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Comparative Assessment of Microfloral Count of Maxillary Obturator Intaglio Surface of Normal and Affected Palatal Site of Maxillectomy Patients.

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ABSTRACT:
Aim: To evaluate and compare the prevalence of micro- organisms on affected versus normal side of intaglio surface of the obturator prosthesis provided to maxillectomy patients.
Materials and Methods: After ethical approval and informed consent, 48 recent postsurgical maxillary defect subjects with age group of 40- 60 years were selected for the study on basis of predetermined inclusion and exclusion criteria. The subjects were rehabilitated with heat cured acrylic obturator prosthesis following standard protocol.
After one month of obturator insertion, two specimens were collected from tissue surface of the obturator; from bulb surface and palatal surface in area of 2*2 centimetres with a sterile swab, immediately after removal of obturator from the subject's mouth. Specimens were subjected for qualitative and quantitative microbiological analysis. Differences in prevalence of microorganisms of specimens were tested with tukey test with a significance level of α=.05. Statistical analysis was performed using with SPSS software.
Results: On comparison, the mean count of Staphylococcus species, Pseudomonas species, Neisseria species and Streptococcus species on intaglio surface of obturators on normal site of subjects (9.92 ± 2.04, 21.54 ± 1.46, 50.64 ± 2.23 and 91.87 ± 3.95) was significantly higher ($p \leq .05$) than the mean count of Staphylococcus species, Pseudomonas species, Neisseria species and Streptococcus species on intaglio surface of an obturator on affected site of subjects (25.14 ± 2.34, 44.90 ± 1.62, 78.83 ± 1.77 and 99.85 ± 3.17) .
Concusion: Within limitation of the study, it was concluded that obturator prosthesis wearers had greater colonisation of Streptococcus spp Candida spp., Staphylococcus spp., Pseudomonas spp., Neisseria spp. on the affected side than on the normal side of tissue surface of the prosthesis.
Running head: *Comparative assessment of microfloral count of maxillary obturator intaglio surface*
Keywords: *Intaglio, microflora, obturator*

I. Introduction

The microfloral environment of the oral cavity may be changed quantitatively and qualitatively with age and change in oral environment.[1]The surgeries that disturb the anatomic and topographic integrity of the oral cavity and the nose and sinuses also disturb oral microflora besides functional and esthetic damages to these regions. The microfloras of these regions are apt to changes primarily due to microflora mixing, the applied antibiotic, irradiation or immune-suppressive therapy.
Generally, the patients with acquired maxillary defect are submitted to prosthetic rehabilitationwith a post-resection prosthesis named obturator. This rehabilitation is aimed at reseparatingthe mentioned cavities, i.e. at restoring the integrity of the oral cavity (Rodney Nicholas, 1984)[2]. Commonly used material for the fabrication of obturator prostheses are heat cured acrylic resin. These materials provide excellent conditions for growth of microorganisms on the surface. Pores, cracks, and structural defects formed by the release of gases during the polymerization process offer microorganisms the opportunity to initially adhere to the obturator surface and, subsequently, penetrate the surface to persist in the interior of the obturator[3-4.]Poor prosthesis hygiene results in the accumulation of debris and bacterial plaque on the surface of prostheses, causing malodour and inflammatory changes to the adjacent mucosa. For elderly patients who are susceptible to infection, a poorly cleaned oral cavity or prosthesis may induce fatal infections such as aspiration pneumonia and endocarditis.[5] Bacteria causing aspiration pneumonia, opportunistic infections, and endocarditis are known to occur on the

prosthesis and the pharynx of the dependent elderly.[5] Yoneyama et al reported that oral care lowered the risk of pneumonia in the institutionalized elderly.[6]

An obturator prosthesis probably contribute to the alteration in the types of microorganisms present in defect regions probably due to following factors: fixing and removal of the prosthesis, good or poor hygiene of both the prosthesis and the oral cavity as well as of the created post resection cavity (Dimitrijevia, 1976), air turbulation disorders during breathing, the saliva break into the post resection cavity, changed physical and chemical properties (humidity, temperature, ion concentration).[7] A study concluded that more pathologic bacterial flora was found on the obturators than in the post-surgical cavities so the post-surgical patients should pay more attention to the very accurate hygiene of their prostheses[8]. Therefore, aim of the study was to comparatively evaluate the prevalence ofmicro- organisms on affected versus normal side of intaglio surface of the obturator.

