

**A new, simple and safe method of preventing hemorrhage, treating aneurisms, and applicable to other surgical conditions : presenting a case of successful amputation of the hip joint and a case of amputation at the shoulder joint, where the method was put in practice : a paper read before the Academy of Medicine, March 14, 1887 / by C.S. Muscroft.**

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A Paper read before the Academy of Medicine,

BY

C. S. MUSCROFT, M.D.,

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March 14, 1887.



A NEW, SIMPLE AND SAFE METHOD OF PREVENTING HEMORRHAGE,  
TREATING ANEURISMS, AND APPLICABLE TO  
OTHER SURGICAL CONDITIONS.

PRESENTING A CASE OF SUCCESSFUL AMPUTATION OF THE HIP JOINT AND A  
CASE OF AMPUTATION AT THE SHOULDER JOINT, WHERE  
THE METHOD WAS PUT IN PRACTICE.

A paper read before the Academy of Medicine, March 14, 1887, by

C. S. MUSCROFT, M.D.

Mr. G. H. Kohrs, aged 58 years is suffering from the effects of epithelioma of the right leg and thigh. The leg had been amputated a year previously. On the tenth day of August, 1886, at the request of the patient, an amputation at the hip joint was performed in the presence of the following medical gentlemen, in the operating room of St. Mary's Hospital, namely: Drs. F. Kramer, F. Kebler, J. B. Berteling, A. Grimm, J. A. Thompson, B. F. Clark, and C. S. Muscroft, Jr., who administered the chloroform.

Dr. Thompson, at the operator's request, furnished the following notes of the remarks made previous to the operation:

"Before beginning the operation Dr. Muscroft said that in all his long experience as a surgeon this was the first time he had been called on to amputate at the hip joint. Naturally this greatest of all surgical operations had been the source of much anxious thought. First as to the necessity of the operation:

"We had a case of malignant growth involving the bone of the limb. It had returned after one amputation. There was room above the growth for an amputation in the upper third of the thigh, a comparatively simple operation. But as the bone was already affected, he thought the chances of recurrence were much less after complete removal, so it was true conservatism to chose the graver operation. It gave the best promise of a radical cure. He had given much study to the details of the operation, and every step in the classic description of this amputation had been carefully considered. It was universally taught by surgeons that controlling hemorrhage was the most difficult and most important part of the operation. Two or three gushes of blood from an artery the

size of the femoral are sufficient to produce fatal shock.

Dr. Muscroft then briefly mentioned the different methods of controlling hemorrhage adopted and recommended by different operators, and said that on mature deliberation he had concluded to reject them all and employ a simple method of his own.

"He proposed to pass a strong pin or needle under the femoral vessels en masse, high up in Scarpa's triangle, and then by winding a cord around the exposed ends of the needle, protected by corks, in a figure of eight turn, to secure sufficient pressure to completely occlude the artery. This method of compression before the operation could not possibly do any harm, and if properly applied there could be no danger of hemorrhage. The additional advantage would be secured that there were no tourniquets or bandages to slip when their point of resistance was removed by the disarticulation of the head of the femur, and the apparatus for controlling the hemorrhage was not at all in the way of the operator or his assistants."

As soon as the patient was fully under the influence of the anæsthetic, a needle one eighth of an inch wide, slightly bent at the point, about the thickness of a dime, and four inches long, was introduced perpendicularly into the front of the thigh, about an inch and a half below Poupart's ligament. The exact point of entrance was one fourth inch internal to the combined sheaths of the vein, artery and nerve. The point was pushed beyond the vessels, then turned outward until the needle had passed beyond them; the point was then pushed out through the integument. The needle was then behind the vessels and nerve. A piece of cord was passed under the heel

and point of the needle, forming a figure of eight ligature. Before the ligature was applied the femoral artery could be felt pulsating strongly, but when it was tightened the pulsation below the needle had ceased entirely. This, to say the least, was very encouraging.

