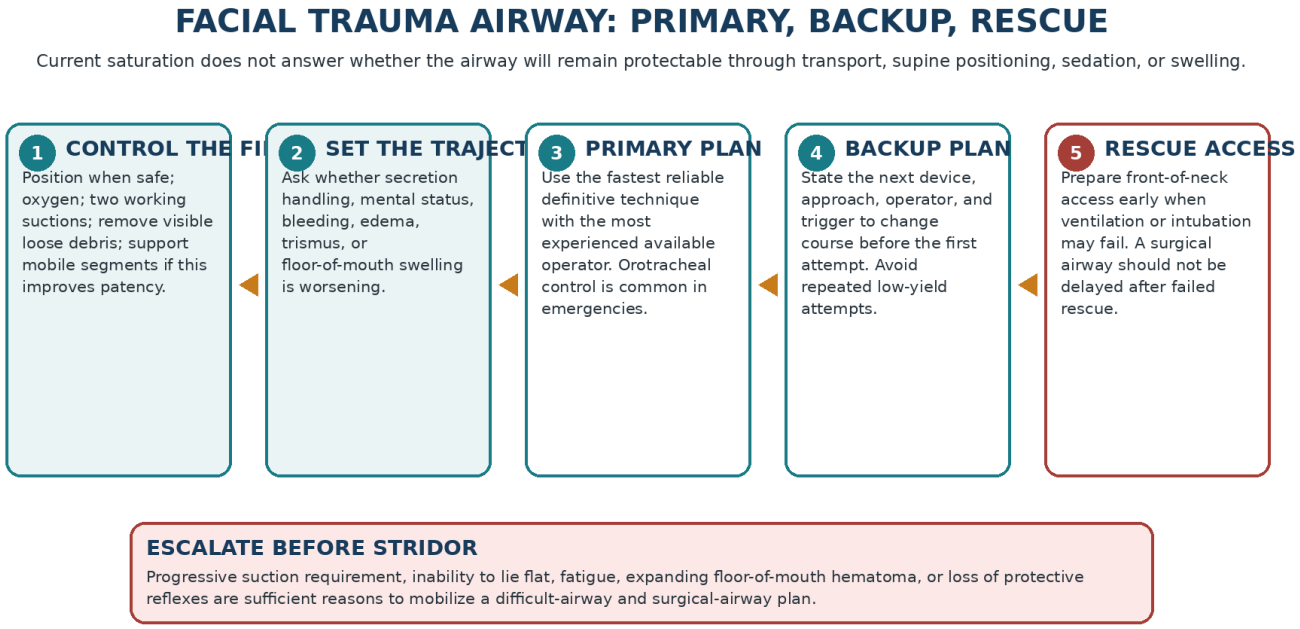


Figure 3.2. A facial-trauma airway plan should name the primary technique, backup technique, and rescue access before the first attempt. Progressive secretion burden, fatigue, expanding hematoma, or loss of airway control should trigger escalation before oxygen saturation falls.

OPERATIVE PEARL

The airway that is easiest in the trauma bay may interfere with maxillomandibular fixation or central midface reconstruction. Secure life first; then revise the airway plan deliberately with anesthesia and the operative team.

3.3 Hemorrhage: pressure before complexity

Most facial bleeding is controlled with suction, direct pressure, packing, temporary wound approximation, correction of coagulopathy, and stabilization of mobile segments. Bleeding from the nose, oral cavity, scalp, or cancellous fracture surfaces can be substantial and difficult to localize. Avoid blind clamping in wounds containing facial-nerve branches, ducts, vessels, or the globe. Persistent severe hemorrhage may require operative control, endovascular embolization, or—rarely—temporary external carotid control as part of a broader resuscitative strategy.

Table 3.2. Hemorrhage control is an escalation pathway, not a single maneuver.

Pattern	Immediate actions	Escalation trigger / next step
Diffuse nasal or oral bleeding	Two suctions, direct pressure, targeted packing, temporary approximation, correct coagulopathy, stabilize mobile segments.	Persistent transfusion requirement, inability to visualize/control the source, or recurrent hemodynamic instability → operative or endovascular control.

Pattern	Immediate actions	Escalation trigger / next step
Focal wound bleeding	Direct pressure and careful exposure under adequate lighting; avoid blind clamps.	Suspected named-vessel, facial-nerve, duct, globe, or deep-space injury → controlled exploration by the appropriate team.
Posterior epistaxis or deep midface hemorrhage	Airway protection, bilateral nasal strategy when appropriate, resuscitation, and early IR/operative discussion.	Continued major bleeding despite packing or difficult access → embolization or operative control.
Expanding floor-of-mouth or neck hematoma	Treat as an airway problem while resuscitating and reversing coagulopathy when indicated.	Do not wait for stridor; secure the airway and pursue source control.

A missing tooth deserves an airway search. If a tooth is not found at the scene or in the wound, inspect the oropharynx and imaging and consider chest imaging when aspiration is plausible. Dental fragments and dentures can become foreign bodies during airway manipulation.

3.4 Neurologic, skull-base, and vascular concerns

Altered mental status should not be attributed to intoxication or facial pain until intracranial injury, hypoxia, shock, and medication effects have been considered. Review head imaging for hemorrhage, pneumocephalus, frontal sinus posterior-table injury, cribriform or planum injury, and skull-base fractures. Clear rhinorrhea may suggest CSF leakage, but bedside appearance alone is unreliable; avoid provocative maneuvers and coordinate definitive evaluation with the skull-base and neurosurgical teams.

BCVI screening should follow the trauma center's protocol rather than an improvised facial-fracture rule. High-energy craniofacial injuries may coexist with cervical-spine and vascular injuries; CTA is appropriate when established screening criteria are met. The EAST guideline supports standardized screening in blunt polytrauma and CTA for high-risk cervical-spine injuries.[15]

3.5 The examination is a time series

Pain, edema, intoxication, sedation, intubation, distracting injuries, and altered consciousness degrade the examination. State the limitation explicitly and schedule reassessment. The “initial exam” is often several examinations: before and after airway control, after bleeding is controlled, when the patient can cooperate, after swelling evolves, and after any intervention that might change vision or occlusion. A normal early finding should also be trended when the clinical situation is dynamic.

DOCUMENTATION LANGUAGE

“Visual acuity and subjective diplopia could not be assessed because the patient was intubated and sedated. Pupils are equal and reactive without an obvious RAPD. Globe contour is preserved on CT. Repeat complete ocular examination is required after awakening.”

RESIDENT SYNTHESIS

The airway decision is based on physiology, anatomy, and trajectory. Control contamination and hemorrhage, identify intracranial and vascular risk, and convert every incomplete examination into a specific plan for reassessment.

ENT SKULL-BASE TESTING PEARL

Clear rhinorrhea or otorrhea is not confirmed by bedside glucose or a halo sign. If laboratory confirmation is needed, collect fluid for beta-2 transferrin (or beta-trace protein where locally available), avoid provocative maneuvers, and coordinate the next step with the skull-base team.

CHAPTER 4

The Threatened Eye

CENTRAL QUESTION

Which ocular findings require immediate action, and which permit deliberate evaluation?

OPENING CASE

An adult with an orbital fracture has increasing pain and proptosis after CT. He can count fingers but now has a new RAPD and a tense orbit. The fracture itself is not the emergency. The rising pressure inside the orbit is.

Vision is the most time-sensitive regional function in facial trauma. Swelling and ecchymosis make the eye difficult to inspect, while pain and intoxication make the patient unreliable. The solution is not to omit the examination; it is to use a minimum reproducible sequence, record objective measurements, and know which findings change the timeline.

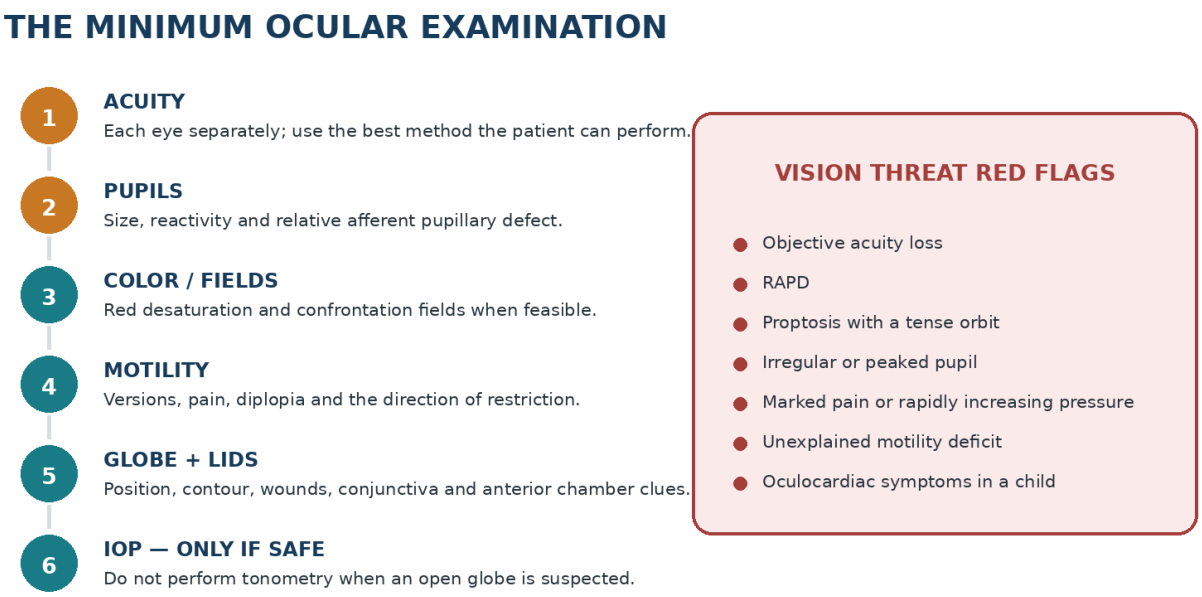


Figure 4.1. The minimum ocular examination. Visual acuity and pupillary function are the core objective measurements; tonometry is conditional on excluding an open globe.

4.1 Visual acuity is a vital sign for the eye

Measure each eye separately using the best method the patient can perform: a near card, distance chart, printed text, counting fingers, hand motion, or light perception. Document the method and correction used. A patient may report “normal vision” despite a measurable decline; conversely, poor participation can mimic visual loss. Repeat the measurement when pain, ointment, blood, or mental status improves.

Pupillary assessment includes size, shape, reactivity, and the swinging-flashlight test for a RAPD. A RAPD indicates asymmetric afferent dysfunction from the retina or optic nerve; it is especially important when the fundus and acuity assessment are limited. Red desaturation, color testing, and confrontation fields add sensitivity when feasible. Extraocular movements should be described by direction and symptoms rather than reduced to “EOMI” or “restricted.”

4.2 Suspected open globe

Clues include a peaked or irregular pupil, full-thickness corneal or scleral wound, uveal prolapse, markedly reduced acuity, shallow or asymmetric anterior chamber, dense subconjunctival hemorrhage that obscures the sclera, or abnormal globe contour on CT. No single negative CT finding excludes an open globe. When suspicion exists, avoid pressure on the eye, do not perform tonometry or forced ductions, place a rigid protective shield rather than a pressure patch, keep the patient NPO, control pain and

emesis, update tetanus as appropriate, and obtain urgent ophthalmologic management. Systemic antimicrobial selection follows the open-globe protocol and ophthalmology guidance.[7,8]

DO NOT

Do not pry the lids open with pressure on the globe, manipulate protruding tissue, perform tonometry, or delay the ophthalmology pathway to complete a lower-priority facial examination.

