EVALUATION OF SUSTAINABILITY OF MECHANICAL PROPERTIES OF POLYPROPYLENE SUTURE EXPOSED IN BETADINE MOUTHWASH USED IN POST PERIODONTAL SUTURES

Nandini Palanivel
Saveetha Dental College
Saveetha Institute of Medical and Technical Sciences,
Saveetha University,
Chennai 600077
Email Id: 151901082.sdc@saveetha.com
DR.Thamarai Selvam
Associate professor,
Department of Periodontics,
Saveetha dental college and hospitals,
Saveetha institute of medical and technical science,
Saveetha University,
Chennai 600077
E- mail :
Corresponding Author
DR. Thamarai Selvam
Associate professor,
Department of Periodontics,
Saveetha dental college and hospitals,
Saveetha institute of medical and technical science,
Saveetha University,
Chennai 600077
E- mail: parkavia@dsc.Saveetha.com

INTRODUCTION:

In the field of dentistry most surgical wounds, traumatic wounds or periodontal therapy needs tissue closure for enhanced healing . Suturing is one of the most common techniques that is applied for the closure of the tissue. A closure by means of bringing both the opposing side of the tissue together for a primary repair of tissue which promotes the wound healing.
Suturing provides many advantages like wound closure wound closure which promotes healing process and minimizing the risk of infection and helps in tissue approximation by holding the tissue layers together and allowing them to heal properly and helps in hemostasis by controlling bleeding.

Suturing techniques can vary depending on the type of wound, its location , and the desired outcome. The ideal suture is easy to handle for the surgeon, provides appropriate strength and secure knots, can tolerate wound changes like swelling and recoil , cause minimal risk of inflammation and infection , should be biocompatible and easily visible and relatively inexpensive. There is no known suture that has all the qualities of an ideal suture. However good handling and techniques and understanding the attributes of each type of suture helps in good healing and prognosis of the wound.

Presently there are many options for sutures . There are many different types of sutures that are grouped based on their characteristics these are mainly classified based on
Absorbable and non- absorbable suture
Synthetic and natural suture
Monofilament and multifilament suture

This gives us a better understanding of the different types of suture and its properties and characteristics which helps us to choose the suture materials for different treatment.

In the category of absorbable and non absorbable suture Absorbable Sutures:
These sutures are designed to break down and be absorbed by the body over time. They are typically used for internal tissues and are not intended to be removed.

Common materials for absorbable sutures include Polyglycolic Acid sutures , These sutures are often used for soft tissue closures Polyglactin sutures are suitable for a wide range of procedures and are often used for subcutaneous and deep tissue layers.. Poliglecaprone This material is commonly used for skin closures and has good handling

Non-absorbable sutures are intended to remain in the body indefinitely and may need to be removed at a later date, depending on the location and type of the wounds. Nylon sutures are versatile and used for a wide variety of wounds. They are strong and can be used on the skin, as well as in deeper tissues. Polypropylene sutures are non-reactive type of suture monofilament sutures of an isotactic crystalline stereoisomer of polypropylene, a synthetic linear polyolefin. Polypropylene sutures are non-absorbable and provide permanent wound support.

MATERIALS AND METHODS

The aim of the study is to evaluate the mechanical properties of the suture material that has been exposed to betadine mouthwash that has been used in periodontal surgeries. Polypropylene sutures are taken for this study of size 4-0 and 5-0 about 10 cm in length and are classified into 3 groups one which is the control group next group being the betadine group(GROUP A) and the last group being suture dipped in artificial saliva(GROUP B). Both the groups have been submerged in the respective medium for 24 hours and the samples were taken and the samples were put to tensile test and the results were obtained .

