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CLINICAL COURSE AND DIAGNOSTIC CRITERIA OF LE FORT I AND LE FORT II MAXILLARY FRACTURES

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Abstract: Maxillary fractures represent a significant category of maxillofacial injuries due to their complex anatomical structure and close association with vital functional systems. Among these injuries, Le Fort I and Le Fort II fractures are the most frequently encountered patterns affecting the midface region. This article analyzes the clinical course and diagnostic criteria of Le Fort I and Le Fort II maxillary fractures, with particular emphasis on their pathological mechanisms, clinical manifestations, and diagnostic challenges. Special attention is given to the role of clinical examination, radiological assessment, and differential diagnosis in establishing an accurate and timely diagnosis. Understanding the distinctive features of these fracture types is essential for selecting appropriate treatment strategies, preventing complications, and improving functional and aesthetic outcomes in patients with midfacial trauma.

Keywords: Maxillary fractures; Le Fort I fracture; Le Fort II fracture; clinical presentation; diagnostic criteria; maxillofacial trauma.

Maxillary fractures constitute a significant portion of maxillofacial injuries and are commonly associated with high-energy trauma such as road traffic accidents, falls from height, and interpersonal violence. Due to the central anatomical position of the maxilla and its functional relationship with the nasal cavity, orbit, oral cavity, and dentition, fractures in this region often result in complex clinical presentations and functional impairments. Disruption of mastication, speech, respiration, and facial aesthetics highlights the clinical importance of timely diagnosis and appropriate management of maxillary fractures.

Among the various classifications of midfacial fractures, the Le Fort classification remains one of the most widely accepted systems for describing maxillary fracture patterns. Le Fort I and Le Fort II fractures represent distinct anatomical pathways of injury, each characterized by specific fracture lines, clinical signs, and pathological consequences. Le Fort I fractures primarily involve horizontal separation of the alveolar process and hard palate, whereas Le Fort II fractures follow a pyramidal pattern affecting the maxilla, nasal bones, and infraorbital structures. These differences significantly influence both diagnostic approaches and therapeutic decision-making.

Accurate diagnosis of Le Fort I and Le Fort II fractures requires a comprehensive clinical examinationn combined with appropriate imaging techniques. Clinical findings such as malocclusion, facial swelling, epistaxis, sensory disturbances, and midfacial mobility must be carefully correlated with radiological evidence to establish the correct fracture type and extent. Delayed or inaccurate diagnosis may lead to severe complications, including improper bone

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healing, chronic pain, functional deficits, and facial deformities. Therefore, a detailed understanding of the clinical course and diagnostic criteria of Le Fort I and Le Fort II maxillary fractures is essential for maxillofacial surgeons and dental professionals. This article aims to analyze the characteristic clinical features and diagnostic principles of these fracture types, emphasizing their relevance in improving early detection, optimizing treatment planning, and achieving favorable functional and aesthetic outcomes.

Le Fort fractures represent classic patterns of midfacial trauma that occur as a result of high-energy impact transmitted through the maxillary complex. The maxilla plays a central anatomical and functional role in the midface, connecting the oral cavity, nasal cavity, and orbital structures. Consequently, fractures in this region are rarely isolated to bone damage alone and are frequently accompanied by soft tissue injury, vascular disruption, neural impairment, and occlusal instability. The pathophysiological basis of Le Fort fractures lies in the disruption of the facial buttress system, particularly the nasomaxillary, zygomaticomaxillary, and pterygomaxillary supports, which leads to abnormal mobility of midfacial segments and functional impairment.

Le Fort I fractures are characterized by a horizontal fracture line that separates the dentoalveolar segment and hard palate from the remaining midface. This fracture typically occurs above the apices of the maxillary teeth and extends posteriorly through the pterygomaxillary junction. The most common mechanism of injury involves a direct force applied to the lower maxilla, often resulting from blunt trauma to the upper lip or anterior dental region. Clinically, patients with Le Fort I fractures frequently present with malocclusion due to displacement of the maxillary segment, pain during mastication, and mobility of the upper dental arch, often described as a “floating palate.” Intraoral examination may reveal gingival bleeding, palatal hematoma, or mucosal lacerations, while facial swelling is usually localized to the lower midface. Epistaxis may be present but is generally less severe than in higher-level midfacial fractures. Functional disturbances primarily involve impaired chewing efficiency and altered speech articulation due to instability of the palatal structure. If left untreated or diagnosed late, Le Fort I fractures may result in persistent occlusal abnormalities, chronic discomfort, improper bone healing, and long-term functional limitations.