4.3 Orbital compartment syndrome

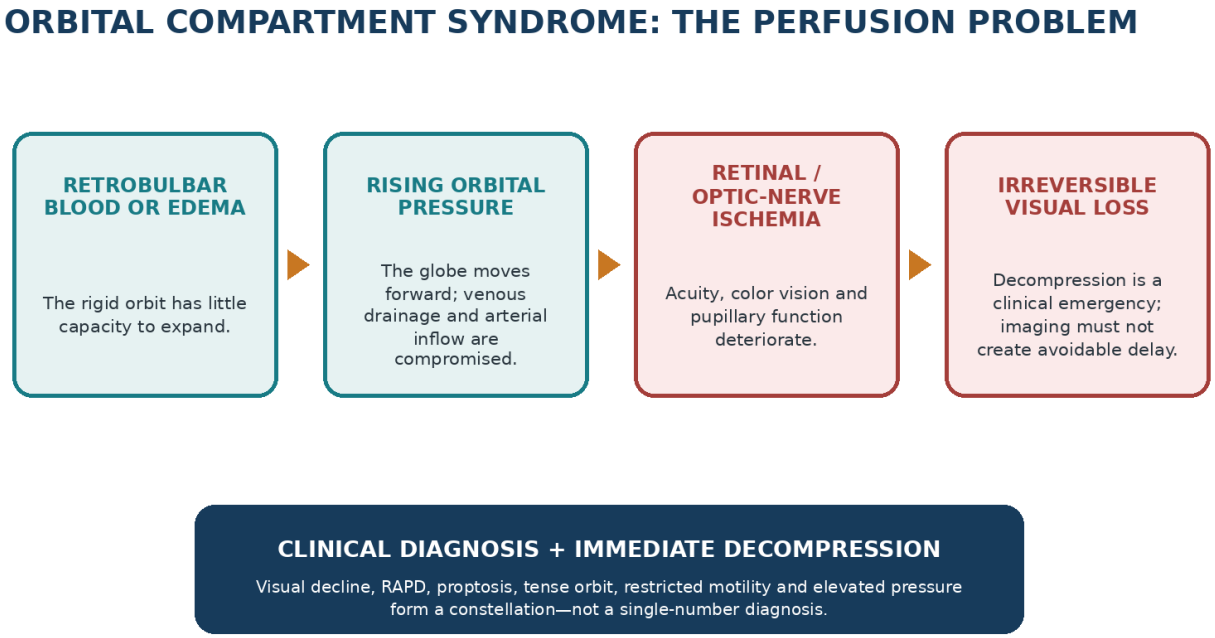


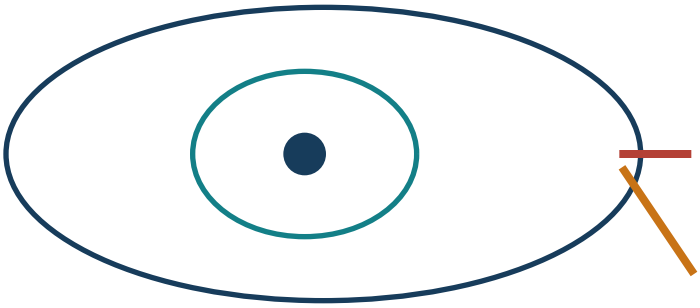
Figure 4.2. OCS is a pressure-perfusion emergency. The diagnosis is clinical; decompression should not wait for imaging when the constellation is compelling.

OCS occurs when hemorrhage or edema raises pressure within the relatively fixed orbital compartment. Venous outflow and then arterial perfusion are compromised, threatening the retina and optic nerve. The important constellation is acute or progressive visual decline, RAPD, proptosis, a tense orbit, restricted motility, elevated IOP when safe to measure, and severe orbital pain or pressure. Not every patient has every sign, and a threshold IOP should not replace clinical judgment.

When vision is threatened, lateral canthotomy with inferior cantholysis is a decompressive procedure, not a cosmetic eyelid maneuver. The diagnosis is clinical and treatment should not wait for imaging or a single pressure threshold. The pressure-releasing step is complete division of the inferior crus of the lateral canthal tendon; an incision without adequate cantholysis may fail to decompress the orbit. Reassess acuity, pupils/RAPD, orbital tension, motility, and IOP when safe. Ophthalmology remains necessary because associated globe, retinal, or optic-nerve injury may coexist and persistent compromise may require additional decompression.[5,23,27]

LATERAL CANTHOTOMY + INFERIOR CANTHOLYSIS

For clinically convincing orbital compartment syndrome with threatened vision: decompress immediately and reassess.



1. Lateral canthotomy
2. Identify and divide the inferior crus completely

1 CONFIRM THE INDICATION

Acute visual decline or RAPD with proptosis, a tense orbit, restricted motility, and elevated IOP when safe to measure.

2 CHECK FOR OPEN GLOBE

No pressure or tonometry if globe rupture is suspected. Shield, keep NPO, control pain and emesis, start protocol-directed systemic antibiotics, and activate ophthalmology.[7,8]

3 RELEASE THE INFERIOR CRUS

Incise the lateral canthus, identify the inferior limb of the lateral canthal tendon, and divide it fully; incomplete cantholysis may not decompress the orbit.

4 REASSESS AND ESCALATE

Repeat acuity, pupils or RAPD, tension, motility, and IOP when safe. Persistent compromise may require superior cantholysis or formal orbital decompression.

DO NOT DELAY FOR IMAGING

OCS is a clinical pressure-perfusion emergency. When the constellation is compelling and vision is threatened, obtain help and decompress rather than waiting for CT or a specific pressure threshold.

OPEN GLOBE + OCS BOTH PLAUSIBLE

Treat this as a dual time-critical emergency. Suspected open globe is the principal contraindication to routine bedside LCIC: shield the eye, avoid pressure and tonometry, and activate ophthalmology or oculoplastics immediately for a deliberate decompression decision. Do not wait for CT. Primary globe repair is generally pursued within 24 hours when feasible.[5,7,8,23,27]

Figure 4.3. Lateral canthotomy with complete inferior cantholysis for clinically convincing orbital compartment syndrome. The inferior crus is the key pressure-releasing structure; reassessment determines whether further decompression is required. Original educational schematic.

Figure 4.4. Two CT examples of posterior orbital and fissural injury. (a) Axial CT shows a hematoma at the posterior pole of the right globe near the optic nerve papilla (arrowhead) in a patient who developed traumatic optic neuropathy. (b) Axial bone-window CT shows narrowing of the left superior orbital fissure (black arrow) compared with the normal right side (white arrow), a pattern that can affect CN III, IV, V1, and VI. These images localize anatomy but do not replace objective visual and cranial-nerve examination. Source: Gómez Roselló et al., Insights Imaging 2020, CC BY 4.0; reproduced without alteration.

4.4 Other ocular injuries that change consultation urgency

Not every important ocular injury presents as open globe or orbital compartment syndrome. The minimum examination should also screen for anterior-segment, retinal, lenticular, eyelid, and ocular-motor abnormalities that require ophthalmologic interpretation.

Finding	What it may represent	Initial implication
Hyphema, irregular anterior chamber, or severe photophobia	Anterior-segment trauma, angle injury, traumatic iritis, or occult globe injury	Protect the eye, avoid unnecessary manipulation, and obtain urgent ophthalmologic assessment.

Finding	What it may represent	Initial implication
Lens asymmetry or dislocation on CT	Zonular disruption and traumatic lens displacement	Correlate with acuity and pupil findings; urgent ophthalmology.
Flashes, floaters, curtain, or unexplained field loss	Retinal tear/detachment or vitreous hemorrhage	Urgent dilated retinal evaluation.
Ptosis or pattern-specific ophthalmoplegia	CN III, IV, or VI injury; superior orbital fissure or orbital apex pathology	Document pupils and the exact motility pattern; review the apex/fissure and involve ophthalmology/neuro-ophthalmology.
Eyelid-margin, canthal, or canalicular laceration	Specialized eyelid or lacrimal injury	Shield/protect the globe and coordinate repair before routine skin closure.

4.5 Traumatic optic neuropathy is not orbital compartment syndrome

TON typically presents with reduced acuity, color vision, or visual field and a RAPD despite a relatively normal-appearing anterior eye. Direct injury may be visible at the optic canal or nerve; indirect injury may follow transmission of force without a dramatic orbital CT abnormality. The immediate task is to exclude reversible ocular and orbital causes, especially OCS, and involve ophthalmology or neuro-ophthalmology. A 2024 systematic review found no evidence that systemic steroids or optic-canal decompression improve outcomes in indirect TON and identified harm associated with megadose intravenous methylprednisolone in patients with traumatic brain injury.[9] This differs fundamentally from OCS, where decompression is time-critical.

EVIDENCE NOTE

Do not reflexively prescribe “high-dose steroids for optic neuropathy.” Current evidence does not support routine systemic steroids or optic-canal decompression for indirect TON. Individual direct compressive lesions require specialist interpretation.

4.6 Entrapment versus nonspecific restriction

Restricted gaze after trauma has a differential diagnosis: true mechanical entrapment, edema, hematoma, pain-limited effort, cranial neuropathy, muscle injury, globe injury, or orbital apex pathology. Entrapment is a clinicoradiographic diagnosis. CT may show soft tissue or a rounded muscle extending through a defect, but muscle adjacent to a fracture is not synonymous with entrapment. Forced-duction testing is an adjunct performed only when the globe is intact and the setting is appropriate; the bedside examination and symptoms remain central.

Children are vulnerable to trapdoor fractures because elastic bone can hinge open and recoil, incarcerating periorbita or muscle despite little displacement. The “white-eye” appearance is misleading. Restricted gaze accompanied by nausea, vomiting, bradycardia, syncope, or severe pain should be treated as urgent trapdoor entrapment until proven otherwise. Notify ophthalmology and the facial-trauma service immediately, keep the patient NPO, control nausea, and prepare for urgent release when examination and imaging support incarceration; prolonged entrapment risks muscle ischemia and persistent diplopia. A routine head CT can miss the injury, so trace the muscle and periorbita across dedicated thin coronal images.[13,24]

Table 4.1. Distinguishing major ocular pathways.

Problem	Key clues	Immediate response
Open globe	Irregular pupil, full-thickness wound, uveal tissue, very poor acuity, abnormal globe contour	Shield; no pressure/tonometry/forced duction; NPO, analgesia/antiemetic, urgent ophthalmology.
Orbital compartment syndrome	Progressive acuity loss, RAPD, proptosis, tense orbit, restricted motility, high IOP if measurable	Immediate decompression when vision threatened; do not delay for imaging alone.
Traumatic optic neuropathy	Acuity/color loss and RAPD with relatively normal anterior eye	Exclude OCS/globe injury; urgent specialist evaluation; no routine megadose steroids.
Entrapment	Directional restriction, diplopia/pain, supportive CT; nausea/bradycardia in child	Immediate ophthalmology and facial-trauma notification. Maintain NPO and control emesis. With bradycardia, syncope, or other oculocardiac symptoms, obtain an ECG and use continuous cardiac monitoring while urgent release is prepared.
Edema/pain-limited movement	Diffuse limitation, improving exam, no objective visual deficit or compelling incarceration	Serial examination and correlation with CT; do not label as entrapment reflexively.

RESIDENT SYNTHESIS

Measure vision, localize afferent dysfunction, protect a suspected open globe, decompress convincing OCS, distinguish TON from pressure-related ischemia, and treat a child with restricted gaze plus nausea, vomiting, bradycardia, or syncope as an urgent entrapment pathway.

CHAPTER 5

The Functional Facial Examination

CENTRAL QUESTION

How can the resident perform a complete examination despite swelling, pain, bleeding, and unreliable landmarks?

The examination should be a sequence, not an improvisation. Prepare suction and lighting, begin with observation, test vision before manipulating swollen tissues, then move from the upper face to the mandible and from function to structure. Adequate analgesia improves the examination, but document findings obtained before local anesthetic or neuromuscular blockade when nerve or muscle function is at risk.

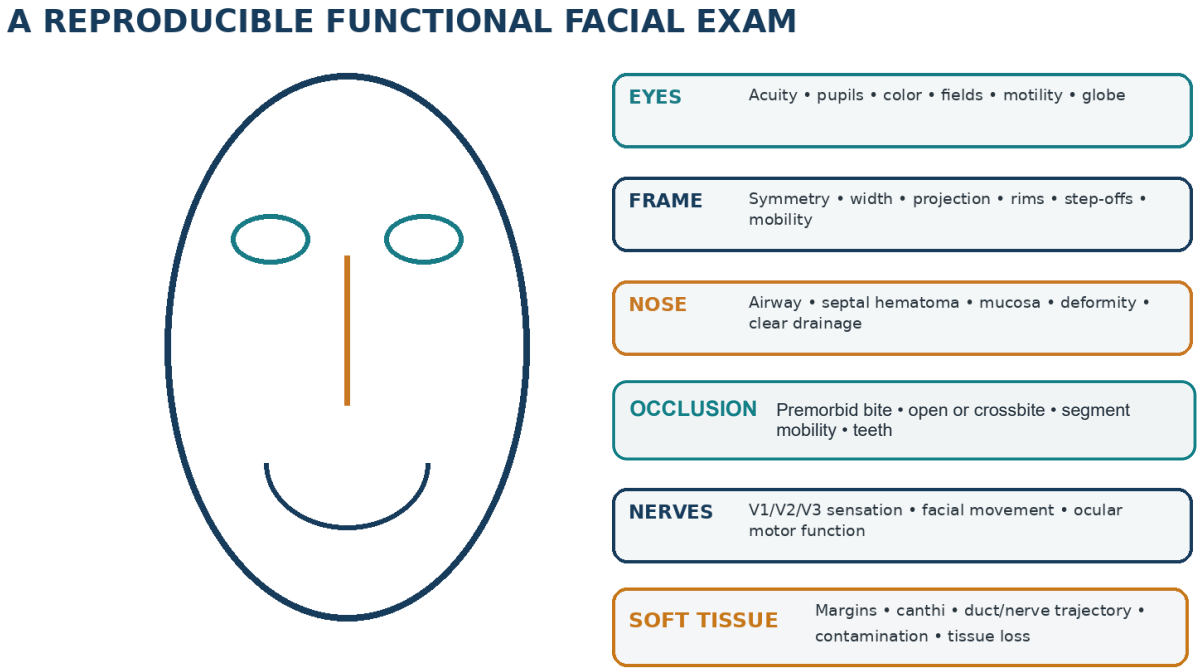


Figure 5.1. A functional examination tests six domains. It is designed to localize failure rather than merely record bruising.

