

Comparison of three suturing techniques in securing the PMMC flap in the oral cavity in OSCC.

Dr. Deepankar Shukla

Designation: Associate Professor, Fellow Oral Oncology, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (DMIMS), Sawangi (Meghe), Wardha (Maharashtra), India
Email Address: dr.deepankarshukla@gmail.com

Dr. Anendd Jadhav

Designation: Associate Professor, Datta Meghe Institute of Medical Sciences (DMIMS), Sawangi (Meghe), Wardha (Maharashtra), India
Email Address: anendd.j@gmail.com

Dr. Nitin Bhola

Designation: Professor and Head of Department, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (DMIMS), Sawangi (Meghe), Wardha (Maharashtra), India
Email Address: vcdmimsdu@gmail.com

Abstract: Background: *In order to promote healing by primary intention the positioning and suturing of surgical flap is the main objective. Aim: To compare 'Simple interrupted', 'Vertical mattress' and 'Figure of 8' suturing techniques in intraoral closure of PMMC flap in oncological ablative defects in Oral Carcinoma. Material and Methods: 30 histopathologically proven patients of oral carcinomas allocated to 3 groups equally in non randomized order requiring PMMC flap for rehabilitation of post ablative defect. Group A consisted patients underwent PMMC flap closure with Vertical Mattress suturing technique, Group B consisted patients underwent PMMC flap closure with Simple Interrupted suturing technique and Group C patients underwent PMMC flap closure with Figure of 8 suturing technique. Gaping and wound dehiscence and marginal necrosis assessed at 1st week and 3rd week postoperatively. Result: Irrespective of the type of suturing technique used there will be no significant difference in the healing outcome will be observed. Conclusion: Simple interrupted suture was fastest to take. Vertical mattress suture was more time consuming and Figure of 8 was also time efficient. No statistically significant advantage could be drawn in terms of Gaping, Dehiscence and Marginal necrosis amongst the three techniques considered in our study.*

Keywords: *Vertical mattress suture, Simple interrupted suture, Figure of eight.*

INTRODUCTION

In order to promote healing by primary intention the positioning and suturing of surgical flap is the main objective. The suture of appropriate diameter and thread must hold the edges of flap in close proximity so as the wound healing should not get affected by functional stresses in normal limit. Precise approximation of surgical flap is vital for haemostasis, reduction of

dead space and covering bony defects. If the edges of wound are not approximated properly it causes collection of blood, serum and other body fluids, inability for haemostasis thereby delaying the healing process and to suppression of flap dehiscence from the surgical bed.

Flap surgeries are more complex processes conceptually than wound healing in any other site in the body. It is proven that mechanical stability of flap require higher attention in suturing . The accomplishment of any surgical outcome depends on appropriate closure and stabilization of margins of wound in their desired position. The biofilm formation in oral cavity due to the aqueous environment disrupts the outcome of healing and stability of flap post-operatively. Also, bacterial colonization and the masticatory forces exerted by dentition may hamper the healing. The goal of immediate reconstruction is wound closure for better functional and aesthetic outcomes. At present, microvascular surgeries are considered as the gold standard of care for reconstructing ablative defects, limitations are lack of expertise in urban countries. The PMMC is still one of most acceptable flap for reconstruction.¹ It is considered as a “workhorse” flap for reconstruction of soft tissue in head, face, and neck (HFN) region.² The versatility of PMMC makes it a reliable and reconstructive option for many HFN defects involving mucosa or skin, or both. The major advantages include good blood supply, less morbidity of donor site, and proximity to HFN region.

A good approximation is the basic need. The skin closure technique should be technically easy, esthetically acceptable and economical. For ideal surgical practice, proper union and less surgical scar are important factors.³ Evolution occurred in wound closure techniques including sutures that absorbable, tapes, staples and adhesive compounds. Many surgeons still prefers traditional sutures. Sutures help in healing by primary intention.

The vertical mattress suture produces greater wound eversion, dead space closure and provides greater wound strength. Vertical mattress sutures has main advantage of eversion of skin for proper apposition is possible in elders having chances of inversion.³ Simple interrupted suture are most commonly used. They are inserted through wound side singly and tied with a surgeon’s knot. They are strong and can be used in areas of stress. The tension is shared as they are placed 4-8 mm apart to close large wounds. As each is independent and loosening one will not produce loosening of the other and it produces degree of eversion. A figure of eight stitch use two core sutures for distribution of apposition forces and minimize tearing^{4,5}.

