***Suturing***

***By***

***Dr.*** ***Abdelrahman*** ***Mohammad*** ***Galal*** ***General*** ***surgery*** ***department***

**Suture** **Classification** **and** **Selection** **(Import)**

**t** **r** **l** **ifi** **ti**

**l** **ti**

**(I** **rt)**

**Classification of Sutures**

**l** **ssific** **ti** **f** **t** **r** **s**

|  |  |
| --- | --- |
| Monofilament | Multifilament |
| Synthetic | Biological |
| Absorbable | Non - Absorbable |

**The** **Ideal** **Suture** **(Import)**

**(I** **rt)**

• Minimal tissue reaction

• Smoothness - minimum tissue drag • Low Capillarity

• Max tensile strength

• Ease of handling - Minimum memory • Knot security

• Cost effectiveness

**Sutures**

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|  |  |  |
| --- | --- | --- |
| •**ABSORBABLE** | | |
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|  |  | |
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•**BIOLOGICAL** •**SYNTHETIC** •**BIOLOGICAL** •**SYNTHETIC**

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| --- | --- | --- | --- |
| •**NON-ABSORBABLE** | | |  |
|  | |  | |
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•**VICRYL\*** ***rapide*** **Suture** •**MERSILK\*** **Suture**

•**MONOCRYL\* Suture**

•

**\*** **t** **r**

•**Coated** **VICRYL\*** **Suture**

•

**t** **I** **\*** **t** **r**

•**MERSILENE\* Suture** •**ETHIBOND\*** **Suture**

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**I** **\*** **t** **r**

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**I** **\*** **t** **r**

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•**PROLENE\* Suture**

**\*** **t** **r**

•**Coated** **VICRYL\*** ***Plus*** **Suture**

•

**t** **I** **\*** ***l*** **t** **r**

•**PDS\*II Suture**

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**\*II** **t** **r**

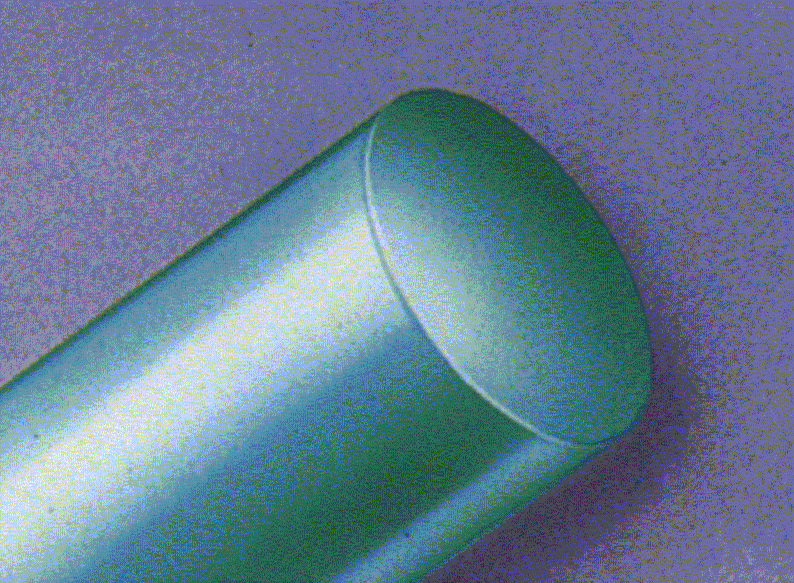
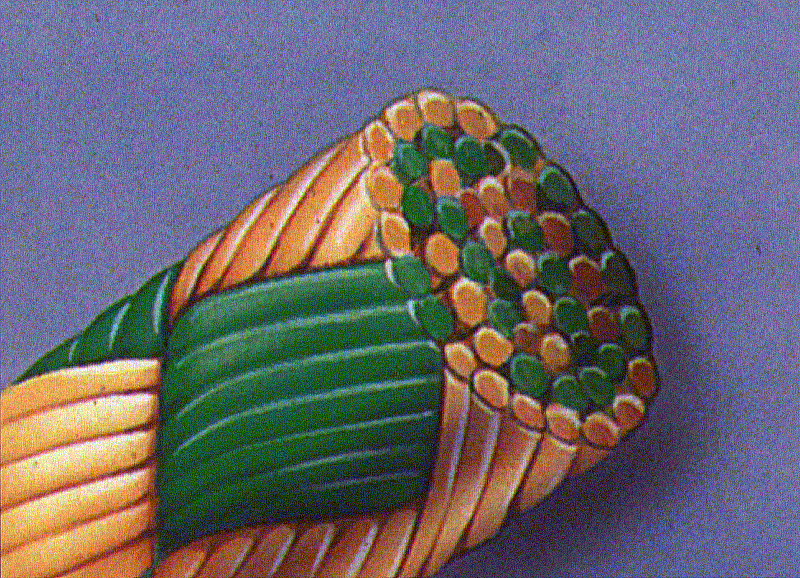
•**PRONOVA\* Suture** •**ETHILON\* Suture** •**NUROLON\*** **Suture**

