

Efficacy Of Non-Absorbable Suture Materials With Respect To Healing In Intra Oral Lesions: A Review Article

Dr Balakrishnan¹, Dr. Vijayebenezer², Dr. Shanmugapriyan³, Dr. Wasim Ahmed⁴

Department of Oral and Maxillofacial Surgery

Sree Balaji Dental College and Hospital

Pallikaranai, Chennai- 100, Tamilnadu, India

ABSTRACT

As oral and maxillofacial surgeons we do come across various intra oral lesions, laceration and often we induce such, through incisions and dissections. Thus, we are faced with the challenge to select the proper material to approximate such tissue injury in order to enable it to heal. There are various materials commercially available, yet not all can be used intra orally. We shall delve deeper into the efficacy of non-absorbable suture materials which are commonly used intraorally.

INTRODUCTION

Over the course of history various materials have been used for the purpose of being used as suturing materials in the field of medicine. The various materials which have been used in past times and are of historical importance are linen, horsehair, flax, silkworm gut, kangaroo tendon, umbilical tape, ligament, cotton, iron wire, bark fibers, stainless steel, gold, and silver. Synthetic fibers, such as nylon and polyester, were first used in the 1940s. Polyglycolic acid (Dexon) and polyglactin 910 (Vicryl) were developed and used in the early 1970s and polydioxanone (PDS) was introduced in the 1980s. Suture materials are classified according to performance, size, and physical properties. Suture performance is categorized as either absorbable or nonabsorbable. Proper healing requires proper positioning of the soft tissues closest to their original position in a stable fashion, with the least amount of tension, thus suture materials are chosen according to the need and site of suture. Not all suture materials are suitable for use in intra oral conditions due to the very special conditions inside the oral cavity due to the nature of its function as well as physiological characteristics. The non-absorbable materials which have been successfully and commonly used intra orally of the centuries are silk (braided), cotton, ethilon. The classification of suturing materials is as follows:

Classification based on biological properties: -

Natural Absorbable Suture material:

- Catgut
- Collagen
- Cargile membrane
- Kangaroo Tendon
- Fascia lata

Synthetic Absorbable suture material:

- Dexon – Polyglycolic Acid
- Vicryl – Polyglactin
- PDS – Polydioxanone
- Maxon – Polytrimethylene Carbonate

Natural Non-absorbable Suture Material:

- Silk
- Linen
- Cotton

Synthetic Non-absorbable Suture Material:

- Nylon
- Polypropylene (Prolen, Surgilene)
- Braided Polyesters (Ethibond, Ethiflex, Mersiline, Dacron)
- Polybuteste (Novafil)

Among all of these materials natural and synthetic non absorbable suture materials are of importance in this study.

DISCUSSION

An important aspect of wound healing is susceptibility to the wound getting infected after suturing has been done. Another aspect is the suture material itself hindering the proper healing of the wound due to a combination of factors like tissue reaction, tensile strength, etc.

Natural materials:

SILK

Silk is natural, multifilament, braided and non-absorbable suturing material. It is composed of proteins called fibroin and Sericin. It has a smooth flow through the tissue while maintaining the knot security. It is coated with a bee's wax. Silk material has an excellent strength and handling property and it is flexible, coated with wax for smooth passage and it mostly has no tissue reactions. Silk has been used as biomedical suture material for centuries. But the only disadvantage is the biocompatibility issues reported for silk obtained from silkworm due to the contamination of residual sericin. Studies have shown that Silk sutures presented a better tension compared to most other non-absorbable sutures. Yet synthetic suture materials were superior to silk in terms of wound healing and inflammatory tissue reactions. The bacterial load of silk suture and the incidence of infection was comparable to the synthetic materials. The greatest advantage of silk is its cost effectiveness and easy availability. Newer studies and advancements has yielded a better variety which is braided silk coated with Triclosan which reduces the bacterial load even more significantly.

COTTON

Cotton is a natural fiber obtained from the buds of cotton plant. This was used mostly before the advent of modern medicine. It is now of only historical significance. Cotton if used in intra oral suture, gives rise to extreme inflammatory reaction due to the plant tissue antigens and also causes high incidence of wound infection.

ETHILON (MONOFILAMENT)

This is type of suture material made of nylon which is a synthetic polymer invented in the 1940s. This material has shown excellent results in case of intra oral wound healing and has considerable tensile strength, thus can be used in high tension sutures. This material also shows the least probability of a tissue reaction. Yet there is a slight

disadvantage of progressive hydrolysis resulting in a gradual loss of tensile strength over time and that monofilament non braided being too sharp can cut through soft friable tissues very easily thus increasing tissue damage. To mitigate such a problem, the braided variety was introduced which had all the benefits and none of the disadvantages. Ethilon also shows the least tissue reaction of all non-absorbable sutures. Yet it does show a higher rate of bacterial adherence and might sometimes cause and increases chance of infection if proper oral hygiene isn't maintained.

CONCLUSION

Although due to advancement of technology has yielded better materials which are resorbable as well as showing better wound healing properties, non-resorbable materials have a few well established advantages which are, the ability to do follow-ups of the patient when the patient comes back to remove the sutures, thus allowing the chance to properly inspect the wound healing, due to non-resorbable nature, they hold tensile strength over longer times and their cost effectiveness over resorbable ones. Thus, we must take all factors into consideration while selecting suture material on a case per case basis. We can conclude that no singular material is greater than all other materials due to different varying properties.

CONFLICT OF INTEREST

No conflict of interest

REFERENCES

1. Gallini G, Pasqualini M: Sutures in oral surgery. *Attual Dent* IV:14, 1988
2. Chu C, Tamplenizza P, Gallini G, et al: I fili di sutura: Studio in vivo con antisieri monoclonali. *Dent Mod* 2:245, 1992
3. La Scala G, Del Marleo M: Sutures in dentistry: Traditional and PTFE materials. *Dent Cadmos* 14:54, 1990
4. Quasso L, Gambarini G, Rizzo OA: Materiali di sutura in chirurgia odontostomatologica. *Dent Mod* 9:1487, 1995
5. Nary Filho H, Matsumoto MA, Batista AC, et al: Comparative study of tissue response to polyglycaprone 25, polyglactin 910 and polytetrafluorethylene suture materials in rats. *J Braz Dent* 13:86, 2002
6. Tamplenizza P, Gallini G, Gorla G: How the gingiva reacts to suture thread. *Attual Dent* IV:20, 1988
7. Grigg TR, Liewehr FR, Patton WR, et al: Effect of the wicking behaviour of multifilament sutures. *J Endod* 30:649, 2004
8. Selvig KA, Biagiotti GR, Leknes KN, et al: Oral tissue reactions to suture materials. *Int Periodont J Rest Dent* 18:474, 1998
9. Parirokh M, Asgary S, Eghbal MJ, et al: A scanning electron microscope study of plaque accumulation on silk and PVDF suture materials in oral mucosa. *Int Endod J* 37:776, 2004
10. Otten JE, Wiedmann-Al-Ahmad M, Jahnke H, et al: Bacterial colonization on different suture materials—A potential risk for intraoral dentoalveolar surgery. *J Biomed Mater Res B Appl Biomater* 74:627, 2005
11. Durdey P, Bucknall TE: Assessment of sutures for use in colonic surgery: An experimental study. *J R Soc Med* 77:472, 1984