



Comparison of Influence of Vicryl and Silk Suture Materials on Wound Healing After Third Molar Surgery- A Review

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Abstract

Suture materials play an important role in healing, enabling reconstruction and reassembly of tissue separated by the surgical procedure or trauma. Suture materials are used daily in oral surgery, and are considered to be substances most commonly implanted in human body. Silk has been used as biomedical suture material for centuries and it provides important clinical repair options for many applications but the disadvantage is the biocompatibility problems reported for silk obtained from contamination of residual sericin (glue-like proteins). Now-a-days, Vicryl suturing material is the commonly used material in oral surgery, because it does not allow adherence of plaque and is well suited for handling. The characteristics of these two materials are discussed in this review and it also compares the influence of these materials on wound healing after third molar surgery.

Keywords-Silk suture, vicryl suture, wound healing, third molar surgery, complications, Polyglactin

INTRODUCTION

Suture materials play an important role in healing of wounds, enabling reconstruction and reassembly of tissue separated by a surgical procedure or a trauma, and at the same time facilitating and promoting healing and haemostasis [1]. Suture materials are used daily in oral surgery, and are considered to be substances most commonly implanted in human body.

Characteristics that should be present in the suturing material for an uneventful and rapid healing are:-

- ease of handling
- sterility
- good tensile strength
- uniform tensile strength
- freedom from irritants

Among these qualities, Tensile strength is an important property in determining which suture material is appropriate for specific situations. Tissue biocompatibility and ease of handling, with a focus on minimal knot slippage, also influence which thread should be selected. The clinician should select the suture material and diameter based on the thickness of the tissue to be sutured and whether there is a need for flap tension [2].

Suture materials are classified on the basis of several criteria, but mainly depending on origin, structure, and biological properties:

- By origin, sutures can be classified into natural and synthetic.
- By structure, they can be monofilament and multifilament.
- By biological properties, they can be absorbable and non-absorbable [3].

The main classification is 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)[4]

Silk has been used as biomedical suture material for centuries and it provides important clinical repair options for many applications. But the disadvantage is the biocompatibility problems reported for silk obtained from silkworm is the contamination of residual sericin (glue-like proteins). Now-a-days, Vicryl suturing material is the commonly used material in oral surgery, because it does not allow adherence of plaque and is well suited for handling.

This review article compares the Vicryl and Silk suture materials and discusses about its characteristic features, advantages and disadvantages.

VICRYL SUTURE MATERIAL

VICRYL (polyglactin 910) is a synthetic, multifilament and absorbable suturing material. Vicryl is a polyester used for absorbable sutures and surgical mesh, especially in ophthalmic surgery. 2-Hydroxy-propanoic acid polymer with polymerized hydroxyacetic acid, which forms 3,6-dimethyl-1,4-dioxane-dione polymer with 1,4-dioxane-2,5-dione copolymer of molecular weight about 80,000 daltons (Fig 1). This material is the one that is preferred in dentistry. It has been proven clinically excellent because it does not allow adherence of plaque and is well suited for handling. In addition, it shows no intensive local reaction. Vicryl rapide contributes to faster healing of wounds in humans, with the lower incidence of dehiscence and milder local reactions.

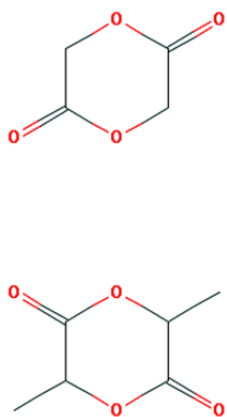


Figure 1. Chemical structure of VICRYL suture material

According to the study conducted by Duprez et al. on clinical research including surgical procedures on children's hips, breaking of suture material was registered after 12 to 16 days. Absorption mechanism includes hydrolysis. Inflammatory reaction was obvious, with abundant macrophages containing suture material fragments. It is also possible that inflammation cells release lytic enzymes, which increase spontaneous lysis and lead to fragmentation of suture material. These authors found Vicryl-rapide to be perfect, tolerant and breaking after 12 to 16 days, with moderately present reaction of macrophage [5].

Searching for an ideal suture material does not imply only on the biological compatibility, but also good clinical behavior, resistance to traction, dimensional stability, low memory effect, good knot security and good flexibility with mild capillary effect.

Gazivoda D et al; conducted a study on comparison of three suturing materials (Vicryl,catgut and Dexon). In their study it is confirmed that Vicryl rapide provokes mildest local reaction, while most severe local reaction is not caused by catgut, but by Dexon. It is also confirmed that

Vicryl rapide contributes to faster healing of wounds in humans, with the lower incidence of dehiscence and milder local reactions than with applied catgut or Dexon. Besides these manifestations, it is important that intensity of local reaction stays as mild as possible (low antigenic potential), with the least possible wound dehiscence. Occurrence of local reaction on the postoperative day 7 presented statistically significant difference when comparing catgut and Vicryl-rapide with Dexon and Vicryl rapide [6].

SILK SUTURE MATERIAL:

Silk suturing material is natural, multifilament and non absorbable suturing material. It is composed of two proteins called fibroin and Sericin (Fig 2). Fibroin is derived from the domesticated species *Bombyx mori* (B. mori) of the family Bombycidae. Fibroin is covered by protein called sericin which is a sticky material. It has a smooth flow through the tissue while maintaining the knot security. It is coated with a bees wax. Silk material has an excellent strength and handling property and it is flexible, coated with wax for smooth passage and it has no tissue reactions [7,8].

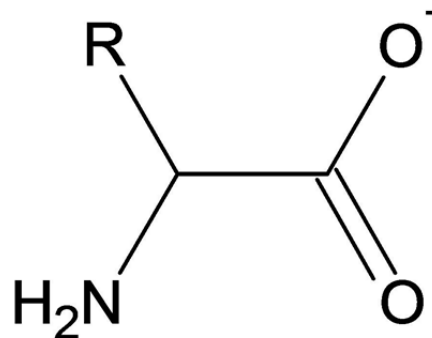


Figure 2. Chemical structure of SILK suture material

At the same time, some biological responses to the protein have raised questions about biocompatibility. Importance is that based on many studies it is clear that the sericin glue-like proteins are the major cause of adverse problems with biocompatibility and hypersensitivity to silk.

Virgin silk suture (containing sericin) induces hypersensitivity in patients, causing a Type I allergic reaction. Exposure to silk debris (e.g., broken virgin silk fibers used in bedding and fabrics) may sensitize patients to silk causing adverse allergic reactions when silk is used as a suture material. Sericin, is identified as the antigenic agent of silk [9,10].

In a study conducted by Sergi-Sala-Perez et.al on the effects of suturing materials on third molar surgery it was shown that when the silk material is used as a suture material, there was presence of bacterial growth when compared to vicryl in which bacterial growth was absent [11].

CONCLUSION

Literature review clearly suggests that the use of vicryl sutures will be beneficial than silk suturing material in terms of uneventful wound healing in third molar surgery.

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