CUTTING-EDGE SURGICAL MEDICAL GROUP

Clinical Practice Guideline

Management of Facial Fractures, Intraocular Pressure Monitoring, and Lateral Canthotomy in Trauma

Date: August 6, 2026

1. PURPOSE AND SCOPE

This guideline establishes evidence-based protocols for the evaluation and management of traumatic facial fractures, with emphasis on the recognition and emergent treatment of orbital compartment syndrome (OCS). It applies to all physicians and advanced practice providers within Cutting-Edge Surgical Medical Group who evaluate and treat patients with maxillofacial trauma.

2. EPIDEMIOLOGY AND SIGNIFICANCE

Maxillofacial fractures account for approximately **500,000 emergency department visits annually** in the United States and are responsible for nearly **$1 billion in healthcare expenditures** each year (Parsons et al., 2022). Approximately **80% of facial fractures involve the orbit, mandible, nasal bones, or maxilla**, with assaults and motor vehicle collisions representing the most common mechanisms of injury (Erstad et al., 2022). Among facial fractures, **mandibular fractures are the most common**, with the parasymphysis (29.2%) and symphysis (24.6%) representing the most frequently involved anatomic locations (Durmuş & Polat, 2025).

Clinical outcomes are generally favorable when injuries are recognized and treated promptly. Overall postoperative complication rates for facial fractures range from **0.6% to 2.8%**, although delaying operative repair beyond 48 hours is associated with a **4.72-fold increase in complications** (Sharma et al., 2023). The reported postoperative complication rate for Le Fort fractures is **2.49%** (Wood Matabele et al., 2023). The overall fracture-related infection rate is **5.6%**, with the highest incidence occurring in mandibular fractures (**8.9%**) compared with midface fractures (**0.9%**) (Van der Cruyssen et al., 2025). In open mandibular fractures, infection rates may approach **50% without antibiotic prophylaxis** but decrease to **less than 10%** when appropriate perioperative antibiotics are administered (Erstad et al., 2022).

Retrobulbar hematoma (RBH), although uncommon, represents one of the most vision-threatening complications of orbital trauma. RBH occurs in approximately **2.5% of orbital fractures**, and approximately **17%** of affected patients subsequently develop orbital compartment syndrome (OCS) (Bourquard et al., 2026). Reported visual outcomes following RBH include **complete visual recovery in approximately 52% of patients, partial recovery in 27–30%, and permanent blindness in 10–22%**, emphasizing the importance of early recognition and immediate intervention (Christie et al., 2018; Boffano et al., 2026).

3. INITIAL ASSESSMENT — PRIMARY AND SECONDARY SURVEY

3.1 Primary Survey (ATLS Protocol)

All patients presenting with facial trauma should undergo a systematic primary survey in accordance with Advanced Trauma Life Support (ATLS) principles, with assessment and stabilization of the airway, breathing, and circulation completed before proceeding with a focused evaluation of facial injuries (Parsons et al., 2022). Particular attention should be directed toward identifying airway compromise resulting from mandibular fractures, floor-of-mouth hematoma, or unstable midface fractures. Clinicians should also maintain a high index of suspicion for associated cervical spine injuries, which occur in a significant proportion of patients with facial trauma, as well as intracranial injuries, particularly in those with upper-third facial fractures or Le Fort fracture patterns. In patients with displaced Le Fort fractures or skull base fractures, appropriate screening for blunt carotid artery injury should also be performed because of the increased risk of concomitant vascular injury.

3.2 Secondary Survey — Facial Examination

Systematic assessment divided by facial thirds:

Upper third (frontal bone/frontal sinus): Assess for CSF rhinorrhea, pneumocephalus, frontal sinus posterior table involvement

Middle third (orbit, maxilla, zygoma, nose): Assess occlusion, midface mobility (Le Fort classification), infraorbital nerve sensation, orbital examination (see Section 4)

Lower third (mandible): Assess occlusion, step deformities, inferior alveolar nerve sensation, floor of mouth hematoma, range of motion

3.3 Imaging

CT with fine cuts (≤1.5 mm) of the face with axial and coronal reformats is the standard of care for evaluation of all suspected facial fractures (Parsons et al., 2022). Imaging should NOT delay treatment of orbital compartment syndrome (Mohammadi et al., 2015).

