

**A new method of tenotomy : by which the tendons are lengthened to a definite extent, instead of the present hap-hazard method / by W.W. Keen.**

**Contributors**

Keen, William W. 1837-1932.  
Royal College of Surgeons of England

**Publication/Creation**

Philadelphia : [publisher not identified], 1891.

**Persistent URL**

<https://wellcomecollection.org/works/kcmhckgb>

**Provider**

Royal College of Surgeons

**License and attribution**

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
<https://wellcomecollection.org>

10

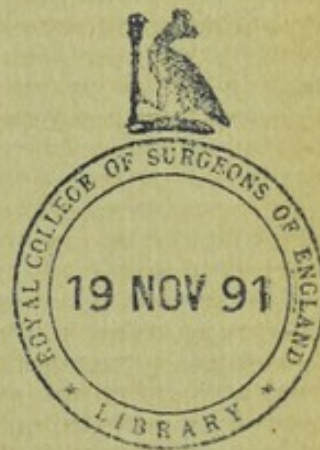
# A NEW METHOD OF TENOTOMY,

BY WHICH THE TENDONS ARE LENGTHENED TO  
A DEFINITE EXTENT, INSTEAD OF THE  
PRESENT HAP-HAZARD METHOD.

BY

W. W. KEEN, M.D.,

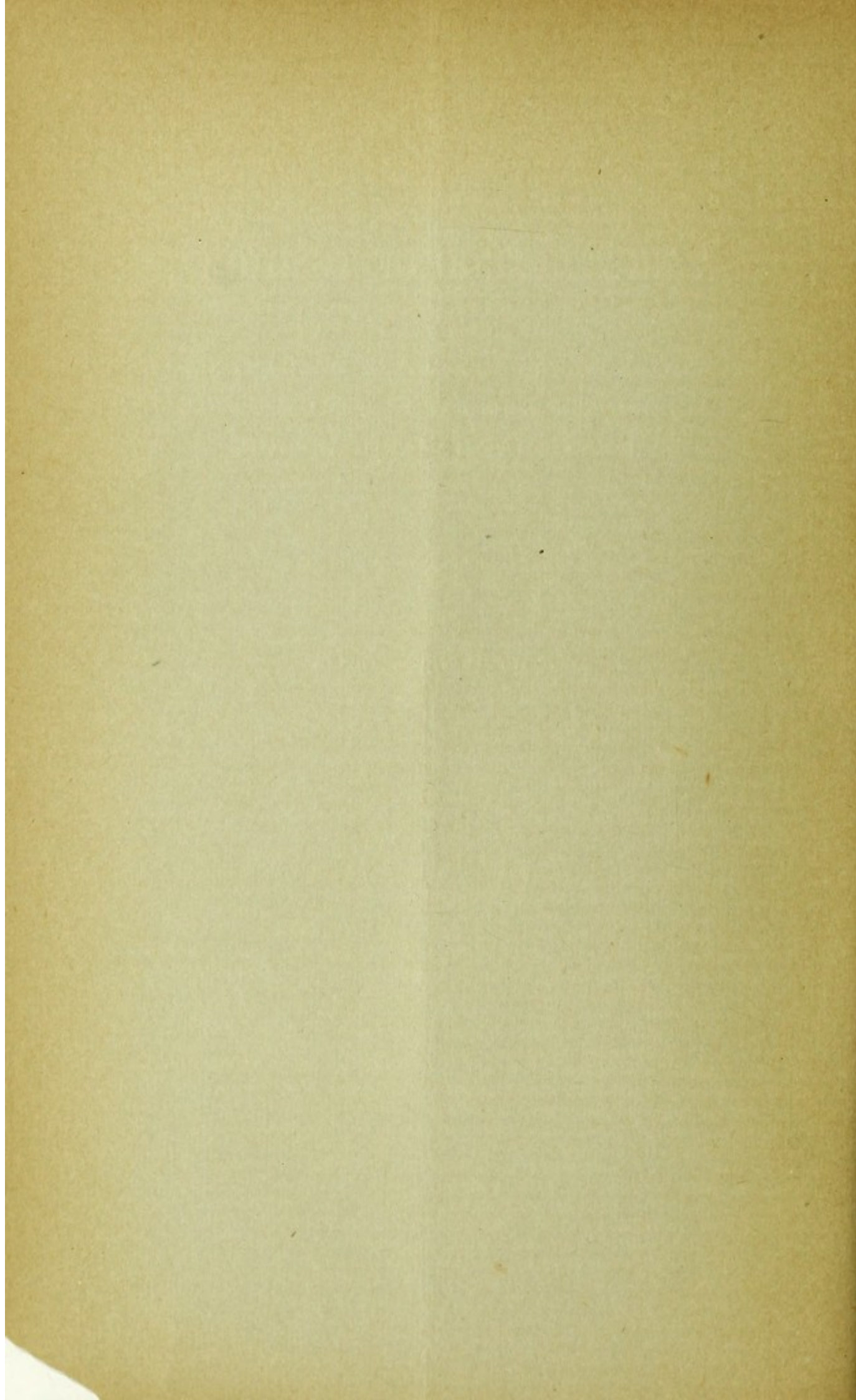
PROFESSOR OF THE PRINCIPLES OF SURGERY IN THE JEFFERSON MEDICAL COLLEGE.