DOCUMENT THE LIMITS

For every untestable domain, state what could not be assessed, why it is unavailable, and exactly when and by whom it will be repeated.

5.1 Obtain a targeted history before touching the face

A short history often supplies the only premorbid reference available. Obtain it before sedation, local anesthetic, intubation, or progressive swelling removes information. When the patient cannot participate, seek prehospital documentation, family observations, photographs, dental records, dentures, and prior imaging.

History domain	High-yield questions
Mechanism and trajectory	Direction and focal point of impact; velocity; fall height; penetrating or bite mechanism; loss of consciousness; ongoing bleeding or swelling.
Eye	Baseline vision; immediate versus delayed change; flashes, floaters, or curtain; gaze-dependent diplopia; pain, nausea, or bradycardia with eye movement.
Occlusion and dentition	Does the bite feel normal? Which teeth touched first before injury? Missing teeth, dentures, orthodontics, prior malocclusion, dental disease, or previous jaw surgery.
Prior anatomy and treatment	Previous facial fracture, rhinoplasty or septoplasty, orbital surgery, facial paralysis, or baseline asymmetry.
Medications and contamination	Anticoagulants or antiplatelet agents; immunosuppression; allergies; tetanus status; animal exposure or rabies context; time from injury and prior wound care.

5.2 Prepare and look before touching

Useful bedside equipment includes a bright light, suction, gloves and eye protection, visual acuity material, cotton-tipped applicators, nasal speculum, tongue depressor, gauze, and local anesthetic when appropriate. Before palpation, inspect facial symmetry from the front, oblique views, and above when possible. Look for globe asymmetry, malar flattening, increased facial width, nasal-root collapse, telecanthus, lip or commissure misalignment, lacerations, tissue loss, active bleeding, and dental-arch asymmetry.

5.3 Palpate the framework systematically

Palpate the frontal bone and supraorbital rims, nasal root and central midface, orbital rims, zygomatic arches and malar eminences, maxilla and palate, then the mandible from one condyle to the other. Compare sides. Step-offs and mobility may be more informative than tenderness. Crepitus suggests communication with aerated spaces but is nonspecific. Trismus can arise from pain, edema, mandibular injury, TMJ injury, or arch impingement on the coronoid process.

Maxillary mobility is assessed by stabilizing the forehead and gently moving the maxillary dental-bearing segment. Mobility level, palatal instability, and occlusion help distinguish isolated dentoalveolar injury from larger midface disruption. Avoid repeated forceful manipulation of an unstable face; the goal is localization, not proving the fracture.

5.4 The nasal examination cannot be external only

Assess external deviation, dorsal support, nasal airway, epistaxis, mucosal laceration, and septal position. A septal hematoma is a soft, fluctuant swelling arising from the septum, often bilateral, that does not shrink like the inferior turbinate after topical decongestion. Blood separates mucoperichondrium from cartilage, threatening cartilage nutrition and allowing abscess formation; prompt drainage and follow-up are required. A normal-looking nasal dorsum does not exclude it.

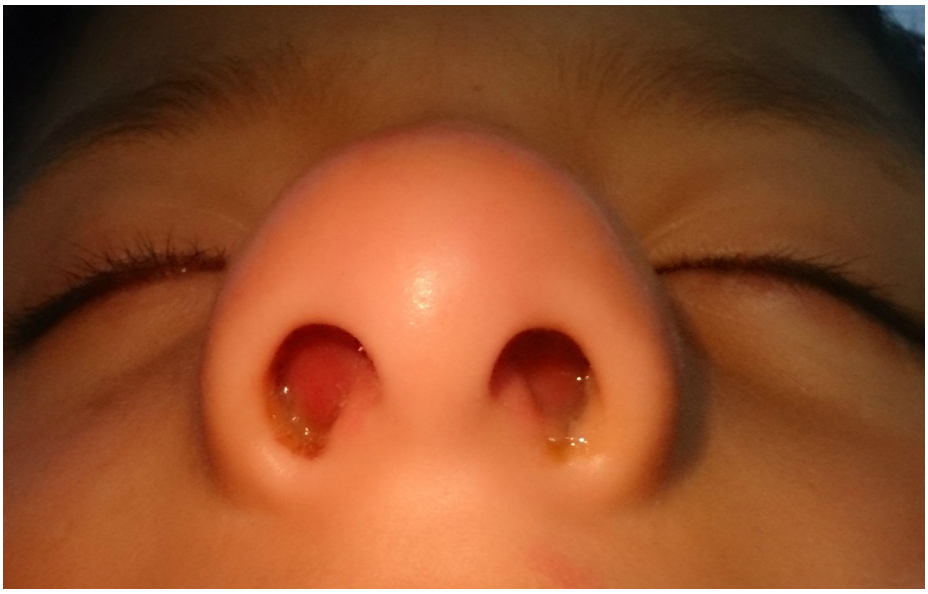


Figure 5.2. Bilateral septal swelling obstructing both nasal cavities after trauma. Inspect the septum in every nasal injury. Source: Afrodriguezg, Wikimedia Commons, CC BY-SA 4.0.

DO NOT MISS

Septal hematoma is a bedside diagnosis and a preventable cause of cartilage necrosis, abscess, septal perforation, and saddle deformity. It is not a problem to defer to routine fracture follow-up.

5.5 Occlusion and oral examination

Ask the patient to close gently into the usual bite and identify the first point of contact. Inspect for open bite, crossbite, premature contact, dental step-offs, mobile teeth, alveolar segments, palatal ecchymosis or laceration, floor-of-mouth swelling, tongue injury, and intraoral wounds. Record missing, fractured, intruded, or avulsed teeth. The patient's report that the bite is "off" can be more sensitive than the examiner's first visual impression, especially when preexisting dental irregularity exists.

Table 5.1. Occlusion as localization.

Occlusal finding	Possible localization	Reasoning
Anterior open bite	Bilateral condylar/ramal shortening, posterior maxillary impaction, or preexisting pattern	Loss of posterior vertical height or altered maxillary position prevents anterior contact.
Unilateral posterior premature contact with	Ipsilateral condylar or ramus injury	Shortening/rotation changes the mandibular

Occlusal finding	Possible localization	Reasoning
Unilateral posterior premature contact with contralateral open bite	Ipsilateral condylar or ramus injury	Shortening or rotation changes the mandibular hinge relationship.
Transverse crossbite or widened arch	Palatal or dentoalveolar split	The maxillary arch has lost transverse stability.
Step between adjacent teeth	Dentoalveolar or mandibular-body segment	A dental-bearing segment has displaced.
Subjective change with subtle exam	Occult condylar, nondisplaced mandibular, or maxillary injury	Premorbid occlusion is precise; small skeletal changes may be perceptible.

5.6 Medial canthi, cranial nerves, and specialized structures

After central trauma, inspect intercanthal distance and nasal-root projection. Gentle bimanual assessment of the medial canthal region may reveal instability, but severe swelling and comminution limit bedside classification. Epiphora, lacerations near the medial eyelid, or avulsed canthal tissues raise concern for lacrimal or MCT injury. Detailed repair belongs to later volumes; initial recognition determines consultation and wound handling.

Test V1, V2, and V3 sensation and document the distribution rather than “CN V intact.” V2 numbness is common with orbital floor and ZMC injuries; lower-lip and chin numbness localizes to the inferior alveolar/mental pathway. Test facial movement by branches when feasible. A wound anterior to the parotid gland or along a line from the tragus toward the upper lip should prompt evaluation of the parotid duct and distal facial nerve. Normal movement does not fully exclude a partial or very distal nerve injury.

5.7 Soft-tissue wounds are three-dimensional injuries

Irrigate sufficiently to see depth and remove gross contamination, but preserve viable tissue. Identify involvement of the eyelid margin, canthi, tarsus, lacrimal system, alar rim, cartilage, vermilion border, oral commissure, muscle, facial nerve, and parotid duct. Photograph wounds when institutional policy and consent allow. Temporary approximation may control bleeding and protect tissue, but do not close a critical-structure injury blindly simply because the skin edges meet.

5.8 Document limitations and repeat the examination

Table 5.2. Documentation that carries clinical meaning.

Domain	Useful documentation	Inadequate shorthand
Vision	“Near acuity 20/30 OD, 20/20 OS with correction; no RAPD.”	“Vision okay.”
Motility	“Pain and limitation in left upgaze; no nausea or bradycardia.”	“EOM restricted.”
Occlusion	“Premature right molar contact with left open bite; patient states bite is new.”	“Malocclusion.”
Sensation	“Reduced light touch over left cheek, upper lip, and maxillary gingiva (V2).”	“Facial numbness.”
Reliability	“Acuity and subjective diplopia unobtainable due to intubation; repeat after extubation.”	Leaving the field blank.

RESIDENT SYNTHESIS

Examine function before fracture labels: objective vision, facial dimensions, maxillary and mandibular stability, premorbid occlusion, septum, sensation, movement, and specialized soft tissues. Then state what remains untested.

EAR AND LATERAL SKULL-BASE SCREEN

Inspect: auricular hematoma, laceration, exposed cartilage, EAC injury or step-off, hemotympanum, perforation, and clear otorrhea.
Document: hearing asymmetry, vertigo or nystagmus, and facial-nerve function - including whether weakness was immediate or delayed.
Avoid: canal irrigation or pneumatic otoscopy when a temporal-bone fracture or CSF fistula is possible. Auricular hematoma requires prompt drainage and compression.[4]

TIME-CRITICAL DENTAL PEARL

An avulsed permanent tooth has a short viability window. Handle it only by the crown and arrange immediate dental or OMFS management. If immediate replantation is not being performed, keep the tooth in an approved preservation medium or cold milk - never dry gauze. Do not replant a primary tooth. If the tooth is unaccounted for, exclude aspiration or wound retention.[29]

CHAPTER 6

Reading the Facial Trauma CT

CENTRAL QUESTION

How should the resident independently review imaging without becoming lost in dozens of fracture lines?

CT is the reference standard when acute facial fracture imaging is required, but its value depends on how it is read. A list of involved bones is less useful than a description of disrupted structural units, displacement, critical contents, and functional implications. The ACR Appropriateness Criteria support noncontrast maxillofacial CT for suspected frontal, midface, and mandibular injury after the primary survey. Isolated uncomplicated nasal trauma remains primarily a clinical diagnosis in many ENT practices; obtain CT when the mechanism, examination, or associated findings raise concern for NOE, orbital, frontal-sinus, skull-base, or other complex injury.[2,28]

6.1 Know what study you have

A dedicated thin-section maxillofacial CT permits multiplanar review from the frontal bone through the mandible. Bone and soft-tissue windows answer different questions. A routine head CT may include much of the face but can miss or incompletely characterize thin orbital, central-midface, dental, or mandibular injuries because of field of view, slice thickness, and reconstruction choices. Three-dimensional reconstructions are useful for overall displacement and communication, but they can conceal internal orbital walls, the skull base, minimally displaced lines, and soft-tissue pathology. Do not obtain dedicated CT solely to prove an otherwise uncomplicated isolated nasal fracture when the result will not change management.

CTA is not routine for every facial fracture. Use it when the mechanism and associated findings meet institutional vascular-screening criteria or when there is active arterial bleeding or vascular concern. MRI has a limited acute role and is reserved for selected soft-tissue, optic-pathway, or foreign-body questions after safety considerations.