4. ORBITAL ASSESSMENT AND INTRAOCULAR PRESSURE MONITORING

4.1 When to Check Intraocular Pressure (IOP)

Intraocular pressure (IOP) should be measured in all patients with suspected orbital injury who present with any of the following clinical findings: periorbital trauma associated with any degree of proptosis, periorbital ecchymosis accompanied by decreased visual acuity, a known or suspected orbital fracture, subconjunctival hemorrhage following blunt facial trauma, ophthalmoplegia or restricted extraocular movements after trauma, tense periorbital swelling, or the presence of a relative afferent pupillary defect (RAPD) on examination. **A normal intraocular pressure ranges from 10 to 21 mmHg.**

4.2 IOP Thresholds and Clinical Decision-Making

Intraocular pressure (IOP) should be interpreted in conjunction with the patient's clinical examination. An IOP of **less than 21 mmHg** is considered within the normal range. Patients with orbital fractures should continue serial monitoring with repeat IOP measurements every two hours for the first 24 hours to detect delayed orbital compartment syndrome (Bourquard et al., 2026).

An IOP of **21–30 mmHg** is considered elevated and warrants urgent ophthalmology consultation. Serial IOP measurements should be performed every 1–2 hours, and medical therapy should be initiated with topical timolol, intravenous acetazolamide, and/or mannitol, as clinically appropriate. Patients should be reassessed frequently for the development of orbital compartment syndrome (OCS).

An IOP of **30–40 mmHg** is significantly elevated and should prompt emergent ophthalmology or surgical consultation. In the presence of clinical signs of OCS, several authors advocate proceeding with surgical decompression once the IOP exceeds 30 mmHg (Mohammadi et al., 2015).

An IOP of **greater than 40 mmHg** is considered critical and is widely accepted as an indication for immediate lateral canthotomy and inferior cantholysis, particularly when accompanied by evidence of optic nerve compression or central retinal artery occlusion (Mohammadi et al., 2015).

Importantly, **IOP should never be used as the sole determinant for intervention. Orbital compartment syndrome is primarily a clinical diagnosis, and the presence of decreased visual acuity, a relative afferent pupillary defect (RAPD), proptosis, ophthalmoplegia, or other signs of optic nerve compromise should take precedence over tonometric measurements. If clinical suspicion for OCS is high, lateral canthotomy and inferior cantholysis should not be delayed while awaiting IOP measurement or imaging** (Dixon et al., 2020).

5. ORBITAL COMPARTMENT SYNDROME — RECOGNITION AND MANAGEMENT

5.1 Definition

OCS is an ophthalmologic surgical emergency resulting from acute elevation of intraorbital pressure, most commonly from retrobulbar hemorrhage, causing

compression of the optic nerve and its vascular supply with resultant ischemia and potential permanent blindness (Ventura et al., 2014; Mohammadi et al., 2015).

5.2 Clinical Signs of OCS

Clinical Recognition of Orbital Compartment Syndrome (OCS)

Orbital compartment syndrome is a clinical diagnosis. Treatment should **not** be delayed while awaiting imaging or intraocular pressure measurements if clinical suspicion is high.

