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# Pediatric Facial Trauma: Clinical Considerations for Radiologists and Dentists

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## Abstract

**Background:** Pediatric facial trauma is a major component of childhood injuries, with soft tissue lacerations, contusions, and dental trauma representing the most common presentations. Unique anatomical and developmental characteristics in children influence injury patterns, diagnostic approaches, and management priorities.

**Aim:** To summarize key clinical considerations in the evaluation, diagnosis, and management of pediatric facial soft tissue injuries, emphasizing age-specific factors and multidisciplinary care.

**Methods:** This narrative review examines current evidence regarding the etiology, epidemiology, clinical assessment, imaging indications, and treatment strategies for pediatric facial trauma. It integrates data from clinical studies, expert guidelines, and multidisciplinary practice recommendations.

**Results:** Findings demonstrate that most pediatric facial injuries are minor soft tissue wounds; fractures occur less frequently due to skeletal elasticity. Effective management requires careful history-taking, thorough physical examination, judicious imaging, and child-centered pain control. Optimal outcomes depend on meticulous wound care, appropriate use of anesthesia or sedation, and timely specialist involvement for complex injuries. Preventive strategies—including safety equipment and caregiver education—significantly reduce injury risk.

**Conclusion:** Pediatric facial trauma generally carries a favorable prognosis with proper evaluation and timely management. A structured, age-sensitive approach supports functional recovery, minimizes complications, and enhances long-term cosmetic outcomes.

**Keywords:** Pediatric trauma, facial injury, soft tissue laceration, dental trauma, imaging, wound management, child safety

## Introduction

Trauma represents the leading cause of morbidity and mortality in the pediatric population, with head injuries being the most prevalent form of pediatric trauma.[1] Maxillofacial trauma, while less frequent, presents unique challenges due to the complex anatomy and functional importance of the face.[2] Pediatric facial trauma encompasses a broad spectrum of injuries, including soft tissue lacerations, contusions, bony fractures, and neurovascular compromise, which may involve critical structures such as the eyes, nose, oral cavity, and associated craniofacial bones and skin. The mechanisms of injury vary widely, ranging from blunt force impacts to penetrating trauma, and the pattern of injury is influenced by age-specific anatomical differences. In younger children and infants, the disproportionately larger cranial vault relative to the face renders the skull more susceptible to blunt trauma, while the facial skeleton remains comparatively protected. In contrast, adolescents demonstrate injury patterns more closely resembling those of young adults,


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reflecting skeletal maturation and the higher likelihood of high-velocity mechanisms of injury. Pediatric patients are defined in this context as individuals under the age of 18 years. Most cases of isolated facial trauma in this population involve minor injuries, such as soft tissue lacerations, nasal trauma, or dentoalveolar disruption. Nevertheless, the potential for associated head, cervical spine, or airway compromise mandates a comprehensive evaluation in every case. Although isolated facial injuries are rarely immediately life-threatening, certain presentations—including complex facial fractures, uncontrolled hemorrhage, oropharyngeal trauma, and burns—may jeopardize airway patency and require urgent intervention. This article primarily addresses initial clinical considerations for the management of soft tissue facial injuries in pediatric patients. While fractures, ocular trauma, and neurovascular injuries warrant specialized attention, they are discussed in detail in other dedicated reviews and StatPearls articles. Topics such as pediatric facial fractures, abusive head trauma, traumatic brain injury, skull fractures, spine and neck trauma, dentoalveolar injuries, auricular lacerations and hematomas, tongue lacerations, penetrating head trauma, facial nerve injury, and ocular trauma—including burns, globe rupture, corneal abrasions, and eyelid lacerations—represent critical components of pediatric facial trauma care that require coordination across multidisciplinary teams including radiologists, dentists, surgeons, and emergency providers.[3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21] An evidence-based, age-specific approach to the initial assessment and management of pediatric facial trauma is essential to minimize complications, preserve function, and optimize long-term cosmetic outcomes. Understanding the unique anatomical and developmental characteristics of the pediatric face, combined with vigilance for concomitant injuries, is fundamental in delivering safe and effective care in this vulnerable population.

