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**Review Article**

# Absorbable sutures: chronicles and applications

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## ABSTRACT

Surgical sutures are used to bind tissues together to help in wound closure and healing after surgery or trauma. Surgical suture materials for medical purposes are available in a variety of forms, the most common of which are absorbable and non-absorbable. Absorbable sutures were traditionally exclusively utilised for approximating internal tissues. However, using absorbable sutures in percutaneous wound closure has recently gained popularity. Absorbable sutures provide many advantages, including eliminating the need for another clinic visit to remove the sutures as well as low risk of infections and minimal scarring. One of the recent advances in absorbable sutures: barb sutures, by removing knots, dispersing wound tension, and increasing closure efficiency, have changed the way doctors work on them. Suture material classes have recently been developed based on their qualities and abilities to promote tissue approximation and wound healing. Surgeons should choose an appropriate suture material for tissue approximation which enhances the healing effect and minimises scaring possibilities. To avoid ischemia, excessive wound tension, and tissue damage, it is necessary to understand their properties. Antibacterial agents have also been added to the absorbable suture materials to provide an extra layer of protection by making it more resistant to infection while still maintaining its high tensile strength and good handling. The present article attempts to describe different absorbable suture materials available along with their respective applications.

**Keywords:** Absorbable sutures, Tissue approximation, Tensile strength, Wound closure

## INTRODUCTION

Surgical sutures are imperative in management of surgical and traumatic wounds.[1,2] Ligating blood vessels and approximating tissues are two common uses of sutures.[3,4] Sutures are primarily used to oppose tissues together to assist and accelerate the recovery process after an incident or surgical operation.[2,5] In addition, sutures also aid in obliteration of dead space, even distribution of stress on the incision line, and maintenance of adequate tensile strength throughout the critical wound healing process until appropriate tissue strength is achieved. Although staples, tapes, and adhesives may be used to close wounds, sutures are the most common method of wound closure.[6] Sutures have grown tremendously over the previous two decades to become the most important group of biomaterials.[7-9] Considering availability of a wide variety of suture materials, it's important to know the differences between various sutures before making an informed decision. Suture material's overall performance is influenced by its physical qualities, handling features, and biological factors. During suturing, a high degree of pliability and elasticity is required for effective application. Furthermore, ease of knot placement, good knot security, and the absence of irritating or contagious chemicals are all highly desired characteristics.[1,10,11] It should be sterile, non-electrolytic, non-ferromagnetic, non-capillary, non-carcinogenic, non-allergenic, simple to use, quick and painless, give great cosmesis, and not serve as a source of bacterial infection. It must be resistant to shrinking, minimum tissue response, simple to sterilise without changing its properties, and cost-effective.[12-15]

However, it is also important to note, there is not a single suture material which can fulfil all these properties. Each form of suture has a unique set of characteristics that must be taken into consideration before usage. Since previous few years, an increase has been observed in creation of suture material classes on the basis of their qualities and abilities to promote tissue approximation and wound healing.

Suture support for different tissues varies widely, with some tissues requiring support for only a few days, while others may require support for weeks or even months. A short-term need for suture support may be met with the use of absorbable sutures. It eliminates the need for stitch removal and the associated discomfort, while also providing maximum tensile strength during the early healing stages. This review is aimed to present an overview of the available absorbable sutures, classification, their distinguishing characteristics, the suture material properties, benefits, and applications.

## HISTORICAL PERSPECTIVE

Suture materials have been used or proposed for millennia. Plant-based (cotton, flax, and hemp) and animal-based sutures were used (tendons, hair, muscle strips and nerves, arteries, catgut, and silk) to start with.

Surgical suture use was first recorded in ancient Egypt about 3000BC, and the earliest documented suture use was discovered in a mummy around 1100BC. A thorough detail about the suture materials used on different types of wounds was written by Sushruta, an Indian sage and physician, in 500BC.[16] Suture procedures were described by Hippocrates, the Greek father of medicine, as well as by Roman Aulus Cornelius Celsus later. Galen, a Roman physician from the second century, presented the mechanism of gut sutures.[17]

By 10$^{th}$ century, Abulcasis devised the catgut suture and the surgical needle.[18,19] The collection of sheep intestines was necessary to make the catgut suture, which was created in the same manner as strings for guitars, violins, and tennis racquets.