Clinical Finding	**Significance**
Acute vision loss or decreased visual acuity	Suggests optic nerve ischemia and vision-threatening injury
Relative afferent pupillary defect (RAPD)	**Most reliable clinical sign** of optic nerve compromise
Proptosis (tense globe)	Indicates increased intraorbital pressure
Fixed, dilated pupil	Suggests severe optic nerve or retinal ischemia
Complete ptosis	May indicate marked orbital edema or cranial nerve dysfunction
Ophthalmoplegia (restricted or absent extraocular movements)	Suggests orbital muscle entrapment or elevated orbital pressure
Tense subconjunctival hemorrhage or chemosis	Supports increased orbital compartment pressure
Elevated intraocular pressure (IOP >30–40 mmHg)	Strong objective indicator of orbital compartment syndrome
Resistance to retropulsion	Indicates a tense orbit with elevated compartment pressure

Clinical Finding	Significance
Periorbital pain out of proportion to examination	Early warning sign of rapidly increasing orbital pressure

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Red Flags Requiring Immediate Action

The presence of ANY of the following should raise immediate concern for orbital compartment syndrome:

- Decreased visual acuity
- Relative afferent pupillary defect (RAPD) *(most reliable sign)*
- Proptosis (tense globe)
- Elevated IOP (>30–40 mmHg)
- Ophthalmoplegia
- Fixed, dilated pupil

Clinical Pearl: Do not wait for CT imaging or tonometry if orbital compartment syndrome is clinically suspected. Immediate lateral canthotomy and inferior cantholysis may be vision-saving.

5.3 Indications for Emergent Lateral Canthotomy and Cantholysis

Immediate Indication for Lateral Canthotomy and Inferior Cantholysis	Recommended Action	Reference
Clinical diagnosis of orbital compartment syndrome (OCS), regardless of IOP measurement or imaging availability	**Perform immediate lateral canthotomy and inferior cantholysis. Do NOT delay for CT imaging or tonometry.**	Mohammadi et al., 2015; Sun et al., 2014
Clinical signs of OCS **with decreased visual acuity or a relative afferent pupillary defect**	Immediate lateral canthotomy and inferior cantholysis	Bourquard et al., 2026