II. Materials and methods

This cross sectional study was conducted over 68recent postsurgical maxillary defect subjects of age group of 40 -60 years visiting to department of prosthodontics for fabrication of obturator prosthesis from March 2012 to June 2016. This study was approved by the institutional ethical committee.Subjects were informed about the procedure and written consent was taken. Proper oral examination was carried out and a detailed dental, medical history was obtained from all subjects. Patients with insufficient oral hygiene, diabetes mellitus, concomitant radiotherapy, leukopenia, and viral infection such as HIV (human immunodeficiency virus), the abuse of analgesics or antipsychotic drugs and history of surgery, recent acute infections, and antimicrobial therapy within the previous 4 weeks were excluded from participation in the study.

Finally, 48 subjects fulfilled the predetermined eligibility criteria and were selected for the study. Subjects were first rehabilitated with an immediate obturator prosthesis during the first or second week following surgery, which had been succeeded by an interim obturator and finally by a permanent obturator prosthesis after 4 months. Immediate and interim prosthesis were made with self-cured acrylic resin(Rapid Repair, Pyrax, Roorkee, India) and permanent obturator prosthesis wasconstructed with heat cured acrylic resin(Trevon, Dentsply, India) through conventional method.

All subjects were provided with permanent obturator prosthesis with following instructions :(1) To take the obturator out of their mouths during night and keep it in tap water only. (2) Oral hygiene maintenance for prosthesis through conventional way by using brushing and water only.(4) Visit after 24hours to eliminate any prosthetic problems interfering with the settling of the obturator.

After one month of obturator insertion, subjects were recalled for identification and quantification of microorganisms on normal side and affected side of obturator prosthesis.

Identification and quantification of microorganisms:

For each subject, two specimens were collected from tissue surface of the obturator; from bulb surface and palatal surface in area of 2*2 centimetres with a sterile swab byan examiner wearing sterile gloves, immediately after removal of obturator from the subject's mouth.

Specimens were sent to Microbiology Department for qualitative and quantitative microbiological analysis.Specimens were cultured within 2 hours of sample collection.

All specimens were inoculated onto Columbia base 5% sheep blood agar and Maconkey Agar. Cultures were done both aerobically and anaerobically at 37 ^{o}C. Anaerobic culture was done in anaerobic jar with gas pak (Himedia). Aerobic cultures were incubated for 48 hours in 5% CO_2. Anaerobic cultures were incubated at 37 ^{o}C for 72 hours.[10] Streptococcus spp. and Neisseria spp. were presumptively identified by the analysis.The CFUs number per square millimetre was recorded for each specimen.

Differences in prevalence of microorganisms between affected site and normal site of intaglio surface of obturator prosthesis were tested with tukey test with a significance level of α=.05. Statistical analysis was performed using with SPSS software.

III. Result

Total 48 subjects were provided with permanent obturatorandmicrofloral count of obturator intaglio surface of normal and affected palatal site of subjects were calculated and compared statistically.The microfloral levels on intaglio surface of normal side of the obturator prosthesis were significantly lower than those on intaglio surface of affected side of the obturator prosthesis wearers ($p < 0.01$).

