WNT-1 and -3a could indicate a slow and delayed bone regeneration process.

Our results showcase the complex myriad of pathways that could be involved in the progression of TMJA and post-surgery healing processes. Immunopathological investigations such as the present one could aid in improving diagnosis, treatment, and prognosis for patients affected with TMJ ankylosis.

CHARACTERIZATION OF FACIAL BONE QUALITY MARKERS

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Introduction. Bone belongs to the supportive tissue and consists of cells (osteoblasts, osteocytes and osteoclasts) and hard mineralized extracellular matrix. Facial skeleton developed in a way of intramembranous ossification within the 1st intrauterine month is special due to the influence of neural crest cells on its development. Main molecular events display the growth and regeneration, degeneration, homeostasis regulation, resorption, antimicrobial defence, cell death and some gene expression. However, despite quite numerous experimental research data, quite limited are those on tissue factors regulating the above-mentioned events.

Aim of our studies was the research of different tissue factors in facial bones to reveal the quality of this hard facial structure in humans from 12 to 50 years old.

Material and methods. The material was obtained from 32 healthy subjects interradicular septae during tooth

extraction and sinus wall during the maxillary sinus augmentation surgery. Patients were divided in children/youth (aged 12- 25) and adult (aged 26-50) groups. The Ethical committee permissions and consent forms of patients/parents were obtained during the research. Bone fragments were proceeded for resorption factor IL-1, inflammation/proliferation indicator NFkβ105, growth factors BMP-2/4, TGFβ-1, osteoclastogenesis inhibitory factor OPG, mineralization factors OPN, OC, tissue degradation enzymes MMP-1, MMP-2, MMP-8, MMP-9, MMP-13, antimicrobial protein β defensin 2 (βD-2), facial bone homeostasis stimulatory genes/gene proteins Barx1, Msx2 and Wnt1 by immunohistochemistry. Apoptosis was detected by TUNEL kit. Data were evaluated semi-quantitatively. The statistical significance of the differences among the mean values of the different groups of age was tested by means of one-way ANOVA with the Bonferroni correction. The correlation between age and signalling molecules expression was assessed by using Spearman's correlation coefficient.

Results revealed similarities in both patients' groups, - up to occasional IL-1 positive osteocytes, while TGFβ-1 mainly stained numerous bone cells. From factors, all healthy controls displayed NFkβ105, OPG, OC, MMP-8 and MMP-9. NFkβ105 marked moderate number, OPG moderate to numerous, OC – abundant number, MMP-8 – few to moderate, but MMP-13 – few bone cells. Interestingly, BMP-2/4 was seen in variable number of cells, ranging from absence until numerous immunoreactive cells in healthy bone. Number of OPN positive cells was most abundant, while βD-2 varied from few to numerous bone cells. From MMPs, MMP-1 and MMP-2 was not seen into the healthy bone, while MMP-8 demonstrated immunoreactivity in few to moderate osteocytes, but MMP-13 – in few cells. Number of apoptotic cells also reached moderate number of cells. From genes/gene proteins,

Msx2 and Wnt-1 displayed occasional number of osteocytes, while Barx1 marked moderate number of healthy bone cells. Finally, apoptosis, OPG and NFkβ105 showed statistically significant tendency to decrease in bone with age. Spearman's correlation coefficient also revealed a moderate correlation between age and mean OPG and NFkβ105 expression and TUNEL staining.

Conclusions. The healthy bone is characterized by persistent expression of OPG, NFkβ105, OC, MMP-8, -9 suggesting the stable suppression of osteoclastogenesis (bone resorption), moderate cellular proliferation (NFkβ105), intensive mineralization (OC) and slow, indistinct bone remodelation (MMPs). The indistinct presence of IL-1 proves the limited resorption of bone, while common for tissue MMP-2 (also MMP-1) do not participate in bone remodelling. An intensive presence of TGFβ-1 and OPN indicates the dominance of bone growth and stable homeostasis, while various BMP-2/4 expression is individual and seemingly depends on other internal/external regulators of hard tissue. The decrease of NFkβ105, OPG, apoptosis within the aging proves the diminished cellular activity, suppression of bone resorption, and also cellular death directly after the skeleton development.