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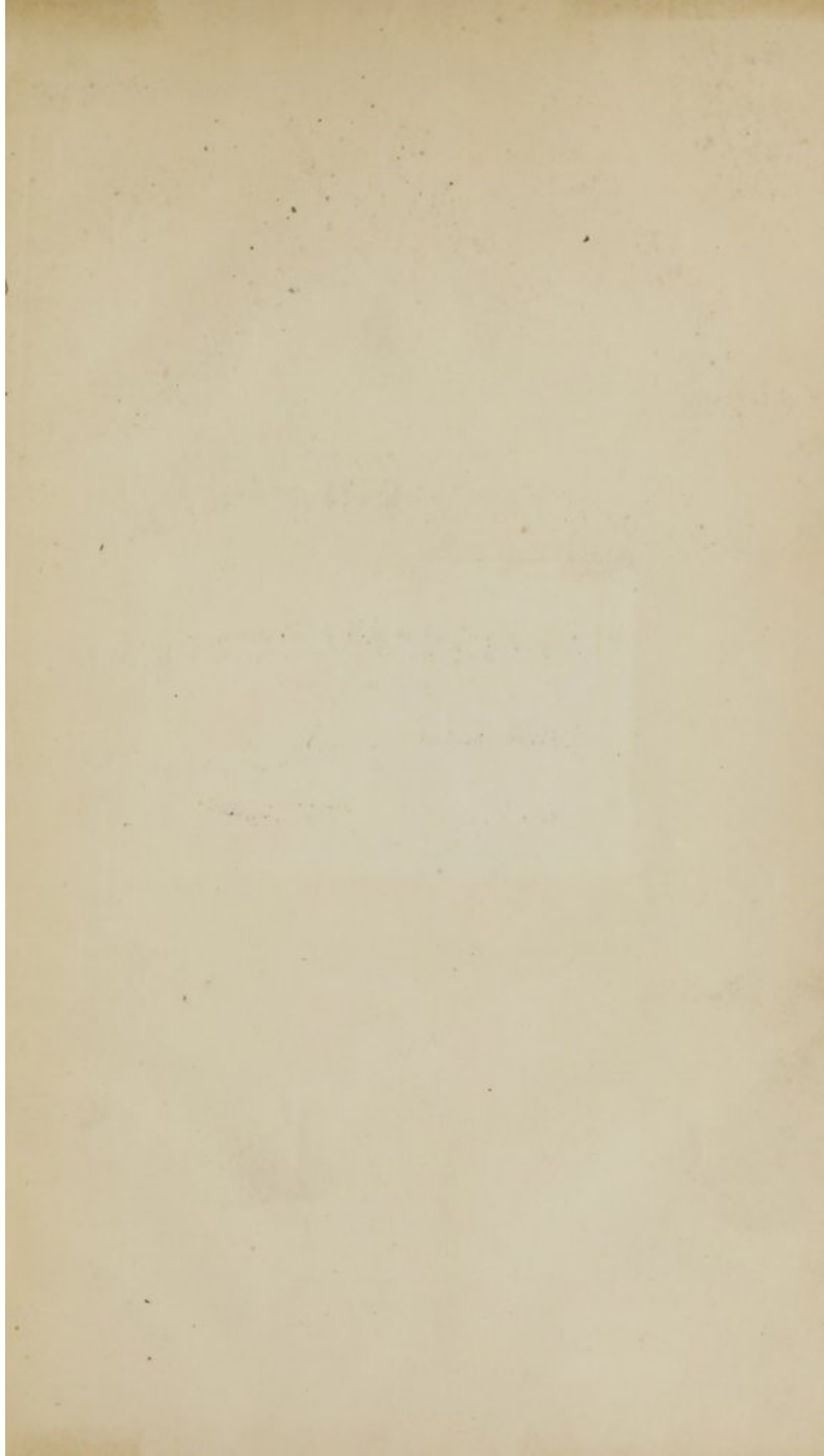
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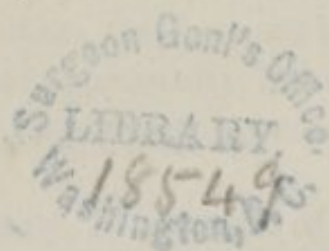
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HISTORY
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THE LIGATURE APPLIED
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THE BRACHIO-CEPHALIC ARTERY;
WITH
STATISTICS OF THE OPERATION.

