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ORIGINAL

Distribution of bacteria isolated from the cases of maxillofacial surgery

Distribución de las bacterias aisladas en cirugía maxilofacial

Nastaran Chokhachi Zadeh Moghadam[1], Amirhossein Fathi[2], Ashkan Salehi[3], Mehrdad Babak Rad[3]

1. Department of Pediatric Dentistry, Boston University Henry M. Goldman Schoolof Dental Medicine, MA, USA. 2. Assistant Professor, Department of Prosthodontics, Dental Materials Research Center, Isfahan University of Medical Sciences, Isfahan, Iran. 3. Department of Dentistry, University of Traditional Medicine of Armenia (UTMA), Armenia

Corresponding author
Dr. Ashkan Salehi
E-mail: ashkansalehip@gmail.com

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Abstract

Background: Maxillofacial infections after the surgical operation are common dental complications. It is important to know the bacterial species responsible for these kinds of infections. The present survey aimed to evaluate prevalence of bacterial pathogens a isolated from post surgical maxillofacial infections.
Methods: One-hundred and eighty patients were evaluated. All patients with post maxillofacial surgeries, including deep fascial infections, dentoalveolar abscess and neck and head pus localization were included in the study. Distribution of bacterial pathogens in collected samples were studied using culture method and biochemical tests.
Results: 150 out of 180 (83.33%) patients were included in the study. The mean age of the examined patients was 49.7 years. The male to female ratio was 92/85 (P <0.05). Histories of smoking and alcohol were determined in 40% and 18% of cases, respectively. *S. aureus* (26.66%), *S. mutans* (25.33%), *Prevotella dentalis* (13.33%), *Stereptococcus viridans* (13.33%), Enterobacter aerogenes (12%), and *Prevotella buccalis* (11.33%) had the highest distribution. *Bacteroides forsythus* (2%), *Fusobacterium nucleatum* (3.33%), *Acinetobacter baummanii* (4%), and *Veillonella spp*. (4%) had the lowest distribution.
Conclusion: Aerobic bacteria had the higher distribution than anaerobics. Accurate prescription of antimicrobial drugs can diminish the risk of maxillofacial infections after surgical operation.

Key words: Maxillofacial surgery, bacteria, prevalence.

Resumen

Antecedentes: Las infecciones maxilofaciales tras la intervención quirúrgica son complicaciones dentales frecuentes. Es importante conocer las especies bacterianas responsables de este tipo de infecciones. El presente estudio tiene como objetivo evaluar la prevalencia de los patógenos bacterianos aislados en las infecciones maxilofaciales postquirúrgicas.
Métodos: Se evaluaron ciento ochenta pacientes. Se incluyeron en el estudio todos los pacientes con cirugías maxilofaciales posteriores, incluidas las infecciones fasciales profundas, los abscesos dentoalveolares y la localización de pus en el cuello y la cabeza. Se estudió la distribución de los patógenos bacterianos en las muestras recogidas mediante el método de cultivo y pruebas bioquímicas.
Resultados: Se incluyeron en el estudio 150 de 180 (83,33%) pacientes. La edad media de los pacientes examinados era de 49,7 años. La proporción entre hombres y mujeres fue de 92/85 (P <0,05). Se determinaron antecedentes de tabaquismo y alcohol en el 40% y el 18% de los casos, respectivamente. *S. aureus* (26,66%), *S. mutans* (25,33%), *Prevotella dentalis* (13,33%), *Stereptococcus viridans* (13,33%), *Enterobacter aerogenes* (12%) y *Prevotella buccalis* (11,33%) tuvieron la mayor distribución. *Bacteroides forsythus* (2%), *Fusobacterium nucleatum* (3,33%), *Acinetobacter baummanii* (4%) y *Veillonella spp*. (4%) tuvieron la menor distribución.
Conclusión: Las bacterias aerobias tuvieron mayor distribución que las anaerobias. La prescripción precisa de fármacos antimicrobianos puede disminuir el riesgo de infecciones maxilofaciales tras una operación quirúrgica.

Palabras clave: Cirugía maxilofacial, bacterias, prevalencia.

Introduction

Infections are considered one of the most critical causes of morbidity and mortality in the last century[1-5]. Maxillofacial infections are one of the most critical complications after the face, neck and oral surgeries. The importance of this infection are high due to their comolications, anatomical positions near to brain, respiratory system and mediastine and high occurrence[6].

Bacteria arge the most common cause of maxillofacial infections[7]. In this regard, *Stereptococcus mutans* (S. mutans), *S. viridans*, *S. oralis*, *S. pneumoniae*, *S. mitis*, *Staphylococcus aureus* (S. aureus), *Klebsiella pneumonia*, *Enterobacter aerogenes*, *Acinetobacter baummanii*, *Prevotella buccalis*, *Prevotella dentalis*, *Bacteroides forsythus*, *Fusobacterium nucleatum*, *Porphyromonas gingivalis*, and *Veillonella spp*. are considered to be the most common causes of maxillofacial infections after surgical operation[7-10].

In keeping with the high imoportance of maxillofacial infections in the dental and head and neck surgical operations, their causes and epidemiology are still unknown. Thus, the present research was done to assess the distribution of bacterial pathogens isolated from the post maxillofacial infections.

Materials and methods

Population

From January to July 2020, a total of 180 patients with post maxillofacial infections were examined in the study. All patients with post maxillofacial surgeries, including deep fascial infections, dentoalveolar abscess and neck and head pus localization were included. Among them, those with fungal and viral infections, tumors, neoplasmic lesions, pregnancy, Human Immunodeficiency Virus (HIV), coronavirus disease 2019 (COVIUD-19), and those received antibiotic therapy and antiseptic solutions were excluded from the survey.

