COMPARISON OF MICROBIAL ACCUMULATION ON SIMPLE INTERRUPTED SUTURE TECHNIQUE VERSUS CONTINUOUS INTERLOCKING SUTURE TECHNIQUE IN ALVEOLOPLASTY PATIENTS.

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ABSTRACT:

AIM: To study the bacterial accumulation on simple interrupted and continuous interlocking suture methods in patients undergone alveoloplasty.

MATERIALS AND METHODS: 15 patients of average age 54.9 years complete edentulous patient were included in the study after the alveoloplasty sutured with simple interrupted technique on one quadrant and continuous interlocking technique on the contralateral side of the quadrant of the same arch with 3-0 silk suture and patient were not under antibiotics and reviewed after 1 week. Sutures were given for the microbial culture.

RESULTS: The mean age of the study population is of age 54.9 years. the microbial accumulation is counted as CFU (number of colonies * 10⁴) the mean number of colonies formed in simple interrupted suture is 18.76 colonies with a minimum of 10 colonies and maximum of 30 colonies. the microbial accumulation is counted as CFU the mean number of colonies formed in continuous interlocking suture is 26.34.

DISCUSSION: since all suture knots were found to harbor bacteria, any suture knots may be considered as a port of entry for infection, which in turn may compromise healing of the surgical wound. It is advised to minimize the duration of the presence of sutures, and their removal should be carried out as early as possible, according to the specific healing conditions.

CONCLUSION: On observation of the microbial accumulation on the knots there is no much difference between the interrupted knots and the interlocking knots, but there is slightly more accumulation of the microbes in the interrupted knots.

I. INTRODUCTION:

Most surgical procedures are finalized with sutures, which enables flap approximation and hemostasis, allowing restoration of function and esthetics. (Website, no date a, Website, no date b; Burkhardt and Lang, 2015) Choosing an appropriate suture material may influence wound healing, particularly in the oral cavity due to the various functions of the oral cavity (i.e., swallowing and eating) and the presence of saliva. (Banche et al., 2007) In clinical situations, suture selection relies mostly on personal preference of the surgeon. Factors which are taken into consideration by the surgeon in suture selection include the surgical site, duration until their removal (or whether to refrain from suture removal), ease of handling, and tensile strength. Due to the importance of infection and inflammation in the healing process following surgery, the biological response to the suture material, such as
tissue reaction and bacterial adhesion, should be included while considering the use of a specific suture. It not includes the type of suture material but also is dependent on the type of suture technique used. Most studies focused on the inflammatory response to the suture material. Selvig et al. showed that changes in the surrounding tissue occur immediately after placement of the sutures which peak after 7 days. (Website, no date c; Leknes et al., 1996) Acute inflammation occurs due to the adherence of bacteria and their penetration into the stitch canal, which is mostly evident when using polyfilament threads (Leknes et al., 1996; Grigg et al., 2004) (Katz, Izhar and Mirelman, 1981; Leknes et al., 1996; Grigg et al., 2004) Limited information is available regarding bacterial adhesion to different suturing techniques. Therefore, the primary aim of the study was to compare bacterial accumulation (CFUs) between different suturing techniques in humans following alveoloplasty. With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). Based on this inspiration we aim to Microbial Accumulation On Simple Interrupted Suture Technique And Continuous Interlocking Suture Technique In Alveoloplasty Patients. Previously our team has a rich experience in working on various research projects across multiple disciplines (Neelakantan et al., 2015; Ramamoorthi, Nivedhitha and Divyanand, 2015; Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Manivannan et al., 2017; Patil et al., 2017; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; Ravindiran and Praveenkumar, 2018; Wahab et al., 2018; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Rajeshkumar et al., 2019; Samuel, Acharya and Rao, 2020; Sathish and Karthick, 2020).

II. MATERIALS AND METHODS:

To test this hypothesis we designed a practical, single-blind, randomised controlled trial. We recruited patients aged between 40-80 years who were treated at the private dental college

in chennai from august-2019 to october 2019.

Inclusive Criteria: All the patients who are completely edentulous patients and referred for alveoloplasty.