REPRINTED FROM THE  
TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

MARCH 4, 1891.





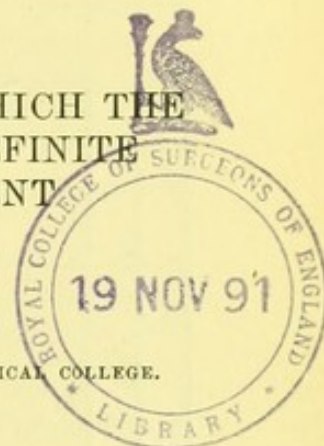
[Reprinted from the Transactions of the College of Physicians of Philadelphia, 1891.]

A NEW METHOD OF TENOTOMY, BY WHICH THE  
TENDONS ARE LENGTHENED TO A DEFINITE  
EXTENT, INSTEAD OF THE PRESENT  
HAP-HAZARD METHOD.

By W. W. KEEN, M.D.,

PROFESSOR OF THE PRINCIPLES OF SURGERY IN THE JEFFERSON MEDICAL COLLEGE.

[Read March 4, 1891.]

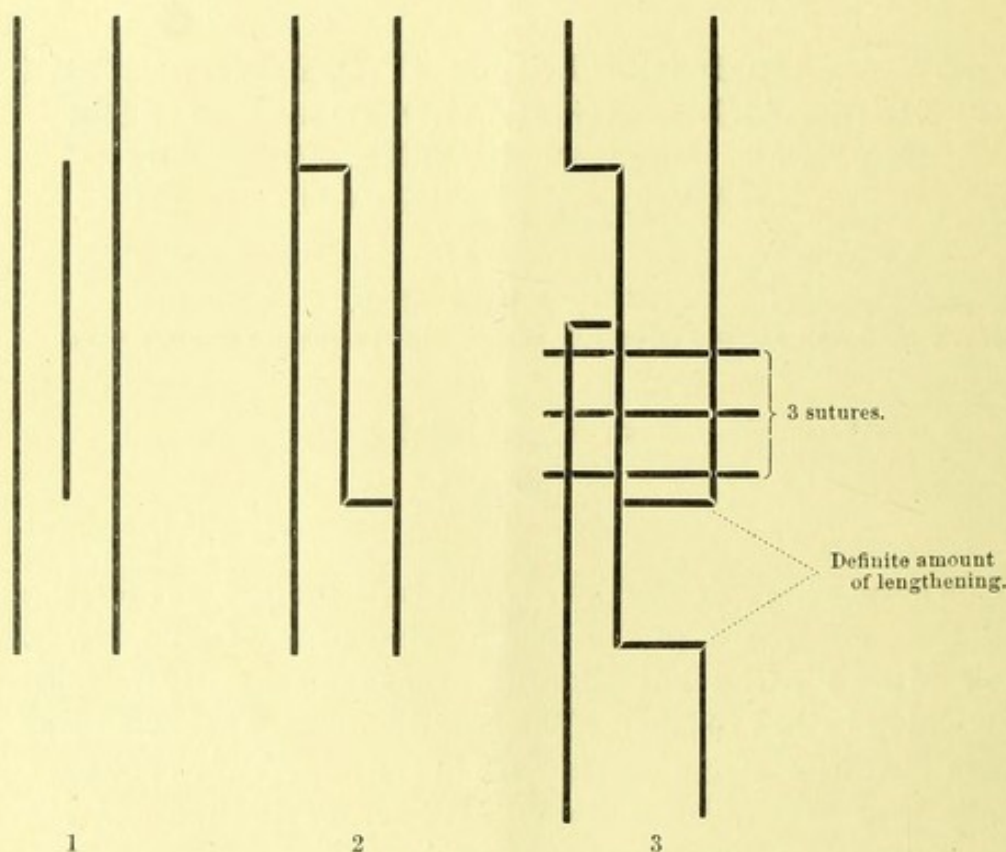


I OWE the suggestion which, I believe, I carried out for the first time anywhere, to the fertile mind of my friend, Dr. S. Weir Mitchell, who has adorned every department of medicine which he has touched. The case in which I operated was one of post-hemiplegic contracture of the flexors of the fingers, kindly sent me by Dr. John Van Bibber, of Baltimore. Dr. Van Bibber sent the patient to me for an opinion as to a possible operation of trephining for epilepsy, but I decided not to operate, as a careful investigation showed that the case was unsuitable. The fingers and thumb were markedly flexed into the palm of the hand, and Dr. Mitchell (who saw her with me) suggested that the contracture could be overcome by lengthening the tendons to a definite extent, instead of cutting them and allowing union to take place without any regulation of its amount.

The patient was a lady, twenty-five years of age. The following operation was done November 29, 1890. An incision was made, beginning just above the pisiform bone and extending three inches obliquely upward, its upper end being over the tendon of the flexor carpi radialis. The edges of the wound, when pulled to one side, very readily exposed all the flexor tendons. Each tendon was first split in the middle one and a quarter inches and then, at the two ends of this incision, section of the opposite halves of the tendon



was made. The two cut-ends were then slid past each other and sewed together for a distance of half an inch, making three-quarters of an inch of lengthening.



The tendons operated on were four of the deep flexors, five of the superficial flexors, the two carpal flexors, the flexor longus pollicis and the palmaris longus—thirteen in all. The flexor of the thumb was only lengthened half an inch, as I was fearful of losing its apposition with the other fingers if, in the shorter digit, the same amount of lengthening was done as in the long ones. Three stitches were taken in each tendon with fine chromic-acid catgut. The wound was drained with a few strands of horsehair and placed on a splint. Two small branches of the ulnar artery had to be ligated. No injury was done either to the median or ulnar nerve.

*December 3.* The night of the operation she had a severe epileptic seizure, during which the right hand was thrown violently about, and when the nurse seized it to protect it from injury it was still convulsed upon the splint.