Sterilization of all suture threads was advocated by Joseph Lister. He started sterilization in 1860s with "carbolic catgut" as the first product which was sterilized and after two decades, he sterilized chromic catgut. It was Lord Moynihan who found "chromic" catgut to be ideal because of the properties like non-irritant, twice tensile strength of cat gut and it could be sterilized. Finally, in the year 1906, he developed first sterile catgut with iodine treatment.[20]

The next significant development occurred in the 20$^{th}$ century. The chemical industry started manufacturing first-ever synthetic thread in early 1930s, making several non-absorbable and absorbable type of suture threads. It was in 1931, the first absorbable synthetic suture was designed using polyvinyl alcohol. Polyesters were invented in the 1950s, and radiation sterilisation for catgut and later polyester was established. Polyglycolic acid was first identified in the 1960s and started to be utilised in the 1970s for its intended purpose. Today, synthetic polymer strands make up the bulk of modern sutures. There are just a few materials that have been used since antiquity: silk and gut sutures. Gut sutures are restricted in Japan and European countries owing to the problem with bovine spongiform encephalopathy. However, it's still a common practise to use silk suture to close wounds.[20]

## PROPERTIES OF SUTURE MATERIAL

With the development of newer sutures/suture material in the current scenario, the distinct properties of each one should be familiarized so that the most suited product is best utilized. Based on the following variables, the physical characteristics may be investigated widely:

***Tensile strength:*** The USP (United States pharmacopeia) defines tensile strength as the weight required for breaking a suture divided by the cross-sectional area.[21]

***Tissue absorption:*** Capacity of our body to dissolve a suture over time is referred to as absorption.[22]

***Cross-sectional diameter:*** It is best to pick a suture diameter that is small enough to accommodate for the natural tissue strength and the expected force on a suture line.

***Coefficient of friction:*** It describes how readily a suture travels through tissue.[22]

***Knot strength and knot security:*** It describes a suture's capacity to be tied firmly with the fewest possible throws per knot. The strength required to induce a knot to break or slip is used to calculate knot strength.[21]

***Elasticity:*** It is stretch capacity of the material in response to wound oedema and then returning back to the original length after the oedema reduces.[22]

***Plasticity:*** Elasticity and plasticity are inextricably linked. Suture capacity of stretching with wound oedema yet stay deformed permanently once the oedema diminishes is known as plasticity.[21,22]

***Memory:*** Suture's capacity to return to the initial packed state after being removed from packaging and stretched.

***Handling:*** Suture's handling quality or flexibility is influenced by its memory, elasticity, and plasticity. The coefficient of friction and pliability also affect handling. The capacity of the suture to be bent is called the pliability.

***Tissue reactivity:*** Inflammation is a common response to foreign elements, which may impede wound healing and increase the likelihood of infection.

***Configuration:*** Sutures may be mono-filament (one strand) or multi-stranded (many strands) (multi-filament).[13]

***Capillarity:*** The capacity of sutures to disperse fluids over their whole length. It is crucial when bacteria are present.