The form of operation decided upon was the oval. The incision, made with a bistoury, was commenced on the outside of the upper part of the thigh and pelvis, an inch above the trochanter major; it was carried down three inches, then a diversion was carried posteriorly through the gluteal muscles as far as the inside of the thigh, another diversion was made anteriorly nearly as far as the sheaths of the large femoral vessels. There was but little bleeding from the gluteal or sciatic arteries. The head of the femur was readily dislodged from its cavity, and the upper part of the os femoris cleared from its attachments. A catlin was then used to separate the remaining tissues containing the femoral artery. When this was done the profunda femoris had to be ligated. The femoral artery was perfectly compressed, standing out in bold relief from the surrounding tissues for three-fourths of an inch, but had not bled a drop. The artery was held by the finger and thumb till a ligature could be permanently applied. The needle was then withdrawn, no blood whatever flowing from its presence.

The perfect control of the artery filled the bystanders with admiration and delight, as well as relieving the anxiety of all present from further fear, and established the most perfect confidence.

The stump was then dressed and the patient put to bed. There was given him ten grains of carbonate of ammonia in camphor water at two doses. If he became restless he was to take a teaspoonful of the following mixture every hour:

R. Morph. sulph, - gr.  $\frac{1}{4}$ .  
Camphor water,  $\bar{\text{z}}\text{ii}$ .

He only took three or four doses.

The wound was very small considering the extensive operation. It was dressed by laying compresses soaked in a solution of dried sulphate of iron,  $\bar{\text{z}}\text{ss}$  to the pint. No drainage tubes were used or any of the so-called disinfectants. He slept well the first night after the operation.

His recovery has been almost painless, and all that could be wished.

The history of the case of amputation of the right arm at the insertion of the deltoid muscle is recorded in the *Buffalo Medical and Surgical Journal*, of May, 1886, on page 452. The title of the report is "Elephantiasis of the Hand, Amputation, Recovery, by B. P. Hoyer, M.D."

The Dr. first gives the pathology of the disease, then describes the condition of the patient previous to the operation. He lays a great stress upon the vascularity of the affected arm, stating that some of the "small arteries have become enlarged to the size of the brachial."

The patient, Mr. C. F. Albright, was placed in my charge by Dr. W. H. Dunham about the first of August last. At the time the stump of the arm was very painful and swollen, with an open ulcer in the center which imperfectly covered the end of the bone, and secreted a sanious pus. The entire stump was œdematous and shining. The end of the bone, which was thickened, could be seen at the bottom of the ulcer, and was exquisitely sensitive to touch by the probe.

The young man (whose age is twenty-six years) being fearful the primary disease had not all been removed, was anxious to have another operation performed, involving the entire structure of the remaining bone.

On the 12th day of August, 1886, the amputation of the right shoulder joint was performed at St. Mary's Hospital in the presence of Drs. W. H. Dunham, Kebler, Clark, Thompson, and Muscroft, Jr., who administered the chloroform. The Lary operation was selected.

Before the operation was commenced, the brachial artery was secured in the same manner as the femoral artery in the case of the amputation at the hip joint two days previously.

As on the former occasion, when the amputation of the arm was performed by Dr. Hoyer, the arteries were found very much enlarged and bled excessively. Not less than twenty vessels were ligated. The compression with the needle and figure of eight ligature was entirely successful in preventing any bleeding from the brachial artery. The needle was introduced from before backwards, and parallel to the borders of the axilla. The point and heel of the needle were protected as on the former occasion by corks.

The patient for a few days was attacked

with epileptoid seizures, which in a few weeks passed off entirely.

The stump of the arm which was removed, was given to Dr. Jas. M. French, the pathologist of the hospital, who kindly made the following report:

190 BAYMILLER STREET, }  
February 15, 1887. }

*C. S. Muscroft, Sr., M.D.,*

DEAR DOCTOR:—The specimen which you sent me for examination represented about the upper two-thirds of the arm. The lower extremity of it, smooth and rounded, presented the characteristic cicatrices of an amputation stump. The upper extremity had the appearance of having recently been severed by an amputation at the shoulder joint. The specimen was about twice the usual diameter of the arm; its consistence was about normal, or a little softer, and its surface was smooth.

