

Choice of suture material and management of surgical wounds

Pavithra H. Dave, Dhanraj Ganapathy, R. M. Visalakshi

ABSTRACT

Background: Suturing is a crucial part of any oral surgical procedure. Sutures are of two types – absorbable and nonabsorbable. The main aim of the present study is to perform a knowledge, attitude, and practice of dental students based on the choice of suture material and the technique for the management of surgical wounds. **Aim:** The objective of the study was to perform a knowledge, attitude, and practice of dental students based on the choice of suture material and the technique for the management of surgical wounds. **Materials and Methods:** A sample size of 100 dental practitioners who perform surgical procedures was considered as participants. A questionnaire comprises 10 questions on the incidence, technique, and management of suture materials and surgical wounds. The subjects were made to fill the questionnaire through an online portal. The recordings were made individually by the investigator and results were analyzed. All the data were arranged in a tabulated form and analyzed using SPSS software. **Results:** The results inferred from the study show that 74% of dental practitioners opted for resorbable sutures and 29% have experienced complications post-treatment such as stitch abscess. 44% of the participants feel they are aware of the resorption time of sutures. **Conclusion:** From the study, we can conclude that there is sufficient knowledge among the dental practitioners regarding the suturing technique and type of sutures for the management of surgical wounds.

KEY WORDS: Awareness, Difficulty, Sutures, Technique

INTRODUCTION

Dental surgery involves the creation of a wound and necessitates the closure of this wound to allow healing and to achieve the surgical objective.^[1] Suturing, being the final procedure of surgery, is used to reattach the tissue, to control bleeding, and allow for primary healing. Tissue reaction is reflected through an inflammatory response, which develops during the first 2–7 days after suturing the tissue.^[2,3]

Several studies published over the past four decades have reported that synthetic materials exhibit a superior behavior to oral tissues in terms of tissue inflammatory reactions compared to nonsynthetic suture materials.^[4] Suture materials that have been investigated in terms of tissue reactions, but the outcome remains debatable. They are further braided and nonbraided. The braided one harbor more bacteria during a period of time. The presence of chrome also provided greater wound support.^[5,6]

Controversy persists over the efficacy of suture materials. It was reported the bacterial count over the braided silk and polyglycolic acid (PGA) sutures to be similar; conversely, other studies have reported that silk sutures are more susceptible to bacterial invasion and severe tissue inflammatory reactions. However, in terms of cost-effectiveness, silk continues to enjoy its status as an inexpensive suture material as compared to other nonabsorbable suture materials.^[7]

Resorption of the sutures occurs by two mechanisms. The sutures of biological origin are resorbed by enzymes present in tissues. Synthetic resorbable sutures such as PGA are resorbed by the Krebs cycle.^[8,9]

Time required for the wound to heal is closely associated with the gap between tissue wound margins. Therefore, perfect adaptation will allow earlier suture removal. Wound support is only needed until the healing process has progressed to such an extent that the tissue can withstand functional forces.^[10]

The main aim of the present study is to perform a knowledge, attitude, and practice of dental students

Access this article online

Website: jprsolutions.info

ISSN: 0975-7619

Department of Prosthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai, Tamil Nadu, India

*Corresponding author: Dhanraj Ganapathy, Department of Prosthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600 077, Tamil Nadu, India. E-mail: dhanrajmganapathy@yahoo.co.in

Received on: 09-12-2018; Revised on: 13-01-2019; Accepted on: 17-02-2019

based on the choice of suture material and the technique for the management of surgical wounds.

MATERIALS AND METHODS

The study was conducted among 100 dental students in South India who perform surgical procedures among patients. A questionnaire was prepared consisting of 10 close-ended questions to know the awareness on incidence and management of suture material and management of surgical wounds. The answers were tabulated, and statistical analysis was performed using SPSS software, and one-way ANOVA was performed to determine the statistical significance.