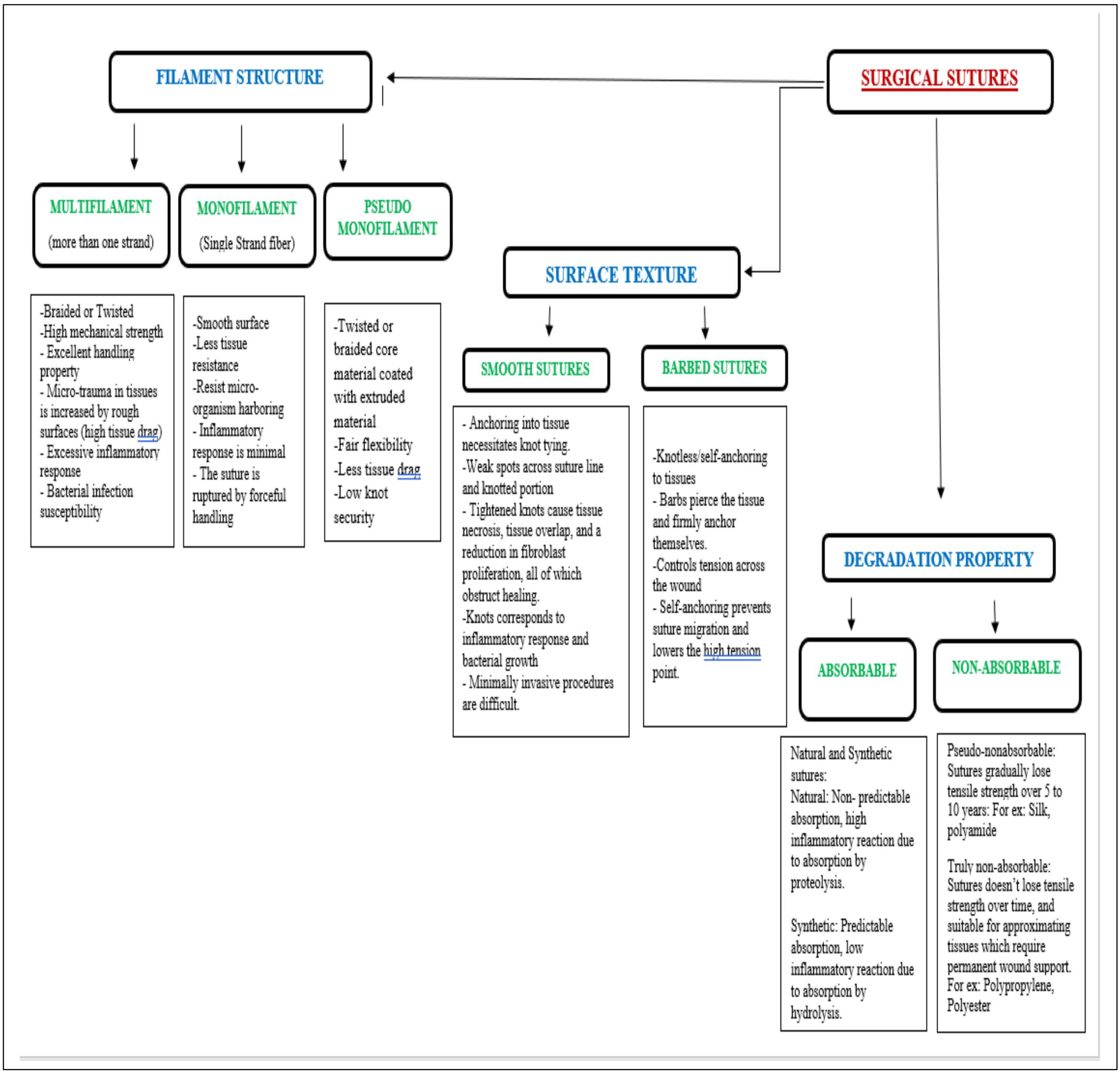


**Figure 1: Overview of types of sutures based on physical and structural characteristics of suture materials.[2,24-49]**

***Fluid absorption:*** While capillarity varies from fluid absorption, both may raise the risk of bacterial transmission and contamination despite their differences.

***Antimicrobial properties:*** A reduction in bacterial adhesion to the suture may be achieved by including antimicrobial properties within the suture or by adding an external coating.

***Ease of removal and colour:*** Sutures may be coloured or left un-dyed. Sutures that have been dyed are simpler to use as well as to remove since the dye makes them more noticeable. Undyed sutures may be less visible and may be used if removal is not required.[15,23]

Other important property it should be non-carcinogenic.

## SUTURES: STRUCTURAL AND PHYSICAL CHARACTERISTICS

Surgical sutures can be classified in various ways basis the filament structure, surface texture of the materials and degrading property (Summarized schematically in Figure 1).