•**Stainless** **Steel** **Wire**

•

**t** **i** **l** **t** **l** **ir**

•Monofilament version VICRYL\* Suture available for use in ophthalmic surgery •MERSILENE\* Suture - trochanter suture is braided



**t** **r**

**l** **ifi** **ti**

**Suture**

Monofilament

fil t

**Classification**

Multifilament (braided)

ltifil t ( r i )

**Absorbable** **Sutures**

**s** **r** **l**

**t** **r** **s**

) L I :

1) PLAIN GUT:

•Derived from the small intestine of healthy sheep.

**2) CHROMIC GUT:**

**)** **I** **:**

•Treated with chromic acid to delay tissue absorption time.

• Loses 50% of tensile strength by 5-7 days.

•50% tensile strength by 10 -14 days.

•Used on mucosal •Used in episiotomy repairs. surfaces.

**3)** **Polyglycan** **910** **(Vicryl®)**

**)**

**l** **l** **c**

**(** **icr** **l** **)**

•Braided •Synthetic polymer

•50% tensile strength for 30 days •Used: subcutaneous

**4)** **Polydioxanone** **(PDS II)**

**)**

**l** **i** **x**

**(** **)**

•A sterile synthetic •Absorbable •Monofilament suture

•Made from the polyester (polydioxanone.)

•PDS II sutures are intended for use in general soft tissue approximation, including use in paediatric cardiovascular tissue, in microsurgery, in ophthalmic surgery and Gastrointestinal anastomosis.

•Complete absorption occurs within 182 to 238 days.

**Non-absorbable** **Sutures**

**-** **s** **r** **l**

**t** **r** **s**

**1) Polypropylene (Prolene®)**:

• Stronger than nylon and has better overall wound security.

•Non braided.

•Monofilament (no infection).

**2)silk** •braided

•Before the advent of synthetic fibers, silk was the mainstay of wound closure.

•workable and has excellent knot security.

**Disadvantages**: •high reactivity •infection

Monofilament ***Advantages*** ***Disadvantages***

tails which could cause

•Smooth surface •Difficult Handling & knotting

•Less tissue trauma

•No bacterial harbours

•No capillarity

•more stiff and suture ends or discomfort.

•Stretchable

**Multifilament**

***Advantages***

• Strong and braided (like a

Rope)

• Soft & pliable

• Good handling

• Good knotting • Not slipping.

***Disadvantages***

•Bacterial harbours

•Capillary action >>>> infection strands

can travel within the suture

•Tissue trauma

**Synthetic**

The drawbacks are

**(**Synthetic materials are man – made, produced by industrial processes**)**

***Advantages***

Non-Absorbables are inert( no

tissue reaction)

•Absorbables resemble natural

substances

•Absorption by hydrolysis

•Predictable absorption

•Stronger than biological

***Disadvantages*** •related to their structure

chemical composition.

rather than their

•More difficult to handle structure

in the monofilament

•Encapsulation can result

in the suture being

extruded or expelled by

the body.

