

Pattern of Bacteraemia After Non-Surgical Extraction of Tooth

Sufyan Ahmed¹, Mehwash Kashif², Atif Iqbal Butt³, Syed Shah Faisal⁴

Abstract

Objective: The objective of this study was to assess the pattern of bacteraemia after non surgical extraction of teeth.

Methods: This prospective descriptive study was conducted at an out-patient setting at Karachi Medical and Dental College, Dental Hospital Karachi, over a period of six months (January 2007 to June 2007) on fifty patients. A pre designed performa was used to collect the relevant information from the patients. All cases of bacteremia (diagnosed on culture media) after non-surgical extraction of tooth/teeth were included in the study. Total seven culture samples were taken from each patient pre and post extraction.

Results: Thirty-four (68%) patients were male and sixteen (32%) were female. Mean age of patients was 32.14 ± 11 years. The commonest reason for tooth extraction was dental caries. The preextraction intravenous blood culture was negative in all fifty patients. The post extraction intravenous culture after one minute was negative in 60% of patients, after five minutes it was negative in 18% of patients. After fifteen minutes post extraction, 99% of blood cultures were positive for bacterial growth, while 56% of blood cultures were negative for any bacterial growth after thirty minutes. Peptostreptococci and Streptococcus viridians species were the commonest bacterial isolates.

Conclusion: Highest level of bacteraemia occurred after fifteen minutes of non-surgical tooth extraction. Peptostreptococci and Streptococcus species were found to be the commonest isolates.

Keywords: Tooth loss, tooth extraction, bacteraemia, gingival, molar.

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Introduction

It is a well-established fact that bacteraemia may occur after the tooth extraction and may lead to the development of bacterial endocarditis in susceptible individuals¹. This bacteraemia is mostly Viridans Streptococcal in origin and may occur more frequently in adults as compared to children.¹⁻³

^{1,2} Department of Maxillofacial Surgery, Karachi Medical and Dental College.

³ Department of Maxillofacial Surgery, Ziauddin University Hospital.

⁴ Department of Orthodontics, Karachi Medical and Dental College

Correspondence: Dr Sufyan Ahmed
Assistant Professor,
Department of Maxillofacial Surgery,
Karachi Medical and Dental College.
1577 Block 15, F.B area, Karachi
Phone: 0300 9288466
Email: drsufyan76@yahoo.com

The incidence of bacteraemia in adults ranges from 0-100% after single tooth extraction. The literature suggests that incidence of bacteremia decreases sharply after 10 minutes and positive blood culture can be detected as long as 30 minutes postextraction^{4,5}.

The human gingival crevice is a unique habitat of bacteria as many bacterial species colonize and harbor in it. Due to rich vascular supply, bacteria have many portals of enteries in gingival crevice^{6,7}. Bacteria may enter into the blood stream through variety of routes. First, they may enter into systemic circulation through tissue trauma. Secondly, the bacteria residing near plaque biofilm may lead to spillage of bacteria in to the systemic circulation⁶⁻¹⁰.

After in depth search of data, no study was found locally that determines the relationship be-

tween bacteremia and tooth extraction. Therefore, due to dearth of local data, this study was planned to determine the nature of bacteremia after non-surgical extraction of teeth and to determine the pattern of bacteremia after non-surgical extraction of a tooth or teeth. The objective of this study was to assess the pattern of bacteremia after non-surgical extraction of teeth.

Patients and Methods

This observational, cross sectional study was conducted at Karachi Medical and Dental College, Dental hospital Karachi. The duration of study was six months i.e. from January 2007 to June 2007. The sample size of 50 patient was calculated through Raosoft software with the confidence level of 95%, margin of error 5%, population size of 57 and response distribution of 50% . Patients were recruited through Non-probability (convenience) sampling fulfilling the inclusion criteria, which were adult patients from both genders of more than fourteen years of age having absolute indication of tooth extraction (Dental caries, Periodontal disease, orthodontic or prosthetic reason etc.) undergoing non-surgical extraction of tooth/teeth under local anaesthesia. The exclusion criteria was patients on antimicrobial therapy within preceding thirty days, pregnancy, congenital heart diseases or patients on high risk of infective endocarditis, patients with coagulopathies, patients with acute peri-apical abscess, extraction of tooth ending up with reflection of muco-periosteal flap and removal of alveolar bone and extraction that exceeded more than hundred minutes.

An informed verbal consent was taken from all patients. The researcher used a pre-designed proforma to collect the demographic information, history and clinical examination including oral health status of the patients, which included dental plaque deposits, tooth mobility and dental caries. Blood samples were taken from ante-cubital vein, just one minute after the initiation of extraction procedure. Post extraction microbiological samples were taken from extraction socket through 0.8 mm thick sterile endodontic paper point, and from ante-cubital vein

just after five, fifteen and thirty minutes interval respectively.

Samples were stored according to the standard recommendations⁹. All 50 samples were taken to laboratory within two hours of extraction. All bacterial isolates were grown using BACTEC media and tested for culture sensitivity.