### *Absorbable sutures*

These sutures disintegrate and degrade after implantation, either due to enzyme degradation and subsequent hydrolysis or just hydrolysis by itself. Generally absorbable sutures are used for deep tissue temporary closure till the critical wound healing period or in tissues where they are difficult to remove. They may cause additional inflammation, which may result in further scarring, if applied on the surface. It is recommended that a rapid-absorbing suture be used if absorbable sutures are to be used superficially. However, newer, absorbable sutures may last for extended periods of time, and this is something to keep in mind. Enzymatic degradation is used to absorb natural materials, but non-enzymatic hydrolysis is used to absorb newer synthetic absorbable sutures.[50-52] The absorbable suture is further categorised into four types. They are- Natural absorbable sutures, synthetic absorbable sutures, antibacterial synthetic absorbable sutures and barbed (Knotless synthetic absorbable) sutures.

#### *Natural absorbable sutures*

The submucosa of sheep intestines or serosal layer of bovine intestines are used to prepare strands of purified connective tissue. These strands are twisted to form the catgut suture material. Surgeons used to prefer catgut earlier, but due to its low tensile strength, unpredictable absorption, and greater tissue reactivity compared to synthetic suture materials, their use has been significantly reduced.

#### *Synthetic absorbable sutures*

Nowadays, the majority of absorbable sutures are synthetic and are made from a variety of absorbable polymers. The duration of time needed for them to be absorbed ranges between-

*Short term (around 50 days):* Used in episiotomy or in fast–healing tissues (skin mucosa) e.g.: Polyglactin 910 fast, polyglycolic acid fast.

*Mid-term (around 60 to 90 days):* Used in soft tissue approximation-orthopaedics, general surgery, ophthalmology, plastic, gynaecology, urology, maxillofacial, and neurology. e.g.: Polyglactin 910, polyglycolic acid, poliglecaprone-25.

*Long term (approx.180 to 390 days):* Used in vascular surgery, abdominal wall closure and orthopaedics. e.g.: Polydioxanone polyester p-dioxanone, poly 4-hydroxybutyrate.

#### *Antibacterial synthetic absorbable sutures*

The most common postoperative complication is a localized SSI ("Surgical site infection"). In the reconstructive processes or when using implant devices, infections induced by bacterial adherence and growth on device or implant surface is a serious challenge. The absorbable suture materials are coated with antibacterial agents like triclosan or chlorhexidine to reduce the adhesion of bacteria to the suture material and thereby reduce the incidence of SSI.[53,54] Antibacterial sutures can successfully enhance wound recovery and protect against wound infections.[55-57]

#### *Barbed/ knotless synthetic absorbable sutures*

A synthetic absorbable suture with barbs on its surface is known as a barbed suture/knotless surgical suture. Barbs embedded in tissue serve as a means of securing a suture without the need for knots during suturing. This is an alternative to conventional sutures by providing an option that does not need the surgeon to tie any knots. Barbed sutures have expanded their use in difficult reconstructive surgical operations and minimally invasive procedures.[58,59] When employing barbed sutures in surgical operations, there has been an increase in both soft tissue management and cosmetic appeal.[60,61] The barbed suture has been successfully used in a range of specialties in recent years, including cosmetic and general surgery, gynaecology and obstetrics, urology, orthopaedics, and other procedures, particularly during minimally invasive surgeries.[62-65]

#### *Applications and characteristics of absorbable suture materials*

Based on the surgeon preference, anatomic area, and specific suture properties, the following types of absorbable sutures are used.[51] The broad classification of the absorbable sutures (Table 1).[13,15,52,67-71,74-80]

## SELECTION OF APPROPRIATE SUTURE MATERIAL

The surgeon makes a decision on appropriate suture material for a certain application based on various conditions: i) As tissue thickness, flexibility, healing speed, and scarring proclivity vary among different body tissues and also with age and health status, a suture material should be chosen according to the patient's age, weight, health status, and incision location. ii) Concurrent conditions like dermatitis, heart disease, diabetes, and usage of drugs like steroids might impact wound healing. The presence of infection and specific characteristics of wound might affect suture material choice. iii) Number of tissue layers in closing a wound, tension in wound, depth of tissue which needs to be sutured, oedema presence, timing of suture removal, inflammatory reactions and adequate strength, have a crucial role in selecting material for suturing in wound management.[14] iv) Surgeons should choose a material with a higher ratio of strength-to-diameter, constant diameter, sterility, pliability, good tissue acceptance, and predictability of function.[15]