**Biological**

**i** **l** **ic** **l**

**(**derived from **naturally** **occuring** **sources** such as animal / plant tissues**)**

***Advantages*** ***Disadvantages***

•Good Handling & •Tissue reactions knotting

•Economical

Note: Biological sutures are now only available in non – absorbables.

**Characteristics** **of** **Non-Absorbable** **Sutures** **(Import)**

**(I** **rt)**

•Permanent

•Only used when long term support is required •Removed when used for skin

•Tissue reaction generally low (except silk) •True non-absorbable sutures include polyester,

polyethylene, polypropylene and steel

**Absorbable** ***Advantages*** ***Disadvantages***

•Broken down by body •Consideration of wound

support time

• No foreign body left support to **s**a tissuepfor. i**as** quickly, **f** it **l**rcould lead t to

(A suture must rovde

**long** **as** **it’** **necessary**

If the sutu e absorbs oo

**wound** **ai** **ure)**

**Non** **–** **Absorbable**

**s** **r** **l**

**(** **t** **ri** **ls** **ic** **r** **t** **r** **t** **,** **r** **i** **i** **i** **l** **c**

**r** **tl** **)**

**(materials** **which** **are** **not** **broken** **down** **by** **the** **body,** **remaining** **in** **place** **permanently)**

***Advantages***

•wound Support

Permanent

***Disadvantages***

•**Foreign** **body** **left** **in** **the** **body**

•**Suture** **removal** **can** **be** **costly** **and**

**inconvenient**

•**Wound** **Sinus** **(**A sinus is a track communicating with an abscess and

the skin)

•**Suture** **Extrusion** **if** **left** **in** **place**

**Suture** **Size**

USP (United States Pharmacopoeia)

5..4..3..2..1..0..2/0..3/0..4/0..5/0..6/0..7/0..8/0..9/0..10/0..11/0 General

Thick Thin

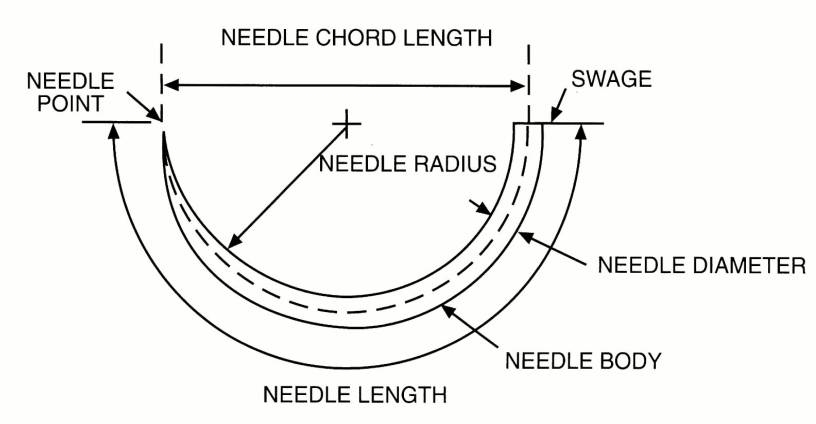
Suture Selection **(Import)**

**(I** **rt)**

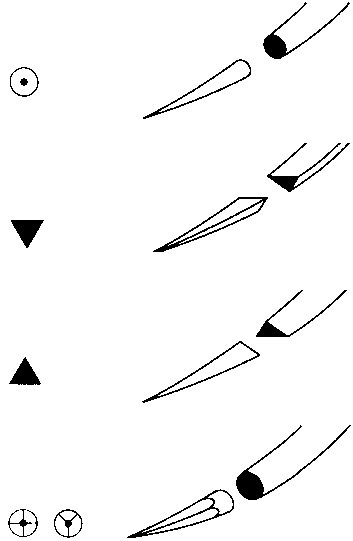
**Bowel:** **2/0** **-** **3/0** **Fascia:** **1** **-** **0** **Skin:** **2/0** **-** **5/0** **Arteries:** **2/0** **-** **8/0**

