



Curtin University Standard Operating Procedure

SUTURING TECHNIQUES

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Purpose: To provide guidelines to researchers in the techniques required when suturing animals as part of research projects in Building 300 at Curtin University. There are many detailed instructions available both in written and on DVD that can assist in learning to suture which the staff at Building 300 can direct researchers to.

Definitions:

Suture material- any material used to approximate tissue edges and provide support to tissues whilst they are healing.

Considerations When Suturing Tissues

1. Type of suture material
2. Type and handling of suture needle
3. Suture technique and patterns
4. Knot tying
5. Suture removal

Properties of Suture Material:

When choosing a suture material there are 3 things to consider and the information should be easily found on the packet of suture material

- Size
- Natural or Synthetic
- Braided or Monofilament



Absorbable	Suture material which is broken down and absorbed by the body over a period of time.
Non Absorbable	Suture material which is not broken down by the body and remains intact. It is generally used for suturing skin, but is also used internally when the animal requires the sutures to remain permanently within in the body cavity.
Braided (Multifilament)	Consists of many strand being woven together which produces a flexible and strong suture material, with good knot strength, but one which can cause 'drag' or damage to the tissues as it is taken through them.
Monofilament	A suture which is made from a single strand of suture material which makes it smooth and less likely to cause tissue trauma, however its smooth surface can make it hard to handle and harder to tie strong reliable knots.
Natural	Are sutures made from natural plant or animal material and their protein content can elicit a large reaction within an animal. Examples include catgut (absorbable) and silk (non-absorbable)
Synthetic	Made from synthesing a large range of polymers and hence there is less reaction to the material in the tissues, and a more consistent breakdown period can be predicted.
Sizing	The sizing of suture removal ranges from 7 – 11/0. The largest is 7 and the smallest is 11/0 The range looks like this Strongest -----> Weakest 7-----4-----0----2/0-----4/0-----11/0 In a mouse, generally 3/0-6/0 suture material will be used.

Other considerations

1. How long the tissues take to heal? For example intestines heal rapidly but tendons take a long time.
2. Is there the possibility of an infection?
3. Is there fluid present in the tissues being sutured? I.e. sutures in a bladder or cystic structure can lead to the formation of stones or precipitation around the sutures so rapidly absorbed sutures in these organs are recommended.
4. What strength of suture material is required? How much tension and pressure is on the wound?
5. Is the material flexible enough for the tissues, and is it possible to knot the sutures in the space available.



Needle size and type

There are 3 different parts to a needle –

1. The eye
2. The body
3. The point

Considerations when choosing the type of needle:

- 1) The type of tissue – minimal trauma needs to be done to the tissue. If the tissue is soft and easy to penetrate a taper point needle is used. If the tissue is tough, a taper cut needle is used. If in doubt, use a taper point for everything except skin.
- 2) Consider the location and depth of tissue to decide on the curvature, diameter and length of the needle
- 3) Swaged on needles (i.e. the needle is already attached to the suture material) are the easiest to use. You can have needles which suture material is then introduced through the eye of the needle, and these need to be as close in size as possible, but these are harder to use.

Suturing

You are aiming for accuracy and security, and these should be your primary considerations. Once you have gained these abilities, then speed is desirable but will come naturally with time when you have achieved the first 2. Other considerations are

- 1) Tissue trauma should be minimised at all times by try to reduce the amount of time and handling of the tissues with delicate instruments.
- 2) The sutures should hold the tissues together in the correct position without too much tension on the tissues themselves. Too much tension can lead to ischaemia and death of the tissues.
- 3) Minimising dead space
- 4) Wound edges should be slightly loose to allow for post-operative swelling.

Knots should be securely tied in a manner to produce the smallest but most secure knot possible in the position and depends on the skill of the operator. Practice makes perfect and our staff in Building 300 will teach these methods to you.

Suture Removal

The sutures are to be removed from the skin 10-14 days after the surgery after ensuring the tissues have healed to the point that the tissues no longer require the support of the suture material. The amount of time depends on the tissues and the rate of healing.



Recommended suture material and sizes for closing surgical incisions:

Type	Size	Closure Pattern	
Abdominal wall/muscle	Absorbable (Vicryl, PDS, Monocryl)	Rats (4-0 to 6-0) Mice (5-0 to 6-0)	Simple continuous
Subcutaneous tissue	Absorbable (Vicryl, PDS, Monocryl)	Rats (4-0 to 6-0) Mice (5-0 to 6-0)	Simple continuous
Skin	Non-absorbable, monofilament (Prolene, Nylon)	Rats (4-0 to 6-0) Mice (5-0 to 6-0)	Simple interrupted

References:

Perret-Gentil, M.I., Principles of Veterinary Suturing. Laboratory Animal Resources Centre. The University of Texas at San Antonio

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