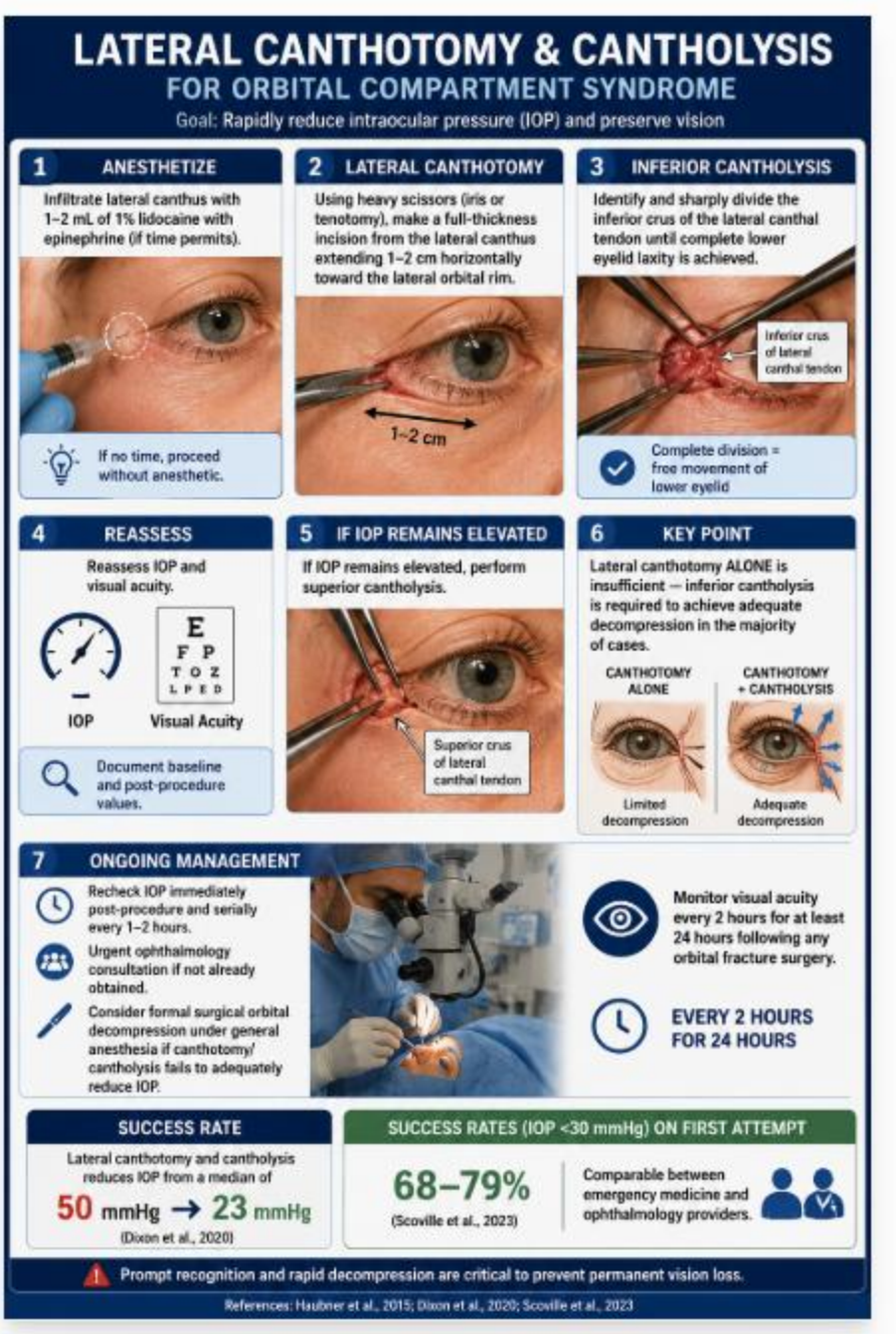
Immediate Indication for Lateral Canthotomy and Inferior Cantholysis	Recommended Action	Reference
(RAPD)		
IOP > 40 mmHg with evidence of optic nerve compression or central retinal artery occlusion (CRAO)	Immediate lateral canthotomy and inferior cantholysis	Mohammadi et al., 2015
IOP > 30 mmHg with progressive vision loss, RAPD, or absent retinal artery pulsation	Immediate lateral canthotomy and inferior cantholysis	Mohammadi et al., 2015
Tonometric pressure **within 20 mmHg of the patient's mean arterial pressure (MAP)**	Immediate lateral canthotomy and inferior cantholysis	Mohammadi et al., 2015
Absent retinal artery pulsation on fundoscopic examination	Immediate lateral canthotomy and inferior cantholysis	Mohammadi et al., 2015

5.4 Time-Critical Nature

Orbital compartment syndrome is a true ophthalmologic emergency in which the timing of decompression is the most important determinant of visual outcome. Visual recovery is greatest when orbital decompression is performed within two hours of injury (Sun et al., 2014), with decompression within 90 minutes of symptom onset offering the highest likelihood of restoring vision. Delayed recognition and treatment may result in irreversible optic nerve ischemia and permanent blindness (Kim et al., 2026). Although surgical decompression should ideally be completed within six hours of injury, meaningful visual recovery has been reported even beyond this window, and intervention should not be withheld solely because of delayed presentation (Bourquard et al., 2026). Overall, a shorter time to treatment is strongly associated with complete visual recovery ($p = 0.003$) and a significantly lower risk of permanent blindness ($p = 0.045$), underscoring the importance of rapid diagnosis and immediate surgical decompression (Christie et al., 2018).

