

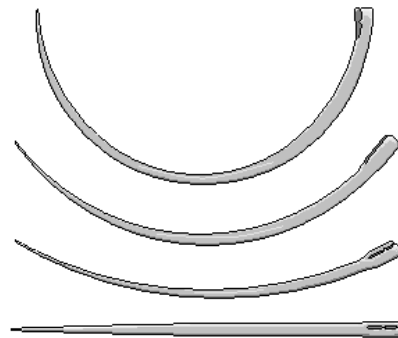
Surgical sewing materials and needles

Surgical needles

1. Needle curvature

Straight or curved

For sewing inside the body, more curved needles are more suitable.



Various degrees of needle curvature

2. Shape of needle cross-section

A) Triangular cross-section – skin (cutting) needles

- They have sharp margins that cut the tissue, therefore sewing is easier. These needles are used to sew solid tissues, such as the skin.
- But: Larger aperture in the tissue.

B) Circular cross-section – muscle (wire) needles

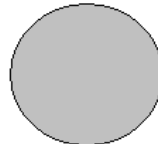
- Do not cut the tissue. Used for sewing gracile tissues
- Do not make so large aperture in the tissue. Thus the channel is better filled with the thread.

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Skin needle cross-section



Muscle needle cross-section



3. Type of connection of threads to the needle

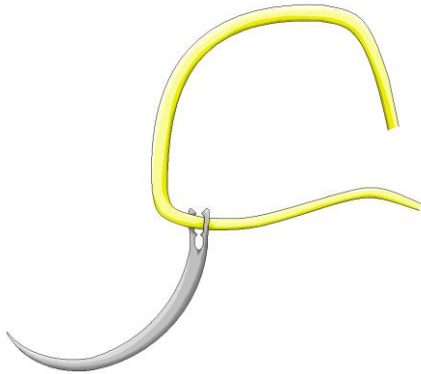
A) Classic type

- The fibre passes through an aperture in the needle, into which it must be inserted and can be pulled out.
- The needle can be used repetitively (non-disposable needle).
- The terminal part of the needle is wider than the thread. Furthermore, the fibre is doubled but only one line stays in the tissue. For these reasons, the channel in the tissue is much wider than the fibre and is not filled with it completely. Infection, blood or other body fluids can pass through this space.

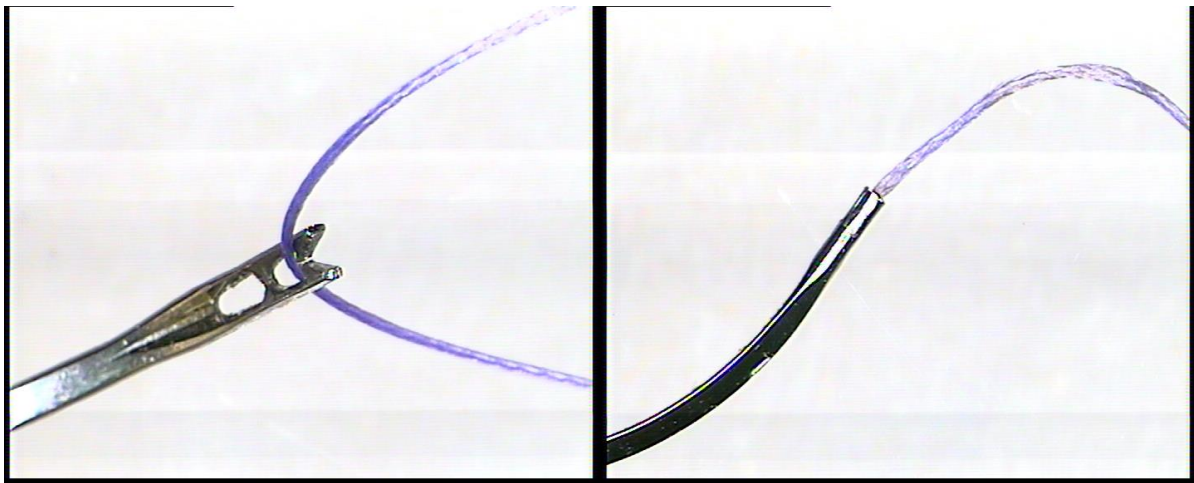
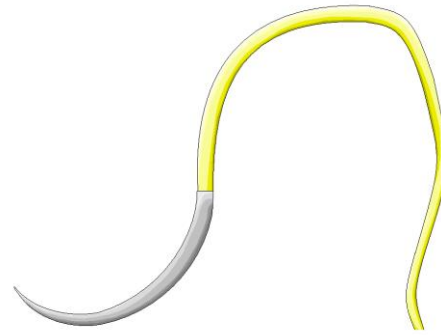
B) Atraumatic type