Le Fort II fractures follow a pyramidal fracture pattern and involve a higher level of midfacial disruption. The fracture line typically extends through the nasal bridge, medial orbital walls, infraorbital rim or floor, and inferiorly through the anterior maxilla toward the pterygomaxillary region. These fractures usually result from a force directed at the central midface or nasal area and are associated with more extensive anatomical involvement than Le Fort I fractures. Clinically, Le Fort II fractures are marked by pronounced midfacial swelling, significant periorbital edema, and ecchymosis around the eyes. Epistaxis is common and often more severe, reflecting nasal and sinus involvement. A characteristic feature of Le Fort II fractures is sensory disturbance in the distribution of the infraorbital nerve, leading to numbness or paresthesia of the cheek, upper lip, and lateral nasal region. Malocclusion and abnormal mobility of a larger midface segment are frequently observed, and patients may exhibit nasal deformity or tenderness over the nasal bridge. In some cases, ocular symptoms such as diplopia, pain on eye movement, or visual disturbances may occur due to involvement of the orbital floor or surrounding structures. Functional impairment in Le Fort II fractures extends beyond

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mastication and speech to include compromised nasal airflow and potential orbital dysfunction, increasing the risk of long-term aesthetic and sensory sequelae if treatment is delayed.

Accurate diagnosis of Le Fort I and Le Fort II fractures is based on a comprehensive clinical examination combined with radiological confirmation. Clinically, careful inspection may reveal facial asymmetry, characteristic swelling patterns, and bruising that help differentiate between fracture types. Palpation and mobility testing are essential diagnostic steps; stabilization of the frontal bone or nasal root while assessing movement of the maxilla through the upper teeth can reveal abnormal segmental mobility. Occlusal assessment plays a critical role, as changes in bite alignment often serve as early indicators of skeletal instability even when swelling obscures direct palpation. Neurological evaluation, particularly assessment of infraorbital sensation, is crucial in suspected Le Fort II fractures. Additional screening of ocular movement and nasal structures is necessary to identify associated complications such as orbital involvement or septal hematoma. Radiological imaging, especially computed tomography of the maxillofacial region, is considered the diagnostic standard for confirming Le Fort fractures. CT imaging allows precise visualization of fracture lines, degree of displacement, involvement of the orbital floor, sinus walls, and pterygomaxillary separation. Le Fort I fractures typically demonstrate a horizontal fracture pattern across the maxillary walls, while Le Fort II fractures show a pyramidal configuration extending toward the infraorbital and nasal regions. Imaging findings must be interpreted in conjunction with clinical signs to establish an accurate diagnosis and guide treatment planning.

Differential diagnosis is essential, as Le Fort fractures may mimic or coexist with other midfacial injuries such as dentoalveolar fractures, zygomaticomaxillary complex fractures, naso-orbito-ethmoid injuries, or isolated nasal fractures. The combination of malocclusion, midface mobility, sensory changes, and characteristic imaging findings remains the most reliable approach to distinguishing Le Fort I and Le Fort II fractures from other trauma patterns. Early recognition of these injuries and their specific clinical features is critical for preventing complications such as improper bone healing, chronic pain, functional deficits, and facial deformities. Understanding the clinical course and diagnostic criteria of Le Fort I and Le Fort II maxillary fractures therefore plays a fundamental role in optimizing patient outcomes and guiding effective surgical and rehabilitative management.

Le Fort I and Le Fort II maxillary fractures represent complex patterns of midfacial trauma with significant functional and anatomical implications. Their clinical course is influenced by the level of skeletal involvement, degree of displacement, and the presence of associated soft tissue, neural, and orbital injuries. Le Fort I fractures primarily affect the dentoalveolar and palatal structures, resulting mainly in occlusal disturbances and localized midface instability, whereas Le Fort II fractures involve a broader pyramidal segment of the midface and are frequently associated with sensory deficits, nasal deformities, and orbital complications. Accurate and timely diagnosis remains the cornerstone of effective management for these fracture types. Comprehensive clinical examination, with particular attention to malocclusion, segmental mobility, neurological status, and ocular function, must be systematically combined with advanced radiological imaging to correctly identify fracture patterns and their extent. Failure to recognize the specific characteristics of Le Fort fractures may lead to delayed treatment, improper reduction, and long-term functional or aesthetic sequelae.

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A clear understanding of the clinical presentation and diagnostic criteria of Le Fort I and Le Fort II fractures allows clinicians to optimize treatment planning, select appropriate surgical or conservative interventions, and reduce the risk of complications. Ultimately, early recognition and accurate classification of these injuries contribute to improved functional recovery, restoration of facial harmony, and better overall outcomes in patients with midfacial trauma.

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