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Microscopic Features Of Soft Tissues In Purulent-Necrotic Complications Of The Maxillofacial Region

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ABSTRACT

Purulent-necrotic processes of the maxillofacial region remain a clinically significant problem because odontogenic infections may spread into deep fascial spaces and, in severe cases, transform into necrotizing soft-tissue infection with rapid progression and life-threatening complications. Contemporary studies also show that severe odontogenic infections are associated with prolonged hospitalization, systemic complications, and the need for early multidisciplinary management [7,8,9]. In this context, microscopic examination of soft tissues is important for clarifying the depth of tissue destruction, vascular injury, inflammatory activity, and reparative changes.

Keywords: maxillofacial region, purulent-necrotic complications, soft tissues, microscopy, morphology.

INTRODUCTION

Aim of the study. To analyze the microscopic features of soft tissues in purulent-necrotic complications of the maxillofacial region caused by different etiological factors and to assess their clinical significance.

Materials and methods. A retrospective-prospective study included 210 patients treated for purulent-necrotic complications of the maxillofacial region in 2023–2026. The study material consisted of intraoperative necrotic tissue fragments, perifocal soft tissue biopsy specimens, and granulation tissue samples [1,2,4,5,10]. Histological specimens were fixed in 10% neutral formalin, embedded in paraffin, and sectioned at 4–5 μm. Microscopic evaluation included diffuse neutrophilic infiltration, interstitial edema, microabscess formation, colliquative and coagulative necrosis, endothelial swelling, microthrombosis, hemorrhagic imbibition, myonecrosis, granulation tissue, reactive fibrosis, and secondary bacterial colonization [3,6,11,12]. Statistical analysis was performed using SPSS 26.0.

Results. Among 210 patients, 128 (61.0%) were male and 82 (39.0%) were female. The mean age was 46.9 ± 14.8 years. Odontogenic lesions constituted the largest etiological group with 112 cases (53.3%). Microscopic examination showed that the most frequent findings were diffuse neutrophilic infiltration in 178 cases (84.8%), interstitial edema in 164 cases (78.1%), microabscess formation in 149 cases (71.0%), colliquative necrosis in 138 cases (65.7%), endothelial swelling in 127 cases (60.5%), and microthrombosis in 131 cases (62.4%). Odontogenic lesions were mainly characterized by an exudative-necrotic pattern with pronounced inflammatory infiltration and tissue detritus. Post-traumatic and postoperative complications more often demonstrated an ischemic-thrombotic pattern, including vascular wall injury, stasis, hemorrhagic imbibition, and myonecrosis. In cases associated with osteomyelitis and osteonecrosis, reparative-fibrotic changes, granulation tissue formation, and secondary bacterial colonization were more pronounced. Repeated surgical debridement was required in 47 patients (22.4%).

Conclusion

Soft tissue microscopy in purulent-necrotic complications of the maxillofacial region reveals distinct morphological patterns depending on etiology and background pathology. Exudative-necrotic changes predominate in odontogenic lesions, whereas ischemic-thrombotic and reparative-fibrotic changes are more typical of post-traumatic, postoperative, and osteonecrosis-associated complications. Microscopic analysis may be recommended as an important clinicomorphological criterion for assessing severity, determining the extent of surgical debridement, and improving prognosis.

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