The double microhook: A simple device to facilitate microanastomosis

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Inherent tissue elasticity has always been a difficult factor to overcome in surgery, and this is particularly so in microsurgery. Vessel and nerves tend to retract once they are divided, and this elastic retraction must be reversed in order to accomplish an anastomosis. A simple concept, easily applied in any operating room, is presented in several variant forms that is of great use in microsurgical procedures, particularly those performed in difficult situations or without experienced assistants.

Key Words: *Adventitia, Double microhook, Interpositional grafts, Microanastomosis*

Double micro-crochet : outil simple pour faciliter la microanastomose.

RÉSUMÉ: L'élasticité tissulaire inhérente a toujours été un facteur difficile à surmonter en chirurgie et particulièrement en microchirurgie. Les vaisseaux et les nerfs tendent à se rétracter une fois qu'ils sont sectionnés et cette rétraction élastique doit être renversée pour accomplir une anastomose. Une simple concept facilement appliqué dans toutes les salles d'opération est présenté sous différentes formes et leur utilité est grande dans les techniques de microchirurgie, particulièrement celles qui sont effectuées dans des situations difficiles ou sans un assistant d'expérience.

Inherent tissue elasticity has always been one of the factors that makes microsurgery challenging. Vessels and nerves, once divided, tend to retract, and this retraction must be reversed in order to accomplish an anastomosis.

If there is also the need to resect segments of vessels or nerves because of damage to them, the problem is made even more severe, and attempts to overcome this with more extensive mobilization can result in even further retraction.

The present methods of accomplishing anastomosis successfully in the face of tissue retraction are:

- Having adequately trained assistants who are capable of grasping the structures atraumatically and taking off the tension while the surgeon sutures;
- Using specialized double approximating clamps that can grasp vessels and then be advanced towards each other to take tension off and bring the structures into approximate apposition;
- Using interpositional grafts. These are frequently essential when resection of vessels/nerves has been required.

These methods, while effective, do have their drawbacks. It is often difficult to get assistants who are experienced at working under a microscope, and even when they are available, the communication between surgeon and assistant is often less than perfect, resulting in crossed signals, repeated actions, and further trauma to tissues.

Double approximating clamps are often technically demanding to apply and quite bulky. This can be particularly frustrating when they must be flipped in order to accomplish back wall anastomosis in a confined space.

Interpositional grafts, while absolutely necessary in many situations, can be quite difficult to handle because of their inherent elastic retraction after harvest. This can result in mistakes about the exact amount of graft required in situations where exactness is essential.

The 'microhook concept' has some usefulness in overcoming the difficulties described. Basically two needles are oriented in such a way that the curve of the barbs face towards each other (Figure 1). Two types of devices have been devised; microhook 'platforms', and free double-ended hooks.

MICROHOOK PLATFORMS

In these devices, a block of surgical silicone is carved in such a way as to provide a base for two opposing micro-needles (Figure 2). The size of the block and of the needles depends on the clinical situation for which they are being used.

Vessels or nerves can be 'hooked' by their adventitia to the barbs and then the necessary anastomotic work performed. Adjustment is accomplished by simple hooking and unhooking – an action which can be easily performed by a microsurgeon with one hand. It is possible to prepare and adjust the structures to be anastomosed without worry about slippage. This is particularly useful in nerves, where 'mapping' of the pattern of fascicles may be desired.

Figure 1) The double microhook with tape band

Figure 2) Silicone block microhooks

Because the vessel or nerve is fixed by only a single point on either side, a large amount of rotation is possible, and both front and back walls can be sutured without readjusting the platform.

Because of the carving and elastic properties of the silastic, it is possible to design suture holding grommets at right angles to the hooks that can be used to hold stay sutures effectively and easily, further reducing the need for assistants.

FREE DOUBLE NEEDLES

These have been manufactured out of fine dental wire and small gauge straight needles. The ends of the straight wire are bent up into a gentle curve and the tips buffed with an emory board or a file to produce a sharp point. A brightly coloured piece of instrument marking tape is then wrapped around the strut. Vessels and nerves can be hooked on the baths, and the long brightly coloured tape can be used to control rotation and provide a bright background for contrast. The tape can be easily pinned with a sterile needle to surrounding tissues to fix it in any appropriate position.

DISCUSSION

These devices have been extremely helpful to the author when performing microsurgery. They have been easy to manufacture, and are much less cumbersome than presently

available approximating clamps. They are particularly useful in situations where highly trained assistants are not readily available. Puncture of the lumen of vessels, although a theoretical concern, does not happen frequently, and when it does it is only minimally more traumatic than the passage of a microsuture through the wall. Obviously, if excessive traction is used, and lumen puncture occurs, linear tears of the intima are possible. However, structures requiring this much traction should probably be considered for interpositional grafts in the first instance.

It is possible that these devices could be manufactured in a disposable form much as sutures themselves are, or in an implantable or even a completely degradable form that could be left in situ. This latter form could be particularly helpful for nerve anastomosis, as a consensus exists in the literature presently that tension across a suture line is one of the most important factors determining the rate of return of neural transmission.

FURTHER READING

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