**Table 1: Applications and characteristics of absorbable suture materials.**

| Suture type | Strand | Raw material | Properties | Use | Disadvantages | Suture re-commendations for various tissue types |
|---|---|---|---|---|---|---|
| **Natural absorbable sutures** | | | | | | |
| Surgical gut-plain [Catgut plain] (Surgical gut, Trugut) | Mono-filament | Serosa of bovine intestine, or ovine intestinal submucosa | It gets absorbed quickly by proteases. The strength is retained up to seven days and is absorbed fully after 14 days. | Used rarely due to rapid un-predictable absorption. | The rate of absorption will be increased in infected tissues. It invokes moderate inflammatory reaction. It should be avoided in CVS and neurological tissues. | Soft tissue approximation, Plastic and ophthalmic procedures. |
| Surgical gut - Chromic [Catgut chromic] (Surgical gut chromic, Trugut chromic) | Mono-filament | Similar to the plain catgut but treated using chromium salts to decrease reactivity and improve strength. | Slowly absorbed compared to plain catgut, and tensile strength is retained for 14 days and completely absorbed by 60-70 days. | Better handling aspects. Used rapid healing tissue. Used where fibrous tissue and inflammatory reactions are required. | The rate of absorption will be increased in infected tissues. It invokes moderate inflammatory reaction. It should be avoided in CVS and neurological tissues. | Soft tissue approximation, ligation, plastic and ophthalmic procedures. |
| **Synthetic absorbable sutures** | | | | | | |
| Polyglycolic acid (Dexon, dexon II, safil, truglyde) | Braided Multi-filament | Synthetic homopolymer of 100% glycolic acid. These sutures are usually coated with a poly caprolactone and calcium stearate for added lubrication, smooth passage through tissue and easy knotting. | Retains approximately 82% of strength at 14 days, 56 % at 21 days and 20% at 28 days. Absorption completes at 90-120 days. | Easy for handling than the gut, low reaction with the tissues, high strength and could be used for infected wounds. | Breakdown enhanced in urine and oral cavity. Avoid polyglycolic acid usage in the urinary tract (bladder) as it rapidly dissolves in urine and can also cause calculi. It must not be used when extended tissue approx. required. It should not be used in neurological and CVS tissues. | Muscle, subcutaneous tissue, dermal tissue, abdominal tissue, thoracic surgery, ligation, soft tissue approximation, C section, intestinal anastomosis, plastic and ophthalmic procedures. |
| Polyglactin 910 (Trusynth, vicryl) | Braided Multi-filament | Co-polymer of 90% glycolic acid and 10% lactic acid. These sutures are usually coated with a polyglactin 370 co-polymer and calcium or added lubrication, easy knot tie- | Holds approximately 75% of strength at 14 days, 49% of strength in 21 days and retains 27% at 28 days. Absorption completes at 60-70 days. | Similar properties to polyglycolic acid. Easy for handling than the gut, less reaction with tissue, high strength and is used on infected | Breakdown enhanced in oral cavities. Avoid polyglactin 910 usage in the urinary tract (bladder) as it rapidly dissolves in urine and can also cause calculi. It must not be | Muscle, subcutaneous tissue, dermal tissue, abdominal tissue, thoracic surgery, ligation, soft tissue appro ximstearate fation, |

Continued.

