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SOME FURTHER REMARKS

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ELASTIC CONSTRICTION AS A HÆMOSTATIC MEASURE

WITH A LETTER FROM PROFESSOR VON ESMARCH

BY

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ELASTIC CONSTRICTION AS A HÆMOSTATIC MEASURE,

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LAST year I had the honor to read a paper on "Elastic Constriction as a Hæmostatic Measure" before the National Association of Railway Surgeons. The principal objects in writing this paper were to call the attention of surgeons to the harm resulting from prolonged and too tight constriction, and to demonstrate, what is now common practice in this country, that elastic compression as a preliminary step to the application of the constrictor is unnecessary; that the desirable degree of bloodlessness can be secured by simple elevation of the limb.

The conclusions deducted from the paper were strongly endorsed by a number of the most prominent surgeons present, and the paper was quite extensively noticed in most of the medical journals in this country. I have very recently received a letter from my esteemed friend, Professor von Esmarch, in which he discusses the paper at some length; and as the letter contains many points of great interest, and as the views advanced represent the

present teachings and practice of this distinguished surgeon on elastic constriction and compression as blood-saving measures, I am confident that he will pardon me for giving it the widest publicity in this country without his permission. Professor von Esmarch is better and more favorably known in this country than any of the living German surgeons, hence I feel that in doing so I am only performing a duty toward the many American surgeons who enjoy his personal acquaintance and who are familiar with the products of his fertile pen.

"KIEL, February 20, 1893.

"DEAR FRIEND AND COLLEAGUE: You were kind enough last year to send me a copy of the lecture on 'Elastic Constriction' which you delivered before the American Association of Railway Surgeons. At that time I merely glanced at it, as I had other work and investigations on hand, and only now, as I am at work on the chapter on artificial bloodless methods for my book on Military Surgery, came to study it more thoroughly. I greatly regret that I cannot agree with you on certain points contained in your paper, and as I greatly value your judgment, and as your position among American surgeons ranks so highly, I would like to endeavor to give you a better opinion of the blood-saving method by constriction, and my position as inventor of the same. Having received such hospitality in your house at my visit in Milwaukee, and as you and your kind colleagues presented to me as a token of esteem the valued gold badge representing the bloodless method, which was received by me as the honored inventor, I now regret that I had not at that time an opportunity to more thoroughly discuss the above method with you, and to demonstrate to you the improvements over my original device contained in my first publication. Please allow me, therefore, *sine ire et studio*, to state my objections to some of the points in your lecture, hoping you will receive them kindly from your old friend and colleague.

"You are correct in stating that I am not the inventor of elastic constriction, but that by my improved technique I have given it a permanent position in modern surgery. It is true that Grandesso Silvestri applied elastic constriction in amputations before I did. Nevertheless I practised elastic constriction before I heard of the work of the above-named gentleman. I also wish to state that previous to that time, back in 1855, I applied roller bandages around the limb before amputation, to save blood, although ignorant of the fact that Brünninghausen had advised the same as far back as 1818 (see my lecture in Volkmann's 'Klinische Vorträge,' p. 380). The principle of my invention is not the controlling of hemorrhage by elastic pressure instead of digital and tourniquet pressure, as had been previously done, but my new and recognized idea that elastic constriction can be applied not only to amputations, but to all operations on the extremities, without loss of blood, and also giving the surgeon a bloodless field for operation. This brought forth the astonishment of Billroth, the enthusiasm of von Langenbeck, Strohmeyer, Brandis, and others; and the remarks of the great English surgeon, Simon, whom Strohmeyer quotes in his 'Erinnerungen,' p. 477. It would perhaps be convenient at the same time to read what Strohmeyer says on pages 477 to 482 in regard to this matter.

"I cannot in the least coincide with you in your statement on elastic compression, saying it is not only useless but also injurious, as you thereby condemn the most important part of my method.