**Micro** **surgery** **9/0** **-** **10/0** **Corneal** **closure:** **9/0** **-** **10/0**

**Needles**

Anatomy of a Surgical Needle

**Needle** **point** **Geometry**



|  |  |  |
| --- | --- | --- |
|  | **Taper-Point** | •Suited to soft tissue •Dilates rather than cuts |
| **Reverse** **cutting** | •Very sharp •Ideal for skin  •Cuts rather than dilates |
| **Conventional** **Cutting** | •Very sharp  •Cuts rather than dilates  •Creates weakness allowing suture tearout |
| **Taper-cutting** | •Ideal in tough or calcified tissues  •Mainly used in Cardiac & Vascular procedures. |

**l**

**i** **t** **tr**

**The** **ideal** **surgical** **needle** **should** **be**

**i** **l** **s** **r** **ic** **l** **l** **s** **l**

1. **Rigid** enough to resist distortion,

2. **Flexible** enough to bend before breaking, 3. **Slim** as possible to minimise trauma,

4. **Sharp** enough to penetrate tissue with minimal resistance, and be

5. **Stable** within a needle holder to permit accurate placement.

Commonly, surgical needles are made from **stainless** **steel**. They are composed of:

The **swaged** **end** connects the needle to the suture

The **needle** **body** or shaft is the region grasped by the needle holder. Needle bodies can be round, cutting, or reverse cutting:

**1. Round bodied** needles are used in friable tissue such as liver and kidney

**.** **i**

**2. Cutting needles** are triangular in shape, and have 3 cutting edges to penetrate tough tissue such as the skin and sternum, and have a cutting surface on the concave edge

**.** **tti** **l** **s**

3. **Reverse cutting** needles have a cutting surface on the convex edge, and are ideal for **tough** **tissue** such as tendon or subcuticular sutures, and have reduced risk of cutting through tissue

. **rs** **c** **tti**

The **needle** **point** acts to pierce the tissue, beginning at the maximal point of the body and running to the end of the needle, and can be either sharp or blunt:

1. **Blunt** **needles** are used for abdominal wall closure, and in friable tissue, and can potentially reduce the risk of blood borne virus infection from needlestick injuries.

2. **Sharp** **needles** pierce and spread tissues with minimal cutting, and are used in areas where leakage must be prevented.

The **needle** **shape** vary in their curvature and are described as the proportion of a circle completed – the ¼, ⅜, ½, and ⅝ are the most common curvatures used.

Needle Shapes (read for MCQ)

|  |  |
| --- | --- |
| •Eye •Microsurgery | •Nasal cavity •Nerve  •Skin •Tendon |
| •Dura •Eye •Fascia •Nerve | •Eye (Anterior • segment) |
| •Muscle •Eye •Skin  •Peritoneum | •Laparoscopy |
| •Cardiovascular •Oral  •Pelvis •Urogenital tract | |

•Needles are available in various shapes to accommodate the **desired depth of bite and the desired "turnout" in specific** **tissue**. The available shapes are shown on the slide.

•Selection of the needle shape is **dependent on the size and** **depth of the area to be sutured**. Use of the ***1/4*** ***circle*** needle is often limited to ophthalmic and microsurgical procedures.

•A commonly used curved needle is ***the*** ***3/8*** ***Circle.*** These needles can be easily manipulated in relatively **large** **and** **superficial** **wounds** **such** **as** **closure** **of** **the** **dermis.**

•Because a large arc of manipulation is required***,*** ***3/8*** ***Circle*** needles can be awkward or **impossible** **to** **use** **in** **deep** **cavities** **such** **as** **the** **pelvis** or in other small difficult to access locations.