Data was entered and analyzed using SPSS version 10.0. Data set was described with respect to age (mean \pm standard deviation) male to female ratio, relative frequencies of presenting symptoms, most commonly extracted tooth, frequencies of different organisms demonstrating the pattern of bacteremia after non-surgical extraction of teeth at different time intervals.

Results

Total numbers of patients included in this study were 50. The mean age was 32.14 ± 11 years, with the age ranges from 18 to 67 years. The male to female ratio was 2:1.

The commonest reason for extraction was dental caries in 60% (n=30) patients, followed by mobile tooth in 20% (n=10), impacted tooth in 12% (n=06), and orthodontics reasons in 8 % (n=04) patients. Molar was extracted in 60% (n= 30) patients.

The pre extraction blood cultures were negative for any organisms in all fifty patients. For post extraction samples the blood cultures were sent after 1,5,15 and 30 minutes.

In cultures after one minute of initiation of extraction sixty percent of the blood samples (n=30) were negative for any organisms, Forty percent of positive cultures showed growth of *Streptococcus viridans* (n=12), followed by *Eubacterium* species in 30% (n=6), *Nisseria sicca* and *Klebsella* 10% (n=2). Fig. 1.

Blood samples taken after five minutes 18% (n=9) of blood cultures were negative for any organisms. Most of the blood samples 62% (n=31) were positive for growth of two bacteria, while in 20% (n=10) cases single organism was detected.

Fig. 1. Culture result after one minute post-extraction.

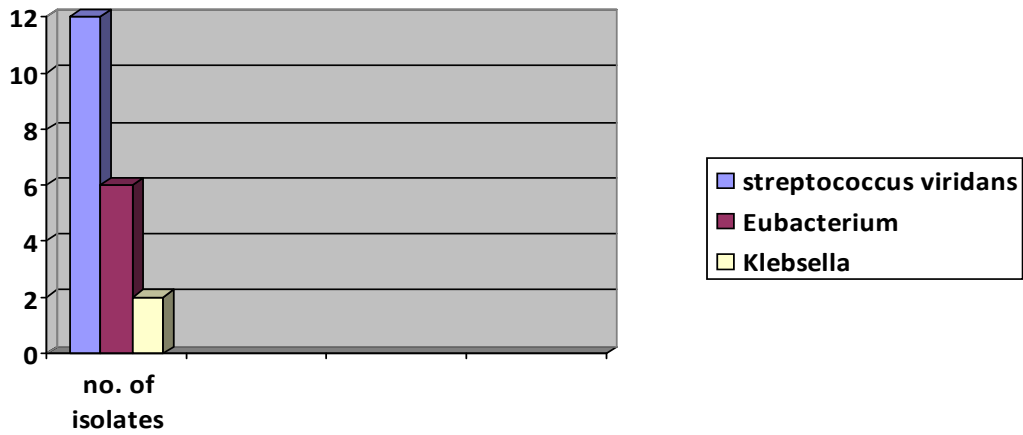
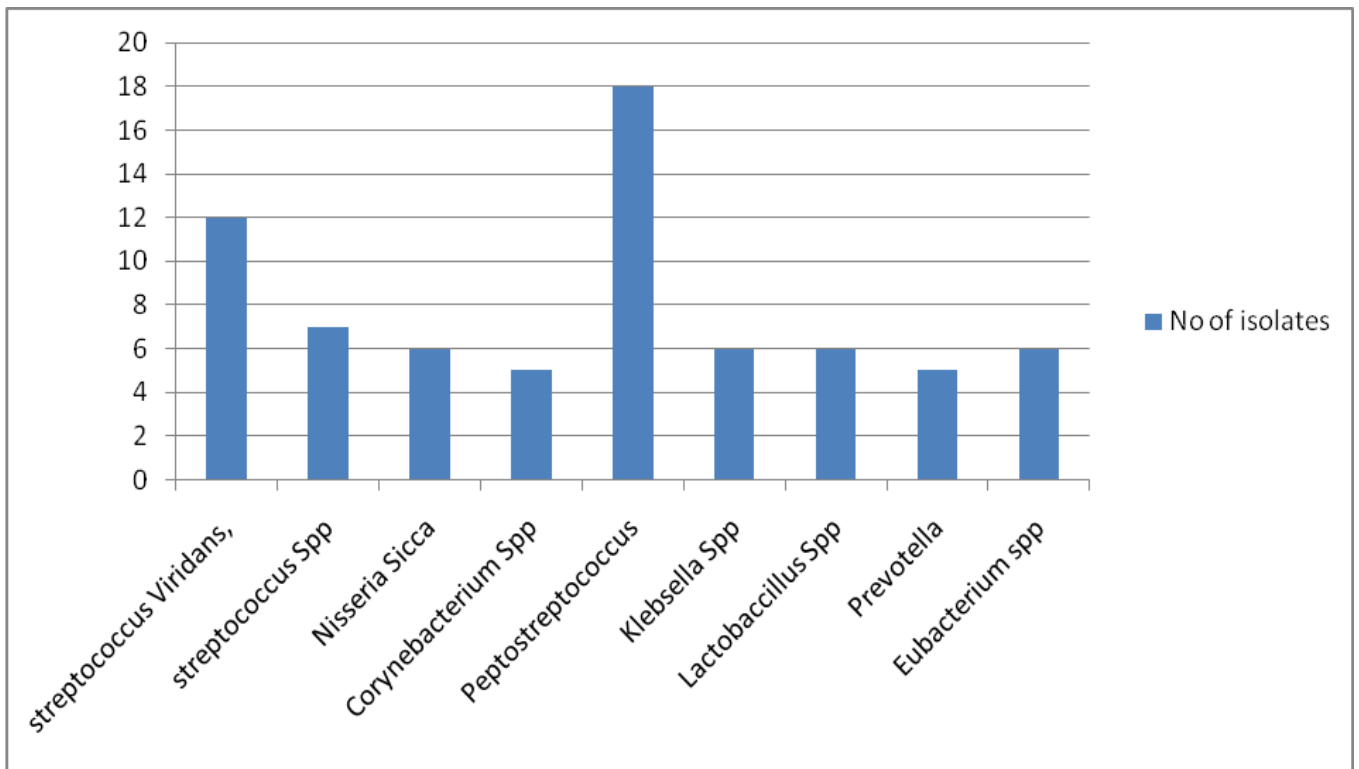