(Paper Read before the Tennessee State Medical Society, May, 1856.)

BY
PAUL F. EVE, M. D.



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HISTORY
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(From the Nashville Journal of Medicine and Surgery, for July, 1856.)

HAVING recently seen two cases of supposed aneurism of the *arteria innominata*, I have thought, in calling the attention of the Society to one of them, the occasion might be improved by giving an account of the several attempts made to tie this large artery. It may be useful to know what has been the result of these operations, for if, as has been asserted, this vessel has never yet been tied successfully, its history should be written, and henceforth the proceeding interdicted in the practice of Surgery.

The account of many, if not most of the surgical operations performed at the present day, extend far back into the earliest periods of medicine. But while this is true of venesection, trephining, amputation, and even of lithotomy, the ligature to arteries for aneurisms is quite a modern one; and in regard to the vessel, the subject of this essay, so recent have been the first operations upon it, that he who dared originally to cast a ligature around this great branch of the aorta, the *brachio-cephalic*, is still engaged in the active duties of the profession, and is undoubtedly the most skillful operator at the present day.

We learn that early in the present century, Mr. Allen Burns of Glasgow, wrote to Sir Astley Cooper for advice as to the best method of placing a ligature around the arteria innominata; stating that he had a patient laboring under aneurism of the subclavian artery near to its common origin with the right carotid. England's greatest surgeon, after describing what he would do under the circumstances, thus cautioned Mr. Burns: "take care that the disease itself is not seated in the arteria innominata, or arch of the aorta." No operation fortunately was attempted, and the patient dying of hemorrhage in about two months, Mr. Bransby B. Cooper, the nephew of Sir Astley, states that upon examining the body, both the aorta and innominata were found diseased.

The honor of tying a ligature the first time around the brachio-cephalic artery in a living human being, belongs exclusively to Dr. Mott, and the operation is therefore American.

CASE I.—*Ligature to the Arteria Innominata.* By PROF. VALENTINE MOTT, M. D., &c., of New York City.

This case was published originally in the Medical and Surgical Register, which was designed chiefly for those occurring in the New York Hospital, and was edited by Drs. Watts, Mott and Stevens, of that city. The operation was performed on the 11th of May, 1818, and was commenced with the intention of either tying the subclavian artery before it passes through, or rather between the scaleni muscles, or the brachio-cephalic itself, should the aneurismal tumor be found to have involved too much of the former vessel, so as to prevent the application of the ligature to the cardiac side of the affection.

The history of this deeply interesting case is succinctly this, as furnished by Dr. Mott:—The patient was a seaman, born in Massachusetts, aged 57 years, and was admitted into the medical department of the New York Hospital for catarrh, on the 1st of March, 1818. He stated that while at work on shipboard, a week before his entrance, his feet had accidentally slipped from under him, and he fell on his right arm, shoulder and back part of his head. No great inconvenience from the fall was at first experienced, but a day or two after it he was unable to lie

upon his right shoulder which became swollen and painful. He was treated for this tumefaction, without any suspicion of its being of an aneurismal character, from the 1st of March to the 3d of the following May, when the patient complained that he felt something give way in the tumor; his shoulder at the same time becoming very painful, the tumor suddenly increasing and presenting a distinct pulsation. Its most prominent projection was below the clavicle. On the 4th of May, the swelling still augmenting, the patient was transferred to the surgical ward. The 5th and 6th the case still progressed unfavorably, and on the 7th a consultation was held respecting it by Drs. Post, Kissam, Stevens and Mott. The latter gentleman now proposed to tie the subclavian artery within the *scaleni* muscles, or even the *arteria innominata*; to which the consulting surgeons agreed; the patient also assenting after a candid presentation of the probable result of the operation, declaring his present condition was truly wretched, and he would cheerfully take the chance promised by it for his life. A thread passed over the tumor, measured, on the day of the operation, five and a quarter inches in one direction, and four in another, and it projected above the natural surface about two inches.

