

Nurses Responsibility in Handling & Identifying Suture Materials

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Abstract

Suture material is an artificial fiber used to keep wound together. Sutures are generally classified into four main categories absorbable or non-absorbable, monofilament or multifilament. The size of suture material is measured by its width or diameter and is vital to proper wound closure. Suture removal timings vary from 3 days to 21 days.

Keywords: Suture; Absorbable; Non-Absorbable; Monofilament; Multifilament and Suture Size.

Introduction

Sutures are tiny threads, wire, or other material used to sew body tissue and skin together. They may be placed deep in the tissue and/or superficially to close a wound. A variety of suture techniques are used to close a wound, and deciding on a specific technique depends on the location of the wound, thickness of the skin, degree of tensions, and desired cosmetic effect (Perry et al., 2014).

Definition

Suture material is an artificial fiber used to keep wound together until they hold sufficiently well by themselves by natural fiber (collagen) which is synthesized and woven into a stronger scar

- Suture is a Stitch/Series of Stitches made to secure apposition of the edges of a Surgical/Traumatic wound (Wilkins)
- Any Strand of Material utilized to ligate blood vessels or approximate Tissues (Silverstein L.H 1999).

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Origin of Material

Suture material is also classified by the origin of material from which it is made

- *Natural* - made from fibers found in nature for example; silk, cotton and catgut
- *Synthetic Material* - is other suture produced with manufactured products for example; nylon, polyglactin 910. Synthetic: Materials are usually chemical polymers and their absorption characteristics are generally more predictable.
- *Metallic Suture* - is limited to surgical stainless steel suture which includes; wire

Purposes of Suture

1. Approximating tissues
2. Ligating blood vessels
3. Transfixing

Selection of Suture Material

A variety of suture materials and suture/needle combinations is available. The choice of suture for a particular procedure is based on the known physical and biologic characteristics of the suture material and the healing properties of the sutured tissues.





Principles of Suture Selection





The selection of suture material by a surgeon must be based on a sound knowledge of

- Healing characteristics of the tissues which are to be approximated,

- The physical and biological properties of the suture materials,
- The condition of the wound to be closed and The probable post-operative course of the patient

Surgical Sutures

Surgical sutures diagram					
Suture material		Polyglycolic acid	Catgut Chromic	Catgut Plain	Polypropylene Monofilament
Suture technology		Synthetic			
Suture color		Violet	Brown or green	Milk-white	Blue
Suture code		PGA	CC	CP	PP

Surgical sutures diagram					
Suture material		Polyester	Silk	Nylon	Stainless steel wire
Suture technology		Braided	Braided	Monofilament	Monofilament
Suture color		White or green	Black or blue	Black or blue	Silvered
Suture code		PB	SK	NL	SW

Suture diameter	USP	11/0	10/0	9/0	8/0	7/0	6/0
	Metric	0.2(0.10)	0.3(0.2)	0.4(0.3)	0.5(0.4)	0.7(0.5)	1(0.7)

Suture diameter	USP	5/0	4/0	3/0	2/0	1/0	1	2	3
	Metric	1.5(1)	2(1.5)	3(2)	3.5(3)	4(3.5)	5(4)	6(5)	7(6)

Thread length (cm) 45, 60, 75, 90, 100, 125, 150

Classification

Sutures are generally classified into four main categories absorbable or non-absorbable, monofilament or multifilament.

A. Natural and synthetic

- *Natural* - silk and catgut
- *Synthetic* - polyglactin 910, polyglycolic acid, polydioxanone, polypropylene, polyester polyamide, linen
- *Absorbable suture* materials provide temporary wound support, while the wound is still healing, and are then absorbed once the wound has sufficient strength to withstand normal stresses.

Advantages - broken down by body and no foreign body left

Disadvantages - time of the wound support catgut polyglactin 91 polyglycolic acid, polydioxanone

- *Non-Absorbable* - generally intended for wound closure, where suture removal is later performed, or when extensive wound support is required.

Advantages - permanent wound support

Disadvantages -foreign body left, suture sinus and sinus extrusion Ex.silk, nylon, polypropylene, polyester, polyamide, linen

- *Monofilament* - Suture materials are a single strand. This structure allows the suture material to pass through the tissues with less resistance and is less resistant to harbouring bacteria.
- *Advantages* - smooth surface, low friction, less drag, less tissue trauma, less tissue infection ,no capillarity .