Questionnaire

1. Year of the study?
 - III year
 - IV year
 - Intern
 - PG
2. Gender?
 - Male
 - Female
3. Where will you indicate sutures?
 - Bone grafts
 - Flap surgery
 - Extraction socket closure
 - Suture subcutaneous tissue
 - All of the above
 - Other
4. Choice of suture material?
 - Resorbable
 - Nonresorbable
5. What are the resorbable sutures you are aware of?
 - Chromic gut
 - Silk
 - Polyester
 - Vicryl
 - PGA
 - Other
6. What are the non-resorbable sutures you are aware of?*
7. Correct technique of suturing?
 - Interrupted sutures
 - Continuous sutures
 - Continuous with lock sutures
 - Horizontal mattress sutures

- Vertical mattress sutures
- Other

8. Difficulty in suturing?
 - Yes
 - No
9. Are there any alternatives to suturing?
 - Yes
 - No
 - Maybe
10. Are you aware of the resorption time of sutures?
 - Yes
 - No
11. Have you encountered stitch abscess?
 - Yes
 - No
12. How do you disinfect the sutures?
 - Glutaraldehyde soaking
 - Autoclaving
 - Boiling

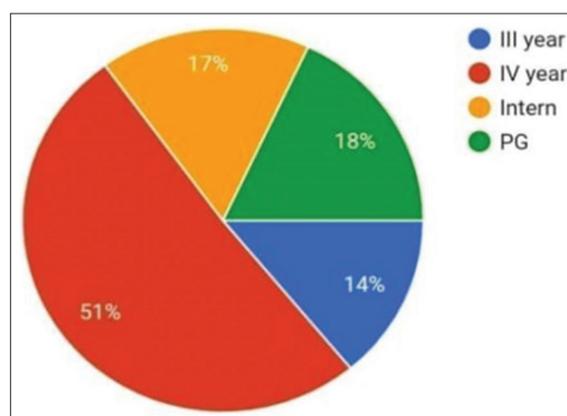
RESULTS

From the results obtained, 14% of the participants were from III year, 51% from IV year, 17% were interns, and 18% were postgraduates [Graph 1]. 70% of the participants were female and 30% were male [Graph 2].

Suturing was opted by 74% of the participants for the following procedures such as bone grafts, flap surgery, extraction socket closure, and suture subcutaneous tissue [Graph 3].

The choice of suture material was chosen for 74% resorbable materials and 26% for non-resorbable materials [Graph 4].

The participants were aware of the chromic gut (43%) and silk (67%) as the most common resorbable and non-resorbable suture material used [Graphs 5 and 6].



Graph 1: Year of the study

Interrupted suturing technique (49%) was opted as the correct technique for suturing followed by continuous with lock suturing technique by 18% [Graph 7].

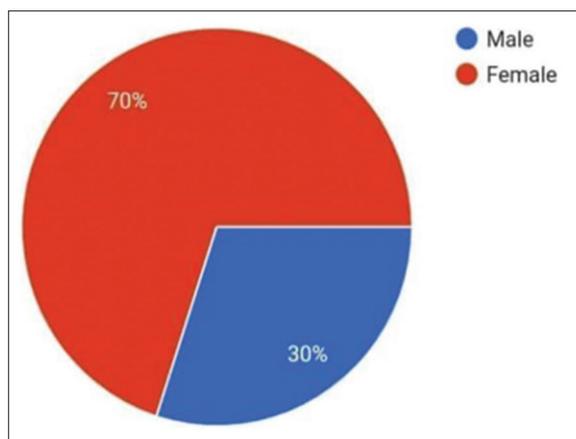
Nearly 62% of the participants had encountered difficulty in suturing [Graph 8]. 45% of the participants were unsure of the alternatives to suturing [Graph 9].

When the resorption time of sutures was asked, 56% of the participants were aware of the time [Graph 10].