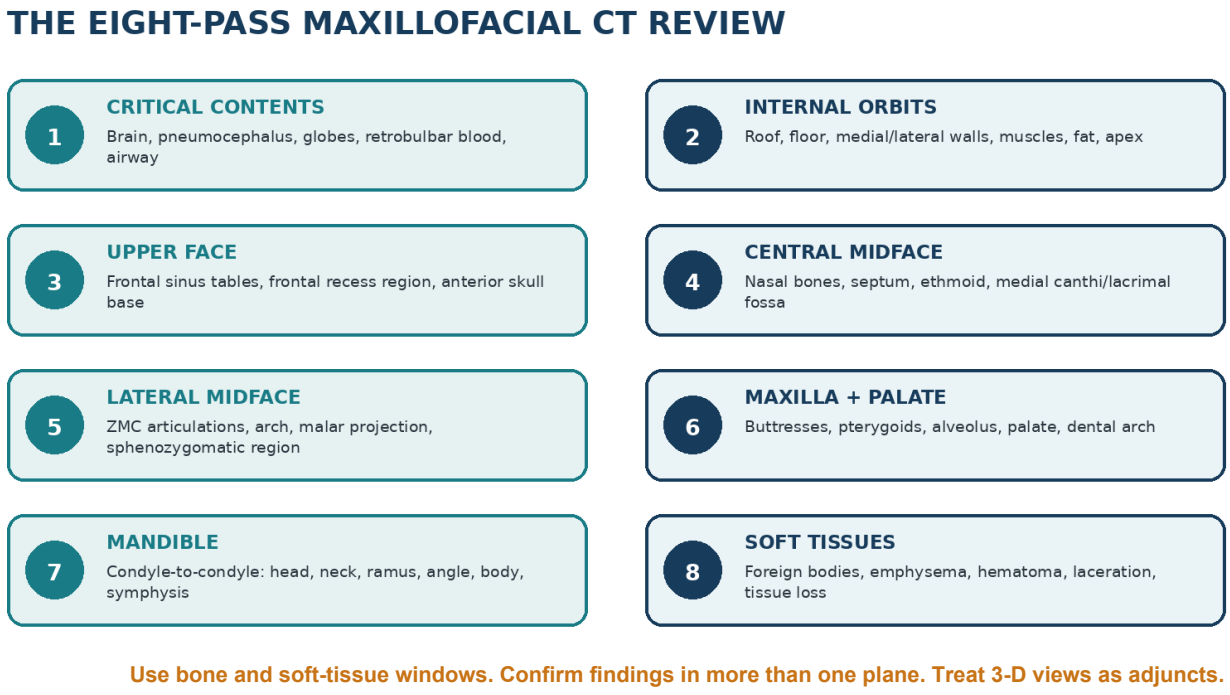


Figure 6.1. The eight-pass CT review. The sequence deliberately places contents and complications before fracture classification.

6.2 Pass 1: critical contents

Before tracing the skeleton, look for intracranial hemorrhage, pneumocephalus, abnormal globe contour, lens dislocation, retrobulbar hemorrhage, marked proptosis, orbital apex crowding, airway narrowing, and foreign bodies. This prevents the common error of spending several minutes naming fractures while a more urgent complication is visible.

6.3 Pass 2: the internal orbits

Review each orbit side-by-side in axial, coronal, and sagittal planes. Trace the roof, floor, medial wall, and lateral wall; inspect muscle shape and course, herniated fat, the infraorbital canal, orbital apex, superior orbital fissure, and globe position. A muscle that is adjacent to or partially herniated through a defect does not prove clinical entrapment. Conversely, a pediatric trapdoor injury may have subtle bony displacement; trace the muscle across sequential coronal images.

6.4 Pass 3: frontal sinus and anterior skull base

Identify anterior-table and posterior-table injury, displacement and comminution, sinus opacification, pneumocephalus, and fractures extending toward the cribriform plate, planum, or frontal recess region. Posterior-table involvement changes the concern from contour alone to intracranial separation and CSF leakage. Sinus opacification after trauma commonly reflects blood and is not by itself sinusitis.

6.5 Pass 4: central midface

Trace the nasal bones, bony septum, frontal processes of the maxilla, ethmoid complex, medial orbital walls, lacrimal fossae, and nasal root. Ask whether the injury is a simple nasal fracture or part of an NOE/central skull-base pattern. Comminution at the lacrimal fossa predicts loss of a simple stable fragment for MCT support even though CT does not directly show tendon integrity.

6.6 Pass 5: lateral midface

Follow the zygomaticofrontal interface, lateral orbital wall and sphenozygomatic region, infraorbital rim, zygomaticomaxillary buttress, and zygomatic arch. Compare malar projection and arch contour side-to-side. Describe rotation, not just displacement: inward rotation can increase orbital volume and flatten the cheek; arch displacement can narrow the space for the coronoid and produce trismus.

6.7 Pass 6: maxilla, pterygoids, palate, and teeth

Trace vertical buttresses, maxillary sinus walls, pterygoid plates, alveolar process, hard palate, and dental arch. Pterygoid plate fracture is required for a classic Le Fort pattern but does not by itself establish one; high-energy trauma can produce pterygoid fractures in non-Le Fort configurations. Identify palatal splits and dentoalveolar displacement because they change arch width and occlusion.

6.8 Pass 7: mandible condyle to condyle

Begin at one condylar head and proceed through the neck, ramus, angle, body, parasymphysis, symphysis, and around the opposite side. Evaluate TMJ position, displacement, comminution, inferior alveolar canal involvement, teeth in the fracture line, and floor-of-mouth soft tissues. A body or parasymphyseal fracture should trigger a deliberate search for a contralateral condylar injury.

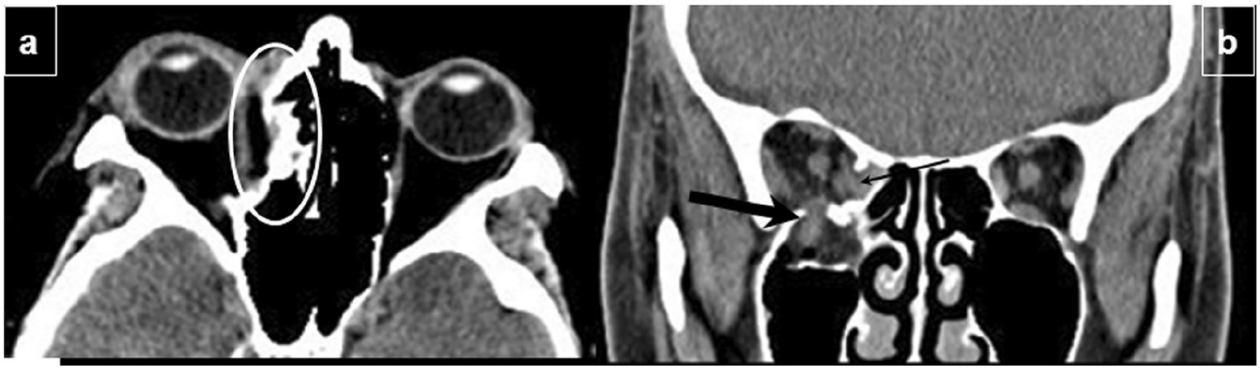
6.9 Pass 8: soft tissues

Look beyond subcutaneous emphysema. Search for retained glass or metal, laceration depth, hematoma, active extravasation when contrast is available, tissue avulsion, parotid-region injury, airway edema, and displaced teeth. Correlate foreign bodies with wounds and operative access. Wood and other organic material may be difficult to recognize and may require specialized imaging discussion.

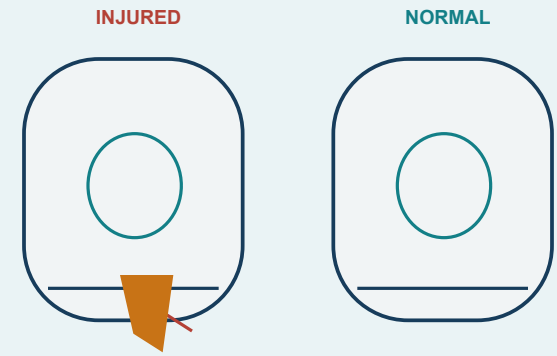
6.10 Imaging atlas: patterns that change interpretation

The following examples are not a substitute for scrolling through the complete examination. They demonstrate the relationships that should be traced across planes and translated into clinical questions.

CT ATLAS 1: ORBITAL WALL FAILURE AND CONTENTS



PEDIATRIC TRAPDOOR: SMALL BONE FINDING, LARGE SOFT-TISSUE PROBLEM



Clinical clues may be stronger than CT: restricted gaze plus pain, nausea or vomiting, bradycardia, or syncope. CT may understate incarceration; trace the muscle and periorbita across thin multiplanar images.

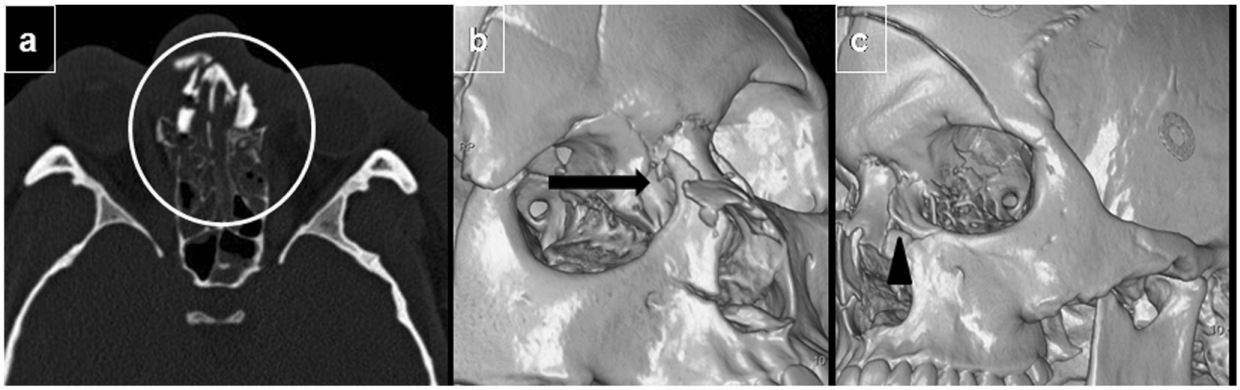
READ THE CONTENTS, NOT ONLY THE LINE

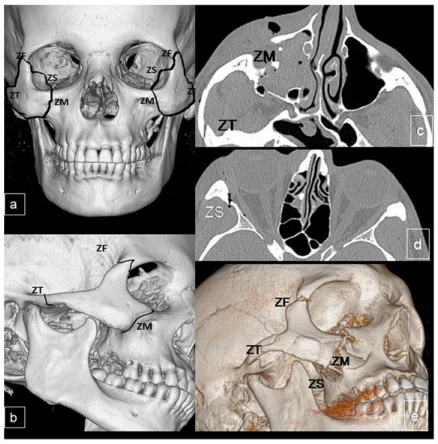
Adult blowout pattern: describe the wall defect, fat or muscle herniation, muscle shape, globe position, and orbital apex.

Pediatric trapdoor pattern: a subtle hinged fracture may incarcerate tissue. Restricted gaze with vomiting or bradycardia requires immediate specialty notification, ECG or cardiac monitoring when symptomatic, and urgent release when entrapment is supported.[13,24]

Figure 6.2. Orbital-wall failure. The adult CT example shows medial and floor disruption with herniated orbital contents; the schematic emphasizes why a pediatric trapdoor injury can have little visible displacement yet severe incarceration. Source CT: Gomez Rosello et al., Insights Imaging 2020, CC BY 4.0; composite and educational annotations added.