**Etiology**

Pediatric facial trauma most commonly results from blunt force mechanisms, including falls, motor vehicle collisions, bicycle-related incidents, sports injuries, and interpersonal violence. Penetrating facial injuries occur less frequently in children but may arise from sharp objects, animal bites, or, in older age groups, weapons-related trauma. The underlying cause of facial injury in pediatric patients is strongly influenced by age, developmental stage, and environmental exposure, which together shape both injury patterns and clinical suspicion during evaluation. Age-specific considerations are central to understanding the etiology of pediatric facial trauma. In infants and very young children, non-accidental trauma remains a critical concern and must be carefully considered when injury patterns, history, or physical findings are inconsistent with reported mechanisms. Accidental self-injurious behaviors are also common in this age group due to immature motor coordination and limited risk awareness. In contrast, adolescents are more frequently exposed to higher-energy mechanisms, including sports-related collisions, assaults, and intentional self-harm, including suicide attempts. Occupational injuries and weapons-related trauma are uncommon in pediatrics but may be encountered in older adolescents, particularly in certain social or geographic contexts. Anatomical and developmental factors play a significant role in determining injury distribution. At birth, the cranial vault is disproportionately larger than the facial skeleton, with facial growth occurring progressively throughout childhood and adolescence.[2][22][23] As a result, children younger than five years are more likely to sustain cranial injuries than isolated facial trauma when exposed to blunt force. Additionally, the pediatric facial skeleton is characterized by increased elasticity, flexible suture lines, and a higher cartilage-to-bone ratio. These features confer a degree of protection against severe displacement when fractures occur, contributing to a lower incidence of complex facial fractures compared to adults. Consequently, the majority of isolated pediatric facial trauma cases involve soft tissue injuries rather than significant bony disruption.

Soft tissue injuries such as lacerations, abrasions, and contusions are particularly common in younger children. These injuries frequently occur when prominent facial structures impact hard surfaces, including floors, stairs, furniture, or playground equipment. Typical injury locations include the chin, cheeks, and forehead, corresponding anatomically to the mandible, zygomatic arch, and superior orbital rim. These areas are especially vulnerable due to their prominence and proximity to underlying bony contours, which can transmit force to overlying skin and soft tissues. Certain facial injuries are unique to the pediatric population and require specific clinical awareness. One notable example is the oral commissure electrical burn, which may occur when a young child bites or sucks on an energized electrical cord.[24] This injury results from a brief electrical arc that causes a localized thermal burn at the corner of the mouth. Unlike many electrical injuries, it typically does not involve deep tissue penetration and is not associated with cardiac arrhythmias. Rapid eschar formation is characteristic and often present at initial evaluation, with minimal or no active bleeding. However, delayed hemorrhage may occur when the eschar separates, usually one to two weeks after the initial injury, underscoring the importance of caregiver education and follow-up planning. Overall, the etiology of pediatric facial trauma reflects a complex interaction between developmental anatomy, age-specific behaviors, and environmental exposure, requiring clinicians to integrate mechanism of injury

with developmental context to ensure accurate diagnosis and appropriate management.

**Epidemiology**

Pediatric trauma represents a major public health concern and accounts for substantial morbidity and mortality worldwide. Each year, pediatric trauma is responsible for more than 11,000 deaths and over 8 million emergency department visits.[2][25] Within this broad category, facial trauma constitutes a significant proportion of injury-related presentations, although isolated facial injuries in children are most often limited to soft tissue involvement. Considerable force is generally required to produce facial fractures in the pediatric population, and as a result, fractures are relatively uncommon. Epidemiological data indicate that facial fractures are identified in only 8% to 15% of pediatric facial trauma cases presenting to emergency departments.[26][27][28] Soft tissue injuries of the face are by far the most frequently encountered manifestations of pediatric facial trauma. Across multiple studies, approximately 34% to 92% of affected children present with soft tissue injuries, most commonly contusions and lacerations.[28][29][30][31] Dental injuries are also prevalent, occurring in approximately 15% to 69% of pediatric facial trauma cases.[28][29][30][31] Among soft tissue injuries, lacerations account for roughly half of all presentations, while the remaining cases include contusions, abrasions, bite-related injuries, and less commonly burns or ocular trauma.[23][29][31] The prominence of these injury types reflects both the elasticity of the pediatric facial skeleton and the frequent involvement of low-energy mechanisms, particularly in younger children. Dental trauma represents a notable subset of pediatric facial injuries. It is estimated that more than 22,000 pediatric dental trauma cases occur annually, highlighting the frequency of oral and dentoalveolar involvement.[32] Sports participation contributes significantly to this burden, with studies reporting that between 10% and 60% of pediatric athletes experience dental trauma at some point during childhood or adolescence.[32] These injuries may occur in isolation or in conjunction with other facial soft tissue injuries, further complicating assessment and management.