*6th* (a week after the operation). Splint was removed, the operation-wound having entirely healed without incident. Whether, at the convulsive seizure, the tendons were torn loose, or whether they have been lengthened too much, I do not know, but I am rather inclined to the latter opinion. The thumb is still spasmodically flexed toward the palm, though by no



means to such an extent as formerly. The fingers have the last two phalanges in hyper-extension, and they cannot voluntarily be flexed.

12th. The forefinger has been for a number of years frequently spasmodically abducted toward the thumb, with cramping pains in its inter-osseous muscle. These have become rather more marked since the operation. The same tendency is noted in the other inter-osseous muscles toward divergence of all the fingers, but without much pain. I injected into the substance of the first inter-osseous muscle  $\frac{1}{200}$  of a grain of atropine sulphate, with speedy relief.

19th. She went home to-day. Her hand is in much better condition, though she cannot yet flex the fingers to any extent. The tendons are not torn loose, inasmuch as in extension faradization flexes the fingers. The douche, hot and cold, and faradization with massage, are recommended.

Tenotomy heretofore may be said to have been a hap-hazard operation. The tendons once cut, the muscle retracts, and the gap, large or small, fills with fibrous tissue, and the function of the muscle is more or less well reëstablished. The method proposed, and carried out in this case for the first time, is, it seems to me, a decided improvement, as it makes the tendon longer *by a definite amount*. The difficulty, I think, will be to judge what is the proper amount. In the present case three-quarters of an inch seems to have been more than was wise, although possibly the function of the fingers may hereafter be improved more than is apparent at present. It is important, therefore, that whenever any other cases are operated upon in a similar manner, the amount of contracture to be overcome, and the correct amount of lengthening of the tendons to be effected should be studied, in order that we may reach a more exact conclusion as to how much the tendons ought to be lengthened. It is evident that the tendons are at first weakened, for such a tendon has only half of its substance left, but the two places at which there are short gaps will undoubtedly very soon be filled with fibrous tissue, and the tendon reëstablished in its full strength. That the reëstablishment of this full strength is very important, will be seen when it is considered that the strain on the tendo Achillis in standing on tip-toe is approximately three times the entire weight of the body, or 450 pounds for a man of 150 pounds' weight, as shown by Dr. A. B. Judson (*New York Medical*



*Journal*, August 23, 1890). The present method, I think, will better attain reestablishment of the full strength of a tendon than the usual one.