May 11th, one hour before the time assigned for the operation, 70 drops of laudanum were administered. There were then no difference in the pulsation of the arteries of the two upper extremities, and his pulse was uniform, regular, and beat 69 to the minute. The patient was placed in a recumbent position, a little inclined to the left side, and an incision made upon the tumor, just above the clavicle, carried close to the bone and the sternum, to terminate over the trachea. Another one extended up along the inner edge of the *sterno-cleido-mastoid* muscle. The integuments and *platysma myoides* were next dissected up from the angle of the wound, and the sternal origin of the *mastoid* muscle, and as much of its clavicular as the tumor would permit were next reflected in the same direction. The *sterno-hyoid* and *sterno-thyroid* muscles were then divided and turned over upon the trachea, and the sheath of the right primitive carotid, *par vagum* and internal jugular were exposed. This was now opened, the vein and nerve drawn to the outside, the artery to

the inside, and descending this latter the subclavian was reached about half an inch from its origin. It was now ascertained that this vessel was too much involved in the disease to justify the application of the ligature to it, and it was at once determined to tie the innominata. In examining the subclavian more particularly at this stage of the operation, a small artery was divided which filled the wound with blood six or eight times. It was supposed to be either the internal mammary, the superior intercostal, or an anomalous branch. This hemorrhage was arrested by pressure. Arrived at the bifurcation of the innominata, a careful dissection over its interior surface was first made, then around it so as to avoid wounding the pleura, the recurrent or phrenic nerves, and a silk ligature was passed and tied about half an inch below the bifurcation, into the right carotid and right subclavian.

The aneurismal needle was passed from below upward, and the knot gradually tightened, watching the effects upon the system. No change of feature or agitation of body was produced by it, nor any unpleasant sensation experienced in the head, chest or arm. The tumor was immediately reduced about one-third in size, and the pulsations ceased in the right temporal and radial of the right arm.

Three small arteries were tied during the operation; one under the sternum, near the mastoid muscle, and may have been a branch of the internal mammary; the second also near the inner edge of the same muscle, supposed to be the most descending branch of the superior thyroid; and the third, which was divided in raising the sterno-thyroid muscle, a branch of the inferior thyroid. Two to four ounces of blood was the quantity estimated to have been lost.

Three sutures and straps of adhesive plaster were employed to coaptate the wound. The operation lasted an hour, and was well borne by the patient; the pulse was not altered by it; the only difference noticed after it was in the temperature being a little lower in the right than in the left arm. But towards evening even this could not be perceived.

On the next day, although no pulsation could be felt in either the brachial or radial arteries of the right arm, still there was

evident circulation in the limb, and the pulse was detected in the temporal of the right side.

During the after treatment there were noticed an increased action and volume in the left carotid; a returning pulsation in the right radial about the fourth day after the operation; some soreness in deglutition; slight fever; a cough; some suppuration in the wound, which was dressed first on the fifth day, and found to be doing well. On the ninth day the patient expressed his gratitude for the relief afforded by the operation, and sat up in bed. His pulse rose this evening to 110, and while preparing to dress the wound, which had contracted and looked well, all but a small opening in the deepest part of it, a sudden and unaccountable *hemorrhage* took place. The size of the stream and rapidity of its flow gave rise to fearful apprehensions for the man's safety, but it was arrested by pressure.

On the fourteenth day the ligature was found loose in the pus and removed, since which the suppuration had been pretty free, though the patient was improving and sitting up a little every day. He used now his right arm better than he had at any time since the accident on shipboard. The next day he was taken down stairs and rejoiced to see once more his hospital friends. On the twentieth day he descended two pair of stairs, and walked several times across the yard of the Hospital.