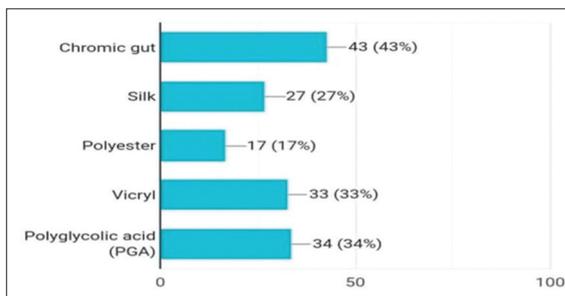
29% of the participants had complications post-treatment such as stitch abscess [Graph 11]. Disinfecting the sutures was done by glutaraldehyde soaking (59%), autoclaving (37%), and boiling (4%) [Graph 12].

DISCUSSION

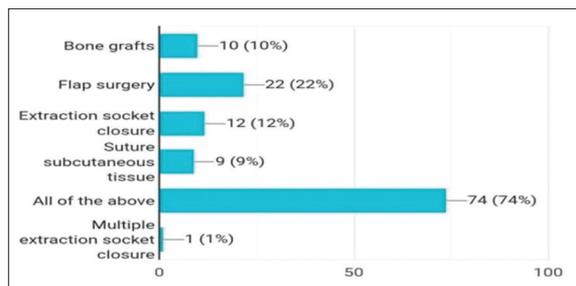
Most of the oral surgical procedures need primary closure of the wound through a flap raised previously. For this, there are a variety of suturing materials which can be classified according to the origin or according to their durability in host tissues.^[11] The chief essential features of a suture should be – stability of knot, capacity to stretch, tissue reaction, and wound safety. The healing of tissue is also dependent on the choice of suture material along with the surgical and suturing technique.^[12,13] In a study conducted by Vastardis, they reported three cases of complications after using subepithelial connective tissue graft. In their study abscess was formed after the initial healing phase. They concluded that this could be due to the reaction of the tissue to the submerged suture material.^[14] In our study, there were 62% of the students who encountered difficulty during suturing. Rest 38% considered it to be easy.