Microscopic examination showed that the chief enlargement was due to a thickening of the skin, due for the most part to a multiplication of connective tissue fibres. These ramified in all directions, forming a loose reticulated network. The meshes of this network were in part occupied by dilated lymphatic capillaries. In parts the walls of the capillaries were much thickened.

The lesions are typical of an elephantiasis.

Very respectfully,

JAMES M. FRENCH, M.D.

The patient made a good and speedy recovery, and walked about the ward in six days.

It is not alone that this simple method of preventing bleeding in the manner already mentioned, and proving successful in the two most dangerous and critical amputations known to surgery. The author claims it is also as readily applied in any case of severe hemorrhage from the extremities, whether from gunshot wounds, railroad accidents, or serious bleeding from any cause. In such cases it is only intended to restrain the bleeding until permanent ligation can be accomplished. This form of compression can be used for hours or days, if need be, without complicating in any way other surgical procedures.

It can be applied to any part of the extremities in shorter time than the tourniquet. It has the advantage of not causing the pain or swelling produced by the latter mode, nor does it require an assistant.

The author has already applied this compression to shut off the circulation of the femoral artery below Poupart's ligament for a secondary bleeding after amputation of the leg. The result was all that could be desired. The pin remained in place four days. After removing the pin no dressing was needed, nor was there any unpleasant result.

The author also claims this mode of cutting off the circulation will prove the simplest, easiest and most effective in the treatment of aneurism in any part of the lower extremities, or in the axilla or any other part of the upper extremity. In the latter the axillary artery can be readily compressed below the clavicle. This form of compression below Poupart's ligament could be produced indefinitely. That the steel pin could be retained without producing serious irritation, in the treatment of aneurism, it has been proved for four days. Then should irritation or inflammation threaten, another pin could be introduced either above or below the one already in use, then after the ligature was properly adjusted, the first pin could be withdrawn. It would be a proper proceeding to test the result of shutting off the circulation in the treatment of aneurism, to take off the ligature without withdrawing the pin, and should there be any pulsation felt in the tumor the ligature should at once be reapplied. There is another advantage, namely, the surgeon could apply the ligature in such a way that if he desired the force of the circulation could be modified to any extent he might wish. Pins could undoubtedly be used in this way for weeks. For instance, insert a pin an inch below Poupart's ligament, in the limb to be treated, continue its use until irritation set in, which in all probability would be not less than a week; at the end of that time insert another an inch below the first, then remove it, continue the second another week, then repeat the operation an inch below the last one. By this time the point at which the first pin was applied would be in a condition to have the operation completed by the reinsertion of a pin. Of course at each insertion of a pin the ligature must be used. This will insure certainly a period of not less than sixteen days, and probably twenty-eight days that the circulation of the blood would be entirely shut off, surely time enough to cure any aneurism amenable to treatment.

Cases have been reported cured when the ordinary modes of compression have lasted but a few hours.

The accompanying drawing represents the form of pin used by the author. A cork is always made to cover the point.

This form of controlling arterial circulation will no doubt open a new field in surgical procedures, its application being so simple and easy of accomplishment.

Whether it would be a proper procedure in controlling bleeding from the large arteries of the neck will be a matter that experience alone will decide. Yet if the surgeon could by this simple means preserve life for only a short time where death was inevitable, it would be a triumph for himself and a great consolation for the patient and his friends.

For aneurisms about the face or jaws, either of idiopathic or traumatic origin, this would be par excellence the treatment.

The two following cases where this hemostatic was used to arrest bleeding will serve to illustrate the origin of the suggestion which was carried out in the two amputations, used as a *prophylactic*.

The first was to the dorsum of the hand, where the artery had been cut by glass. The pin in this case passed under the arteries, was only in use three or four days.

Another instance was one in which the ulnar artery had been wounded above the wrist. Secondary bleeding came on after midnight. A needle was passed through the integument under the artery and brought out again through the integument. The ligature was removed on the seventh day. There was no further bleeding.