CT ATLAS 2: CENTRAL AND LATERAL MIDFACE



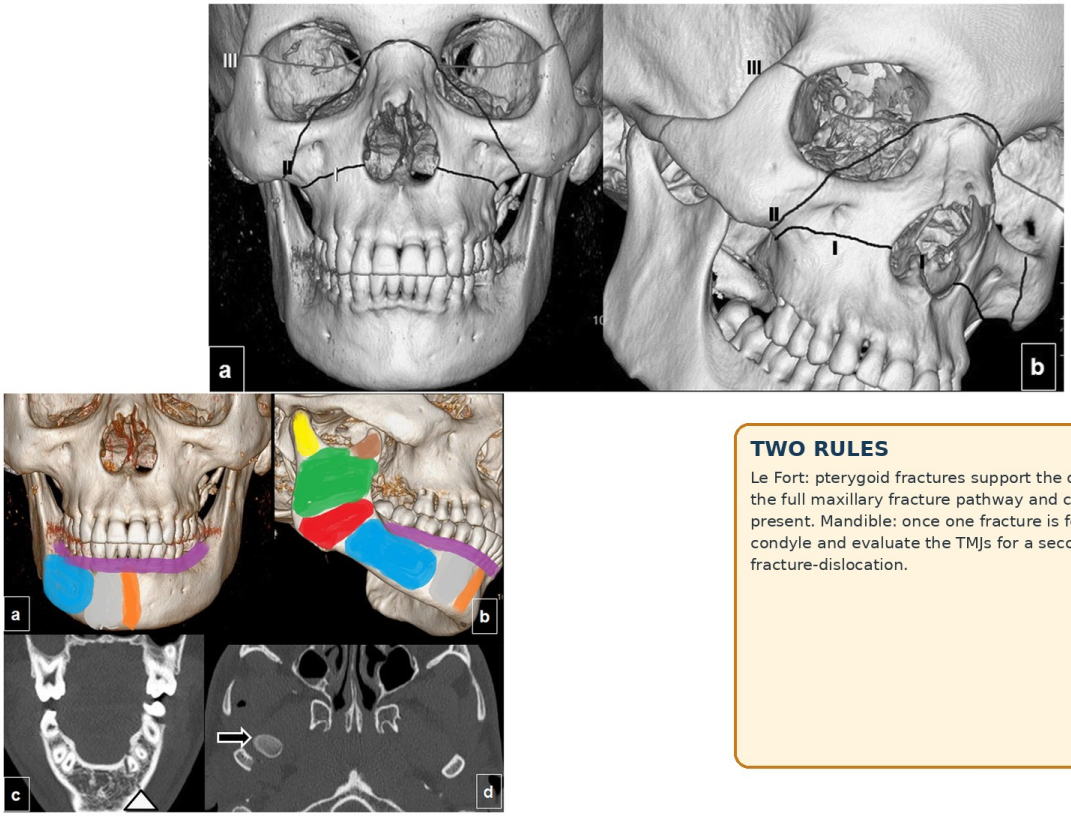


WHAT CHANGES THE REPORT

NOE: describe central comminution at the lacrimal fossa, intercanthal widening, nasal-root collapse, medial orbital involvement, and skull-base extension; CT cannot directly prove medial canthal tendon integrity. ZMC: follow ZF, ZS, ZM, and arch interfaces and describe rotation, malar retrusion, orbital-volume change, and coronoid clearance.

Figure 6.3. Central and lateral midface. NOE assessment centers on comminution at the lacrimal fossa and the stability of the tendon-bearing fragment; ZMC assessment follows all four articulations and describes rotation, projection, orbital volume, and arch clearance. Source images: Gómez Roselló et al., Insights Imaging 2020, CC BY 4.0; composite and educational annotations added.

CT ATLAS 3: FRACTURE PATHWAYS AND THE SECOND RING FAILURE



TWO RULES

Le Fort: pterygoid fractures support the diagnosis only when the full maxillary fracture pathway and clinical mobility are present. Mandible: once one fracture is found, trace condyle to condyle and evaluate the TMJs for a second fracture or fracture-dislocation.

Figure 6.4. Fracture pathways and paired failures. Le Fort classification requires the complete maxillary pathway, not a pterygoid fracture in isolation. The mandibular CT demonstrates the ring principle: a body fracture may pair with contralateral condylar injury and TMJ displacement. Source images: Gómez Roselló et al., Insights Imaging 2020, CC BY 4.0; composite and educational annotations added.

DESCRIBING DISPLACEMENT: SAY WHAT THE FRAGMENT DID

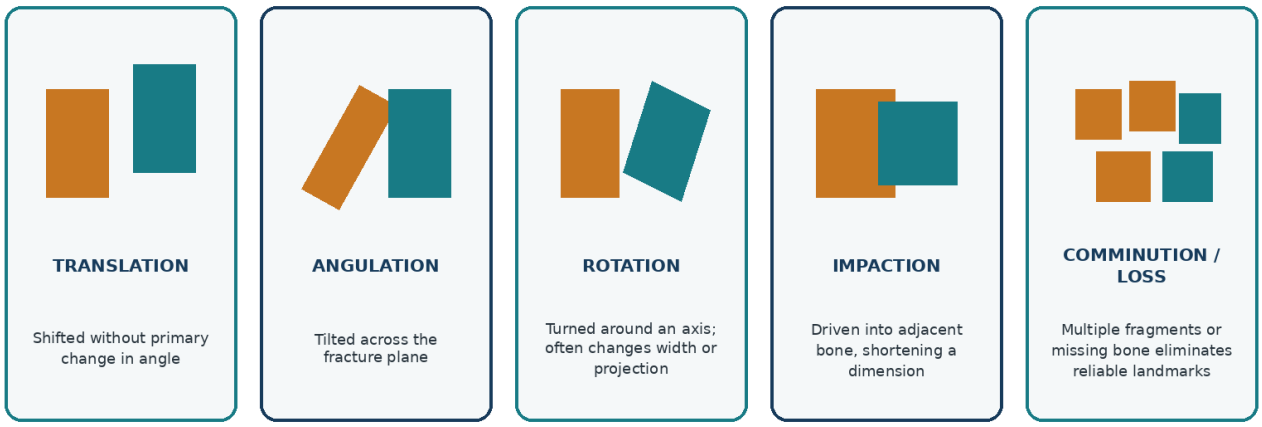


Figure 6.5. Displacement should be described as translation, angulation, rotation, impaction, comminution, or bone loss. These terms predict changes in facial dimensions and operative difficulty.

6.11 Follow relationships across planes

Important findings should be confirmed in more than one plane. Axial images are strong for arches, lateral walls, pterygoids, mandibular body, and rotational displacement. Coronal images show orbital floors and roofs, vertical buttresses, palate, and mandibular height. Sagittal images clarify anterior-posterior displacement, frontal sinus tables, orbital floor slope, and condylar relationships. Three-dimensional views summarize the outer framework but should be the final pass, not the first.

Table 6.1. Imaging language that changes management.

CT statement	Why it is insufficient	More useful formulation
“Multiple left facial fractures.”	No unit, displacement, or functional consequence.	“Displaced left ZMC injury with inward rotation, malar retrusion, arch narrowing, and an associated floor defect.”
“Inferior rectus herniation.”	Does not establish clinical entrapment.	“Inferior rectus and fat extend through the floor defect; correlate with directional motility, pain, diplopia, and oculocardiac symptoms.”
“Pterygoid fractures consistent with Le Fort.”	Pterygoids alone are not diagnostic.	“Bilateral pterygoid fractures plus maxillary fracture pathways producing Le Fort I-level mobility.”
“Frontal sinus fracture.”	Does not describe intracranial boundary or drainage region.	“Anterior- and posterior-table fractures with small pneumocephalus; evaluate CSF leak and frontal recess involvement.”
“Mandible fracture.”	Misses multiplicity, occlusion, and joint relationship.	“Right parasymphyseal fracture with contralateral displaced condylar-neck fracture and loss of ramal height.”

DIAGNOSTIC TRAP

The radiology report is a second interpretation, not a substitute for independent review. Conversely, disagreement should trigger collaborative rereview—not casual dismissal of the report.

RESIDENT SYNTHESIS

Read critical contents first, then each facial unit in a fixed order. Confirm in multiple planes, describe displacement and comminution, and connect the image to vision, occlusion, dimensions, movement, and intracranial boundaries.

CHAPTER 7

Building the Injury Map

CENTRAL QUESTION

How do examination and imaging become a coherent diagnosis rather than a disconnected list?

The injury map is the bridge from data to action. It is not a drawing of every fracture line. It is a structured statement of location, displacement, functional consequence, associated critical-structure injury, soft-tissue condition, uncertainty, and urgency. A good map lets another clinician understand the patient without reopening every CT image.

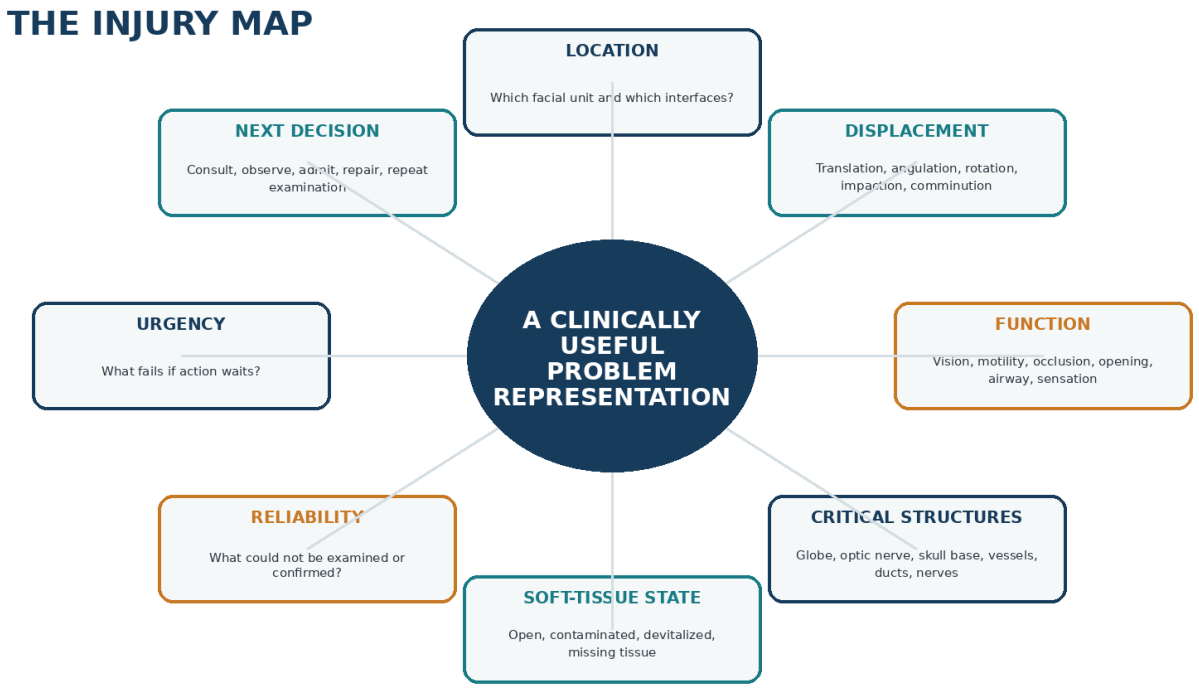


Figure 7.1. Eight components of the injury map. The center is a problem representation that explains what the injury is doing.

7.1 Start with a one-sentence problem representation

Compare two descriptions. “Left orbital floor, maxillary sinus, and zygomatic fractures” lists bones. “Displaced left ZMC injury with malar flattening, V2 numbness, trismus from arch narrowing, and an associated floor defect without objective visual compromise” describes a structural unit, its displacement, the functional effects, and the immediate ocular status. The second formulation is easier to triage and easier to defend.

7.2 Build by domains

Table 7.1. Injury-map domains.

Domain	Question	Example
Physiology	Are airway, breathing, circulation, and neurologic status stable?	“Airway protected by oral ETT; bleeding controlled; hemodynamically stable.”
Vision/globe	What was objectively measured and what is threatened?	“20/25 OU, no RAPD, full motility; no globe contour abnormality or retrobulbar hematoma.”
Framework	Which facial unit is displaced and how?	“Left ZMC internally rotated with loss of malar projection.”
Occlusion/movement	Is bite, mouth opening, or segment stability altered?	“New left open bite and mobile maxillary segment.”
Specialized structures	Are canthus, lacrimal system, nerve, duct, eyelid, septum, or oral sphincter involved?	“Medial eyelid laceration crosses canalicular trajectory.”
Contamination	Open wound, oral communication, bite, devitalization, or foreign body?	“Open mandibular fracture through gingival laceration; gross contamination absent.”
Reliability	What cannot be known yet?	“Premorbid occlusion uncertain because patient is edentulous and dentures

Domain	Question	Example
Reliability	What cannot be known yet?	"Premorbid occlusion uncertain because the patient is edentulous and dentures are unavailable."
Timeline	What fails if treatment waits?	"No emergent skeletal indication; requires admission for serial ocular and airway examination."

7.3 Classification systems are compression tools

Le Fort, NOE, ZMC, orbital-wall, frontal-sinus, and mandibular classifications can compress complex anatomy into shared language. They are useful only if the listener understands what the label communicates and what it omits. A Le Fort designation does not state displacement, palatal injury, occlusion, or whether the pattern is complete. An NOE type does not replace examination of canthal position and lacrimal injury. “Orbital floor fracture” does not state visual status, entrapment, globe injury, or change in volume. Classification should follow—not replace—the functional assessment.

BOARD PEARL

On oral boards, state immediate threats and functional deficits before reciting classifications. A sophisticated answer may never need a classification if the anatomy and management are described precisely.

7.4 Recognize combined patterns

Facial injuries cluster because forces cross an interconnected framework. A ZMC injury commonly includes an internal orbital defect. Central NOE trauma may extend into the frontal sinus or anterior skull base. Le Fort-level injuries may coexist with palatal, dentoalveolar, mandibular, and ZMC fractures. A parasymphyseal mandibular fracture may pair with a contralateral condylar fracture. When one component is found, search the predictable adjacent units and the second point of ring failure.