"I have remarked in the beginning that firm elastic compression in cases of suppurative affections is dangerous ('Vorträge,' p. 284), and advised in such cases to elevate the extremity for a short time before applying constriction, and had subsequently no ill results. The same also applies to soft, malignant tumors, but I do not think it justifiable to abandon elastic compression entirely for these reasons, as there are still a sufficient number of cases left in which compression would be unaccompanied by

any risks and would certainly be far superior to simple elevation, among which are the following: 1. Operations for necrosis and bone abscesses. 2. Osteotomies. 3. Operation for pseudo arthrosis. 4. Operation for reposition of old luxations. 5. Extirpation of fibroma, lipoma, angioma, enchondroma, osteoma, neuroma, etc. 6. Plastic operation on cicatrices. 7. Operation for Dupuytren's finger contractions. 8. Operation for suturing of nerves and tendons. 9. Operation for ligation of arteries and veins. 10. Operation for aneurism. 11. Operation for removal of foreign bodies in deep tissues. 12. Operation for resection of joints without suppuration or running fistulæ. In such cases I advise figure-of-eight coil (Schlangentour) over joint. 13. Operation for obliteration of joints.

"The bad results which have been observed after too long constriction—necrosis of the margins of the wounds, slow healing, paralysis, etc.—are only caused, in my opinion, by unnecessarily tight constriction. I have in my former work called attention to the fact, and have personally witnessed, that the young men in England and Scotland, with strong muscles, developed by rowing, had too tightly applied the far too thick and too hard rubber tubing. This mistake in the commencement was made in Berlin also. I myself have never observed the above bad effects in my practice. The constrictor which I use to render the limb temporarily bloodless, as you are well aware, is not the former hard rubber tubing with chain, which I now only use in high amputations and exarticulations of the shoulder and hip-joints, but the ordinary rubber band 5 ctm. (2 inches) wide and about 140 ctm. in length, with an ordinary hook to fasten it. It answers most purposes and can, if correctly applied, even successfully compress the femoral artery close to Poupart's ligament in a strong and well developed man. In my clinic I allow the assistants to apply the constrictor under my supervision, so that the students can acquire a thorough knowledge of the same. The important point is that the

turns overlap each other evenly and with equal pressure. (See illustrations, Figs. 335, 353, 355, in my 'Military Surgery.')

"I generally apply this constriction high up; for example, operation on the forearm, constrictor high up about the middle of the arm and not close to the elbow-joint. Operation on the leg, apply to the middle of the thigh and not close to the knee-joint, avoiding consequently places where tendons and nerves lie in close proximity to the surface where the successful constriction of the parts would be interfered with. In regard to the length of time constriction could be applied to man without bad results, I have had no personal experience. In large operations I have applied constriction two hours or more without causing harmful compression of the nerves or gangrene of the flaps. I have also had reported to me from trustworthy colleagues cases where constriction was applied eight, ten, or more hours without evil results. A very interesting case of this kind you will find in vol. 22, p. 245, *Der Deutschen Zeitschrift für Chirurgie*. The constriction was applied to arrest the hemorrhage from an incised wound in the forearm, with injuries to the arteries, and remained for seventeen hours without developing gangrene or interfering much with the repair of the wound. As far as your experiments on animals are concerned, I would like to call your attention to Cohnheim's experiments, in which he demonstrated that in warm-blooded animals the circulation could be obstructed from six to eight hours without bad results.[1] Your experiments do not seem to correspond with Cohnheim's. I observe that in your second series of experiments the extremities below the constriction showed considerable œdema. As I cannot comprehend why the œdema should appear if the arteries are thoroughly constricted, a mistake must have been committed in some part of the experiment. Perhaps the constriction was imperfectly applied close above the wrist-joint, where

[1] See the above-cited Klinische Vorträge, p. 383.

so many tendons are located and but little soft tissue, and thus gave rise to venous congestion.

