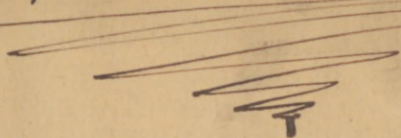


ISHIGURO (T.)

The whale tendon suture.



ligature





The Whale Tendon Ligature.

By T. ISHIGURO, M.D.

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The ligatures formerly in use in tying vessels of the human body, were of different kinds to those of the present day. Silk and hemp ligatures were at one time applied by surgeons to such purpose, but as both had the defect of acting as foreign bodies in the animal economy, they were superseded by ligatures made of thin strips of leather. In support of the use of the leather, it was thought that ligatures of that materia would be decomposed by the heat and moisture of the body, and that they would finally become absorbed; but numerous trials convinced those most favorable to the use of leather ligatures that the idea was a fallacy; for leather, it was found, was far from being easily dissolved, and besides, it was very apt to break off at the time of its application.

Dr. Lister's ligature (cat-gut), though of comparatively recent origin, is held in such high estimation, that it is now almost exclusively used for tying vessels, or applying the suture to the viscera. It was in the year 1874 that I first saw its practical application in the operating theatre of the College, by Dr. Schultz, Instructor of Surgery to the Imperial Medical College, Tokio, which was possibly the first introduction and utilization of Lister's ligature in Japan.

My whale tendon ligature was invented a few years after. I first conceived the idea upon seeing, in the country, a whale tendon bow-string used in whipping cotton. The thought struck me that, with slight modifications, such strings might be made into ligatures; but I left the matter untouched, until subsequently, in 1877, when urgent necessity caused me to turn my mind to the subject again.

It was in that year that the South-western Rebellion—which kept the Empire for some months in a state of great disturbance—broke out. In the month of February, of 1877, I was ordered by the Government to proceed to Osaka, to take charge of the hospital which was specially established there, for the purpose of treating wounded Imperialists. The cases sent to and treated at that post, from the commencement to the end of the war, amounted to more than seven thousand, among which I had occasion to make frequent trials of Lister's ligature. On reflection, I was strongly persuaded to bring out the whale tendon ligature, as a substitute for Lister's, and finally I accomplished my invention by adopting the following course:

I. The Preparation.—The mode of making the ligature is very simple. Firstly, a whale's tendon is dissected by the points of needles, and teased out until the fibres look very like those of hemp. Secondly, the longest and finest fibres among them are selected, and they are then spun together as ordinary silk thread. I find that the whale tendon is the best for the purpose. Any others, for instance those of the horse or cow, are deficient in strength.

II. The Results of the Tests to which this Ligature has been Subjected.—1st. A weight of 4 lb. 4 oz. was suspended on a cord of one metre in length and 0.18 gramme (3 gr.) in weight, but it was not broken.

2d. The ligature was boiled for seventy-two hours, and then kept at blood heat for five days, but it only showed slight expansion or softening, without the least dissolution or loss of strength.



3d. The ligature was soaked in a solution of *pepsin* (2 drachms), dilute *hydrochloric acid* (1 drachm), and *aqua* (5 oz.), and then kept at the temperature of the body for twenty hours, but showed not the least sign of dissolution.

4th. It was tested likewise by soaking in *acetic acid* and *lactic acid* (both in a diluted state), and also in *liquor potassæ*,—in all of which cases the strength of the ligature was proved by like results. The soaking lasted from five to six days, but no dissolution took place.

5th. The first actual trial was made upon a patient, to whom excision of the femur was necessary. In this case one of the ends of the ligature was cut off close to the knot, while the other was left hanging out of the wound. After the lapse of seven days an examination was made, and it was found that not the least trace of the ligature was to be detected. Subsequent trials proved that three days after the application were sufficient for the full absorption of this ligature.

6th. The same experiment was made on the femoral of a dog. On examination five days afterwards, it was found that the ligature had exercised its full powers on the vessel, while there was not the least trace of it remaining in the body; the whole of it having been absorbed by that time.

The success of these several tests gave great satisfaction to me. But there still remained another question to ascertain, which was—For what length of time would it remain in the body as ligature? for a too speedy absorption is liable to cause secondary hemorrhage. Opportunities soon occurred for trials on that point, and convinced me of its safety. A case of leg amputation afforded a very good opportunity; the ligature was applied to both the *tibial* and *fibular* arteries of the patient, but there was not the least manifestation of secondary hemorrhage. The subsequent trial which was made on the femoral was attended with like result. A like success followed in both instances.

After submitting the ligature to these tests myself, it was presented to my medical colleagues for trial, among whom were Surgeon Nagamatsu and Surgeon Nagase, of the army, who were at Osaka, and whose duty was then to attend on many hundreds of those who had been wounded in battle, and who possessed, consequently, more opportunities of making practical tests than most other surgeons. They informed me that the ligature was availed of by them in a large number of cases, with entire success. They conferred upon it the name of *Ishiguro's ligature*; and so I made my invention publicly known in October, 1877. In Japan the ligature has rapidly established itself in estimation among the medical men, and there is no other than that used now in the military hospitals.

Bearing in mind the strength which the ligature naturally possesses, and which can be still more increased by soaking it in carbolic oil, it may be concluded that it can be relied on to answer every purpose of ligaturing and suturing.

With these words the inventor commits his ligature to his professional brethren, respectfully asking them to submit it to that practical trial which is, after all, the only true test of its efficacy.

Tokio, June 10th, 1880.

(Translated by S. Kibachi.)

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