These were cases of arterial wounds in which the usual modes of compression had failed. The success which followed these cases (which occurred over two years ago) determined the operator to use the same treatment in other cases, no matter what the calibre of the artery involved or where located, providing the hemostatic pin and ligature could be applied. This in very many cases would obviate the necessity of the more serious operations for suppressing bleeding.

It was undoubtedly the impression made by the result of these cases, and the

determination to carry out the principle in any form of accident requiring such treatment, that led to the suggestion of compressing the artery by this form of pressure to secure the patient from bleeding, as was done in the amputation at the hip joint and of the shoulder joint.

Another advantage which has not been mentioned, is that it allows the operator to take his own time and leisure in applying the final ligature (which may consist of catgut, tendon, strips from the aorta of the ox, or of silk or cotton) or other necessary details. This form of treating the artery for prevention of bleeding will not in any way interfere with the application of the Esmarch bandage should it be required to retain the residuary blood in a limb.

In the operation where the hip joint was amputated, after making the final severance of the tissues containing the femoral artery, it was found the artery stood boldly out from the surrounding attachments, not being covered even by its sheath. This effect was undoubtedly produced by the artery being held fast by the compression used, so that it could not retract. Should this prove to be always so, it only adds another very important advantage to the operation, and such results may be expected where the division of the tissues are in close proximity to the point of compression.

The same principle can be applied if we should at any time meet with an abnormal distribution of an artery, as was the case in a successful amputation of the hip joint by Valentine Mott, the external iliac giving off two femoral arteries in the place of one.

The results which have followed the application of this mode of prevention and suppressing bleeding have been so successful that the author feels confident it cannot fail to come into general use.

Its first application in the gravest and most dangerous amputation known to surgeons, illustrates its influence for good by converting its most serious complication into the simplest part of the operation. And certainly the best fitted to amputations in any part of the superior or inferior extremity, unless the fingers or toes. Truly can we here with truth apply the aphorism of Desault, when he says: "the simplicity of an operation is the measure of its perfection."

Points to be considered in connection

MAX WOODER & SON, CHICAGO, ILL.



with this hæmostatic mode of preventing hemorrhage in amputations and other operations:

The first to recommend it is its simplicity and ease.

2d. There is no interference with the general venous circulation in nearly all cases.

3d. The plan is so simple that it does away with all of the more complicated forms of compression of vessels by tourniquets, bandages or tubing.

4th. It is also a process for shutting off the arterial flow in cases of aneurisms.

5th. The introduction of the pin or needle will in most cases be an entirely bloodless operation, and attended with very little pain. The pin used may be straight, bent at the point, or of any curve or shape to suit the operator.

6th. It is also a ready, safe method of arresting hemorrhage in recent accidents from compound fractures or other causes.

7th. Many cases will fall under the ob-

servation of the practicing surgeon in which its utility will suggest itself.

8th. The kind of metal of which the pin or needle is made is a matter of the utmost importance, experience teaching that steel or iron produces less irritation than the more costly metals, such as gold or silver.

9th. Freedom from septicæmia.

10th. The great facility with which the operator could obtain a pin suitable for the compression. For one of the larger vessels it could be obtained from a lady's toilette supplies, by any of the long steel pins with glass heads, especially those used for fastening on their hats. Their being straight in most cases would be an advantage.

11th. This manner of preventing bleeding in operations about the hip joint (excision), shoulder joint or knee, will be of the greatest importance.

12th. It does away with the necessity of a most important assistant.

#### DISCUSSION.

DR. CONNER congratulated the essayist on the favorable results of the hip joint amputation, an operation that, so far as he knew, had been but three times successfully performed in this city during the last twenty-five years, once by the late Dr. Blackman, once by himself, and now a third time by Dr. Muscroft. The operation is necessarily one of great magnitude, about one-sixth of the whole body being taken away, and one of its greatest risks is in hemorrhage. For the prevention of this many operative precedures have been employed. The flow of blood through the femoral artery can be absolutely controlled by the pressure of a finger. But a trained finger is not always to be had, nor even always to be relied upon. An aortic tourniquet may cause fatal pressure inflammation. The Davy lever, or a hand in the rectum, can thoroughly compress the iliac artery, but the use of either is by no means devoid of danger. The Esmarch strap can be satisfactorily applied, after the method of Lloyd, of Birmingham, but there is danger that unless properly handled it will slip after the division of the soft parts. Spence, of Edinburg, suggested the use of a flat steel pin passed under the femoral vessels, a method of controlling hemorrhage successfully used by Varick, of Jersey City, and one essentially the same as that pre-