The true incidence of pediatric facial trauma is likely underestimated. Many minor facial injuries are managed at home or treated in outpatient or stand-alone clinic settings without presentation to an emergency department. Consequently, such cases may not be captured in hospital-based or systems-level data collection, leading to underreporting in epidemiologic studies. Age and sex distributions demonstrate distinct trends. Neonates and toddlers show relatively equal gender representation or a slight male predominance. With increasing age, male involvement becomes progressively more pronounced, reaching a male-to-female ratio ranging from 2:1 to 4:1 by late adolescence.[2][22][26][27][28][29] Children between approximately 1 and 6 years of age represent the largest proportion of pediatric facial trauma presentations, accounting for 26% to 58% of cases.[28][29][30][31] Mid-adolescence constitutes the second most common age group for presentation.[28][29][30][31] Mechanisms of injury vary considerably with age. Falls and play-related incidents account for 38% to 55% of facial trauma cases overall and predominate in children younger than six years.[28][29][33] Motor vehicle collisions contribute to approximately 5% to 21% of cases, while sports-related injuries account for 11% to 32%.[28][29][33] Assault-related facial trauma represents 4% to 17% of presentations and is disproportionately observed among adolescent males.[28][29][33] In contrast, sports-related injuries are more evenly distributed across children older than five years. Collectively, these epidemiologic patterns underscore the influence of developmental stage, activity level, and social factors on the occurrence of pediatric facial trauma.

**History and Physical Examination**

A comprehensive history and meticulous physical examination form the cornerstone of evaluating pediatric facial trauma. In children, these components are especially critical because the mechanism of injury, symptom reporting, and examination reliability differ substantially from adults. The information obtained during the initial assessment directly influences clinical suspicion, diagnostic strategy, and the need for advanced imaging modalities.[34] The clinical history often dictates both the anticipated pattern of injury and the threshold for pursuing further diagnostic evaluation. Mechanism of injury provides essential clues regarding the type and severity of facial trauma. Falls, sports-related injuries, motor vehicle collisions, and assaults each carry distinct risk profiles for fractures, soft tissue injuries, and associated intracranial or cervical spine trauma. The height of a fall, speed of impact, use of protective equipment, and direction of force should be carefully explored, as these factors help predict underlying skeletal or neurological injury. Obtaining an accurate history in pediatric patients frequently requires corroboration from multiple sources. Depending on the child's age and developmental level, information may need to be gathered from parents, caregivers, teachers, coaches, or emergency medical services personnel. Younger children may be unable to articulate symptoms or the sequence of events, while adolescents may underreport details due to fear, embarrassment, or concerns related to non-accidental injury. Consistency of the reported history across sources should be assessed, particularly when the mechanism of injury is unclear or does not align with physical findings. Symptom review should be broad and systematic. Children may complain of head or facial pain, dental discomfort, ocular pain, nasal

obstruction, or jaw stiffness. Sensations of sinus pressure, nasal congestion, or epistaxis may suggest midface or nasal injuries. Dental complaints such as loose teeth, tooth avulsion, or a subjective feeling of malocclusion are important indicators of alveolar or mandibular trauma. Auditory symptoms, including hearing loss or tinnitus, may reflect temporal bone or middle ear involvement. Neurological complaints such as tingling, numbness of facial regions, confusion, visual disturbances, or a history of loss of consciousness raise concern for nerve injury or traumatic brain injury and warrant heightened vigilance. A complete medical history is essential to contextualize findings and guide management. Information regarding preexisting medical conditions, prior facial or dental procedures, current medications, allergies, and vaccination status should be obtained. The timing of the last oral intake is particularly relevant if procedural sedation or operative intervention may be required. In addition, clinicians should assess for bleeding disorders or anticoagulant use, as these factors may exacerbate soft tissue swelling or hemorrhage and alter management decisions.

**Physical Examination**

The physical examination carries heightened importance in pediatric patients, as younger children may be nonverbal or unable to provide a detailed and reliable history. Evaluation of any significant traumatic injury should begin with adherence to advanced trauma life support principles. Initial assessment must prioritize airway patency, breathing adequacy, and circulatory stability. Extensive facial trauma can compromise the airway through bleeding, swelling, or structural disruption and may coexist with traumatic brain injury, cervical spine injury, or multisystem trauma. These life-threatening conditions must be identified and addressed before proceeding to a focused facial examination. Once the primary survey is complete and the patient is stabilized, a secondary survey should include a detailed assessment of the facial structures. Even when facial injury appears isolated and formal trauma activation is not required, a thorough examination of the skin, musculoskeletal system, and extremities is essential. Children frequently sustain multiple injuries from a single traumatic event, and focusing solely on the face risks missing clinically significant associated injuries. Optimal examination conditions are crucial for accuracy. A calm and cooperative child allows for a more reliable and complete assessment. Measures such as allowing the child to sit on a caregiver's lap, providing adequate analgesia, and using age-appropriate distraction or anxiolysis can significantly improve examination success.[35][36] A systematic approach to the facial examination helps ensure that subtle injuries are not overlooked. Progressing in an organized manner, such as from superior to inferior, lateral to medial, and superficial to deep structures, promotes thoroughness and consistency.