FIG1: THE ABOVE DEPICTED IMAGE IS ARTIFICIAL SALIVA

FIG 2: THE ABOVE DEPICTED IMAGE IS BETADINE MOUTHWASH

FIG 3: THE IMAGE ABOVE DEPICT THE SUTURE SAMPLE BEING IMMERSED IN BETADINE SOLUTION FOR 24 HOURS

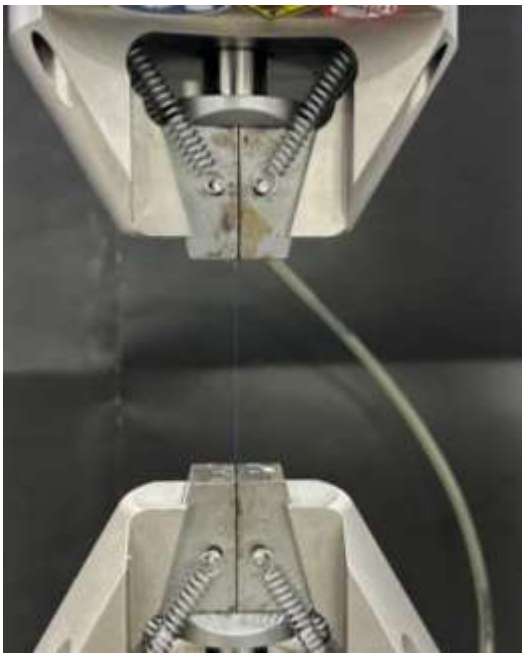


FIG 4: Common solid mount To measure tensile strength of suture

materials.

RESULTS:

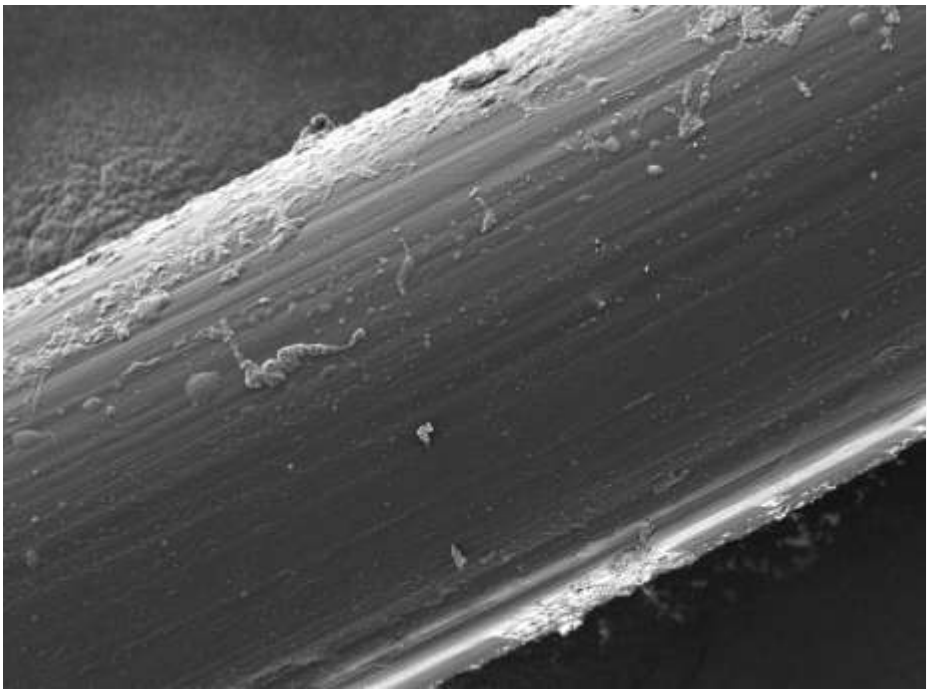


FIG 1: SEM IMAGE OF THE POLYPROPYLENE SUTURE (CONTROL GROUP)