Table 1. Post Extraction culture results after 15 min

Organisms	No. of isolates	%
Nisseria Sicca	14	28
Cornybacterium species	5	10
Peptostreptococcus	19	38
Klebsella Species	06	12
Lactobacillus	06	12
Prevotella	04	8

Fig. 2. Organisms after five minutes post extractions.



Peptostreptococci in 58% (n=18) and Streptococcus viridians in 42% (n=12) were the most frequently isolated organisms. Fig. 2.

At fifteen minutes post extraction only 02% (n=1) was negative for any bacterial growth, while 50% of the blood samples (n=25) were positive for single organism growth and 48% (n=24) were positive for two organisms. Peptostreptococcus species was the most frequently detected organism in 38% (n=19) cultures, followed by Nisseria sicca in 28% (n=14) Klebsiella and Lactobacillus 12% (n=06) of cultures. Remaining organisms are shown in (Table 1).

Cultures after thirty minutes post extraction 56% (n= 28) were negative for any bacterial growth. In 63% (n=14) two organisms were detected and 36% (n=08) had growth of single organism.

Peptostreptococcus was present in 63% (n=14) cultures, streptococcus viridians and Nisseria sicca in 37% (n= 08) each. Lactobacillus was present in 12% (n=06) of patients cultures.

Discussion

Bacteremia following tooth extraction is a well known and established fact. The incidence of bacteremia is estimated to be 39-100% in which Streptococcus viridians are the most frequent species¹¹⁻¹³. It has been evident from the study conducted by Peterson et al. that 35.7% patients had positive blood cultures after the extraction of non-diseased primary teeth and 61.1% patients had positive culture after the removal of non-diseased permanent teeth. The extraction of diseased teeth has the incidence of 52.9%⁷.

This study was conducted on adult patients with the mean age of 32 ± 11 years while many studies in the past were conducted on the paediatric population^{14,15}.

The results of this study have shown that the pre extraction samples are negative for any organisms. This is consistent with the results of other studies^{16,17}. The Cultures obtained after one minute

of initiation of extraction revealed 60% of samples negative for any organisms. This is in consistent with study conducted by Rajasuo et al. in 2004 in which 44% had bacteremia after one minute of extraction^{17,18}. Culture on blood samples taken after five minutes, 18% (n=09) was negative for any organisms. This is in consistent with the study conducted by Lockhart PB and colleagues which revealed that 44% of cultures were positive for bacteremia after 5 minutes^{4,12}.

The peak incidence of bacteremia in our study was found in culture after fifteen minutes post extraction. Only one sample (02%) was negative for any bacterial growth, while 50% of the blood samples (n=25) were positive for single organism growth and 48% (n=24) were positive for two organisms. This is consistent with other studies^{4,17}.

The potential source of bias in this study is bacteremia caused by dental caries and periodontal disease. More than 300 bacterial species are the usual inhabitants of oral cavity¹⁹. It has been estimated that more than 104 microorganisms colonizes the oral cavity and oropharynx at a time²⁰. Bacteria may enter the blood through the push of inflammatory process due to progress of dental caries from tooth surface to pulp and then to the periapical area and into the bone²¹. Bacteremia may also occur due to dental manipulation such as brushing, flossing and using toothpick but this bacteremia is transient in nature and may resolve after some time²². It has been evident from the studies that severe periodontal diseases and other dental procedures may also be responsible for bacteremia¹¹. Therefore, it is recommended that randomized controlled trials must be conducted in order to exclude these potential biases from the study so that more accurate results will be obtained.

The limitation of the study is limited funds and hence the small sample size. Therefore, it is recommended that a large scale, multicenter funded study should be planned in order to obtain local population bacteriological results so that national guidelines may be established.

Conclusion

The results of this study indicate that the highest level of bacteraemia occurred after fifteen minutes of non-surgical tooth extraction. Peptostreptococci and Streptococcus species were found to be the commonest isolates.

Conflict of interest: Author has no conflict of interest and no funding/grant from any organization.

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