**Musculoskeletal and Skin Assessment**

Inspection and palpation of the facial skin and underlying musculoskeletal structures are fundamental components of the examination. Lacerations should be carefully evaluated for depth, configuration, and contamination. Gentle exploration is necessary to assess for involvement of deeper structures, including facial muscles, tendons, blood vessels, nerves, salivary ducts, and fascial planes. The presence of visible fat within a cheek wound is particularly concerning, as it may indicate violation of deeper tissue layers and potential injury to the parotid duct or facial nerve branches, prompting early consultation with a facial specialist.[37][38] Assessment of sensory and motor function across the distributions of the facial and trigeminal nerves is essential. Asymmetry of facial movement, inability to raise the eyebrows, incomplete eye closure, or drooping of the mouth corner may suggest facial nerve injury. Traumatic facial nerve palsy is classically associated with temporal bone fractures, although penetrating injuries can result in direct nerve damage.[15][39] Sensory deficits, such as numbness or paresthesia over the cheeks, lips, or chin, may reflect trigeminal nerve involvement. Palpation should assess for tenderness, step-offs, instability, or crepitus. While swelling and pain with range of motion are common after trauma, focal bony tenderness, palpable deformity, or crepitus overlying the sinuses may indicate underlying fractures.[23] Examination of jaw movement is particularly important, as trismus or pain with opening may signal mandibular or temporomandibular joint injury.

**Ocular Examination**

Evaluation of the eyes is a critical component of the facial trauma assessment and should be performed early in the clinical course. Periorbital edema can progress rapidly and may later limit the ability to open the eyelids for adequate examination. In cases without suspected direct ocular trauma and without apparent visual complaints, a basic assessment consisting of visual inspection, pupillary light response, and evaluation of extraocular movements may be sufficient. Pupils should be assessed for size, symmetry, and reactivity to light. Brisk, equal, and symmetric responses are reassuring, whereas anisocoria or sluggish reactivity raises concern for intracranial pathology, including hemorrhage. Extraocular movements should be evaluated in all directions of gaze. Limitation of movement or diplopia suggests possible entrapment of an extraocular muscle, commonly associated with orbital fractures. Gross visual acuity should be assessed when possible, using corrective lenses if the child normally wears them. The presence of chemosis, subconjunctival hemorrhage, or significant periorbital ecchymosis may indicate blunt ocular injury. Such findings necessitate further evaluation

and are discussed in detail in the context of blunt eye trauma.[17]

**Ear Examination**

Assessment of the ears includes both external and internal inspection. The external ear should be examined for lacerations, abrasions, or hematomas. Auricular hematomas and lacerations with exposed cartilage require prompt attention to prevent complications such as infection or cartilage necrosis, as detailed in related clinical guidance.[11][12] Internal examination focuses on the external auditory canal and tympanic membrane. The presence of hemotympanum is particularly concerning and may indicate a basilar skull fracture. Gross assessment of hearing, such as response to voice or finger rub, can provide additional information regarding auditory function.

**Nasal Examination**

Examination of the nose should assess external swelling, deformity, and alignment of the nasal bridge. Palpation of both bony and cartilaginous components helps identify tenderness or instability. Comparison with pre-injury photographs, when available, can assist in recognizing subtle deformities. Internal inspection is mandatory and should evaluate septal hematoma, foreign bodies, and active bleeding. Septal hematomas require urgent intervention to prevent cartilage necrosis and long-term deformity. When epistaxis is present, attempts should be made to localize the bleeding source, although traumatic epistaxis is most commonly anterior in origin.[40]