- The terminus of the fibre is attached directly to the terminus of the needle.
- The needle is disposable.
- The needle with the thread is delivered in a sterile package.
- The fibre is not doubled when passing through the tissue; the needle is not wider in the place of fibre attachment. Thus, the channel in the tissue is narrower and better filled with the thread than in the case of classic type.

Classic type



Atraumatic type



Sewing material

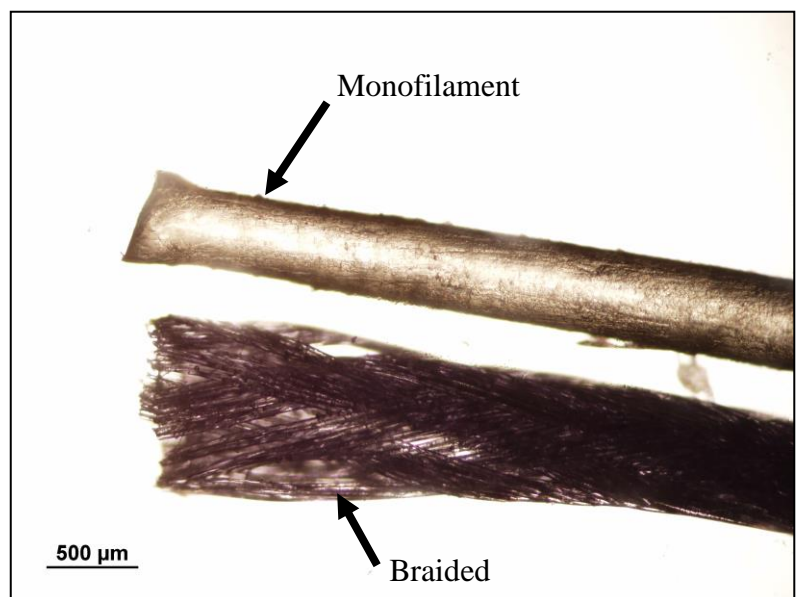
1. Thread structure

A) Braided materials

- The thread consists of many thin filaments.
- The surface is rough and less slippery. Manipulation with these threads is easier.
- Absorption of blood and other body fluids – substrate for bacterial colonization and infection

B) Monofilament threads

- Homogenous structure of the thread.
- Smooth and slippery surface – more difficult manipulation
- Do not soak up fluids.



2. Resorbability

A) Resorbable materials

- Gradually losing strength. Sutures need not to be extracted.
- Duration of resorption is less defined in natural materials and well defined in synthetic materials. It could be prolonged by coating fibre surface with a protective layer.
- Examples:

Catgut – natural material made of sheep gut submucosa or bovine gut serosa, recently not used in human medicine

Monolac – synthetic material, monofilament

Caprolac - synthetic material, monofilament

Chirlac – synthetic material, braided

B) Non-resorbable materials

- If not extracted, the sutures remain in the tissue permanently.
- Examples:

Silk – natural material, braided

Nylon - synthetic material, monofilament or braided

Orsilon - synthetic material, braided

Tervalon - synthetic material (polyester), braided

Chiralen - synthetic material (polypropylen), monofilament

3. Fiber diameter

- European Pharmacopoeia nomenclature: EP x (or American nomenclature: USP x)
- x is a number indicating diameter of the fibre. The unit of EP is 1/10 mm. EP 1.5 fibre has a diameter of 0.15 mm (In the American system it corresponds to USP 4/0 for non-resorbable and synthetic resorbable materials and USP 5/0 for Catgut).
- Thick fibres are stronger and therefore they can tolerate stronger traction of wound margins. On the other hand, they represent larger amount of extraneous material present in the tissue and wider channel in the tissue after the thread is extracted. In the case of thin fibres, there is a higher risk of cutting the margins of the wound.