sented to-night. The safest method of operating, when it can be employed, is a circular or modified circular amputation high up in the thigh, and the after disarticulation of the femur by an external incision, such as is ordinarily employed in excision of the hip; a method with which is associated the names of Lacauchie and Furneaux Jordan.

The speaker had twice performed the hip-joint amputation, once for osteo-sarcoma, terminating fatally within twenty-four hours, and once for caries of the femur and associated epithelioma, consequent upon gun-shot fracture received over thirty years previously at the battle of Molino del Rey, in Mexico, the patient recovering to die of recurrence of cancer in the stump, nearly three years later. He exhibited the femur removed at this operation, as also a photograph of the patient after recovery. In this case the method of Lacauchie was used, the femoral artery being tied not far above the junction of the middle and upper thirds. In the other case the Esmarch bandage was used, which slipped, but by the very prompt and skillful digital compression of the common femoral artery by Dr. Dandridge, the hemorrhage was limited to the first spurt.

The speaker is certain that when the Esmarch strap is properly applied



and firmly held in position, the operation can be rendered almost bloodless, and there is in its use the great advantage of controlling the flow of blood through both the anterior and the posterior flaps, an advantage all the greater because of the fact that occasionally—rarely, it is true—the companion artery of the sciatic nerve is not an insignificant vessel, but one of large size, taking the place, it may be, of the superficial femoral, as was the case in a patient successfully operated upon by Dr. H. H. Clark, of Illinois, a former student and graduate of the Medical College of Ohio.

As respects the shoulder joint amputation, the speaker cannot see the necessity of underpinning the vessels, which can be readily controlled by the hand of an assistant following the knife, or better yet, the Esmarch strap can be applied, as he himself had done several times. He would be afraid that in using the pin as Dr. Muscroft had advised, undue compression might be made upon the axillary plexus of nerves, a danger which does not attend the proper application of the rubber strap. We could all see a wide range of application of the pins presented by the essayist, but in essence Dr. Muscroft's method is but acupuncture, which has been thoroughly tested and is not to-day regarded with very much favour.

DR. RAVOGLI remarked that after the expressed opinion of the previous speaker he will not enter in the discussion on the value of these hemostatic means. He can not agree with the essayist as to the novelty of the operation, which is nothing else than the acupuncture that has been employed for a long time in surgery. Vico Genoensis, surgeon, in 1520 in the article *De Vulneribus*, describes this operation: *modus autem ligationis aliquando efficitur intror mittendo acum sub vena desuper filum stringendum.*

In 1739 Petit and Heister, Jr. mentioned this operation of applying needles and thread so as to prevent and stop hemorrhage of the humeralis in the same way as later proposed by Simpson in amputations.

Rizzoli, in Bologna, tried to revive this method; he applied acupuncture in a case of a small aneurism of the arteria brachialis. The pulsations ceased entirely in the tumor, and ten days thereafter the acupuncture could be removed. The same

method was adopted in the removal of a sarcoma of the neck, upon the anterior carotis primitiva, with the purpose of preventing hemorrhage. In this case, however, the difficulty and danger of practicing acupuncture consists in the possibility of compressing the pneumogastric nerve which would arrest the heart's action.

The idea of passing a needle under the blood-vessels and ligating with the thread is an acupuncture which has been used for a long time in surgical practice.

DR. WILDER had witnessed with much pleasure one of the operations alluded to by Dr. Conner, and can see the importance of devising means for the prevention of hemorrhage, since one or several gushes of blood may prove dangerous to the patient otherwise in good condition.