Table 1 showed the total number of colonising microorganisms (log10 CFU/mm^2) on the intaglio surface of the normal and affected side of the obturator prosthesis.The mean count of Candida species, Staphylococcus species, Pseudomonas species, Neisseria species and Streptococcus species on intaglio surface of obturator on normal site of subjects were 41.62 ± 2.34, 9.92 ± 2.04, 21.54 ± 1.46, 50.64 ± 2.23 and 91.87 ± 3.95 respectively. The mean count of Candida species, Staphylococcus species, Pseudomonas species, Neisseria

species and Streptococcus species on intaglio surface of an obturator on affected site of subjects were 42.12 ± 2.77, 25.14 ± 2.34, 44.90 ± 1.62, 78.83 ± 1.77 and 99.85 ± 3.17 respectively. On comparison, the mean count of Staphylococcus species, Pseudomonas species, Neisseria species and Streptococcus species on intaglio surface of an obturator on affected site of subjects were significantly higher ($p \leq .05$) than their counts on intaglio surface of an obturator on normal site of subjects.

IV. Discussion

The patients having resection of maxilla need the prosthesis for proper phonetics as well as for the purpose of ingestion of proper healthy diet.Therefore, following resection of maxilla, operated subjects were prosthetically rehabilitated by immediate prosthesis in the first or second week followed by interim and finally by acrylic permanent prosthesis.

Heat cured acrylic resin is the most common material for the fabrication of obturator prosthesis because of its durability and compatibility with tissues[9].Hence, patients with resected maxilla were rehabilitated with permanent obturator prosthesis made by heat cured acrylic resin. However, this material is more prone to accumulation and ingrowth of microflora due to micro pores and irregular rough surface.Moreover, oral microflora is much affected by the various surgical modalities that change the anatomic integrity. Therefore, patients wearing obturator prosthesis were examined for intaglio surface of an obturator on affected site and normal site of subjects.

In the present study, predominant micro-organisms noticed, were Candida spp., Staphylococcus spp., Pseudomonas spp., Neisseria spp., Streptococcus spp.Streptococcus spp. was the most prevalent microflora and was significantly higher in number on intaglio surface of obturator on the affected site than normal site. It can be explained by study of Almstahl et al[10]who reported that Streptococcus spp. were found frequently in the healthy subjects but increased in number in subjects with hypo salivation caused by radiation therapy, primary Sjogren's syndrome, medication, neuroleptic treatment or unknown factors. Staphylococcus spp. generally inhabit the nasal cavity [11, 12]. It is considered that oronasal communications in maxillectomy patients could lead to greater colonisation of Staphylococcus spp. Therefore, Staphylococcus spp. was significantly higher on intaglio surface of obturator on affected site than normal site. It has been reported that an increase in the number of pathogenic bacteria might result in systemic disease [11, 13.]

Prosthesis used to obturate the defect is also exposed to microorganisms of the nose and sinus. These include Staphylococcus spp., Pseudomonas spp., Haemophilus spp. and Neisseria spp.Neisseria spp. shows a positive correlation of the number of microorganisms and moisture levels of palatal obturator prosthesis wearers[14.]

The present study had been limited to few microfloral colonies with less sample size. In future, study could be carried out involving more subjects to get more precision in results.Also, in future, study can involve other maxillofacial prosthesis such as prosthesis for mandibular resection, velopharyngeal prosthesis etc.

V. Conclusion

Within the limits of this study, obturator prosthesis wearers had greater colonisation by Candida spp., Staphylococcus spp., Pseudomonas spp., Neisseria spp., Streptococcus spp. on the affected side than on the normal side of the prosthesis.

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Table 1: Microfloral count (log10 CFU/mm^2) on intaglio surface of an obturator on normal and affected site of subjects

Microflora	**Mean ± S.D (Normal side)**	**Mean ± S.D (Affected side)**	**t- test value**	**Test of significance**
Candida spp.	41.62 ± 2.34	42.12 ± 2.77	-.584	.573 ($p \geq .05$)
Staphylococcus spp.	9.92 ± 2.04	25.14 ± 2.34	-15.783	.000 ($p \leq .05$)
Pseudomonas spp.	21.54 ± 1.46	44.90 ± 1.62	-35.012	.000 ($p \leq .05$)
Neisseria spp.	50.64 ± 2.23	78.83 ± 1.77	-28.585	.000 ($p \leq .05$)
Streptococcus spp.	91.87 ± 3.95	99.85 ± 3.17	-4.310	.002 ($p \leq .05$)