SUMMARY

Infections in the head and neck area are caused by a morphologically diverse bacterial microbiota. Odontogenic and non-odontogenic causes can be indicated as a source of infection development. The former are the dominant cause of craniofacial inflammation, including teeth with pulp gangrene, as well as acute and chronic purulent periodontitis. These types of clinical forms are major medical conditions treated in the field of maxillofacial surgery.

The aim of this dissertation was a retrospective analysis of the performed microbiological studies and understanding bacterial etiological factors causing infections in patients treated in the Department of Maxillofacial and Plastic Surgery of the Medical University of Bialystok Hospital in the years 2013-2017, with particular emphasis on soft tissue infections of the face and neck area. In addition, the species profiles of isolated bacteria were evaluated along with their mutations in individual years, a comparative analysis of microbes causing odontogenic and non-odontogenic infections was performed. Cumulative analyses of drug susceptibility were also performed in groups of bacteria selected in terms of the appropriate number.

The research material consisted of bacterial strains isolated as part of routine microbiological diagnostic tests from patients of the Department of Maxillofacial and Plastic Surgery of the Medical University of Bialystok Hospital. Bacterial strains isolated from purulent secretion, oropharyngeal swab, blood and other biological materials related and unrelated to the diagnosis of soft tissue infections of the face and neck area were analyzed in detail as odontogenic and non-odontogenic processes. Microbiological culture of material samples for aerobic / facultatively aerobic and anaerobic bacteria was taken on bacteriological agar plates in accordance with laboratory standards. In the subsequent stages, identification of isolated microbes to the species or genus level was carried out and a drug susceptibility test was performed with the use of Vitek 2 automatic system, while in the case of anaerobic bacteria, ATB strips were used at this stage, in accordance with the manufacturer's recommendations. The obtained results of drug susceptibility tests for selected groups of bacteria were subjected to statistical analysis using the Chi-square test and the Fisher's exact test. The results were considered statistically significant at $p<0.05$.

The dominant clinical materials were swab-collected samples, which accounted for 45.9% of all materials. Most of them were secured from the maxillofacial area, such as swabs

from the pharynx, inflammatory infiltration, gingival fistula, cutaneous fistula, nasal passage, surgical wound, Stensen's duct ostium, maxillary sinus, post-extraction tooth socket. Purulent materials were taken slightly less frequently – 38.6% of the samples, all from anatomical locations of the head and neck area. Cyst fluid accounted for 14% of the total materials, while few samples in the entire study period were urine – 1.2% and blood – 0.3%.

The bacterial strains (385) analyzed over a period of 5 years were divided based on basic morphological and physiological characteristics of the cell (shape, Gram staining, energy metabolism). The following subgroups were included in the classification: anaerobic rods G(–), anaerobic rods G(+), anaerobic cocci G(–), anaerobic cocci G(+), anaerobic bacilli, streptococci E (Enterococcus), streptococci S (Streptococcus), other streptococci, staphylococci, other cocci, enteric rods, non-fermenting rods A (Acinetobacter), non-fermenting rods P (Pseudomonas), non-fermenting rods S (Stenotrophomonas) and other rods. Of all strains, anaerobic rods G(–) (23.9%), streptococci S (22.1%), enteric rods (15.3%) and staphylococci (10.6%) were the most abundant. The presence of bacteria in each of the other subgroups was less than 8%, and in such subgroups as anaerobic bacilli, non-fermenting rods S, other streptococci and other cocci did not exceed one percent.

Among all Gram-negative isolates grown in 2013-2017 which were included in the group of odontogenic, anaerobic rods dominated. They made up almost 60% of the group. Genus Prevotella was the most widely represented taxonomic unit, dominated by 3 species Prevotella melaninogenica (10.9%), Prevotella buccae (12.5%) and Prevotella oralis (14.3%) – the most numerous species in the group of isolated bacteria from odontogenic infections.

Genus Fusarium was the second most frequent, with its main representative – Fusobacterium nucleatum (8.3%). Anaerobic cocci consisted of undifferentiated group in terms of genus – only bacteria belonging to the genus Veilonella (9,2%) were isolated without species identification.

Gram-positive bacteria in odontogenic infections were most often represented by streptococci of the genus Streptococcus (43.7%). Most of them were identified only to the genus level (13.2%), subsequently frequent species were Streptococcus mitis (11.8%), Streptococcus salivarius (6.2%), Streptococcus sanguinis (4.8%) and Streptococcus anginosus (3.5%).

The second most common group was anaerobic cocci (21.5%), including Parvimonas micra (6.2%), Finegoldia magna (4.8%), Peptostreptococcus spp. (3.5%) and Peptoniphilus asaccharolyticus (2.1%).

Gram-negative anaerobic rods and cocci were characterized by 100 percent susceptibility to imipenem, piperacillin with tazobactam and ticarcillin with clavulanic acid. Rifampicin, chloramphenicol and cefoxitin were active against 98.1%, 97.2% and 96.3% of the strains, respectively. In turn, strains resistant to clindamycin accounted for 44.3% of this bacteria group,

followed by amoxicillin (40.6%), piperacillin (20.8%), ticarcillin (19.6%) and metronidazole (14%).

Gram-positive anaerobic rods and cocci were 100% susceptible to carbapenems (imipenem) and penicillin with or without a β-lactamase inhibitor (amoxicillin with clavulanic acid, piperacillin with tazobactam, ticarcillin with clavulanic acid and piperacillin), as well as highly susceptible to rifampicin (92.7%), chloramphenicol (95%), cefoxitin (92.3%) and ticarcillin (95.2%). The majority of these strains were resistant to metronidazole (55%)