The present study aims to compare ‘Simple interrupted’, ‘Vertical mattress ‘and ‘Figure of 8’ suturing techniques in intraoral closure of PMMC flap in oncological ablative defects in Oral squamous cell carcinoma.

Objectives

1. To evaluate the healing outcomes of using simple interrupted suturing technique for PMMC flap closure in OSCC.
2. To evaluate the healing outcomes of using vertical mattress suturing technique for PMMC flap closure in OSCC.
3. To evaluate the healing outcomes of using figure of 8 suturing technique for PMMC flap closure in OSCC.
4. To compare the three techniques for PMMC flap closure in OSCC.

Methods:

MATERIALS AND METHOD

This is a prospective, non-randomized pilot study is scheduled to be conducted in the department of Oral & Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha during Oct 2019 to April 2020. The study would be conducted in accordance with Helsinki declaration and its later amendments or comparable ethical standards and after approval by the institutional ethical guidelines prescribed by Central Ethics Committee on Human Research (C.E.C.H.R) of Datta Meghe Institute of Medical Sciences.

SAMPLE SIZE DETERMINATION:

The calculation of sample size based on previous studies (Alexander C. Castillo et al³). The following formula was used to calculate the sample size required for this study at 95% confidence interval and 80% power of study. Therefore, sample size for this study came as 10 patients per group. This study will be conducted on 30 histopathologically proven patients of oral carcinoma allocated equally in 3 groups in a randomized order by requiring PMMC flap for reconstruction of the post ablative defects.

Group A (n= 10): PMMC flap closed with Vertical Mattress suturing technique.

Group B (n= 10): PMMC flap closed with Simple Interrupted suturing technique.

Group C (n= 10): PMMC flap closed with Figure of 8 suturing technique.

Patients fulfilling the criteria given below, were recruited for the study

CRITERION FOR INCLUSION:

- 1) Histopathologically proven 'Oral Squamous Cell Carcinoma'.
- 2) Systemically healthy individuals.
- 3) Patient requiring reconstruction with PMMC.

CRITERION FOR EXCLUSION:

- 1) Patients who have been operated earlier for Oral Squamous Cell Carcinoma.
- 2) Patients who have received pre operative radiotherapy / chemotherapy.
- 3) Immunocompromised patients.
- 4) Any other flap

ARMAMENTARIUM:

1. 3-0 vicryl (310) polyfilamentous braided dyed polyglactic acid suture material.
2. Needle Holder
3. Toothed Adson's forcep
4. Dean's suture cutting scissor

METHODOLOGY:

CONSENT:

Informed consent will be obtained from all patients before inclusion in the study. (Annexure-I). Assessment of the cases will be done preoperatively on the basis of case history and clinical examination (Annexure- II).

PRE-OPERATIVE INVESTIGATIONS:

The patients will be subjected to CT Head with contrast (Ipromide) in Department of Radio-Diagnosis, AVBRH, Sawangi (Meghe). CECT 16 slices/cut with Axial, Coronal and Saggitalcuts. Complete Blood investigations will be done and Physician and anaesthetist fitness will be obtained for surgery.

INTERVENTION

- Randomization will be done by lottery method.

Group A: Vertical mattress suturing technique

Placement of suture done by taking large bite of tissue from edge of wound and crossing at equal distance through the tissue on opposite side. The reversed needle having very small bite at dermal/ epidermal edge for close approximation of edges of wound.

Group B: Simple interrupted suturing technique

It is most commonly used suture method. The sutures are placed independently. The distance between each suture and the incision line can be varied according to the necessity and convenience.

Group C: Figure of 8 Suturing technique

After everting the distal side of incision with help of tissue forcep, insert the needle 5- 10 mm away from wound edge. Needle twisted and bite taken with depth of subcutaneous tissue just lower to dermis on the proximal side. The last part of suture is placed by penetration of tissue on proximal side just lower to dermis, with upward facing needle. Emerge needle tip 3 mm away from wound edge on proximal side. An instrument square knot or surgeon's knot was tied.