5.5 Lateral Canthotomy and Cantholysis — Procedure

When performing a lateral canthotomy and cantholysis, the lateral canthus should first be infiltrated with 1–2 mL of 1% lidocaine with epinephrine, if the clinical situation permits. Using heavy scissors, such as iris or tenotomy scissors, a full-thickness horizontal incision should then be made through the lateral canthus, extending approximately 1–2 cm toward the lateral orbital rim. Inferior cantholysis is subsequently performed by identifying and sharply dividing the inferior crus of the lateral canthal tendon until complete lower eyelid laxity is achieved. Following decompression, intraocular pressure (IOP) and visual acuity should be reassessed immediately. If IOP remains elevated or orbital compartment syndrome persists, superior cantholysis should be performed to achieve additional decompression (Haubner et al., 2015). Lateral canthotomy alone is insufficient in most patients, as division of the inferior canthal tendon is necessary to achieve adequate orbital decompression (Haubner et al., 2015). Overall, lateral canthotomy with cantholysis has been shown to reduce median IOP from approximately 50 mmHg to 23 mmHg (Dixon et al., 2020). Reported first-attempt success rates, defined as reduction of IOP to less than 30 mmHg, range from 68% to 79% and are comparable when the procedure is performed by emergency medicine physicians or ophthalmologists (Scoville et al., 2023).



5.6 Post-Procedure Management

Following lateral canthotomy and cantholysis, intraocular pressure (IOP) should be reassessed immediately to determine the effectiveness of orbital decompression and then monitored serially every 1–2 hours. An urgent ophthalmology consultation should be obtained if one has not already been initiated. If IOP remains persistently elevated or clinical evidence of orbital compartment syndrome continues despite adequate

canthotomy and cantholysis, formal surgical orbital decompression under general anesthesia should be considered. Following orbital fracture surgery, visual acuity should be monitored every two hours for a minimum of 24 hours to facilitate early recognition of recurrent orbital compartment syndrome or other vision-threatening complications (Bourquard et al., 2026).

6. FACIAL FRACTURE MANAGEMENT BY ANATOMIC REGION

6.1 Orbital Floor Fractures

The timing of operative repair for orbital floor fractures should be guided by the patient's clinical presentation and radiographic findings (American Academy of Ophthalmology, 2024; Burnstine, 2002). Immediate surgical intervention is indicated in patients with computed tomography (CT) evidence of extraocular muscle entrapment associated with a persistent oculocardiac reflex, white-eyed blowout fractures—particularly in pediatric patients—or globe subluxation into the maxillary sinus. Surgical repair within two weeks is recommended for patients with symptomatic diplopia accompanied by positive forced duction testing and CT evidence of muscle entrapment, large orbital floor defects resulting in clinically significant enophthalmos or hypoglobus, or progressive infraorbital nerve hypoesthesia. Observation is appropriate for patients with minimal diplopia that does not affect primary or downgaze, preserved extraocular motility, and no significant enophthalmos. Radiographic predictors associated with an increased likelihood of requiring operative repair include an orbital volume increase greater than 1.3 cm^3 (odds ratio [OR] 10.5) and inferior rectus muscle displacement within or below the fracture line (OR 3.7) (Basta et al., 2021).

6.2 Mandibular Fractures

Mandibular fractures frequently require operative management, with surgical fixation indicated in more than 90% of cases (Erstad et al., 2022). Open reduction and internal fixation (ORIF) is the preferred treatment modality and is performed in approximately 75% of patients, whereas intermaxillary fixation (IMF) is utilized in approximately 23% of cases (Durmuş & Polat, 2025). Definitive surgical repair should ideally be completed within two weeks of injury to minimize bony callus formation, reduce the risk of malunion, and facilitate optimal fracture reduction (Yu et al., 2024). Airway management should be individualized based on the pattern of injury, with nasotracheal intubation generally appropriate for isolated mandibular fractures, while submental

intubation or tracheostomy may be required in patients with concomitant Le Fort or other complex midface fractures (Yu et al., 2024). Following operative repair, postoperative management should include elastic occlusal guidance and a structured jaw range-of-motion rehabilitation program to restore function and optimize recovery (Meara, 2023).