| Suture type | Strand | Raw material | Properties | Use | Disadvantages | Suture re-commendations for various tissue types |
|---|---|---|---|---|---|---|
| | | down, and smooth passage through tissue. | | wounds. | used were extended tissue approximation is required. It should not be used in neurological and CVS tissues. | C section, intestinal anastomosis, plastic and ophthalmic procedures. |
| Polyglycolic acid fast absorbable (Safil quick, truglyde fast) | Braided multi-filament | Synthetic homopolymer of 100% glycolic acid with a lower molecular weight These sutures are coated usually with a mixture of polycaprolactone and calcium stearate for added lubrication, smooth passage through tissue and easy knot tie-down. | Retains 40-45% of strength in 7 days; 100% of the strength is lost in 14-21 days. Absorption completes at 42-63 days | Designed to act like gut, but with min inflammatory reaction. Used wound support is required for short term and where it is beneficial to rapidly absorbing sutures. It is useful in episiotomies, paediatric surgery, circumcision, closing oral mucosa and ophthalmic surgery. | Should not be used where extended approximation of tissue under stress is required or where wound support beyond 7 days is required. Should not be used for ligation, cardiovascular and neurological tissues. | Soft tissue approximation, Skin, oral mucosa, conjunctival suturing, paediatric surgery, episiotomies, circumcision. |
| Polyglactin 910 fast absorbable (Trusynth fast, vicryl rapide) | Braided multi-filament | Polyglactin-910 material with a lower molecular weight These sutures are coated usually with calcium stearate and polyglactin 370 co-polymer mixture for lubrication, easy knot tie down and smooth passage through tissue. | Retains 40-45% of strength in 7 days; 100% of the original strength will be lost between 14 to 21 days. Absorption completes at 28-45 days | Designed to act like gut, but with min inflammatory reaction. Used wound support is required for short term and where beneficial to rapidly absorbing sutures. Useful in paediatric surgery, episiotomies, circumcision, closure of oral mucosa ophthalmic surgery. | Should not be used where extended approximation of tissue under stress is required or where wound support beyond 7 days is required. Should not be used for ligation, cardiovascular and neurological tissues. | Soft tissue approximation, skin, oral mucosa, conjunctival suturing, paediatric surgery, episiotomies, circumcision. |
| Poliglecapron e 25 (Monocryl, monoglyde) | Monofilament | Co-polymer of epsilon-caprolactone and glycolide uncoated. | Retains 68-79% strength at 7 days and 39-41% strength at 14 days. Absorption completes in 90 days | Easy for handling, min tissue reactivity and good knot security. General soft tissue approx. and/or ligation | It should not be used in areas which require high tensile strength and areas with prolonged healing. For example, Fascia It should not be used for CVS and neurological tissues. | Skin closure, subcutaneous, parenchymal organs, hollow viscus, soft tissue approximation, subdermal, intestinal surgery, ligat ion. |

Continued.

| Suture type | Strand | Raw material | Properties | Use | Disadvantages | Suture re-commendations for various tissue types |
|---|---|---|---|---|---|---|
| Polydioxanone (PD Synth, PDS II) | Monofilament | A polymer of polyester poly (p-dioxanone uncoated. | Retains 74-79% tensile strength at 14 days, 65-70% of strength at 28 days and 50-60% at 42 days. Absorption completes at 180-220 days | Used when tissue approximation for an extended time is required. Used for infected tissues. Used in Paediatric cardiovascular tissues. | Poor handling aspects and poor knot security because of memory and stiffness. It should not be used for approximating tissues which require more than six weeks of tensile strength retention, or where prolonged tissue approximations are required under stress or with a combination of prosthetic devices (synthetic grafts or heart valves). Should not be used in adult cardiovascular tissue, ophthalmic surgery, microsurgery and neural tissue. | Rectus sheath closure, abdominal closure, soft tissue approximation, paediatric cardiovascular tissues, ligation. |
| Polyglycolide-trimethylene carbonate (Maxon) | Monofilament | Polyglyconate copolymer of glycolic acid and trimethylene carbonate Uncoated. | Helps in retaining 75% tensile strength at two weeks and 25% at 6 weeks' post-implantation. Absorption completes at 180 days. | Used in Paediatric cardiovascular tissues. | Not suggested for use in adult cardiovascular tissue, ophthalmic surgery, microsurgery and neural tissue. Not used where extended tissue approximation is needed or in fixing permanent synthetic grafts or CVS prostheses | Soft tissue approximation, ligation, paediatric cardiovascular tissue. |
| Polyglytone 6211 (Caprosyn) | Monofilament | Composite of caprolactone, glycolide, lactide, and trimethylene carbonate Uncoated. | Helps in retaining 50-60% tensile strength after five days and loss of all original strength within 3 weeks. Absorption completes at 56 days | Higher tensile strength, better knot security and handling than the gut and higher infection resistance. | It should not be used in areas which require high tensile strength combined with prolonged healing. It should not be used in CVS, neurological, microsurgery and ophthalmic surgery. | Subcutaneous tissue, Subdermal tissue, Intestinal surgery, soft tissue approximati on. |
| Glycomer 631 (Biosyn) | Monofilament | Synthetic polyester is made of trimethylene carbonate, dioxanone and glycolide. | Retains 75% of its strength by 14 days and by 21 days up to 40%. Absorption | It has minimal tissue reactivity and is easier to handle. It can be used for suturing | Should not be used where extended approximation of tissue is needed. Not to be used in | Abdominal closure, muscle, parenchymal organs, hollow viscus, |