While turning in bed on the twenty-third day, and when the wound had nearly healed, though the aneurismal tumor still existed, another alarming hemorrhage occurred, supposed to the extent of 24 ounces, which reduced the patient apparently to *articulo mortis*. From this prostration he was revived, but the bleeding continued to recur at irregular intervals the two following days, and *proved fatal on the twenty-sixth day after the operation*. The temperature in both arms was the same to the last.

The post-mortem examination revealed the following important facts:—Not a vestige of inflammation or its consequences, says Dr. Mott, could be discovered in the arch of the aorta or origin of the innominata, nor in the lungs or pleura. A probe passed from the aorta through the innominata into the ulcerous remains of the aneurism. The coats of the arteria innominata

for half an inch below where the ligature had cut through, showed appearances of inflammation, and there was a coagulum adhering to one of its sides. This artery half an inch from its origin, gave off an anomalous branch large enough to admit a crow-quill. The three vessels, innominata, right subclavian, and carotid, for an inch were destroyed and removed by the ulceration. They all opened into this aneurismal sac or ulcer. The clavicle was found carious, and entirely divided about the middle.

The circulation to the right upper extremity in this case was supposed at first to have been carried on by the inosculation of the epigastric and internal mammary arteries, and after the destruction of the aneurismal tumor in the subclavian by ulceration, the principal supply of blood to the arm must have been derived from the communication of the intercostals with the thoracic arteries; the anastomosis of the infra-scapula and other arteries of the axilla with the intercostals, and also the occipital with the ascending branches from the subclavian, may have contributed to this circulation.

This case fully proved the important fact, that the circulation in the arm and head of the right side, and the regular performance of the animal functions were not interrupted materially by tying the *arteria innominata*; and moreover, there was good promise for some time, that the operation would be successful.

When a patient, after an important operation has been performed upon him, rises from bed, descends a flight of stairs and walks in the yard, all unaided, there are hopes that he will live again; but the subsequent experience of about a dozen similar attempts to the one above narrated, satisfies us now pretty surely that he cannot. But at the time that this case was published, the profession entertained little doubt that ligature of the *arteria innominata* would soon become the proper treatment for aneurisms situated near its bifurcation into the right subclavian and right carotid.

Mr. Ab'm Colles, lately one of the most distinguished surgeons and professors of Dublin, wrote to our no less celebrated countryman, the following liberal and noble sentiments: "I shall

not attempt to say how much the profession is indebted to you for this bold and splendid operation. That it did not succeed I lament on your account; that it will hereafter succeed there cannot be a doubt in the mind of any reasoning man." Alas, that bitter experience should have taught us on this subject, as on many others in medicine, how valueless is all reasoning alone for practical purposes in our profession.

CASE II.—The 2d case recorded of *Ligature to the Brachio-Cephalic*, was that of *Baron Von Graefe*, late Surgeon-General to the Prussian army, and was performed in 1822. He made only one incision on the inner edge of the mastoid muscle, and continued it two inches downwards upon the sternum. The muscles, cellular tissue, &c., were then separated down to the carotid artery, and the *arteria innominata* reached and tied. The ligature became loose on the fourteenth day, as in Dr. Mott's case, and the patient lived sixty-five days after the operation. The cause of death was hemorrhage, produced by very imprudent efforts on his part. This occurred fifty-one days after the separation of the ligature.

We regret not succeeding in obtaining more particulars of this case: the promise of success, it will be perceived, was even much greater than in the first instance in which this operation was performed.

CASE III.—Upon the authority of Dr. Frederick Brittan, the translator of Prof. Malgaigne's *Operative Surgery*, *Norman*, of Bath, in England, in 1824, next tied the *arteria innominata*. He gives no particulars of the case, except that it proved fatal. The *London Lancet* also mentions this case, and also Mr. Ferguson, in his *System of Practical Surgery*.