6.3 Le Fort and Midface Fractures

Le Fort and midface fractures are associated with favorable surgical outcomes when managed appropriately, with an overall postoperative complication rate of approximately 2.49% (Wood Matabele et al., 2023). Reported wound infection rates are approximately 4% following operative repair (Soong et al., 2014). Patients with Le Fort II and III fracture patterns should undergo careful evaluation for associated cerebrospinal fluid (CSF) leak and blunt carotid artery injury, as these injuries may accompany high-energy midface trauma and require prompt recognition and management (Parsons et al., 2022).

6.4 Timing of Surgical Repair — General Principles

Timely operative management of facial fractures is associated with improved outcomes. Delays in surgical repair beyond 48 hours have been associated with a 4.72-fold increase in the risk of postoperative complications (Sharma et al., 2023). However, in patients with polytrauma, current evidence has not demonstrated a clear advantage of delayed versus early facial fracture fixation, and the timing of repair should be individualized based on the patient's overall clinical condition (Chen et al., 2026). Management of life-threatening injuries must always take precedence, with definitive facial fracture repair proceeding as soon as the patient has been medically stabilized and optimized for surgery.

7. ANTIBIOTIC PROPHYLAXIS

Fracture Type	Recommended Antibiotics	Duration	Recommendation / Evidence
Open/Compound Mandibular Fractures	Cefazolin **or** amoxicillin/clavulanate	Discontinue within **24 hours after definitive repair** or within **72 hours after injury** if	Perioperative antibiotic prophylaxis is recommended for all open or compound mandibular fractures.

Fracture Type	Recommended Antibiotics	Duration	Recommendation / Evidence
		operative repair is delayed	(Appelbaum et al., 2023)
Closed, Non-Contaminated Operative Facial Fractures	Standard perioperative prophylactic antibiotic	**Single perioperative dose only**	Postoperative antibiotics are **not recommended**. (Appelbaum et al., 2023)
Le Fort Fractures	Standard perioperative antibiotic	**24 hours postoperatively**	One day of postoperative antibiotics is as effective as a five-day course. (Soong et al., 2014)
Zygomatic Fractures	Standard perioperative antibiotic	**24 hours postoperatively**	One day of postoperative antibiotics is as effective as a five-day course. (Soong et al., 2014)

According to the American Association for the Surgery of Trauma (AAST) Critical Care Committee, patients with open or compound mandibular fractures should receive perioperative antibiotic prophylaxis with either cefazolin or amoxicillin/clavulanate. Antibiotics should be discontinued within 24 hours after definitive surgical repair or within 72 hours following injury if operative repair is delayed (Appelbaum et al., 2023). For closed, non-contaminated operative facial fractures, a single perioperative dose of antibiotics is recommended, and postoperative antibiotic therapy is not indicated. In patients with Le Fort and zygomatic fractures, evidence demonstrates that one day of postoperative antibiotic therapy provides outcomes equivalent to a five-day course, supporting shorter-duration prophylaxis (Soong et al., 2014).

8. POST-INJURY MONITORING PROTOCOL

ORBITAL FRACTURE OBSERVATION PROTOCOL

For all patients with orbital fractures admitted for observation

MONITORING SCHEDULE

ASSESSMENT	FREQUENCY	DURATION
Visual Acuity Assessment	Every 2 hours	24 hours (Bourquard et al., 2026)
IOP Measurement *If any periorbital trauma*	Every 2 hours	24 hours
Pupil Examination Including RAPD Assessment	Every 2 hours	24 hours
Extraocular Movement Assessment	Every nursing assessment	—

IMMEDIATE NOTIFICATION

Notify the surgical team immediately for any of the following:

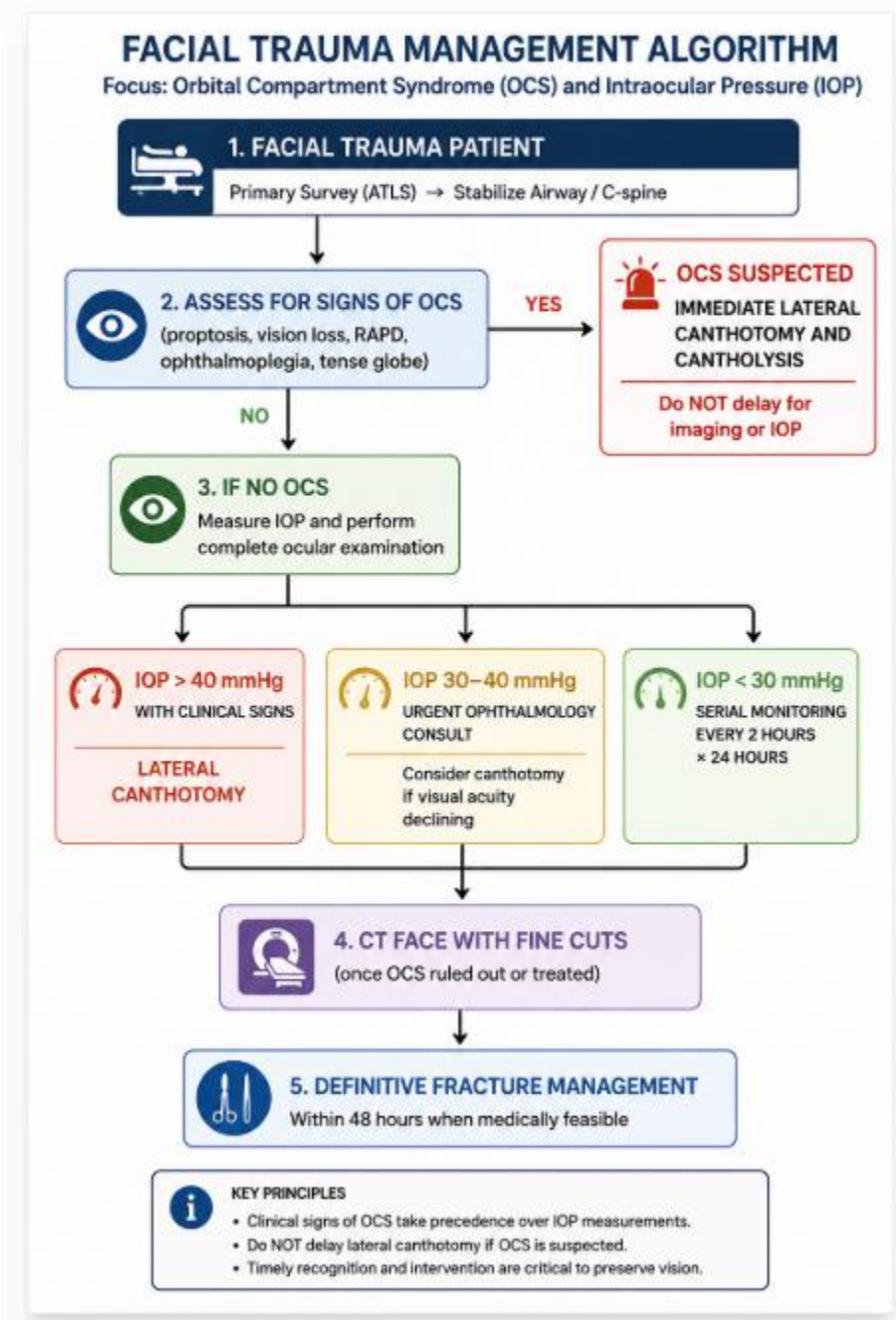
- Any decline in visual acuity
- New Relative Afferent Pupillary Defect (RAPD)
- IOP > 30 mmHg

KEY POINTS

- Timely monitoring is critical to detect orbital compartment syndrome early.
- Follow the schedule strictly for the first 24 hours.
- Document all assessments and findings.

Consistent Monitoring • Early Detection • Protecting Vision

9. SUMMARY ALGORITHM



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