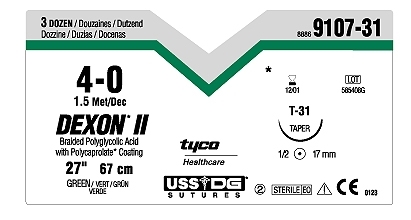
•A ***1/2*** ***Circle*** needle is relatively easy to use in these confined locations, although it requires more rotation of the wrist than a 3/8 circle.

•The tip of a ***1/2*** ***circle*** needle can become obscured by tissue deep in the pelvic cavity for example. When this occurs the surgeon may have difficulty locating the point to reposition the needle holder and pull the needle through tissue. A ***5/8*** ***Circle*** needle may be useful in this situation, as may a ***'J'*** ***needle.***

•***Straight*** ***needles*** are generally used for skin and ***compound*** ***curved*** ***needles*** for Ophthalmics.

**Suture** **Label**

**The** **Suture** **Packaging** **(Import)**



**t** **r**

**c** **i**

**(I** **rt)**

**STRAND** **SIZE**

**MATERIAL**

**STRAND** **LENGTH**

**PRODUCT** **CODE**

**NEEDLE** **CODE** **WITH** **LIFE** **SIZE** **PICTURE** **OF** **NEEDLE**

**NEEDLE** **COLOUR** **CIRCLE**

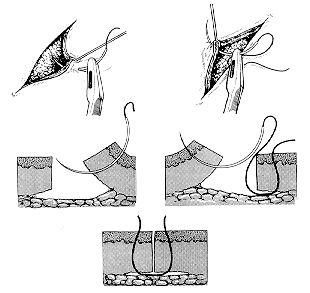
**POINT** **NEEDLE** **TYPE** **LENGTH**

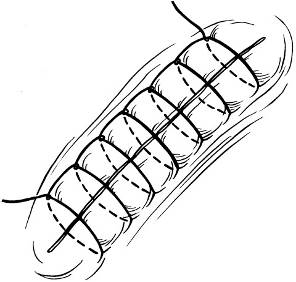
**Common** **Suture** **Techniques**

**t** **r**

**c** **i** **s**

1. Simple Interrupted

•Used on majority of wounds •Each stitch is independent

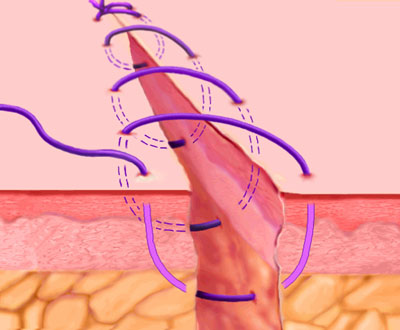
Suture Techniques

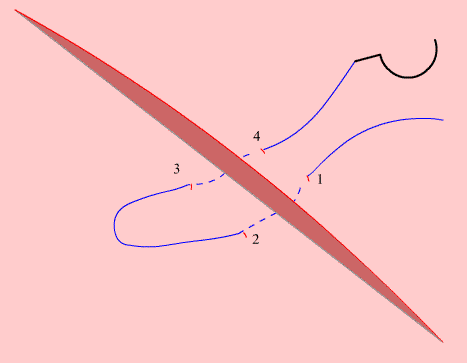
2. Simple Continuous •Useful in pediatrics

•Rapid

•Easy removal

•Provides effective hemostasis •Distributed tension evenly along length •Can also be locked with each stitch

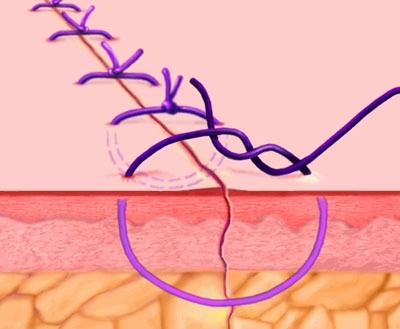


Horizontal Mattress

3. Horizontal Mattress

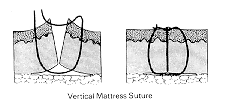
Good for closing wound edges under high tension, And for hemostasis.