The method proposed by the author of the paper is not a new one; and acupuncture was probably employed by the ancients.

It is a serious matter to remove a limb, with the amount of blood contained therein. The speaker thought that it could only exert a beneficial influence upon the case to apply an Esmarch bandage and thereby empty the blood from the extremity into the body.

Duncan, of Edinburgh, recommends transfusion in these cases to prevent shock.

DR. MUSCROFT, in conclusion, remarked that he had listened with great interest to the gentlemen who had participated in the discussion. Dr. Conner had laid stress upon the facility with which a reliable assistant was able to control the hemorrhage. He had forgotten that such an assistant is rarely present. If the speaker's method is employed an assistant is not needed.

In case of amputation at the hip-joint, the gluteal and sciatic vessels may be compressed just as easily as the femoral.

The employment of the pin is only temporary, and can not, therefore inflict any serious damage on the nerves by pressure.

The speaker's method was not the acupuncture Simpson employed; his acupuncture was only used after the amputation, when a ligature would answer just as well, and in most cases would require much less time.

The speaker had reviewed the history of the use of the ligature from 1500 B. C. up to the present time, and read the follow-

ing extracts from a paper bearing upon his subject:

Ligatures first used by Lus'ratus, in the year 1500 B. C., who tied the cord of new born infants eight inches from the umbilicus before cutting it.

Some writers claim that Hippocrates invented it, B. C. 460-377.

Archigenes, B. C. 100, made free use of the ligature after amputations.

Celsus, B. C. 30-25 and A. D. 45-50. Learned it from a physician of Alexandria.

Galen, A. D. 131-211, used the ligature to the distal ends of vessels. Material—silk and catgut.

Antythus, A. D. 300, used the ligature in treatment of aneurisms.

Paulus Aginatias, 628-680, treats extensively of the ligature.

Rhazes, A. D. 850-922, used the ligature.

Avicenna, A. D. 980-1037, also used the ligature (linen), and treated aneurisms after the method of Antythus.

Averoza, A. D. 1113-1162 or 1196, and Averroes, A. D. 1198, were familiar with the ligature.

Roban in 1252 used the needle with the ligature.

Roger of Parma, 1214, mentions the use of the needle with ligature, a practice followed by the most prominent Italian surgeons.

Bruno of Castel Lougobruco used the needle and ligature in 1252, both for arterial and venous hemorrhage, and also the hook to seize the vessels.

Charteac, A. D. 1300-1363, preferred the ligature when the artery was deep seated, the end of the artery being brought to view and then tied.

Leonardo Bertapaglia, died 1460, modified the intermediate ligature by passing the needle around with a double thread, not *under* but *through* the artery, tying both ligatures firmly over each other.

We have also the names of Giovanni Vigo, 1460-1520; Alfon Fern, about the same time; Angelo Botognini, 1508; Jacques Houllier, 1480-1508; Hans von Pfolsprevardt, in Germany; Huronymus Brusching, 1450-1533; Hans von Gersdorf, 1517, a military surgeon; Walther Ryff.

All of these men used the ligature, some of them as it is used at the present time.

"Then comes Ambrose Parè, 1517-1490, to whom surgery owes a great debt of gratitude, not as the discoverer but as the first and most devoted champion of the ligature.

Previous to his time the ligature had for the most part been used only as a dernier resort in cases of wounds of vessels, while styptics and the actual cautery were still relied upon as the safest and easiest methods of arresting hemorrhage."

Even his methods were far from being perfect," and it has taken centuries to establish it in the confidence of the profession.

These quotations are taken from the "Handbook of References of Medical Science," art. Ligatures.

In no case was he able to interpret the sense of any operation as similar to that of his proposed measure.

By adopting the latter we do away with all the disagreeable methods hitherto adopted.

Granted that in amputation at the shoulder joint hemorrhage is more easily controlled than at the hip, yet by using the pin we do away with the necessity of assistants.

The speaker claimed that his measure and acupressure are not identical. The latter never having been used as a prophylactic, and only in open surfaces, after, and not before, an amputation.

533 and 335 John St.

CINCINNATI:

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