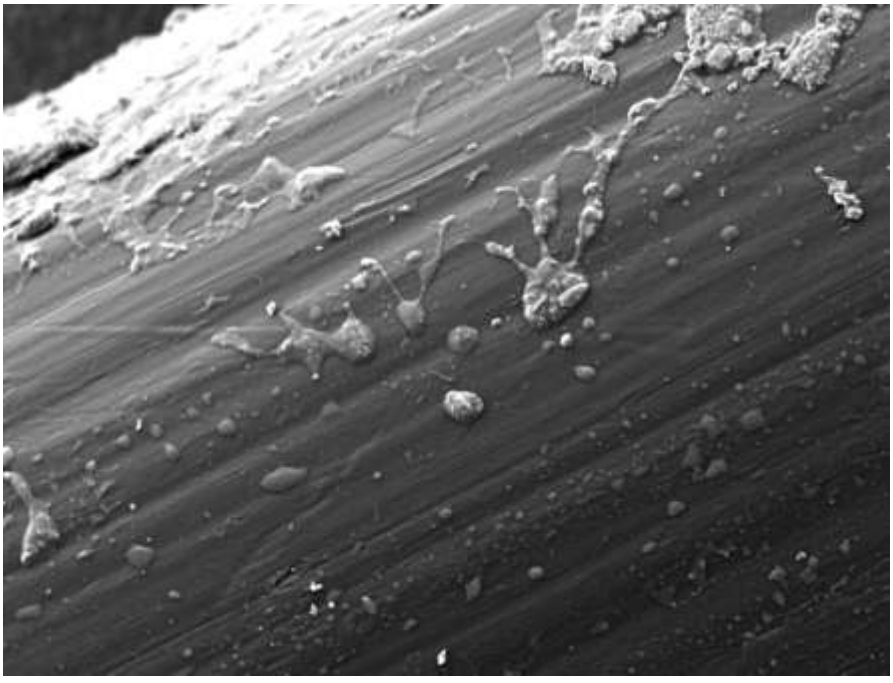


FIG 2: SEM IMAGE OF THE POLYPROPYLENE SUTURE DIPPED IN ARTIFICIAL SALIVA

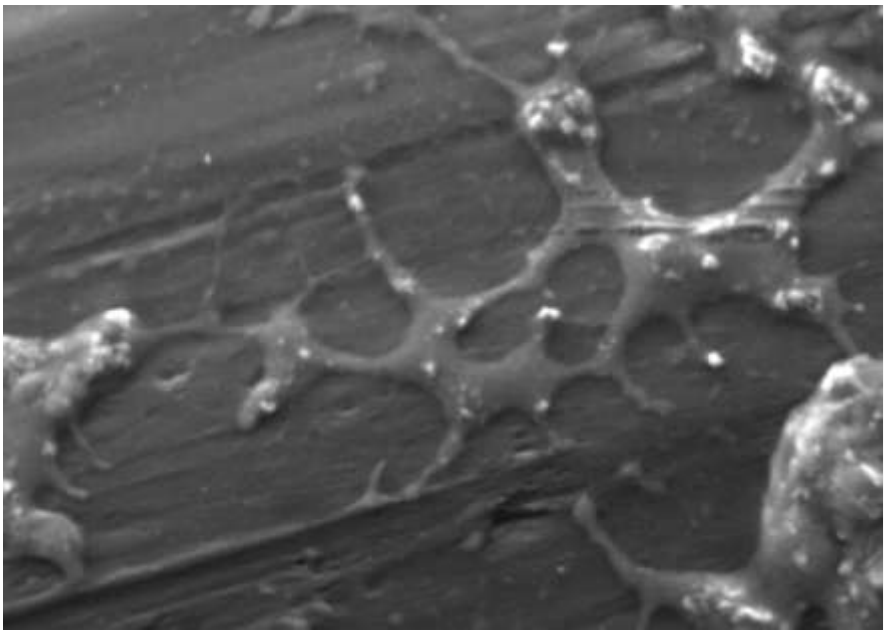
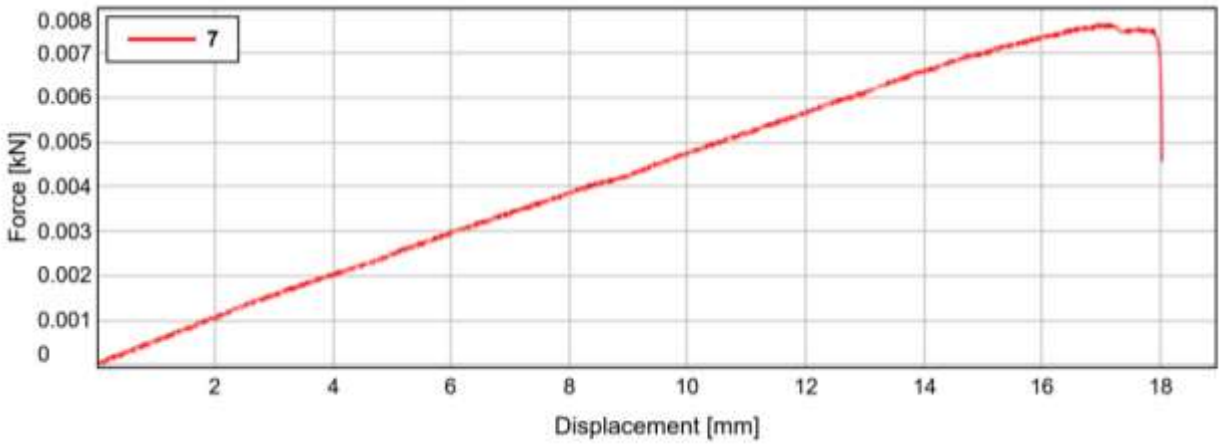
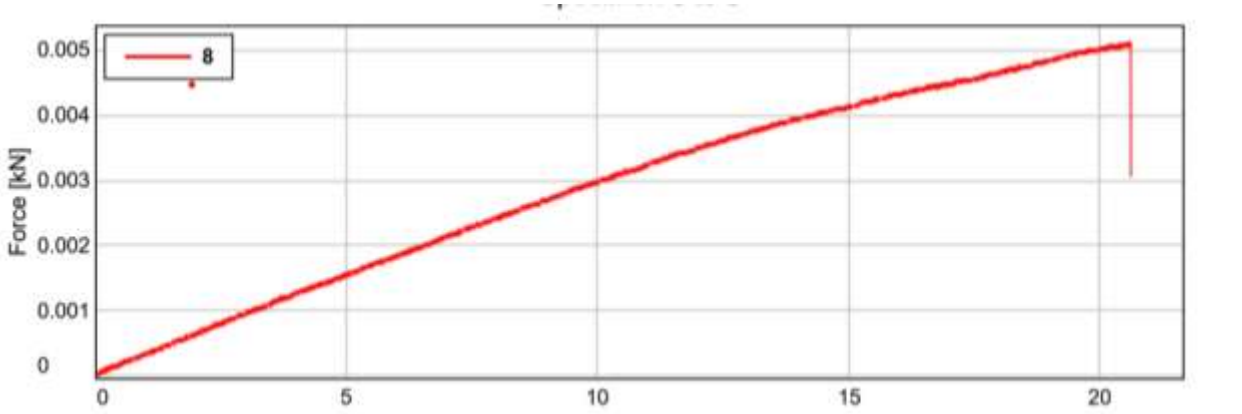