- *Disadvantage* - handling and knotting and stretch ability and bending –pliability. Ex.polyglactin 910, catgut, gluconate, polydioxanone, polypropylene, polyamide.
- *Multifilament* – Suture material is comprised of several filaments, which are twisted or braided

together. These materials are less stiff to handle, but have higher coefficient of friction. Multi filament generally has higher tensile strength, flexibility, and more pliable with better handling and knot security. However, multifilament materials have increased capillarity, which results

Absorbable Suture	Polyglactin 910 (Synthetic)	Polyglycolic Acid (Synthetic)	Polyglycolic Acid coated with magnisum state (Synthetic)	Natural Gut	Glyconate (Uncoated)
Brand Name	Vicryl	Safil @Violet	Safil @ Quick	Catgut (plain and chromic)	Monosym
Structure	Braided and monofilament	Braided	Braided	Monofilament	Monofilament
Color	Violet or undyed	Violet or undyed	Green or undyed	Natural brown	Violet or undyed
Tensile Strength	65% after 14 days 40% at 21 days 10% at 35 days	50% after 18 days	50% after 7 days	50% after 6 days	50% after 14 days
Absorption Reearction	Hydrolysis and low inflammatory tissue response	Hydrolysis and low inflammatory tissue response	Hydrolysis and low inflammatory tissue response	Proteolysis & high inflammatory tissue response	Complete mass Absorption 60 to 90 days
Application	Gastro intestinal O&G, Ophthalmic, Orthopedics, urology surgeries, skin closure (intra/subcutaneous)	Gastro intestinal O&G, Ophthalmic, Orthopedics, urology surgeries, skin closure (intra/subcutaneous), neurosurgery and ligature	O&G (episiotomy), ophthalmic (Conjunctival suturing), oral mucosa, paediatrics, skin closure (intra/subcutaneous), neurosurgery and ligature	O&G, Ophthalmic, Orthopedics,	Gastrointestinal, O&G, urology, plastic and reconstructive surgeries, skin closure (intra/subcutaneous) and ligature
Non - Absorbable Suture					
Non-Absorbable Suture	Polypropylent (uncoated) Sysnthetic	Polyester (Coated with silicone) Synsthetic	Polyamide(uncoated) Synthetic	Silk (Natural silk filaments coated with wax and silicne / uncoated) Synthetic	Stainless Steel alloy (Uncoated) Synthetic
Brand Name	Premilene	PremiCron	Dafilon	Silkam(coated) Virgin Silk (Uncoated)	Steelex
Structure	Monofilament	braided	Monofilament	Monofilament	Monofilament
Color	Blur	Green or white	Blue, black or undyed	Silkam- Black Virgin Silk - Blue	Metallic
Tensile Strength	-permanent	permanent	permanent	permanent	permanent
Absorption Reearction	Non-absobable	Non-absobable	Non-absobable	Non-absobable	Non-absobable
Application	Vascular, Cardiac, Plastic and reconstructive, skin closure, neurosurgery, microsurgery, gastrointestinal surgeries.	Cardiac and orthopaedics	Plastic and reconstructive, skin closure, neurosurgery, microsurgery and ophthalmic surgeries	General skin closure, oral surgeries, neurosurgeries and ligature	Orthopaedic Surgeries

in the suture material absorbing fluid and may result in wicking of bacteria through the tissues.

Advantages—better strength, soft and pliable and good handling

Disadvantages—capillary action, tissue trauma, tissue drag, tissue cutting, and harboring bacteria
Ex. polyglactin 910, polyglycolic acid, polyester, silk.

Different Sizes of Suture Materials

Suture Size

The size of suture material is measured by its width or diameter and is vital to proper wound closure. As a guide the following are specific areas of their usage:

- Size 0: largest suture
- Size 1-0 and 2-0: Used for high stress areas requiring strong retention, i.e. – deep fascia repair
- Size 3-0: Used in areas requiring good retention, i.e. – scalp, torso, and hand chest, abdomen, back
- Size 4-0: Used in areas requiring minimal retention, i.e. – extremities. Is the most common size utilized for superficial wound closure.
- Size 5-0: Used for areas involving the face, nose, ears, eyebrows, and eyelids.
- Size 6-0: Used on areas requiring little or no retention. Primarily used for cosmetic effect nose, lip, face and penis
- Size 7-0: smallest suture, skin eyelid, lip and face.

Suture Removal Timing

1. Scalp-6-8 days
2. Face, lip, eyelids, eyebrows, & nose-3-5 days
3. Ear-10-14 days .

Reading the Suture Label



4. Chest and abdomen -8-10 days.
5. Back -12-14 days .
6. Extremities -12-14 days
7. Hand -10-14 days .
8. Foot and sole -12-14 days .
9. Penis -8-10 days .
10. Condition delaying wound healing -14-21 days

References

1. Bosker, G., et al. "Laceration repair." Textbook of Adult and Pediatric Emergency Medicine. American Health Consultant, 2000.
2. Doud Galli, Suzanne K., et al. "Wound Closure Technique." 9 May 2011. <<http://emedicine.medscape.com/article/1836438-overview>>.
3. Wedro, Benjamin, and Melissa Conrad Stöppler. "Stitches (Sutures, Wound Closures)." MedicineNet. 16 Apr. 2009. <<http://www.medicinenet.com/stitches/article.htm>>.