Excluding Criteria: Those who had previously had radiotherapy to the head and neck, those with diabetes mellitus or organ transplants, or who used bisphosphonates steroids, as were those who smoke, history of previous alveoloplasty are excluded from the study

Surgical Protocol: All patients who have to undergo alveoloplasty for the whole arch have been selected. All the patients were given 2% lignocaine without adrenaline is infiltrated, full thickness mucoperiosteal flap elevated, bony spicules has been removed and sutured with simple interrupted technique on one quadrant and continuous interlocking technique on the contralateral side of the quadrant of the same arch with 3-0 silk suture.

Post - Operative Protocol: All patients underwent alveoloplasty post surgical instruction has been given. Analgesic has been prescribed for 5 days without antibiotics. Patient has been instructed for gentle salt water gargling after 3 days of procedure.

Bacterial Culture: Sutures collected were sent in transport media of each sample. Suture materials of each quadrant were placed on two blood agar plates. For each sample, one plate was incubated in aerobic condition (CO2 5%) while another identical plate was incubated in anaerobic conditions (N2 85%, H2 5%, CO2 10%) for 7 days. Following the incubation period, numbers of colony-forming units (CFUs) were counted. The number of black-pigmented CFUs was counted on plates from the anaerobic conditions. CFU was calculated as the number of colonies per 10 μl at the minimum dilution with clear, separate, and countable colonies. Both aerobic and anaerobic bacteria were counted and entered in excel

III. RESULTS AND DISCUSSION:

Here more female population had undergone alveoloplasty. From the above pie chart 55.17% are females and 44.83% are males (figure 1). The majority of the population are of age between 45 years to 50 years. The mean age of the study population is of age 54.9 years. (figure 2)...the microbial accumulation is counted as CFU (number of colonies *10⁴) the mean number of colonies formed in simple interrupted suture is 18.76 colonies with a minimum of 10 colonies and maximum of 30 colonies (figure 3)...the microbial accumulation is counted as CFU...
The current study shows that bacterial adhesion differs between various suture techniques. Overall, adhesion of bacteria to simple interrupted suture was found to be lower continuous interlocking sutures. There is minimal suture material in the simple interrupted method whereas more suture material is exposed in the oral cavity in case of continuous interlocking suture method, a future study with the appropriate design should be performed in order to determine the microbial accumulation on different types of suture techniques. The flow of bacteria along the suture canal from the oral environment and into the tissues causes an inflammatory response (Burkhardt and Lang, 2015). As a consequence, the medical and dental literature stresses the harmful effect of bacterial adhesion to suture materials and also states a clear advantage of monofilament non-resorbable suture (Justinger et al., 2009)(Edlich et al., 1973)(Masini et al., 2011). It is also important to select the suture technique according to type of tissue approximation but also one should be aware of the microbial accumulation on the different suturing techniques. Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020). We hope this study adds to this rich legacy.

Figure 1: The following pie chart represents the gender distribution of the study population. More female population had undergone alveoloplasty with 55.17% are females(green) and 44.83% are males(blue)
Figure 2: the above bar chart represents the age distribution of the study population. X-axis represents the age of the patient and Y-axis represents the frequency of the patient. The majority of the population are of age between 45 years to 50 years.

Figure 3: the above bar chart represents the microbial accumulation on simple interrupted sutures. The microbial accumulation is counted as CFU. The mean number of colonies formed in simple interrupted suture is 18.76%.
Figure 4: The above bar chart represents the microbial accumulation continuous interlocking sutures. The microbial accumulation is counted as CFU the mean number of colonies formed in continuous interlocking suture is 26.34 with a minimum of 18 colonies and maximum of 32 colonies.

Figure 5: The above correlation chart represents the relation between the suturing method and number of colonies formed. In the above chart X axis represents the number of colonies formed and Y axis represents the number of patients. Color red represents the microbial colonies in the continuous interlocking suture technique and yellow represents the microbial accumulation in the simple interrupted suture technique. Pearson chi square value 34.53 and p value 0.023(<0.05) which is statistically significant. From the above chart it is evident that microbial accumulation is significantly associated with type of suture technique.

IV. CONCLUSION:
From the above study and results it is evident that accumulation of the microbes are more in the continuous interlocking suture technique when compared to simple interrupted suture methods.
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CONFLICT OF INTEREST:
The authors declare no conflicts of interest.

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