Simple, Interrupted



Suture Techniques

4. Vertical Mattress

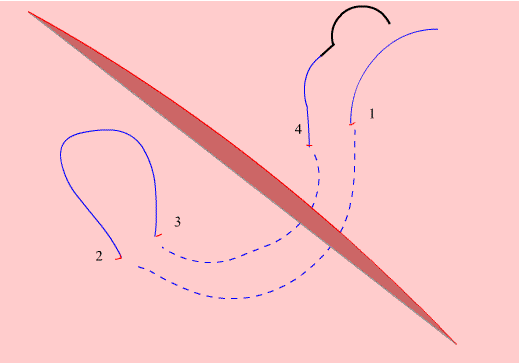
•Useful for everting skin edges •“Far-far-near-near”

Vertical Mattress

Good for everting wound edges

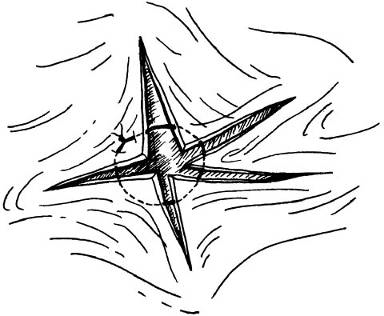
(neck, forehead creases, concave surfaces)

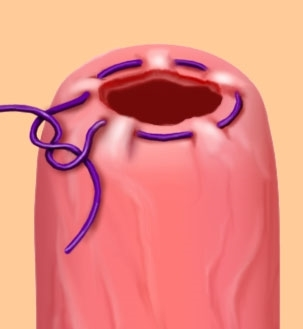


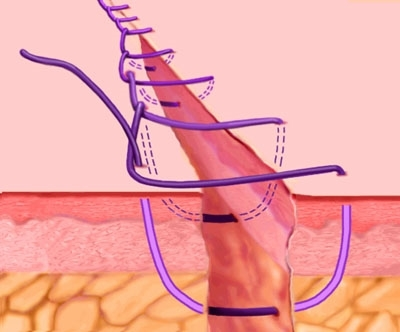
Vertical Mattress

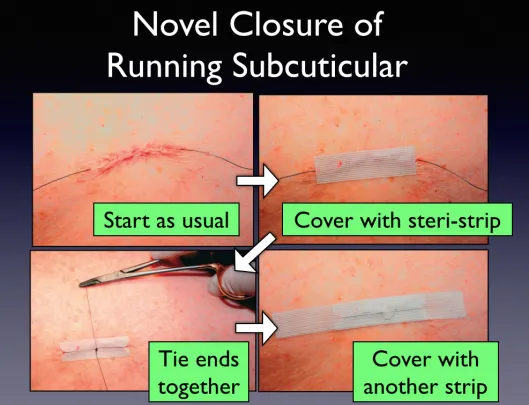
Suture Techniques

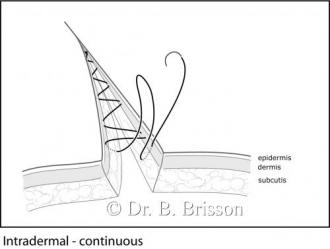
5. Purse-string

•Useful for stellate lacerations





6. Subcuticular suture: cosmotic



**Special** **wound** **closure** **techniques**

**ci** **l** **cl** **s** **r**

**t** **c** **i** **s**

1.Staplers 2.Clips. 3.Adhesive strips. 4.ZipLine.

**Staples,** **Adhesives** **&** **Tape**

**t** **l** **s,** **si** **s**

•Staples

•Quick, poor aesthetic result •Adhesives

•Dermabond- painless, petroleum dissolves •Tape

•Steri-strips

Closure using Clips

•**Suture** **removal** •Face: 3-4 days •Scalp: 5 days •Trunk: 7 days

•Arm or leg: 7-10 days •Foot: 10-14 days

**Thanks** **for** **your** **attention** **!!!**

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