**Oral Cavity Examination**

A careful examination of the oral cavity completes the facial assessment. The lips, mucous membranes, tongue, gingiva, teeth, and posterior oropharynx should be inspected. Evaluation for fractures or dislocations includes assessment of trismus, focal bony tenderness, malocclusion, and dental mobility. Gingival tears, ecchymosis, or step-offs along the alveolar ridge may be subtle indicators of underlying mandibular or maxillary fractures. Mucosal lacerations should be evaluated for depth, gaping, and whether they are through-and-through injuries involving both mucosa and skin. Such injuries may require layered repair and carry a higher risk of infection. Thorough documentation of dental injuries, including avulsions, fractures, or displacement, is essential, as these findings have implications for both acute management and long-term outcomes. In summary, the history and physical examination in pediatric facial trauma require a structured, vigilant, and child-centered approach. Integration of historical details with systematic physical findings allows clinicians to identify both obvious and subtle injuries, prioritize imaging and consultations, and ensure comprehensive and safe patient care.

**Evaluation**

The evaluation of pediatric facial trauma should be deliberate, minimally invasive, and guided by clinical findings, with particular attention to reducing unnecessary distress in children. In cases of isolated facial injury, laboratory investigations are generally not required, as they rarely contribute meaningful diagnostic information and may increase pain, fear, and anxiety, especially in younger patients. Laboratory testing is more appropriately reserved for children with multisystem trauma, suspected infection, coagulopathy, or significant hemorrhage, rather than uncomplicated facial injuries. Imaging plays a central role in the assessment of suspected facial fractures, but its use must be judicious. Computed tomography is the preferred initial radiographic modality when facial fractures are clinically suspected, as it provides high-resolution visualization of complex facial anatomy and allows accurate identification of bony disruption, displacement, and associated injuries. Plain radiographs have a limited role in the evaluation of facial trauma but may be useful in the assessment of dental injuries, particularly when tooth fractures, avulsions, or alveolar involvement are suspected. In contrast, when clinical examination reveals only superficial soft tissue injuries without signs of underlying skeletal involvement, further imaging is not indicated, as it does not alter management and exposes the child to unnecessary radiation. Similarly, in cases of suspected isolated nasal fracture, neither plain radiographs nor urgent CT imaging is recommended, as diagnosis is primarily clinical and imaging rarely influences acute management.[2][22]

The complexity and depth of soft tissue injuries must also be carefully evaluated. Deep, gaping, or anatomically complex lacerations, particularly those involving the lips, eyelids, cheeks, or regions near major neurovascular or salivary structures, may require consultation with facial surgical specialists such as plastic surgeons, otolaryngologists, or oral and maxillofacial surgeons. Early specialist involvement supports optimal functional and cosmetic outcomes and reduces the risk of long-term complications. Ocular evaluation warrants special consideration due to the potential for vision-threatening injuries. In any patient with eye pain, visual disturbance, or abnormal ocular findings, globe integrity must be assessed before proceeding with further examination. If globe rupture is suspected, no pressure should be applied to the eye, and procedures such as tonometry must be avoided.[17] Fluorescein staining with a Seidel test can assist in identifying aqueous leakage suggestive of globe rupture.[41] In cooperative children, slit lamp examination with fluorescein enables detailed evaluation for corneal abrasions, foreign bodies, hyphema, and inflammatory changes within the anterior chamber. Fluorescein pooling at the medial canthus, particularly in the presence of adjacent lacerations, raises concern for lacrimal duct injury

and necessitates specialist assessment. Tonometry is indicated when visual changes are present, primarily to assess for elevated intraocular pressure associated with retrobulbar hematoma.[17] Point-of-care ocular ultrasound, when performed by trained and experienced clinicians, provides a valuable adjunct in the evaluation of ocular trauma. This modality can identify lens dislocation, vitreous hemorrhage, retinal detachment, and indirect signs of elevated intracranial pressure without exposing the child to radiation.[42][43] When integrated with a thorough clinical examination, these evaluation strategies support accurate diagnosis while prioritizing patient safety and comfort.

