METHODS OF REHABILITATION IN PATIENTS WITH COMBINED INJURIES OF THE NOSE AND PARANASAL SINUSES

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Abstract. *Combined injuries of the nose and paranasal sinuses are among the most complex craniofacial traumas because they may simultaneously impair nasal breathing, sinus drainage, olfaction, facial contour, and psychological well-being. Modern rehabilitation should not be limited to fracture repair alone, but should include staged restoration of airway patency, mucosal recovery, sinus ventilation, smell function, and long-term prevention of delayed complications. Objective tools such as acoustic rhinometry and rhinomanometry improve evaluation of nasal patency, while standardized olfactory testing is important because post-traumatic smell dysfunction is common and may persist despite fracture reduction. Psychological screening should also be integrated into rehabilitation protocols, as anxiety, depression, and post-traumatic stress are frequent after facial trauma.*

Keywords: *nasal trauma, paranasal sinuses, combined injury, rehabilitation, frontal sinus, acoustic rhinometry, rhinomanometry, olfactory dysfunction.*

Materials and methods. This thesis is based on a narrative review of peer-reviewed publications addressing frontal sinus fractures, nasal trauma, objective assessment of nasal airflow, post-traumatic olfactory dysfunction,

and psychological rehabilitation after maxillofacial injury. The analysis focused on staged rehabilitation, functional outcomes, and long-term follow-up principles.

Results and discussion. Early rehabilitation begins with stabilization of the patient, maintenance of the upper airway, and precise imaging-based assessment of the injury. In frontal sinus trauma, treatment planning is guided by five key parameters: anterior table injury, posterior table injury, frontal recess or nasofrontal outflow tract involvement, dural integrity, and the presence of cerebrospinal fluid leak. The primary objective is to create a “safe sinus” while minimizing morbidity. Recent reviews also note that some nasofrontal outflow tract injuries can be managed nonoperatively if close clinical and radiologic surveillance is ensured.

Functional rehabilitation should then focus on restoration of nasal patency and sinus ventilation. In this regard, acoustic rhinometry and rhinomanometry are valuable objective methods because they quantify minimal cross-sectional area, nasal volume, and airway resistance, thus complementing endoscopic and clinical findings. These techniques are especially important when subjective nasal obstruction does not fully reflect the anatomical and functional deficit.

Olfactory rehabilitation is another essential component. Post-traumatic olfactory dysfunction is common after nasal injury; in one prospective study, 46.4% of patients with nasal bone fractures had olfactory dysfunction, and closed reduction did not significantly improve smell at 6 months. More broadly, traumatic olfactory loss may be conductive or neurosensory, and only a minority of patients improve spontaneously. Therefore, rehabilitation protocols should include objective smell testing and, when indicated, structured olfactory training and counseling.

Late rehabilitation must include surveillance for chronic sinusitis, mucocele, mucopyocele, meningitis, and brain abscess, particularly after

frontal sinus injury. At the same time, the psychosocial dimension should not be underestimated: facial trauma is associated with a high burden of anxiety, depression, and post-traumatic stress symptoms. Early screening and referral for psychological support improve recovery and quality of life, making multidisciplinary follow-up essential.

Conclusion. Rehabilitation of patients with combined injuries of the nose and paranasal sinuses should be multidisciplinary, staged, and function-oriented. The most effective model combines early anatomical assessment, restoration of nasal airway and sinus drainage, objective monitoring with rhinomanometry and acoustic rhinometry, evaluation and rehabilitation of olfaction, long-term radiologic follow-up, and mandatory psychological support. Such an integrated approach improves both functional and quality-of-life outcomes.

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