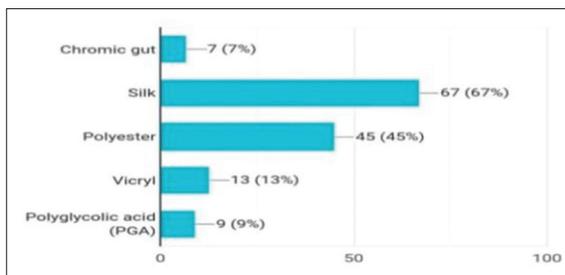
Graph 2: Gender



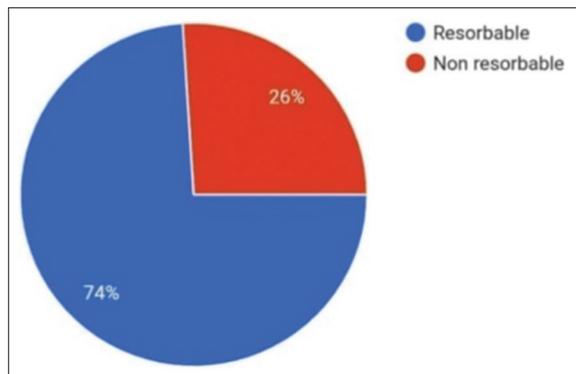
Graph 5: Resorbable sutures



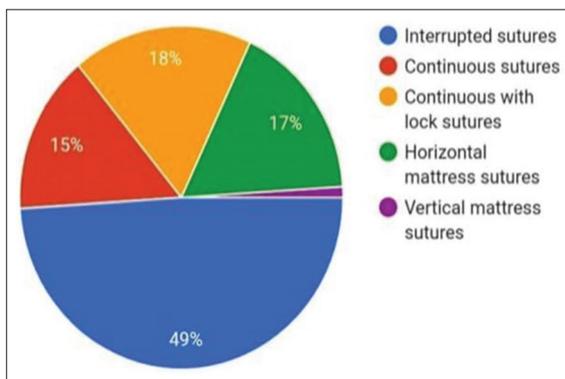
Graph 3: Indications for suturing



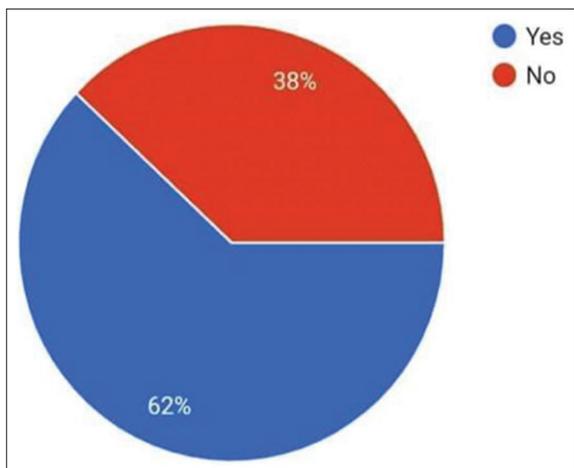
Graph 6: Non-resorbable sutures



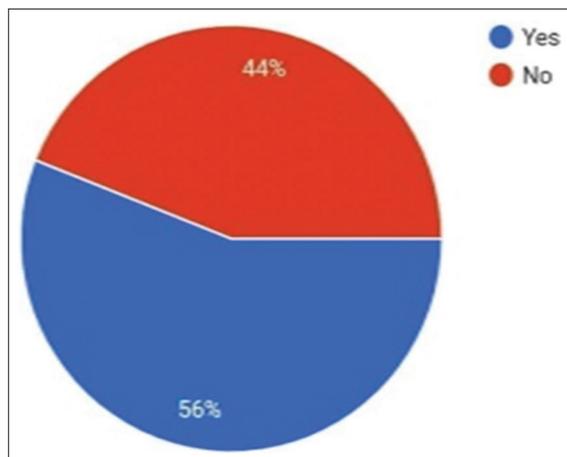
Graph 4: Choice of suture material



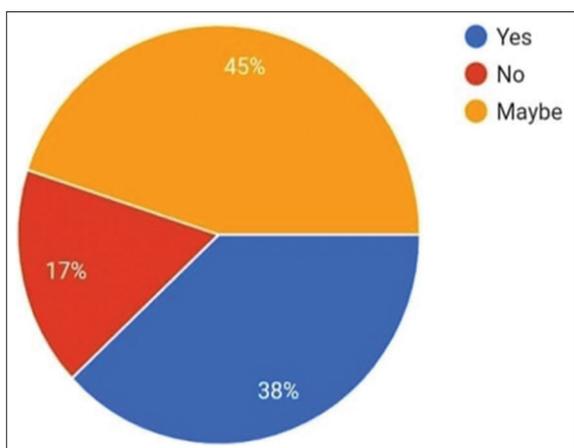
Graph 7: Technique of suturing



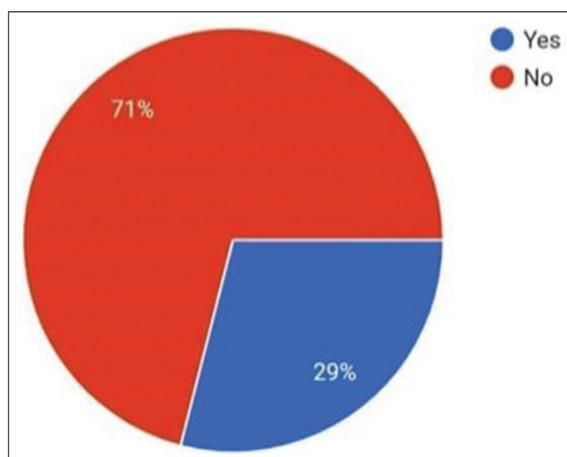
Graph 8: Difficulty in suturing



Graph 10: Resorption time of sutures



Graph 9: Alternatives to suturing

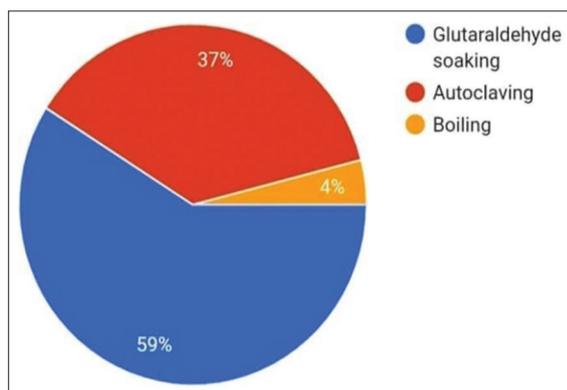


Graph 11: Stitch abscess

There were 74% who had an idea about the common uses of suturing. There was no significant difference between the two groups. There considered suturing essential after every oral surgical procedure.

There were 38% of subjects aware of alternatives to suturing and used adhesives instead of sutures. Rest of 45% were unsure about the substitute of suturing. There was a significant difference between the two groups. In a study conducted by Javed *et al*, they found that delayed hypersensitivity reactions to chromic catgut suture are not diagnosed easily postoperatively. According to their study, there were 87% of the dentists who were unaware of the delayed hypersensitivity reactions associated with the use of chromic catgut sutures.^[15] In a study conducted by Nagpal *et al.*, there were 46% of the subjects aware of the composition of chromic catgut suture and there were 78% of the dental students who were aware of the same.^[16]

Another factor that may instigate tissue reactions is the capability of bacteria to adhere to various suture materials. In their *in vitro* study, Javed *et al.* investigated



Graph 12: Disinfection of sutures