"This location, in my opinion, has the same disadvantage as constriction above the elbow or the knee-joint in man. Pardon me, my dear friend, for absorbing so much of your time, but my efforts are to give you a better opinion of the value of my bloodless operations. If I have succeeded I will be content. I have sent you copies of all of my former writings on the subject, and you will perceive that I have from time to time improved my method. I also have sent you a sample of my constrictor, which I use almost exclusively. For the elastic compression to be applied below, I now use, as before, the brown rubber bandage. Recently the first volume of the fourth edition of my 'Military Surgery' has appeared in print. I have sent you a copy, and hope in a few months to send you the second volume. By request of our Minister of the Interior, I have sent to the World's Fair at Chicago a number of illustrations of my artificial bloodless method. You are no doubt familiar with the same through my 'Handbook on Military Surgery.'

"My wife and I would like very much to go to the World's Fair this coming summer, but I am afraid it will not be possible. We both send you our heartiest and best wishes. I remain, sincerely,

"Your old friend,

"FRIEDRICH VON ESMARCH."

It is not my intention to criticise any of the remarks made or views expressed in the above letter. When I had the pleasure of introducing the writer of the letter to my class in Rush Medical College I said, among other things, "the surgeon who has transformed the bloody operating-theatre into a dissecting-room."

This allusion alone shows my stand-point in regard to Professor von Esmarch's position to one of the greatest discoveries in surgery of the present age.

The distinguished surgeon admits himself that others

resorted to the same expedient long before he startled the scientific world with his memorable paper on this subject. Esmarch's name should and always will be inseparably associated with bloodless surgery. To him, and to no one else, belongs the credit of perfecting the procedure, of giving it a permanent place in surgery, and of securing its universal adoption. At the present time different nations claim the discoverer of America, but who will convince the world that it was not Columbus? The substitution of elastic for inelastic material and the perfection of the technique entitles von Esmarch to be called the inventor of bloodless surgery. No one is more willing and anxious to accord to him this well-merited honor than I and all of my colleagues on this side of the Atlantic. In my paper I made the assertion that I regarded elastic compression not only as unnecessary as a preliminary measure to elastic constriction, but that it might become a serious source of danger. These assertions I must maintain now. I will admit that in the operations named in the letter, elastic compression could be employed without incurring immediate risks, but I must insist that it is not necessary. For more than ten years I have not resorted to it. By elevating the limb for a few minutes prior to applying the constrictor the parts are rendered practically bloodless. The only exception I would make would be in amputations at the shoulder or hip-joint as a blood-saving procedure in very anæmic persons for conditions which would not contra-indicate elastic compression. I have no doubt that if the directions given in the letter concerning the use of the elastic constrictor were carried out properly, we would hear less frequently of paralysis as one of the results of too tight constriction. The fact, however, remains that not infrequently paralysis of the musculo-spiral nerve follows as one of the immediate consequences of constriction of the arm. One such case occurred in my clinic during the present college session, and a similar case came into the hospital for treatment from the Pacific

coast. In my own case the constrictor was applied by an assistant. The paralysis lasted for four weeks. In the second case the surgeon was under the belief that he had cut the nerve. Examination nine weeks after the operation satisfied me that the paralysis was caused by constriction. Perfect recovery did not take place until three months after the operation. These, and other cases which have come under my observation since writing my paper, have satisfied me that paralysis from elastic constriction occurs more frequently than most surgeons are willing to admit. That the blame does not rest on the method is true; but this and other complications following it should be kept in view of the inexperienced surgeon, students, and assistants in order to call their attention repeatedly to its proper application in practice.

Troublesome parenchymatous hemorrhage and marginal gangrene of flaps and wounds are other complications which I am convinced are often attributable to improper methods of bloodless operating. As stated in the beginning of this paper, it was not my intention at any time to discourage the use of elastic constriction, but to remind the profession of some of the difficulties which may follow its improper use. As far as my own experiments are concerned, it can be seen from the records that the circulation in the limb was completely arrested below the point of constriction, as during the time the constrictor was in place incisions in the distal part were never followed by bleeding until the constrictor was removed.

In all the experiments the limb was not rendered bloodless prior to the application of the constrictor, and this might account for the swelling which was noted in some of the experiments.

I regard Professor von Esmarch's letter as a valuable contribution to the history of bloodless surgery, and, as such, it will be read with profit and interest by surgeons in America.