Samples collection

Aspiration sites were cleaned with ethanol (70%, Merck, Germany). Pus aspiration was done using a sterile needle. In some cases, a sterile swab was used. Samples were transferred to the laboratory using the thioglycolate broth (Merck, Germany) media were used for samples transmission to the laboratory.

Isolation and identification of bacteria

Blood agar media (Merck, Germany) were used for an initial examination of samples in an aerobic and anaerobic conditions. Chocolate agar media (Merck, Germany) were used for an initial examination of samples in microaerophilic condition. Totally, 5% defibrinated sheep blood was added into blood agar media. Isolates were Gram-stained after 24 h of growth in air and CO2 conditions at 37ºC, respectively. Isolates growth on the anaerobic blood agar were Gram-stained after 48 h incubation at 37ºC. Gram-negative and Gram-positive bacteria were tested rendering the Analytical Profile Index (API 20E) system[11]. Gram-positive coccoid bacteria were tested by catalase test. catalase-negative strains were tested for the hemolytic reaction, and growth in media contained 6.5% NaCl. Catalase-positive strains were tested for resistance to Novobiocinm, coagulase production, and mannitol fermentation on mannitol salt agar (Merck, Germany). Anaerobic strains were identified by AP120A procedures[12].

Numerical evaluation

Statistical data were tested by SPSS/21.0 software (SPSS Inc., Chicago, IL)[13-17]. Chi-square test and Fisher'sexact two-tailed tests were used for data analysis. P-value less than 0.05 was determined as a significance level[17-22].

Results

Demographical features

Demographical properties of the examined patients are specified in **table I**. Of 180 patients tested in the study, 150 (83.33%) met our inclusion critria. The mean age of the studied patients was 49.7 years. The male to female ratio of the examined population was 92/85 (P <0.05). Histories of smoking and alcohol were determined in 40% and 18% of included patients, respectively.

Table I: Demographic properties of examined patinets.

Demographic characters	Individuals (150 people included)
Mean age (SD) (year)	49.7 (10.2)
Sex (M/F)	92/58
Mean weight (SD)	73.2 (8.2)
Smoking (%)	40
Alcohol (%)	18

Table II: Bacterial distribution amongst the cases of maxillofacial infections.

Bacteria	Distribution (%)
Stereptococcus mutans	38 (25.33)
Stereptococcus viridans	20 (13.33)
Stereptococcus oralis	9 (6)
Stereptococcus pneumoniae	12 (8)
Stereptococcus mitis	15 (10)
Staphylococcus aureus	40 (26.66)
Klebsiella pneumonia	8 (5.33)
Enterobacter aerogenes	18 (12)
Acinetobacter baummanii	6 (4)
Prevotella buccalis	17 (11.33)
Prevotella dentalis	20 (13.33)
Bacteroides forsythus	3 (2)
Fusobacterium nucleatum	5 (3.33)
Porphyromonas gingivalis	9 (6)
Veillonella spp.	6 (4)

Bacterial distribution

Table II shows the bacterial distribution amongst the cases of maxillofacial infections. *S. aureus* (26.66%), *S. mutans* (25.33%), *Prevotella dentalis* (13.33%), *Stereptococcus viridans* (13.33%), *Enterobacter aerogenes* (12%), and *Prevotella buccalis* (11.33%) were the most commonly isolated bacteria. *Bacteroides forsythus* (2%), *Fusobacterium nucleatum* (3.33%), *Acinetobacter baummanii* (4%), and *Veillonella spp.* (4%) had the lowest distribution.

Discussion

Dental sciences have been developed in recent years[23-30]. However, some complications remain health threating issues[30-36].

The present survey showed that post surgical maxillofacial infections are threating among patients. In this regard, *S. aureus* (26.66%), *S. mutans* (25.33%), *Prevotella dentalis* (13.33%), *Stereptococcus viridans* (13.33%), *Enterobacter aerogenes* (12%), and *Prevotella buccalis* (11.33%) were the most commonly isolated bacteria. Similarly, Kityamuwesi et al. (2015)[37] reported that *S. aureus* (23.50%) and *S. viridans* (19.40%) were the most commonly detected bacteria in odontogenic infections. Similar distribution of bacterial pathogens in the cases of maxillofacial surgeries were reported from Taiwan[38], Austria[39], Denmark[40], and Japan[41]. Similarly, Nóbrega et al. (2016)[42] mentioned that Peptostreptococcus spp., Prevotella, and *P. gingivalis* were the most commonly detected bacteria amongst endodontic infections in Brazil. The profile of anaerobic bacterial distribution of our survey was similar to United States[43], United Kingdom44, and Japan[45].

The present survey is the first report of distribution of causes of maxillofacial infections in Armenia. The present survey was limited to the low numbers of isolated bacteria, absence of the analysis of the location of maxillofacial infections and types of surgery and finally absence of the evaluation of antibiotic resistance pattern of bacterial isolates.

Conclusions

The main attainment of the present survey was determination of the distri bution of the most important bacterial pathogens in the cases of maxillofacial infections after head and neck surgical operation. As shown, *S. aureus, S. mutans, Prevotella dentalis, Stereptococcus viridans, Enterobacter aerogenes*, and *Prevotella buccalis* were the main pathogens isolated from the examined cases. Using sterile condition in the sutrgical operation and application of suitable antimicrobialk drugs can diminish the risk of maxillofacial infections.

Conflict of Interest

The author declare that he have no conflict of interest.

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