the capability of bacteria to adhere to various types of sutures to cause tissue reactions. The results showed that bacterial adherence to braided silk sutures was five- to eight-folds higher as compared to nylon to which the least numbers of bacteria adhered.^[17]

The suture choice must be made in relation to the type of operation that must be performed. In anatomic regions such as the nasal and oral mucosa that demand

higher tensile strength, the multifilament synthetic suture material is preferred.^[18] In areas that demand lower tensile strength, the monofilament suture material is suggested. Due to their ability to adhere to sutures, these bacteria consequently may act as a focus of odontogenic infection. In fact, fusobacteria, *Peptostreptococcus*, *Prevotella*, and streptococci species are usually identified in odontogenic infections, resulting in a potential risk factor for surgical wounds healing.^[19]

In a study conducted by Lilly and Homsy *et al.* in the year 1922, there were 65% of absorbable sutures which can be used as deep sutures in case of hepatic, renal, and splenic. They can be successfully used as subdermal sutures.^[20,21] In our study, there were 74% subjects who were aware of types of suture material. There were 56% subjects who had an idea about the resorption time of various sutures. There was significant awareness of the subjects regarding suturing and sutures.

CONCLUSION

From the study, we can conclude that there is sufficient knowledge among the students regarding the suturing technique and type of sutures. However, there was a lack of awareness regarding the various alternatives to sutures and resorption time of sutures, and very less percentage of them opted for these alternatives. Emphasizes also needs to be made on the need for careful suture selection of suturing materials for oral surgical interventions.

