THE SURGICAL USES OF KANGAROO TENDONS.

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For tying large vessels in their continuity the long even tendon from the tail of the kangaroo possesses decided advantages. It is as strong as the ordinary silk ligature, its knot is equally secure, and it causes no ulceration in the coats of the vessel. It has all the valuable qualities of the catgut ligature without any of the defects.

A fine tendon makes also an excellent suture, it produces no more irritation than a gut suture, and it resists the softening effects of purulent discharges for a much longer period.

In 1877 I brought the peculiar properties of these tendons under the notice of the profession in Melbourne at a meeting of the Medical Society of Victoria, and since that time they have been in frequent use there, in place of silk or gut, as ligatures and sutures. At the Melbourne Hospital they have been used on different occasions for the deligation of main arterial trunks, as the common

carotid, the femoral, &c., and they answered every requirement. The inner coats of a vessel can be divided or not, as the operator pleases, and the ends of the ligature may be cut short off. A reef-knot which has been fairly tied in a tendon will neither slip, nor will it become loose, under any circumstances. In a wound where there is little or no suppuration the tendon appears to coalesce with the living tissues. Even in suppurating wounds, where they were bathed in septic discharges, I have found the tendon sutures partly softened but still holding well together, at the end of eight days. In all the cases here referred to the tendons were previously prepared by immersion for some weeks in carbolic oil, after the manner recommended by Professor Lister for carbolising catgut. Some of our operations were performed under the antiseptic method, but others were not. *Entire* tendons only were used, those which were split being always rejected. In the hospital carbolised tendons have been also employed for making the deep stitches in ovariectomy; also for bringing together the cut edges of the vagina in the operation for the cure of vesico-vaginal fistula; in both cases they held the parts in apposition till perfect union took place. In plastic operations, in operations for the radical cure of hernia, and for the cure of varicocele, I have left carbolised tendons in the tissues, which have readily healed over them. A tendon ligature which I had applied to the carotid artery of a dog was found, ten days afterwards, when the animal was killed, perfectly strong, and the knot as secure as when it was tied, while the tendon itself was incorporated with newly formed material, and adhered firmly to the outer coat of the vessel. In this case, as one might suppose, antiseptics were not employed, and the dog tore out the sutures which held the skin edges of the wound together; therefore at the end of ten days only the deeper parts and the opening which had been made in the sheath of the vessels were healed; the rest was healing by granulation, but the ligature was not softened.

A medium sized tendon (*e.g.* about as thick as a catgut ligature which would be selected for the deligation of a large artery) is so strong that it is difficult to break it with your hands; both its strength and calibre are uniform throughout its entire length, which ranges from twelve to eighteen inches. It is owing to the peculiar flattened form, and perhaps also to the fibrous surface of the tendon from the kangaroo's tail, that a reef-knot tied in it retains its grip when left in the interior of a wound.

Like catgut, tendons can be hardened, if desired, before they are employed as sutures in certain operations, by previous immersion, for about seven hours, in a half per cent. solution of chromic acid. This preparation may sometimes be necessary, but it was not adopted in any of the cases just referred to. When hardened by chromic acid they make excellent drains for wounds, and I have often so employed them.

Their preparation for surgical purposes is most simple, but it is necessary to mention that they should not be removed from the tail *en masse*, they must be taken out one at a time, without force, or they will sometimes split longitudinally, which greatly deteriorates their strength. *A split tendon cannot be relied on, and should never be used.* In their normal state they are of various sizes; some are thick, others very fine, in fact every diameter which can be required is obtainable; there is, therefore, no occasion for splitting. Neither is it wise to twist two or more tendons together, as it destroys their flattened forms.

On removal from the recently killed animal they are cleaned first in water, afterwards in a carbolic acid solution, and then dried. They can be preserved dry, or in five per cent. carbolic oil, whichever is most convenient. It will be necessary to steep them again in a watery solution of carbolic acid before they are used.

Some tendons which I sent to London a few years ago were exhibited by the late Mr. Callender at the Clinical Society, and Mr. T. Smith of St. Bartholomew's Hospital speaks well of them. But as it has been said that they

are not at present procurable in England, I wish to add that if they are required the difficulty of obtaining supplies from Australia is almost *nil*.