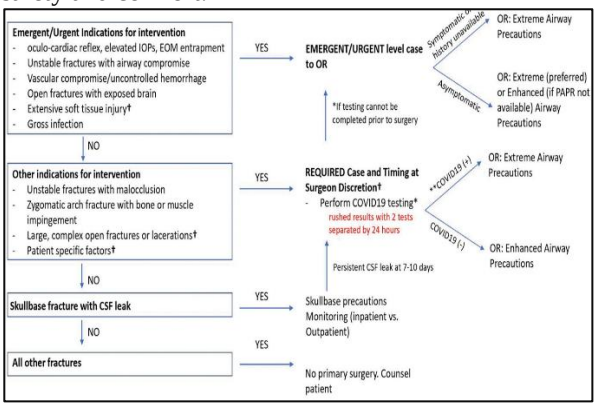


**Fig. 1:** Facial Trauma Protocol.

**Treatment / Management**

The management of pediatric facial trauma is guided by the severity and type of injury, the age and cooperation level of the child, and the need to minimize pain, anxiety, and long-term functional or cosmetic sequelae. In the majority of pediatric patients presenting with isolated facial soft tissue injuries such as contusions or superficial abrasions, conservative treatment is sufficient. Local wound care, application of ice, rest, and the use of anti-inflammatory analgesics typically result in satisfactory recovery without complications. However, more complex injuries require a structured and stepwise approach that integrates pain control, wound management, and specialist involvement when indicated. Effective anxiolysis and pain control are central to successful treatment in pediatric trauma. Nonpharmacologic strategies such as distraction, parental presence, and age-appropriate reassurance are often effective and should be used whenever possible.[35][36] Despite this, procedural interventions frequently necessitate pharmacologic support. In neonates and infants younger than six months, oral sucrose solutions have demonstrated efficacy in reducing procedural pain.[36] For mild to moderate pain, acetaminophen and ibuprofen are appropriate first-line agents. Adjunctive measures such as ice application can reduce both pain and edema, particularly in contusions, while frozen treats or teething devices may provide additional comfort and distraction for intraoral injuries. Inhaled and intranasal pharmacologic agents play an important role when cooperation is limited or brief but detailed examinations are required. Nitrous oxide may be considered for short procedures or focused examinations, particularly when intranasal administration is contraindicated.[36][44] Intranasal fentanyl is commonly used for analgesia, while intranasal ketamine or midazolam may provide anxiolysis or sedation without the need for intravenous access, thereby reducing procedural distress.[36][45] These approaches allow timely intervention while minimizing invasiveness.

Topical anesthetic agents should be employed early when wound care or vascular access is anticipated. Adequate time must be allowed for anesthetic onset to optimize patient comfort. Historically, lidocaine-epinephrine-tetracaine formulations have been favored for open wounds. Although some commercially available topical anesthetics include warnings against use on open wounds and lack formal FDA approval for this indication, existing evidence supports their safety and effectiveness when applied directly to wounds.[36][46][47][48] Selection of a topical agent should consider availability, onset time, and formulation, with gel or ointment preparations generally providing superior efficacy compared with liquid forms. Regional nerve blocks represent an underused yet valuable technique in pediatric facial trauma. By reducing the number of needle insertions and the total volume of anesthetic required, nerve blocks can provide effective anesthesia for laceration repair or dental injuries while minimizing discomfort.[48][49] Facial nerve blocks can be performed using surface landmarks without advanced imaging, and longer-acting local anesthetics are particularly beneficial in managing dental pain. Detailed descriptions of specific facial nerve blocks are addressed in other StatPearls resources.[50][51][52][53] Assessment of immunization status is mandatory in all patients with open wounds or dental avulsions. As tetanus vaccination is included in routine pediatric immunization schedules, most appropriately vaccinated children are protected. For clean, well-irrigated wounds requiring closure, routine systemic antibiotics do not confer additional benefit.[23] In contrast, deep wounds, animal bites, contaminated injuries, or wounds presenting more than 24 hours after injury warrant empiric antibiotic therapy.

Proper wound management begins with meticulous cleaning prior to repair. Copious high-pressure irrigation is essential to reduce bacterial load and prevent infection.[48] Small facial lacerations less than 4 cm in length and not subjected to significant tension may be effectively closed with tissue adhesives.[54] Simple lacerations are typically managed by emergency or urgent care providers. Both absorbable and non-absorbable sutures are acceptable; however, fast-absorbing sutures are often preferred in younger children, particularly when

sedation is required, as they eliminate the need for suture removal while achieving comparable cosmetic outcomes and infection rates.[11][20][23][55][56] Facial sutures are generally reassessed after 3 to 5 days. Non-absorbable sutures, commonly nylon or polypropylene, are removed if healing is adequate.[46] Deep absorbable sutures used in complex repairs should consist of materials such as polydioxanone, polyglactin, or polyglycolic acid, while superficial closure with absorbable sutures should employ fast-absorbing gut.[48] When longer-lasting absorbable sutures are used superficially, trimming or removal at 3 to 5 days may reduce irritation and scarring. In younger children, protective dressings can discourage manipulation of the wound. Although evidence does not conclusively demonstrate that topical ointments improve healing or reduce infection, their use is generally safe and reasonable for closed wounds.[23][46] Dog bites to the face require particular attention due to infection risk and cosmetic considerations. Amoxicillin-clavulanic acid is the recommended empiric therapy.[21] Primary closure may improve cosmetic outcomes but carries an increased risk of infection, necessitating careful clinical judgment.[57]