7.5 Make uncertainty visible

Uncertainty is not weakness when it is named and managed. Examples include unmeasurable acuity, unknown premorbid occlusion, uncertain CSF leak, outside CT with thick sections, suspected duct or canalicular injury, or inability to assess facial movement after local anesthetic. Attach an action to each uncertainty: repeat after extubation, obtain dedicated imaging, compare prior photographs, involve ophthalmology, or explore the wound under controlled conditions.

Table 7.2. From label to problem representation.

Weak presentation	Why it fails	Stronger presentation
“Panfacial fractures, stable.”	Does not state airway, vision, occlusion, or what “stable” means.	“Intubated high-energy panfacial injury; hemodynamically stable, globes preserved on CT, ocular examination limited, maxilla mobile, occlusion unavailable.”
“No entrapment on CT.”	Entrapment is clinicoradiographic and may be subtle.	“No CT evidence of muscle incarceration; full motility without nausea, bradycardia, or diplopia.”
“Open mandible fracture.”	Does not state site, displacement, occlusion, dentition, or contamination.	“Displaced left body fracture communicating with gingival laceration, new malocclusion, intact airway, no gross contamination.”
“Nasal fracture; follow up.”	Misses septum and central injury screening.	“Isolated displaced nasal bone injury with patent airway, no septal hematoma, telecanthus, ocular deficit, or CSF concern.”

7.6 A model oral presentation

PRESENTATION

“This is a hemodynamically stable adult after a high-energy MVC. The airway is protected with an oral ETT. The ocular examination is limited by sedation, but pupils are equal and reactive without obvious RAPD and the globes retain normal contour on CT. There is a displaced left ZMC injury with inward rotation and arch narrowing, a left floor defect, mobile Le Fort I-level maxilla, palatal split, and traumatic malocclusion. CT shows no retrobulbar hematoma, pneumocephalus, or posterior-table frontal sinus injury. Immediate priorities are serial ocular examination after awakening, oral care and appropriate short-course prophylaxis for the open oral injury per protocol, and coordinated delayed reconstruction after stabilization.”

RESIDENT SYNTHESIS

A useful presentation states physiology, objective vision, functional deficits, structural units, displacement, contamination, uncertainty, and timeline. It allows the plan to follow logically from the description.

CHAPTER 8

The Initial Management Plan

CENTRAL QUESTION

What must happen now, what can wait, and what can be managed without an operation?

The phrase “needs surgery” is incomplete. Facial trauma decisions require two separate judgments: whether an intervention is indicated and when harm will occur if it is delayed. The correct timeline is determined by airway, vision, hemorrhage, neurologic risk, contamination, evolving function, soft-tissue viability, and the ability to monitor the patient—not by CT drama alone.

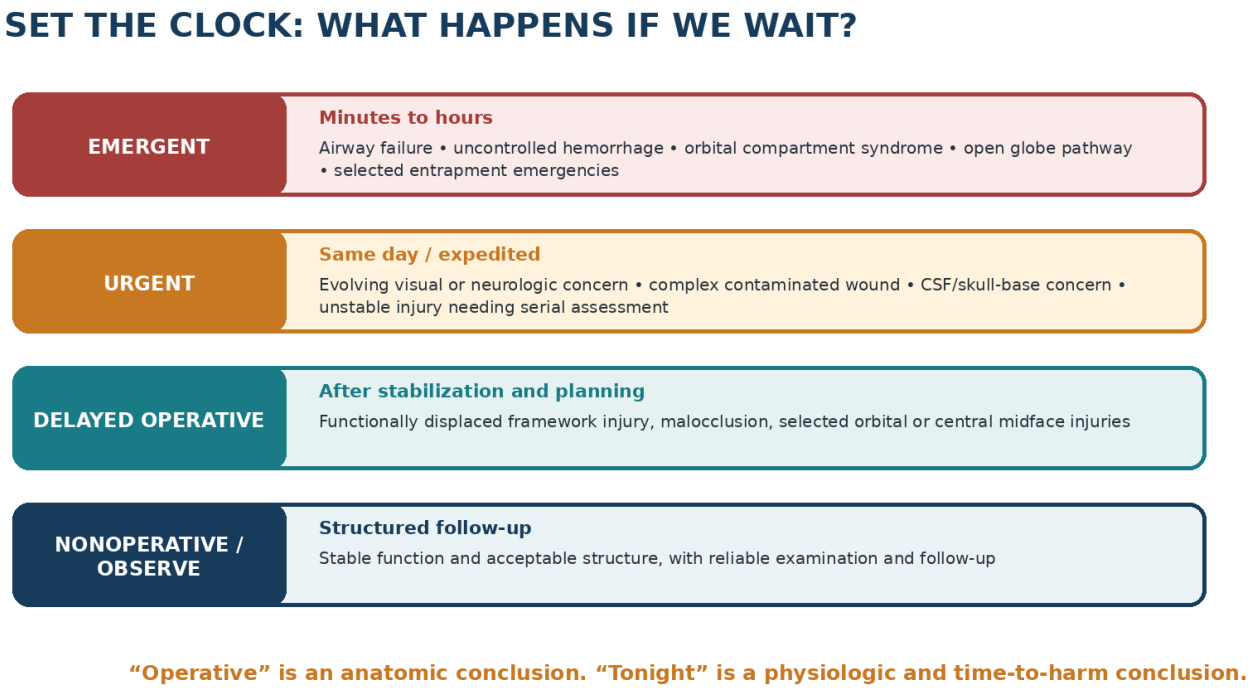


Figure 8.1. Four management clocks. The categories describe time to harm, not the technical difficulty of the eventual operation.

8.1 Emergent problems

Emergent problems include threatened or failed airway, uncontrolled hemorrhage, OCS with threatened vision, the open-globe pathway, expanding hematoma, and selected entrapment syndromes with severe systemic or ocular findings. Intracranial injury, vascular injury, and unstable physiology may supersede facial reconstruction entirely. When the emergency is recognized, treatment and the appropriate consultant should proceed in parallel rather than serially.

8.2 Urgent problems

Urgent problems require expedited same-day specialty assessment or intervention but may allow focused imaging and planning. Examples include evolving visual or neurologic deficits, suspected pediatric trapdoor entrapment, complex wounds involving eyelid margin, canaliculus, facial nerve, or parotid duct, contaminated open injuries, persistent CSF concern, and unstable injuries that cannot be safely monitored as an outpatient. The exact timing is anatomy- and institution-dependent.

8.3 Delayed operative and nonoperative injuries

Many functionally displaced fractures are repaired after resuscitation, edema evolution, complete examination, and operative planning. The delay should be purposeful, not indefinite: the team is allowing physiology to stabilize while preserving the opportunity to restore occlusion, orbital support, facial dimensions, or specialized structures before fibrosis and malunion make reduction harder. Nonoperative management is active care: it requires documented acceptable function, patient education, follow-up, and reassessment for delayed diplopia, enophthalmos, malocclusion, trismus, infection, or deformity.

8.4 Supportive care: know the purpose of each order

Table 8.1. Supportive care with purpose and limits.

Measure	Purpose	Caveat
Head elevation and intermittent cold therapy	Reduce edema and improve comfort	Do not allow these measures to delay evaluation of progressive proptosis or airway swelling.
Analgesia and antiemetics	Improve examination, ventilation, hydration, and protect an injured globe from Valsalva/vomiting	Sedation can worsen airway control and examination reliability.
Sinus precautions	Reduce pressure transmission through orbital/sinus/skull-base defects	Commonly includes no forceful nose blowing and open-mouth sneezing; evidence for exact duration is limited and practice varies.
Saline and oral hygiene	Clear crusting/debris and reduce oral contamination	Avoid high-pressure irrigation across unstable or skull-base injuries.
Soft or no-chew diet	Reduce pain and movement across selected maxillary/mandibular injuries	Diet does not stabilize an unsafe fracture or replace fixation when indicated.
Wound irrigation and temporary approximation	Reduce contamination, control bleeding, protect tissue	Identify nerve, duct, canaliculus, cartilage and margin injuries before definitive closure.
Tetanus assessment	Prevent tetanus in contaminated wounds	Follow current immunization and wound-management guidance.
Eye protection	Protect cornea or suspected open globe	Rigid shield for suspected open globe; do not apply a pressure patch.

8.5 Antibiotics: separate prophylaxis from treatment

The evidence does not support routine prolonged prophylaxis for every facial fracture. The 2024 AAST Critical Care Committee consensus recommends no prophylactic antibiotics for closed, nonoperative orbital, upper-face, midface, or mandibular fractures, and no postoperative antibiotics for closed, noncontaminated operative facial fractures beyond the perioperative period. Open or contaminated injuries may receive a short course—generally 24 hours or less in the consensus framework—while mammalian bites are commonly managed with a short therapeutic/prophylactic course based on wound risk. Established infection requires treatment rather than prophylaxis.[16,17]

Table 8.2. Antibiotic decisions. Local protocols may differ; document the indication and intended duration.

Scenario	Evidence-calibrated approach	Important nuance
Closed, nonoperative facial fracture	No routine prophylactic antibiotics.	Sinus communication alone does not establish benefit from prolonged prophylaxis; use local protocols only for exceptional patient- or wound-specific risk.
Closed, noncontaminated operative fracture	Perioperative prophylaxis; avoid routine postoperative courses beyond 24 hours.	Select the agent for operative site, oral/sinus communication, allergy, and local antibiogram.
Open mandible, posterior-table frontal-sinus, or clearly contaminated facial fracture	Prophylaxis for 24 hours or less plus irrigation/debridement and source control, consistent with the AAST consensus.	Gross contamination, devitalized tissue, delayed presentation, immunocompromise, or established infection may require an individualized therapeutic plan.
Through-and-through skin-to-oral laceration	Short prophylactic course is commonly recommended.	Define true communication with the oral cavity; a superficial intraoral wound is not equivalent.
Simple facial or scalp laceration	No routine prophylactic antibiotics.	Consider 24 hours or less only for exceptional wound or patient risk, such as extensive contamination, devitalization, dead space, or marked immunocompromise.
Mammalian bite	Short course with coverage for oral flora; irrigate and assess tissue viability.	Rabies risk, tetanus, and source control are separate decisions.
Abscess, cellulitis, osteomyelitis	Therapeutic antibiotics and source control.	This is treatment, not prophylaxis; obtain cultures when appropriate.

> **EVIDENCE NOTE**
>
> Name the indication, anticipated organisms, source-control plan, and stop time. Facial fractures do not automatically require Augmentin. Traumatic pneumocephalus or CSF leak alone is not an indication for prophylactic antibiotics; coordinate persistent leakage or meningitis concern with skull-base and neurosurgical teams.[16]

8.6 Steroids and decongestants

Routine systemic steroids are not required for uncomplicated facial fractures. They may be used selectively for edema or specific perioperative indications, but they do not treat OCS, open globe, mechanical entrapment, or unstable anatomy. Megadose

methylprednisolone should not be used reflexively for indirect TON given lack of benefit and evidence of harm in traumatic brain injury.[9] Topical decongestants may help short-term nasal bleeding or congestion but should not substitute for drainage of a septal hematoma or definitive hemorrhage control.

8.7 Consultation follows the threatened structure

Ophthalmology is needed urgently for objective visual decline, RAPD, suspected open globe, OCS, hyphema, severe ocular pain, abnormal pupil, significant proptosis, unexplained motility deficit, or inability to complete a reliable examination in a high-risk injury. Neurosurgery or skull-base collaboration is appropriate for intracranial injury, posterior-table/anterior skull-base involvement, pneumocephalus with concerning fracture, or CSF leakage. Trauma surgery coordinates polytrauma and physiology. Dentistry or oral surgery contributes to dental viability, splinting, and complex occlusion. Interventional radiology may be essential for persistent arterial hemorrhage. Ownership varies; anatomy does not.

8.8 Admission versus discharge

Table 8.3. Disposition is a safety decision, not a fracture-count decision.

Favor admission / observation	Discharge may be reasonable when
Airway, bleeding, visual, neurologic, or evolving swelling concern	Airway and hemorrhage are stable with no expected deterioration
Need for serial ocular, neurologic, or occlusal examination	Objective ocular evaluation is reassuring or appropriately completed
Polytrauma, anticoagulation complication, or inability to hydrate	Pain, nausea, hydration, and diet are manageable
Urgent operation or complex wound repair	No emergent/urgent indication and follow-up is secured
Unreliable examination, unsafe home situation, or unreliable follow-up	Patient understands precautions and has reliable transport/communication
Uncontrolled pain, emesis, or significant comorbidity	Clear written return precautions and specialty timing are provided

8.9 Discharge and return precautions

Return immediately for reduced or altered vision, increasing proptosis or eye pain, new or worsening diplopia, dyspnea, inability to handle secretions, recurrent heavy bleeding, fever or progressive swelling, clear watery rhinorrhea, worsening malocclusion, inability to hydrate, or new neurologic symptoms. Tell the patient which symptoms are expected—swelling, bruising, mild numbness—and which represent a change in risk. Follow-up should be specific in service, time, and location rather than “ENT as needed.”