Although with a different purpose entirely, yet something after the same fashion, namely, by splitting the nerve in half, Dr. Beach has reported in the *Boston Medical and Surgical Journal* of December 11, 1890, a method of uniting the two ends of a severed nerve.

### DISCUSSION.

DR. H. AUGUSTUS WILSON: I would ask Dr. Keen whether the method which he has described would not also be applicable to shortening the tendons as well as lengthening them.

DR. O. H. ALLIS: Two years ago Dr. John Rhoades, of the Jefferson College, asked me if tendons could not be lengthened in the manner described by Dr. Keen, and I have been practising that upon the tendo Achillis, and have taught the class at the Jefferson College this method. It can be readily done on the larger tendons. I have never known a tendon refuse to unite, but I know that there are instances where a person has suffered from paralysis, and has a certain amount of contracture, and if it does not unite in such cases the limb is more helpless than before. I should adopt this method in that class of cases. In ordinary congenital club-foot I do not think there is any gain from this operation.

DR. JAMES HENDRIE LLOYD: As I understand it, Dr. Keen has operated on a case of post-hemiplegic contracture. The cases of that kind that I have seen, where the contracture has been so great as to draw the fingers into the palm of the hand, have resulted in such a useless limb, that the question occurred to me, What special good could be done by simply lengthening the tendons and allowing the fingers to be extended? I should like to know whether Dr. Keen has observed that there was any improvement in the voluntary power following the operation. Contractures following hemiplegia are especially apt to affect the flexor muscles. Does the operation lead to any increase in power in the extensor group? Otherwise I can hardly see what practical benefit it would be to the patient. I refer only to post-hemiplegic contraction, and not to club-foot following infantile paralysis.

DR. JAMES YOUNG: The operation spoken of by Dr. Keen is certainly unique, and I can imagine certain cases in which it will be of great service, but it must not be forgotten that all tendons heal by exudate from the sheath. The inflammation that follows section of the tendon does not heal it, but it is the secondary inflammation in the sheath. It is the plastic exudate from the sheath that joins the two severed ends of the tendon. A somewhat similar operation has been performed, and is spoken of as Reeve's operation.



The operation is subcutaneous, and consists in making an oblique incision through the tendo Achillis. I do not like to hear the operation performed by orthopedic surgeons spoken of as being done in a hap-hazard manner. After section of the tendon, the tendency is to correct, and rather over-correct, the deformity, and in this way the result anticipated is a definite one. The results are definite. Certainly in all contracture tendons we can look for a result that is definite, but in paralytic cases the deformity should not be over-corrected.

DR. JOHN B. ROBERTS: It is many years since I heard the late Dr. Levis speak of dividing tendons obliquely to prevent the ends from getting too far away from each other. I have done the operation for at least five or six years. Now to hear Dr. Allis tell how he went a step further, and made this angled lengthening subcutaneously, and then Dr. Keen coming and suturing the two together, affords a very interesting illustration of the advances made possible by aseptic surgery.

DR. KEEN: The suggestion of Dr. Wilson in regard to shortening of tendons by this method seems entirely practical.

As I understand Dr. Allis, he has done this operation subcutaneously and without sutures. It seems to me that this is exactly the difference between the two. It makes no difference whether the section is transverse, oblique, or angular, if we allow the muscles to contract as much as they will without definite fixation, it is still a hap-hazard operation. The muscles are allowed to contract to any extent that they will, and the part is retained in position by splints, and allowed to heal in a hap-hazard way, with no definite and predetermined amount of lengthening or shortening, as the case may be.

Dr. Lloyd has asked in regard to the usefulness of operations in post-hemiplegic contractures. I have done a number of tenotomies in such cases for Dr. Mitchell, and have obtained quite useful limbs in not a few cases. Even where the limb is useless the operation is of service as a cosmetic procedure, giving an open hand instead of the closed hand.

I am coming more and more to the opinion that all of our surgery with modern methods should be practically open wounds rather than subcutaneous. Perhaps that is rather strong to say all; but I think that a very large part of modern subcutaneous surgery should give way to the open method. The other day I had a patient at the Orthopædic Hospital, where I was obliged to sever the adductor muscles and the rectus femoris muscle in a contracted thigh. I divided subcutaneously all the parts that I could with safety, and yet the limb was still contracted. I, therefore, made an open wound in both places, and I found that at the internal wound I was within one-quarter of an inch of a large vessel, which would have given considerable trouble if it had been severed. Making the wound an open one, I was able to continue severing the muscles until I got the limb straight, and the wounds have healed without reaction. I do not believe in working in the dark where we can work in the light, and modern methods have given us the opportunity of doing this.



(11)