Intraoral lacerations are common in children and often heal rapidly due to the region's rich vascular supply. Many such injuries do not require repair, especially if they are superficial. Repair is generally reserved for through-and-through lacerations involving the lip, cheek, or tongue.[58][59] When repair is performed, approximation need only be sufficient to prevent food entrapment. These procedures frequently require sedation due to limited patient cooperation.[13] Certain injuries necessitate specialist involvement. Wounds affecting highly cosmetic or anatomically complex areas, including the eyelids, ductal systems, cartilaginous structures, or suspected nerve injuries, should be managed by facial or ophthalmologic specialists. Depending on provider expertise, involvement of the vermillion border, nasolabial fold, or ear may also warrant referral. Facial wounds can often be safely closed up to 24 hours after injury, allowing for next-day specialist evaluation when appropriate. Nasal soft tissue injuries are typically managed conservatively with ice and observation. Septal hematomas require prompt drainage and nasal packing to prevent cartilage necrosis.[60] Traumatic epistaxis usually resolves with pressure and ice, though vasoconstrictive agents, cauterization, or packing may be required in persistent cases.[40]

Ear injuries demand careful assessment. Auricular hematomas should be promptly drained and treated with pressure dressings to prevent deformity.[12] Small tympanic membrane perforations with minimal hearing loss may be followed conservatively by a primary care provider, while larger defects or significant hearing loss necessitate otolaryngology follow-up within four weeks.[61][62][63] Patients and caregivers should receive clear instructions regarding ear protection and water avoidance during healing. Antibiotic ear drops are indicated when perforations occur in contaminated settings. Dental trauma management depends on dentition stage. Avulsed permanent teeth may be re-implanted and splinted, whereas avulsed primary teeth should not be re-implanted to avoid damage to developing permanent teeth.[9][10] Dental follow-up is essential to determine the need for space maintenance or orthodontic intervention. Finally, facial burns and ocular injuries require specialized consideration. Patients with facial or electrical burns, or those with multiple traumatic injuries, should be referred to trauma or burn centers or receive close specialist follow-up.[16][64] Ophthalmology consultation is essential for any eye injury associated with visual impairment or suspicion of globe rupture, muscle entrapment, or retrobulbar hematoma.[17][18] Through timely, child-centered, and multidisciplinary management, outcomes in pediatric facial trauma can be optimized while minimizing both immediate and long-term morbidity.

**Differential Diagnosis**

The evaluation of pediatric facial trauma requires a broad differential diagnosis because facial injury may coexist with occult or life-threatening conditions, particularly after high-energy blunt mechanisms such as motor vehicle collisions. Beyond visible soft tissue damage, clinicians must consider injuries to deeper bony, cartilaginous, vascular, neural, and visceral structures. Facial bone fractures, including mandibular dislocation, maxillary or sinus fractures, and associated skull fractures, should be carefully excluded, as should cervical spine instability or spinal cord injury. Dental fractures and avulsions are common and may be overlooked without systematic oral examination. Soft tissue wounds range from superficial abrasions to penetrating injuries, including bites or projectile trauma. Ocular involvement such as globe rupture, extra-ocular muscle entrapment, or retrobulbar hematoma must be considered in the presence of visual complaints or periorbital findings. Additional considerations include septal hematoma, auricular hematoma, tympanic membrane perforation, burns, inhalation injury, ductal disruption, nerve injury, vascular compromise, and traumatic brain injury. Psychosocial factors, including non-accidental trauma, assault, neglect, or self-harm, must also be actively assessed to ensure accurate diagnosis and appropriate safeguarding.

**Prognosis**

The overall prognosis for pediatric facial trauma is favorable, particularly in cases limited to soft tissue injury without associated fractures. Even when facial fractures are present, children demonstrate a strong capacity for bone remodeling, which reduces the likelihood of permanent deformity or the need for operative intervention. Most patients

recover fully with conservative management and appropriate follow-up. The most frequent long-term consequence is scarring, especially following burns or lacerations involving cosmetically sensitive areas such as the lips, eyelids, or periorbital region. Although scarring is often primarily cosmetic, it may occasionally result in functional impairment affecting speech, vision, or facial expression. Preventive measures, including meticulous wound care and consistent application of sunscreen to healed wounds for six to twelve months, can significantly reduce scar prominence and pigment alteration.[65] When injuries are promptly recognized, properly managed, and followed longitudinally, the majority of children experience excellent functional and aesthetic outcomes with minimal long-term morbidity.