DIAGNOSTIC TRAP

“Needs ORIF” does not mean “needs ORIF tonight.” “No emergent operation” does not mean “safe for discharge.” The first statement is about anatomy; the second is about physiology, monitoring, and follow-up.

RESIDENT SYNTHESIS

Assign a management clock, begin supportive care with a clear purpose, use short and indication-based antibiotic courses, involve consultants according to threatened structures, and make disposition depend on trajectory and examination reliability.

CHAPTER 9

Integrated Trauma-Bay Cases

CENTRAL QUESTION

Can the resident apply the full workflow under realistic uncertainty?

For each case, answer aloud in the same order: physiology, vision, examination reliability, functional deficits, CT pattern, injury map, timeline, supportive care, consultations, and disposition. The goal is not to guess an operation from one CT phrase; it is to produce a safe and defensible first plan.

Case 1 — The swollen orbit after assault

CASE

A 28-year-old has left periorbital edema, diplopia in upgaze, V2 numbness, and a CT-reported orbital floor fracture. Acuity is 20/20 bilaterally, pupils are normal without RAPD, the globe is not proptotic, and pain limits upgaze. CT shows a moderate floor defect with fat herniation; the inferior rectus remains above the defect without a rounded configuration.

Key decisions

Is there an ocular emergency?
Does diplopia establish entrapment?
What should be repeated after swelling and pain improve?
Can the patient be discharged safely?

Reasoning

The objective visual examination is reassuring and there is no OCS or open-globe constellation. Diplopia immediately after trauma is common and can arise from edema, pain, hematoma, or neuropathy; it does not by itself prove entrapment.

Document the direction and degree of restriction, perform serial ocular examinations, and arrange appropriate specialty follow-up. Operative indications for orbital reconstruction are addressed in Volume II, but the initial decision is that no time-critical visual threat is present.

Discharge can be reasonable when pain and nausea are controlled, follow-up is reliable, and return precautions emphasize visual change, increasing proptosis/pain, and worsening motility.

BOARD PEARL

Do not convert every floor fracture with diplopia into an emergent operation. First exclude globe injury, OCS, optic neuropathy, and compelling entrapment.

Case 2 — The nauseated child with little bruising

CASE

A 10-year-old is struck below the eye by a baseball. The eye appears relatively white. The child vomits twice, becomes bradycardic during attempted upgaze, and has marked vertical motility restriction. CT shows only a thin, minimally displaced floor line.

Key decisions

What localizes the nausea and bradycardia?
Why can CT look deceptively mild?
How urgent is the consultation?

Reasoning

The combination of restricted gaze and vagal symptoms localizes to probable oculocardiac reflex from incarcerated orbital tissue. Pediatric elastic bone can hinge and recoil, leaving a subtle bony line while trapping periorbita or muscle.

This is an urgent entrapment pathway, not routine outpatient diplopia. Notify ophthalmology and the facial-trauma service immediately, keep the child NPO, control nausea, and prepare for urgent release when the examination and dedicated imaging

support incarceration. Do not attribute the systemic symptoms to concussion alone. Trace the muscle and periorbita across thin multiplanar images, recognizing that CT may understate the injury.

BOARD PEARL
The “white-eye” appearance is a trap. In a child, restricted gaze with nausea, vomiting, bradycardia, or syncope is an urgent surgical localization clue, even when CT displacement looks minimal.

Case 3 — The mobile maxilla after an MVC

CASE
An awake adult after a high-speed collision has a mobile maxillary dental-bearing segment, palatal ecchymosis, new malocclusion, and bilateral epistaxis. Vision is intact. CT shows bilateral pterygoid fractures, maxillary sinus wall fractures, a palatal split, and a unilateral ZMC injury.

Key decisions

What must be assessed before naming a Le Fort pattern?
What is the functional failure?
What associated units must be searched?

Reasoning

The priorities remain airway, bleeding, vision, neurologic status, and cervical spine. The functional failure is loss of maxillary and palatal stability with traumatic malocclusion—not merely the presence of pterygoid fractures.

Review the fracture pathways through vertical buttresses, palate, ZMC, mandible, and skull base. Document premorbid occlusion before swelling, sedation, or intubation makes it less accessible. Definitive reconstruction is delayed until the patient is stabilized and the complete framework is mapped unless another emergency dictates timing.

BOARD PEARL
Pterygoid fracture is necessary for classic Le Fort patterns but is not sufficient. Describe the mobile occlusion-bearing segment and the actual fracture pathway.

Case 4 — The intubated patient with panfacial fractures

CASE
A patient is transferred intubated and sedated after an MVC. The outside report lists bilateral ZMC, NOE, Le Fort, orbital floor, and mandibular fractures. No pre-intubation ocular or occlusal examination is available.

Key decisions

Which data are unavailable?
How can uncertainty be reduced?
What must be monitored before reconstruction?

Reasoning

Acuity, subjective diplopia, premorbid occlusion, facial movement, and some sensory findings are unknown. State this explicitly rather than calling the examination normal.

Review pupils, globe contour, retrobulbar spaces, airway, skull base, and displacement independently. Seek preinjury photographs, dentures, dental records, and pre-intubation notes. Repeat ocular, cranial-nerve, and occlusal examination as soon as participation permits.

Panfacial reconstruction depends on identifying preserved reference points. The immediate plan is physiology, vision surveillance, wound care, and coordinated planning—not reflexive overnight fixation of every segment.

BOARD PEARL
Inability to examine is itself a risk factor. Name the missing information and the time at which it will be recovered.

Case 5 - The anticoagulated older adult after a fall

> **CASE**
>
> A 78-year-old on anticoagulation falls onto the left face. CT shows a minimally displaced orbital wall fracture and a large periorbital hematoma. Initial acuity is unchanged, but swelling is progressing.

Key decisions

Why is a minor fracture not necessarily a minor observation problem?
What associated head-injury, anticoagulant, and reversal questions must be addressed?
What should be trended, and what determines disposition?

Reasoning

Do not let a small facial fracture narrow the trauma evaluation. Establish the agent, last dose, renal function, baseline neurologic status, loss of consciousness, and neurologic trajectory; a maxillofacial CT does not substitute for the institution's anticoagulated-head-injury pathway. Coordinate head imaging, observation or repeat imaging, and any reversal decision with trauma, emergency medicine, and neurosurgery as indicated.[26]

In parallel, trend acuity, pupils, proptosis, orbital tension, motility, IOP when safe, and hemodynamics as clinically indicated. Disposition depends on trajectory, repeat-exam reliability, comorbidity, support, and access to urgent reassessment - not the fracture count.

> **BOARD PEARL**
>
> Treat the patient's bleeding and neurologic risk and the examination trajectory, not only the bony injury.

Case 6 - The nasal injury everyone almost ignores

> **CASE**
>
> A teenager has nasal obstruction after a collision. The dorsum is mildly swollen without dramatic deviation. Anterior rhinoscopy reveals bilateral fluctuant septal swelling.

Key decisions

What is the diagnosis?
Why is routine nasal-fracture follow-up inadequate?
What else should be examined?

Reasoning

This is a septal hematoma until proven otherwise. It requires prompt drainage, management of any abscess or contamination, and close follow-up because cartilage is nourished through the mucoperichondrium.

Complete the ocular, central-midface, occlusal, otologic, and neurologic examinations. A nasal injury may be isolated, but higher-energy trauma can involve the medial orbits, NOE complex, and skull base.

> **BOARD PEARL**
>
> The internal nasal examination is the emergency screen. External deformity determines later reduction planning.

Case 7 - The cheek laceration with normal facial movement

> **CASE**
>
> A glass laceration crosses the right cheek anterior to the parotid gland. Facial movement appears symmetric. CT shows no fracture and no obvious foreign body.

Key decisions

Which specialized structures remain at risk?
Does normal movement clear the wound?
What should happen before routine skin closure?

Reasoning

The wound may involve the parotid duct, distal facial-nerve branches, mimetic muscle, buccal fat, or oral mucosa. Normal movement is reassuring but does not exclude partial or small distal-branch injury.

Explore the wound under adequate lighting and anesthesia with knowledge of duct and nerve trajectories; assess intraoral communication and foreign body. Complex injuries should be repaired or coordinated with the appropriate facial trauma specialist rather than closed superficially.

BOARD PEARL

A normal CT is not a negative soft-tissue exploration. The location and depth of the wound determine the anatomy at risk.

Case 8 — "Normal vision" that was never measured

CASE

A patient with a displaced ZMC fracture repeatedly says, "I can see." No acuity is documented. When tested, the injured eye reads only the largest line and has red desaturation and a RAPD.

Key decisions

What changed: the eye or the quality of the examination?
What diagnoses must be excluded immediately?
How should this be presented?

Reasoning

The risk was present before the measurement; the earlier reassurance was false because it was subjective. Exclude OCS, open globe, retinal injury, optic neuropathy, and orbital apex pathology with urgent ophthalmologic evaluation and clinical examination.

Present the objective deficit first: "Newly documented marked acuity and color loss with RAPD after facial trauma," followed by proptosis/orbital tension, globe findings, and CT. The ZMC classification is secondary until the vision pathway is addressed.

BOARD PEARL

Vision is a measured variable. A patient's ability to perceive light or recognize a face is not equivalent to preserved acuity or optic-nerve function.

9.1 The final ten-step resident workflow

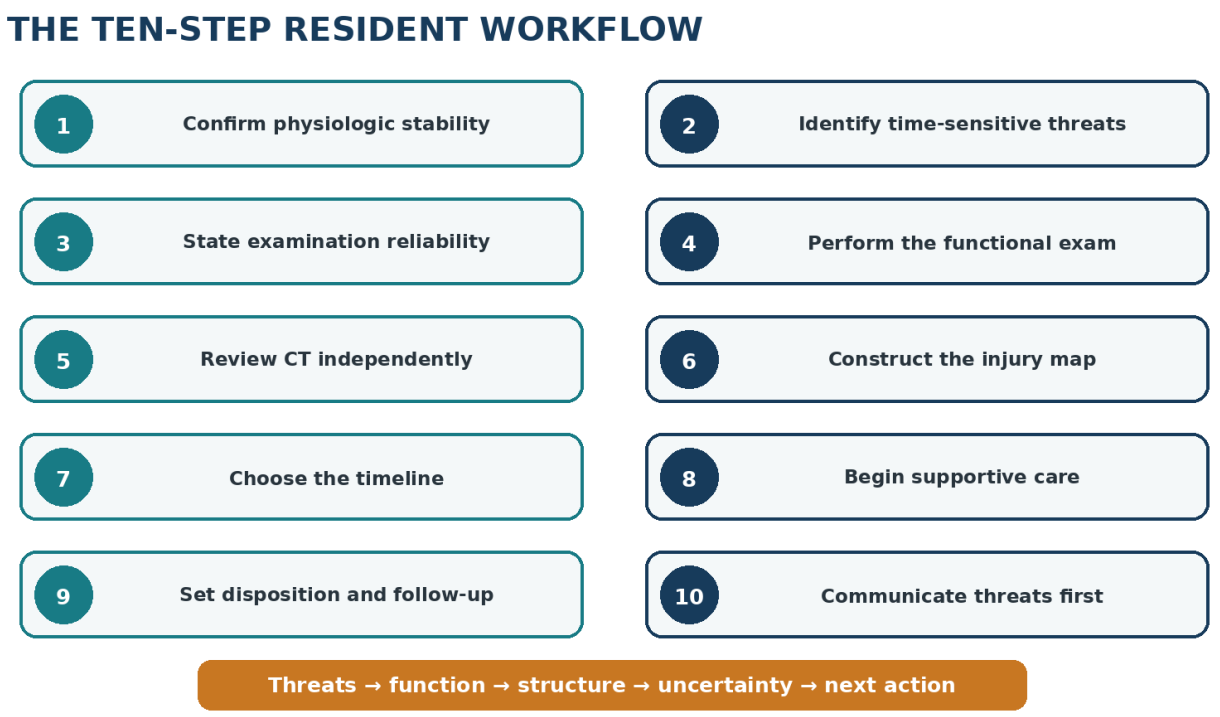


Figure 9.1. The final resident workflow. Use the same order for bedside assessment, consultation notes, handoff, and oral boards.

Table 9.1. The ten-step workflow in operational form.