EVALUATION:

Following parameters were recorded:

1. Gaping and wound dehiscence
2. Marginal Necrosis

Follow up period: 1st week postoperatively and 3rd week postoperatively.

Outcome:

In the patients with OSCC requiring reconstruction with PMMC flap for the post ablative oncological defects, the flap is going to be secured by either of the three suturing techniques which is Simple interrupted, Vertical Mattress and Figure of 8. Irrespective of the type of

suturing techniques used there will be no significant difference in the healing outcome will be observed.

Expected Outcomes:

Irrespective of the type of suturing technique used there will be no significant difference in the healing outcome will be observed.

Sample size determination:

As it is a pilot study, so all the patients with OSCC reporting to the Sharad Pawar Dental College on outpatient basis or Acharya Vinoba Bhave Rural Hospital within the time duration of the study, requiring PMMC flap for the reconstruction of the post ablative oncological defect, fulfilling the criteria for the study will be recruited in the study and will be alternatively allocated in the group.

DISCUSSION:

In any intra and extra-oral surgical procedure, the management of soft-tissue is an main objective to achieve a correct esthetic and functional result. In reaching this goal, there are 2 aspects of similar importance : one is designing and management of the flap, and the other is technique of suturing.^{6,7} Infection along the incision line is the potentially dangerous post-operative event, also affect the quality of life of patient by delayed healing. There need to be regular monitoring for surgical complications which include gaping, dehiscence and edge necrosis. The material and technique of suturing used to close the defect have direct impact on healing potential.

The major purpose of sutures is stabilization of flap without imposing needless traction over soft tissue during process of healing. The selection of technique of suturing is dependent on its features. The technique decides the flap to be everted or introflected, to compress adjacent tissues to warrant hemostasis, or to create a hermetic closure in different planes.

No studies have yet been reported in literature comparing the suturing techniques in securing the PMMC flap in the oral cavity in OSCC. Hence, the present prospective pilot study was designed to compare ‘Simple interrupted, Vertical mattress and Figure of 8’ techniques of suturing in intraoral closure of PMMC flap in oncological ablative defects in Oral carcinoma.

In practice today, universally accepted technique for small defect, or equidistant defect is simple interrupted suture .It needs surgeons knot after insertion of suture through the margins of wound. When placement of knot is correct, there is slight eversion of wound edges.⁸

Vertical mattress suture is mainly indicated for eversion if skin edges. It incorporates larger quantity of tissue within passage of the suture loops and permits greater closure strength and better distribution of tension in a wound. Vertical mattress involves the far – far, near – near system. Far – far suture passes 4 – 8 mm distance from the wound edge deep in the wound below the dermis. Undermining the wound edges beforehand helps in the placement of the sutures. The near – near suture is placed at a shallow depth of about 1mm and it should lie in the upper dermis. It should be placed within 1 – 2 mm of the wound edges. Both the ends of the suture thread after near – near passage of the needle should be tied on one side of the wound. The ends are tied likewise so that the knot lies on the side where the suture passage began.

The vertical mattress suture is tied snugly yet gently. If excess pull is applied on the knot it would create more edge eversion and produce excessive tension and scarring. The excessive tension may result in skin tear at the near – near placement site. Under the

externalized loops of the vertical mattress suture necrosis of the skin has been observed on tight tying of knots and causes retraction of scar which will be pulled downwards. It is also named as “cross hatching, railroad or Frankenstein marks”.

There should be symmetrical placement of the vertical mattress suture. If not so, the wound will come together with one edge higher and the other one low which will create a shelf resulting in esthetically and functionally inferior scar.

Figure-of-eight suture has been recognized as an economizer both of time and of suture material. It still possesses a lot of other merits, mainly among which are its simplicity; very wide field of application; and the fact that it can combine some of the advantages of both the continuous and the interrupted suture.

30 systemically healthy patients diagnosed with oral carcinoma requiring cancer resection and reconstruction with PMMC flap will be allocated equally in 3 groups by alternate randomization irrespective of age, disease and treatment characteristic and were electively posted for ablative resection, neck dissection and reconstruction with PMMC flap. All the surgeries will be performed by single experienced surgeon. Bhola et al reported on role for bilobed/bipaddled pectoralis major myocutaneous flap for single-stage immediate reconstruction of post ablative oncologic full-thickness defects of the cheek⁹.