Continued.

| Suture type | Strand | Raw material | Properties | Use | Disadvantages | Suture re-commendations for various tissue types |
|---|---|---|---|---|---|---|
| | | Uncoated. | completes at 90-110 days. | tissues which require more tissue holding strength. | neurological or cardiovascular surgeries. | ligation, ophthalmic surgery, soft tissue approximation, subcutaneous tissue. |
| Poly 4-hydroxy-butyrate (MonoMax) | Monofilament | Polymers of 4-hydroxybutyric acid made by the transgenic process of fermentation. Uncoated. | Retains half of the initial tensile strength after 90 days. Absorption completes at 180-390 days. | General soft tissue approx., especially when the absorbable monofilament suture with extended support to wound for the 15 weeks is indicated. | A longer time of retention might result in higher infection risk. Contra-indicated for tissues requiring permanent wound support, approximation of tissues under tension, or the suturing of synthetic implants like vascular grafts and cardiac valves. | Abdominal wall closure, soft tissue approximation, ligation. |
| **Antibacterial synthetic absorbable sutures** | | | | | | |
| Triclosan coated polyglactin 910 (Vicryl plus, Trusynth plus neo) | Mono-filament | Copolymer of 90% glycolic and 10% lactic acid. In addition to coating with a mixture of polyglactin 370 co-polymer and calcium stearate, they are also coated with triclosan. | Similar tensile strength retention and absorption as polyglactin-910 suture Possess anti-microbial property. | Reduces suture colonization and wound infection. Similar usage as polyglactin-910 suture. More preferred in approx. tissues with a propensity to get infected. | Similar disadvantages as polyglactin-910 suture, with additional chances of allergy to triclosan. | Muscle, subcutaneous tissue, dermal tissue, abdominal tissue, thoracic surgery, ligation, soft tissue approximation, C section, intestinal anastomosis, plastic and ophthalmic procedures. |
| Triclosan coated poliglecaprone 25 (Monocryl plus) | Mono-filament | Co-polymer of epsilon-caprolactone and glycolide. triclosan coating. | Similar absorption and retention of tensile strength as the poliglecaprone-25 suture. Possess anti-microbial property. | Reduces suture colonization and wound infection. Similar usage as poligle-caprone 25 suture. More preferred in approx. tissues with a propensity to get infected. | Similar disadvantages as poliglecaprone 25 suture, with additional chances of allergy to triclosan. | Skin closure, subcutaneous tissue, parenchymal organs, hollow viscus, soft tissue approximation, subdermal, intestinal surgery, ligation. |
| Triclosan coated polydioxanone (PDS plus) | Mono-filament | The polymer of polyester poly (p-dioxanone. Coated with triclosan. | Similar tensile strength retention and absorption as polydioxanone suture. Possess anti-microbial property. | Reduces suture colonization and wound infection. Similar usage as poly-dioxanone suture. More preferred in | Similar disadvantages as polydioxanone suture, with additional chances of allergy to triclosan. | Rectus sheath closure, abdominal closure, soft tissue approximation, pediatric cardiovascular tissues, |

Continued.