Step	Action	Output
1	Confirm physiologic stability	Airway, breathing, hemorrhage, neurologic status, cervical spine and associated trauma.
2	Identify time-sensitive threats	Open globe, OCS, evolving visual loss, entrapment syndrome, expanding hematoma, intracranial or vascular concern.
3	State examination reliability	Awake/intubated, cooperative, swelling, intoxication, sedation, language/developmental barriers
4	Perform functional examination	Vision, pupils, motility, framework, occlusion, septum, ears or hearing, nerves, and soft tissues.
5	Review CT independently	Critical contents, orbit, upper/central/lateral midface, maxilla/palate, mandible, soft tissues.
6	Construct injury map	Location, displacement, function, critical structures, contamination, uncertainty.
7	Choose timeline	Emergent, urgent, delayed operative, or nonoperative.
8	Begin supportive care	Analgesia, antiemetic, precautions, wound/oral care, tetanus, selective antibiotics.
9	Set disposition and follow-up	Admit/observe/discharge with explicit service, timing, and return precautions.
10	Communicate threats first	Physiology → vision → function → structure → uncertainty → next action.

FINAL RESIDENT TAKEAWAY

A safe facial trauma consultation is not a perfect fracture classification. It is a prioritized account of physiology, objective vision, functional failure, three-dimensional displacement, specialized-structure injury, examination uncertainty, and time to harm—followed by a plan that closes each risk.

Practical Appendices

Appendix A - One-page facial trauma examination

Domain	Checklist
Primary threats	□ Airway or secretions □ Work of breathing □ Active bleeding □ Mental status □ Cervical spine □ Associated trauma
Eyes	□ Acuity each eye □ Pupils or RAPD □ Color or fields □ Motility or diplopia □ Globe position □ Lids or conjunctiva □ IOP only if globe intact
Framework	□ Frontal or supraorbital □ Nasal or central □ Orbital rims □ ZMC or arches □ Maxilla or palate □ Mandible or condyles
Nose	□ Airway □ Septal hematoma □ Mucosal injury □ Deformity or support □ Clear drainage
Ears or lateral skull base	□ Auricular hematoma or cartilage □ EAC or TM □ Hemotympanum or otorrhea □ Hearing or vestibular symptoms □ Facial-nerve timing and function
Oral or occlusion	□ Usual bite □ First contact □ Open or crossbite □ Mobile segments □ Palate □ Teeth □ Floor of mouth □ Trismus
Nerves	□ V1 □ V2 □ V3 or mental □ Facial movement by region □ Ocular motor function
Soft tissue	□ Eyelid margin or canthi □ Lacrimal trajectory □ Facial nerve □ Parotid duct □ Vermilion or commissure □ Cartilage □ Tissue viability or foreign body
Reliability	□ What could not be assessed? □ Why? □ When and by whom will it be repeated?

Appendix B - One-page CT search pattern

Pass	Review
1. Critical contents	Brain or pneumocephalus; globes or lenses; retrobulbar spaces; airway; foreign body; visible temporal bones, middle ears, and mastoids.
2. Internal orbits	Roof, floor, medial and lateral walls; muscles or fat; apex or fissures; infraorbital canal.
3. Upper face	Frontal sinus anterior and posterior tables; frontal recess region; anterior skull base.
4. Central midface	Nasal bones and septum; frontal maxillary processes; ethmoid; medial orbit or lacrimal fossa.
5. Lateral midface	ZF, ZS, ZM, arch; malar projection; coronoid clearance.
6. Maxilla or palate	Buttresses; pterygoids; alveolus; palate; dental-arch width.
7. Mandible	Condyle to condyle; TMJs; canal; teeth; multiplicity; ramal height.
8. Soft tissues	Emphysema; hematoma; laceration depth; tissue loss; foreign body; airway edema.

SIGN-OFF CROSS-CHECK

Before closing the consultation, state what threatens life, vision, airway, hearing or facial-nerve function; what is objectively normal; what remains untested; and exactly when the next examination will occur.

Appendix C - Consultation note template

Field	Document explicitly
Mechanism and associated injury	Mechanism, trajectory, timing, loss of consciousness, anticoagulant or antiplatelet use, cervical-spine and other trauma.
Primary survey and trajectory	Airway, secretion handling, breathing, hemorrhage and hemodynamics, neurologic status, current stability, and anticipated deterioration.
Examination reliability	What could not be tested, why, what surrogate data exist, and when and by whom it will be repeated.
Eye	Acuity each eye and method, pupils or RAPD, color or fields when feasible, motility or diplopia, globe position, tension, and IOP only when safe.
Face, nose, ear, and nerves	Dimensions, skeletal mobility or step-offs, septum, auricle or EAC or TM, hearing or vestibular symptoms, V1-V3, facial movement, and specialized soft-tissue structures.
Oral, occlusal, and dental	Premorbid and current bite, first contact, trismus, palate and floor of mouth, mobile segments, wounds, missing or avulsed teeth, and contamination.
Independent CT review	Critical contents, injury units, displacement, orbital volume or contents, skull base, temporal bone when visible, mandible, soft tissues, and uncertainty.
Assessment and plan	One-sentence injury map; emergent, urgent, delayed, or nonoperative timeline; consultations; precautions; antibiotics with indication and stop time; disposition; serial examinations.

Appendix D - Patient-facing emergency return precautions

CALL EMERGENCY SERVICES OR RETURN TO THE ED NOW FOR:

- Any new reduction, dimming, color change, curtain, or loss of vision.
- Increasing eye pain or pressure, bulging, rapidly worsening swelling, new double vision, or inability to move an eye.
- Difficulty breathing, noisy breathing, inability to swallow saliva, progressive mouth or floor-of-mouth swelling, or heavy bleeding that will not stop as instructed.
- New weakness, confusion, severe headache, repeated vomiting, seizure, or fainting.
- Clear watery drainage from the nose or ear, especially when one-sided or positional; new hearing loss, severe vertigo, or facial weakness.
- Fever, pus, rapidly spreading redness or swelling, inability to drink, or uncontrolled pain.

Appendix E - Oral-board presentation template

SAY THIS IN ORDER

1. Physiologic stability and airway. 2. Objective ocular findings and immediate threats. 3. Examination reliability. 4. Functional deficits: occlusion, movement, sensation, airway, bleeding, hearing or facial movement. 5. Structural injury units and displacement. 6. Critical soft-tissue, skull-base, temporal-bone, and vascular associations. 7. Emergent, urgent, delayed, or nonoperative timeline. 8. Immediate actions, consultations, disposition, and the next examination.

References

1. American College of Surgeons Committee on Trauma. Advanced Trauma Life Support (ATLS): Student Course Manual. 11th ed. Chicago, IL: American College of Surgeons; 2025.

2. Parsons MS, Policeni B, Juliano AF, et al. ACR Appropriateness Criteria Imaging of Facial Trauma Following Primary Survey. J Am Coll Radiol. 2022;19(5 Suppl):S67-S86. doi:10.1016/j.jacr.2022.02.013.

3. Gomez Rosello E, Quiles Granado AM, Artajona Garcia M, et al. Facial fractures: classification and highlights for a useful report. Insights Imaging. 2020;11(1):49. doi:10.1186/s13244-020-00847-w.

4. AO Foundation Surgery Reference. Examination of patients with midfacial injuries. Accessed July 28, 2026.

5. AO Foundation Surgery Reference. Emergency treatment. Accessed July 28, 2026.

6. Saini S, Singhal S, Prakash S. Airway management in maxillofacial trauma. J Anaesthesiol Clin Pharmacol. 2021;37(3):319-327. doi:10.4103/joacp.JOACP_315_19.

7. Zhou Y, DiSclafani M, Jeang L, Shah AA. Open globe injuries: review of evaluation, management, and surgical pearls. Clin Ophthalmol. 2022;16:2545-2559. doi:10.2147/OPTH.S372011.

8. Wang D, Deobhakta A. Open globe injury: assessment and preoperative management. EyeNet. August 1, 2020. Accessed July 28, 2026.

9. Blanch RJ, Joseph IJ, Cockerham K. Traumatic optic neuropathy management: a systematic review. Eye (Lond). 2024;38(12):2312-2318. doi:10.1038/s41433-024-03129-7.

10. Wladis EJ, Aakalu VK, Sobel RK, et al. Interventions for indirect traumatic optic neuropathy: a report by the American Academy of Ophthalmology. Ophthalmology. 2021;128(6):928-937. doi:10.1016/j.ophtha.2020.10.038.

11. Boyette JR, Pemberton JD, Bonilla-Velez J. Management of orbital fractures: challenges and solutions. Clin Ophthalmol. 2015;9:2127-2137. doi:10.2147/OPTH.S80463.

12. Lin KY, Ngai P, Echegoyen JC, Tao JP. Imaging in orbital trauma. Saudi J Ophthalmol. 2012;26(4):427-432. doi:10.1016/j.sjopt.2012.08.002.

13. Lim RB, Hopper RA. Pediatric facial fractures. Semin Plast Surg. 2021;35(4):284-291. doi:10.1055/s-0041-1736484.

14. Timashpolsky A, Dagum AB, Sayeed SM, et al. A prospective analysis of physical examination findings in the diagnosis of facial fractures: determining predictive value. Plast Surg (Oakv). 2016;24(2):73-79. doi:10.4172/plastic-surgery.1000958.

15. Kim DY, Biffl W, Bokhari F, et al. Evaluation and management of blunt cerebrovascular injury: a practice management guideline from the Eastern Association for the Surgery of Trauma. J Trauma Acute Care Surg. 2020;88(6):875-887. doi:10.1097/TA.0000000000002668.

16. Appelbaum RD, Farrell MS, Gelbard RB, et al. Antibiotic prophylaxis in injury: an American Association for the Surgery of Trauma Critical Care Committee clinical consensus document. Trauma Surg Acute Care Open. 2024;9(1):e001304. doi:10.1136/tsaco-2023-001304.

17. Forrester JD, Wolff CJ, Choi J, Colling KP, Huston JM. Surgical Infection Society guidelines for antibiotic use in patients with traumatic facial fractures. Surg Infect (Larchmt). 2021;22(3):274-282. doi:10.1089/sur.2020.107.

18. Jackson R, Jia W, Edafe O. Evaluation of the management of nasal septal haematoma and abscess: a systematic review. J Laryngol Otol. 2025;139(3):153-159. doi:10.1017/S0022215124001610.

19. AO Foundation Surgery Reference. Examination of patients with nasal bone fractures. Accessed July 28, 2026.

20. AO Foundation Surgery Reference. Examination of patients with mandibular fractures. Accessed July 28, 2026.

21. AO Foundation Surgery Reference. Panfacial fractures (sequencing of repair). Accessed July 28, 2026.

22. Susarla SM, Peacock ZS. Zygomaticomaxillary complex fracture. Eplasty. 2014;14:ic27.

23. Cellina M, Ce M, Marziali S, et al. Computed tomography in traumatic orbital emergencies: a pictorial essay - imaging findings, tips, and report flowchart. Insights Imaging. 2022;13(1):4. doi:10.1186/s13244-021-01142-y.

24. AO Foundation Surgery Reference. Orbital reconstruction: pediatric orbital floor fracture. Accessed July 28, 2026.

25. Expert Panel on Polytrauma Imaging; Lee JT, Camacho MA, Diercks DB, et al. ACR Appropriateness Criteria Major Blunt Trauma: Update 2025. J Am Coll Radiol. 2026;23(6):1088-1105. doi:10.1016/j.jacr.2026.01.030.

26. Expert Panel on Neurological Imaging; Shih RY, Burns J, Ajam AA, et al. ACR Appropriateness Criteria Head Trauma: 2021 Update. J Am Coll Radiol. 2021;18(5 Suppl):S13-S36. doi:10.1016/j.jacr.2021.01.006.

27. American Academy of Ophthalmology. Orbital compartment syndrome. EyeWiki. Last reviewed July 21, 2026. Accessed July 28, 2026.

28. American Academy of Otolaryngology-Head and Neck Surgery Foundation. Clinical indicators: nasal fracture (with or without septal fracture). April 23, 2021. Accessed July 28, 2026.

29. Fouad AF, Abbott PV, Tsilingaridis G, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2020;36(4):331-342. doi:10.1111/edt.12573.

IMAGE CREDITS

Figures 2.1 and 4.4: Gomez Rosello et al., Insights Imaging 2020, CC BY 4.0. Figures 6.2-6.4 use source panels from that article in educational composites with added labels and explanatory text. Figure 5.2: Afrodriguezg, Nasal Septal Hematoma, Wikimedia Commons, CC BY-SA 4.0. All other diagrams are original educational illustrations.

EDUCATIONAL DISCLAIMER

This guide is for resident education and does not replace local trauma protocols, direct specialist consultation, credentialing requirements, or patient-specific clinical judgment. Recommendations should be adapted to institutional resources and evolving evidence.