REFERENCES

1. Akifuddin S. Review on sutures in oral surgery-an update. *J Adv Med Dent Sci Res* 2014;2:201-4.
2. Tsesis I, Blazer T, Elbahary S, Rosen E. Complications of endodontic surgery. In *Common Complications in Endodontics*. Berlin: Springer, Cham; 2018. p. 203-15.
3. Kim JS, Shin SI, Herr Y, Park JB, Kwon YH, Chung JH, *et al.* Tissue reactions to suture materials in the oral mucosa of beagle dogs. *J Periodontal Implant Sci* 2011;41:185-91.
4. Javed F, Al-Askar M, Almas K, Romanos GE, Al-Hezaimi K. Tissue reactions to various suture materials used in oral surgical interventions. *ISRN Dent* 2012;2012:762095.
5. Okamoto T, Rosini KS, Miyahara GI, Gabrielli MF. Healing process of the gingival mucosa and dental alveolus following tooth extraction and suture with polyglycolic acid and polyglactin 910 threads. Comparative histomorphologic study in rats. *Braz Dent J* 1994;5:35-43.
6. Silverstein LH, Kurtzman GM. A review of dental suturing for optimal soft-tissue management. *Compend Contin Educ Dent* 2005;26:163-6, 169-70.
7. Racey GL, Wallace WR, Cavalaris CJ, Marguard JV. Comparison of a polyglycolic-poly-lactic acid suture to black silk and plain catgut in human oral tissues. *J Oral Surg* 1978;36:766-70.
8. Yilmaz N, Inal S, Muğlali M, Güvenç T, Baş B. Effects of polyglactin 25, silk and catgut suture materials on oral mucosa wound healing in diabetic rats: An evaluation of nitric oxide dynamics. *Med Oral Patol Oral Cir Bucal* 2010;15:e526-30.
9. Velvart P, Peters CI, Peters OA. Soft tissue management: Suturing and wound closure. *Endod Top* 2005;11:179-95.
10. Lilly GE, Armstrong JH, Salem JE, Cutcher JL. Reaction of oral tissues to suture materials: Part II. *Oral Surg Oral Med Oral Pathol* 1968;26:592-9.
11. Vastardis S, Yukna RA. Gingival/soft tissue abscess following subepithelial connective tissue graft for root coverage: Report of three cases. *J Periodontol* 2003;74:1676-81.
12. Graham ID, Young D. Book and video reviews episiotomy challenging obstetric Interventions. *Birth*. 1997;24:203-4.
13. Craig PH, Williams JA, Davis KW, Magoun AD, Levy AJ, Bogdansky S, *et al.* A biologic comparison of polyglactin 910 and polyglycolic acid synthetic absorbable sutures. *Surg Gynecol Obstet* 1975;141:1-0.
14. Bandyopadhyay D, Marlow NM, Fernandes JK, Leite RS. Periodontal disease progression and glycaemic control among Gullah African Americans with Type-2 diabetes. *J Clin Periodontol* 2010;37:501-9.
15. Javed F, Näsström K, Benchimol D, Altamash M, Klinge B, Engström PE, *et al.* Comparison of periodontal and socioeconomic status between subjects with Type 2 diabetes mellitus and non-diabetic controls. *J Periodontol* 2007;78:2112-9.
16. Nagpal R, Yamashiro Y, Izumi Y. The two-way association of periodontal infection with systemic disorders: An overview. *Mediators Inflamm* 2015;2015:793898.
17. Javed F, Klingspor L, Sundin U, Altamash M, Klinge B, Engström PE, *et al.* Periodontal conditions, oral *Candida albicans* and salivary proteins in Type 2 diabetic subjects with emphasis on gender. *BMC Oral Health* 2009;9:12.
18. Katz S, Izhar M, Mirelman D. Bacterial adherence to surgical sutures. A possible factor in suture induced infection. *Ann Surg* 1981;194:35-41.
19. Grier RL. Surgical sutures-part II: Indications for different suture materials and comparable costs. *Iowa State Univ Vet* 1972;34:6.
20. Lilly GE. Reaction of oral tissues to suture materials. *Oral Surg Oral Med Oral Pathol* 1968;26:128-33.
21. Homsy CA, McDonald KE, Akers WW, Short C, Freeman BS. Surgical suture-canine tissue interaction for six common suture types. *J Biomed Mater Res* 1968;2:215-30.

Source of support: Nil; Conflict of interest: None Declared