FIG 1: SEM IMAGE OF THE POLYPROPYLENE SUTURE DIPPED IN BETADINE MOUTHWASH



Graph 1: this table shows the tensile strength of the polypropylene suture (control group)



Graph 2: this table shows the tensile strength of the polypropylene suture (control group)

S.NO	SPECIMEN LABEL	TENSILE STRENGTH AT BREAK (MPa)
1	Polypropylene suture 4-0 (control)	3.47
2	Polypropylene suture 5-0 (control)	3.64
3	Polypropylene suture 4-0 (group A)	4.46
4	Polypropylene suture 5-0 (group A)	4.17

DISCUSSION:

All the suture were intact and firm during the period where the sutures were submerged in the respective medium and from the results obtained for the tensile strength of the suture of both the control group and group A (suture dipped in betadine solution).The control group of 4-0 polypropylene suture showed 3.47 MPa during the tensile strength test at breaking point and the tensile strength of 5-0 polypropylene suture during the tensile test is 3.64 MPa at the breaking point of the suture.The group A shows the tensile strength of 4-0 polypropylene suture showed 4.46 MPa during the tensile strength test at breaking point and

the tensile strength of 5-0 polypropylene suture during the tensile test is 4.17 MPa at the breaking point of the suture.

In a survey done by Maksoud et al.27 non-absorbable sutures tend to perform better than absorbable sutures. He described chromic gut (4-0) as the most acceptable suture for general repair, with poly tetrafluoroethylene (4-0) as the most favorable material for bone grafts in periodontal surgeries and ridge augmentation. Soft tissue procedures involving gingival grafts, allografts of gingiva and connective tissues, frenectomy and frenuloplasty all healed bet- ter when using chromic gut (5-0).27 In the case of minor oral procedures like socket preservation, canine exposure and dental implant placements, chromic gut (4-0) was preferred and its performance was on par with vicryl (4-0) in sinus augmentations.27 In addition, implant procedures were found to have better success rates when monofilament and braided sutures were used.

CONCLUSION:

Sutures are an essential component in wound healing, and the choice of suture type and material both play a pivotal role in the management of surgical procedures. With currently available advanced surgical techniques surgeons are continuously exploring the armamentarium for the ideal suture material and knot configuration. However, the strength is only graded for varying suture diameter and there are few comparisons readily available on the base material. The major goal of all sutures is to maintain knot security and aid healing, but the lack of standardization in knots, suture method and material can make evaluating suture materials very complex. In addition, oral surgeries, with their unique biological environment, pose a serious challenge demanding precision in wound closure to enable proper healing. In this studies we can conclude that the suture material that was dipped in betadine solution has more tensile effect than that of the normal suture and other qualities like secure knots, can tolerate wound changes like swelling and recoil , cause minimal risk of inflammation and infection should be assessed for a better and a complete suture which is help in better wound healing and wound closure

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