Following parameters will be recorded:

1. Gaping and wound dehiscence
2. Marginal Necrosis

Follow up period: 1st week postoperatively and 3rd week postoperatively.

Upon healing of the gaping and dehisced margins they will be freshen up and resutured with the respective suturing technique of that Group. In the patients having Marginal necrosis the necrosed demarcated tissue will be removed and the margins will be resutured . A study on alternative to sutures for skin closure after neck dissection was reported by García, Eet al¹⁰ and Oswal et al ¹¹.

As mentioned of the three techniques appreciable difference may be noted in technique complexity. Simple interrupted suturing technique might be the most time efficient repair to perform in accordance to our study.

In our study irrespective of the type of suturing techniques used there may be no significant difference in the healing outcome will be observed.

Conclusion:

So far, no literature is found on comparing the types of suturing techniques and evaluating their efficacy for intraoral PMMC flap closure in post ablative defects of OSCC. Therefore more data is required on the suturing techniques for securing the PMMC flap in post ablative defects of OSCC.

REFERENCES:

- [1] Sejal Kumarpal Munoyath, Kavitha Prasad, Saumya Sehgal :Complications of pectoralis major myocutaneous flap in orofacial reconstruction– case report with review of literature. Journal of Dental & Oro-facial Research Vol 12 Issue 1 Jan 2016.

- [2] Kiran Shrikrishna Gadre, Pushkar Gadre, Vikrant Dilip Sane, Rajshekhar Halli, Pankaj Doshi, and Sachin Modi : Pectoralis Major Myocutaneous Flap—Still a Workhorse for Maxillofacial Reconstruction in Developing Countries. *J Oral Maxillofac Surg* 71:2005.e1-2005.e1020.
- [3] Karia J, Patel A, Jadav H : A comparative study of vertical mattress vs subcuticular stitches in type 1 surgery . *JPSBR*: Volume 4, Issue 1: 2014 (106-109).
- [4] Alexander C. Castillo, Kyle Kaltwasser¹, Randal Morris, Erick R. Sanchez, Surjit Rai, Nicholas Lombana, Dat Tran, Ludwik Branski, and Andrew Y. Zhang : Comparing 3 Suture Techniques After Muscle Laceration Repair.
- [5] Allison Stoecker , Collin M Blattner, Stephanie Howerter, Whitney Fancher, John Young, and William Lear : Effect of Simple Interrupted Suture Spacing on Aesthetic and Functional Outcomes of Skin Closures. *Journal of Cutaneous Medicine and Surgery* DOI: 10.1177/1203475419861077.
- [6] F Shah, M Porecha, M Gandhi, P Mehta, B Prajapati, Niket: Evaluation Of Different Types Of Skin Closure Techniques. *The Internet Journal of Surgery*. 2012 Volume 28 Number 3.
- [7] Sandro Siervo; suturing techniques in oral surgery.
- [8] M Brandt M, W. Jenkins. Suturing principles for the Dentoalveolar Surgeon. *Dent Clin N Am* 2012, Volume 56, 281-303.
- [9] Bhola, Nitin, Anendd Jadhav, Rajiv Borle, Gaurav Khemka, Sanatan Kumar, and Harshit Shrivastava. “Is There Still a Role for Bilobed/Bipaddled Pectoralis Major Myocutaneous Flap for Single-Stage Immediate Reconstruction of Post Ablative Oncologic Full-Thickness Defects of the Cheek?” *ORAL AND MAXILLOFACIAL SURGERY-HEIDELBERG* 19, no. 2 (June 2015): 125–31. <https://doi.org/10.1007/s10006-014-0458-1>.
- [10] García, E., Rey, P. del, & Martínez, E., Evaluation of Blood processed by cell saver in pediatric scoliosis. *Journal of Medical Research and Health Sciences*, 3(6) (2020). <https://doi.org/10.15520/jmrhs.v3i6.193>
- [11] Oswal, Shrenik, Rajiv Borle, Nitin Bhola, Anendd Jadhav, Sanidhya Surana, and Rajesh Oswal. “Surgical Staples: A Superior Alternative to Sutures for Skin Closure After Neck Dissection-A Single-Blinded Prospective Randomized Clinical Study.” *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY* 75, no. 12 (December 2017). <https://doi.org/10.1016/j.joms.2017.08.004>.