**Complications**

Complications of pediatric facial trauma may emerge acutely or in a delayed fashion and vary according to injury type and severity. Infection remains a significant concern, particularly in contaminated wounds, burns, or animal bites, and may present days after the initial injury. Delayed bleeding is a recognized risk in specific injuries such as oral commissure electrical burns, where vascular erosion may occur after eschar separation. Dental trauma can lead to long-term complications, including tooth loss, enamel defects, malocclusion, and the need for orthodontic intervention. Scarring and keloid formation may develop over time and can have both cosmetic and functional implications. Chronic facial pain or sensory disturbances may result from nerve involvement. Additionally, psychosocial consequences, including anxiety, behavioral changes, or post-traumatic stress, may appear weeks to months after the injury. Recognition of these potential complications underscores the importance of anticipatory guidance, structured follow-up, and timely referral to appropriate specialists.

**Patient Education**

Preventive strategies play a critical role in reducing both the incidence and severity of pediatric facial trauma. Education begins with vigilant screening for child abuse, neglect, and unsafe home environments, particularly in younger children. In older children and adolescents, prevention efforts should expand to include assessment of self-harm risk, interpersonal violence, and participation in high-risk activities. Consistent use of age-appropriate vehicle restraints, including car seats and seat belts, has been shown to significantly reduce injury severity and mortality.[66][67] Protective equipment such as helmets, mouthguards, and face shields should be strongly encouraged during sports and recreational activities. Education on proper technique, adherence to safety rules, and supervision by trained coaches further reduces injury risk.[32][68][69] Engaging caregivers and patients in clear, practical safety guidance empowers families to adopt behaviors that minimize preventable trauma and its long-term consequences.

**Other Issues**

Post-injury care and follow-up are essential components of recovery in pediatric facial trauma. Patients with dental injuries or significant jaw pain should be advised to follow a soft or liquid diet and avoid extreme food temperatures to reduce discomfort and prevent further injury. Liquid formulations of home medications may be necessary during the acute recovery period. Most minor facial injuries can be followed by a primary care provider, such as a pediatrician, with reassessment for healing and complications. Certain injuries require targeted outpatient follow-up, including dental trauma, which should be evaluated by a dentist, and oral commissure burns, which benefit from burn or plastic surgery review. When diagnostic imaging has been performed, providing copies to caregivers helps prevent unnecessary repeat studies during follow-up care. Clear discharge instructions and structured follow-up planning improve continuity of care and outcomes.

**Enhancing Healthcare Team Outcomes**

Optimal management of pediatric facial soft tissue trauma relies on coordinated interprofessional collaboration. Mild injuries are often managed by primary care providers, while more complex cases are evaluated and treated in emergency or urgent care settings. Emergency physicians, nurses, and pediatric specialists form the core clinical team, with consultation from plastic surgery, otolaryngology, dentistry, ophthalmology, or social services as indicated. Social workers play a vital role when non-accidental trauma or psychosocial concerns are identified. Although facial injuries are rarely life-threatening, failure to recognize subtle signs of deeper injury can lead to preventable complications. Effective communication, systematic assessment, and shared decision-making across disciplines ensure comprehensive evaluation, timely intervention, and safe discharge planning. A cohesive team approach enhances patient safety, reduces missed injuries, and supports favorable short- and long-term outcomes.

**Conclusion:**

Pediatric facial trauma encompasses a broad range of injuries, most commonly soft tissue lacerations and contusions, which generally heal well when managed appropriately. Understanding the unique anatomy and developmental stages of children is essential for accurate diagnosis and effective treatment. A systematic approach to history-taking, physical examination, and selective imaging ensures that subtle injuries are not overlooked and that unnecessary radiation exposure is avoided. Management should prioritize pain control, emotional comfort, and meticulous wound care, with early specialist involvement when injuries affect cosmetically or functionally sensitive structures. Although long-term outcomes are typically excellent,

complications such as scarring, nerve injury, or dental sequelae may occur and require ongoing follow-up. Preventive measures—including proper supervision, use of protective equipment, and caregiver education—play a critical role in reducing the incidence and severity of pediatric facial injuries. With timely, coordinated, and child-centered care, most children achieve full functional and aesthetic recovery.

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