| Suture type | Strand | Raw material | Properties | Use | Disadvantages | Suture re-commendations for various tissue types |
|---|---|---|---|---|---|---|
| | | | | approximation tissues with a propensity to get infected. | | ligation. |
| **Barbed (Knotless synthetic absorbable) sutures** | | | | | | |
| Barbed poliglecaprone 25 (Stratafix PGA-PCL) | Bi-directional barbed mono-filament with needles at both ends, unidirectional barbed mono-filament with a loop/stopper on 1 end, needle on another. | Co-polymer of epsilon-caprolactone and glycolide | Similar tensile strength retention and absorption as poliglecaprone-25 suture | Knotless and uniformly distributes tension on the suture line, which cosmetically produces good results. | Not used where prolonged tissue approximation (more than 2 weeks) under stress is needed or to fix permanent CVS prostheses or synthetic grafts. | Subcuticular closure, soft tissue approximation, Minimally invasive surgeries. |
| Barbed polydioxanone (Stratafix PDO, trubarb PDO) | Bidirectional barbed monofilament with needles at both ends and unidirectional barbed mono-filament with a loop/stopper on one end and needle on another. | The polymer of polyester poly (p-dioxanone | Similar tensile strength retention and absorption as polydioxanone suture. | Knotless and uniformly distributes tension on the suture line, which cosmetically produces good results. | Not used where prolonged tissue approx. (>6 weeks) under stress is needed (e.g., fascia). Not used in conjuncture with/ for fixation of prosthetic devices (e.g., Synthetic grafts/heart valves). Not used in CVS, neurological, micro-surgery, ophthalmic surgery. | Internal tissues, subcuticular closure, where absorbable and long-lasting suturing is preferred. Soft tissue approximation, minimally invasive surgeries. |

## BENEFITS AND DRAWBACKS OF ABSORBABLE SUTURE

### *Benefits of absorbable suture*

Benefits of the absorbable suture were as follows that using absorbable sutures is beneficial in case where suture support is needed only for a brief period or if suture removal is difficult or uncomfortable owing to its anatomical position, prompt re-epithelization, maximum tensile strength during early healing stages, minimal foreign body reaction, minimal scar development with fast absorbable sutures, minimizes infection with mono-filament synthetic absorbable sutures and anti-bacterial coated sutures, procedure is speedier and less operator-dependent in case of knotless sutures, faster and more effective wound repair and postoperative problems, better cosmetic outcomes with no crosshatch traces across suture line, prevents the need for stitch removal and its associated discomfort.[15,81]

### *Drawbacks of absorbable sutures*

Drawbacks of absorbable sutures were as follows that sutures may act as a foreign particle in our body for a transient time and may trigger antigen-antibody reaction locally in some cases. an added disadvantage is that it can potentiate an existing infection. Wound dehiscence can be considered as another major disadvantage. it can occur when absorbable sutures used for approximating areas that could expand, stretch or undergo distention. When used in tissues with a poor blood supply (for example, an epithelial tissue), the absorption may be delayed leading to suture extrusion and severe inflammation locally. when absorbable suture is placed superficially, they might persist for a prolonged period and be trans-epidermally eliminated from a wound. It could have an effect on scar after healing. Absorbable sutures must not be placed near the surface of the skin. This reduces the absorption and increases the probability of suture tunnel epithelization. This epithelization could result in cysts formation and permanent suture tracts.[82]

## CONCLUSION

Absorbable sutures are an important medical invention in managing wounds, and the recent developments have increased their efficacy and applicability. There has been a constant increase in the creation of suture material classes as per their qualities and abilities to promote tissue approximation and wound healing. With technological innovation in material science, many different types of absorbable sutures have been designed over the past few decades, with advantages of different rates of tensile strength retention, absorption rates, anti-bacterial coating and the newest variant of the knotless suture. The increase in the availability of various absorbable sutures empowers today’s surgeons to choose the right absorbable suture for approximating/ligating almost any tissue in the body except for tissues requiring permanent support. To enhance wound healing and scar aesthetics, surgeons should choose best suture for tissue approximation. Thereby, understanding their properties is critical for minimizing tissue harm, excess wound tension, and ischemia. Appropriate choice of suture for a certain procedure is a crucial factor for procedure to be successful. This review focuses on different physical and mechanical properties of absorbable sutures, enabling surgeon to make evidence-based decisions for choosing right absorbable suture material for various body tissues.

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