CASE IV.—The fourth case was operated upon by *M. Arendt*, the first surgeon of the Emperor of Russia; his patient died on the eighth day of inflammation of the aneurismal sac, pleura and lung. It is published in the *Journal of Graeffe and Walther*, of Berlin, in 1826, which I have not been able to obtain.

CASES V. AND VI.—Prof. Velpeau in his article on sub-clavian artery, in the *Dictionnaire de Médecine* in 30 volumes, says, that in August, 1840, M. Arendt, the operator in case

fourth, verbally communicated to him that another distinguished surgeon of St. Petersburg, M. *Bujalski*, had twice performed the same operation, losing both patients at the end of two or three days.*

CASE VII.—This case is published in the *Baltimore Medical and Surgical Journal and Review*, volume I., and was operated upon by *Prof. J. Wilmot Hall, M. D.*, on the 7th of September, 1830. Several diseased glands and extensive morbid adhesions were found in connection with the aneurismal tumor, and considerable hemorrhage occurred during the performance of the operation. Compression by means of sponges, sutures to the wound, &c., were employed to arrest the bleeding, even after tightening the ligature. Four days after the operation, the patient began to complain of difficult respiration and deglutition, pain about the sternum, &c., &c.; had slight discharge of bloody serum from the wound; continued to decline, and died on the fifth day, or 113 hours after the operation. In the post-mortem examination, all the parts involved in the operation were found closely united by adhesions, and were thickened and softened. Even the carotid and innominata could be readily torn. The ligature, which remained in the wound, had passed through two holes in the coats of the innominata, which were two or three lines in diameter, and six to eight apart, and situated on the anterior and internal surfaces of that vessel.

CASE VIII.—In this instance, *Prof. Wm. H. Porter*, of Dublin, in 1831, cut down upon the arteria innominata, but finding the artery in such a diseased condition, he failed to apply a ligature. The aneurismal tumor nevertheless disappeared entirely and the patient perfectly recovered. So that it may be said, the only successful attempt upon the brachio-cephalic artery to cure aneurism by ligature, was where an Irishman did not tie the vessel at all. In this case, too, no pulsation could be felt beyond the tumor at the time the operation was performed, and its performance may have only hastened the coagulation in the

*This is his language:—"M. Arendt, qui m'a communiqué verbalement ce fait, en août 1840, m'a dit qu'un autre chirurgien distingué de Saint Petersburg, M. Bajalski, avait eu recours deux fois à la même opération, et que les deux malades avaient succombé au bout de deux ou trois jours."

aneurism by the inflammation it created around the artery; a process which nature was carrying on to effect the cure.

CASE IX. This operation was performed in the Benevolent Asylum in Sydney, New South Wales, by *W. Bland, Esq.*, on the 26th of March, 1832, as published in the London Lancet. The patient, aged thirty-one, had perceived a small throbbing tumor immediately above the middle of the collar bone two years before applying for relief. The method of operating was that of Surgeon Graefe, with the addition of dividing (as Dr. Mott did) the sternal origin of the mastoid muscle. On the third day after the operation, the right upper extremity was of about the temperature of the left. The wound was first dressed on the fourth day; found to be doing well, but no perceptible pulsation could be felt in any of the branches, either of the right carotid artery or right subclavian. The patient, however, had perfect use of both arms.

On the seventeenth day, up to which time the case was very promising, *hemorrhage* occurred, and continued to return until death, from exhaustion, took place the next day, being the eighteenth since the operation, and before the ligature had been detached from the wound.

On dissection the following facts were observed: the pleura and contiguous cellular substance had been in no way injured by the operation; the wound had nearly healed, from its bottom to the surface, and contained only about a teaspoonful of matter; the ligature encircled the *arteria innominata*, close to its bifurcation, and had nearly completed its division; the carotid artery was closed by solid coagula, and about two-thirds of the brachio-cephalic itself was filled with a solid plug of coagulum adhering to its walls, but the subclavian up to the aneurismal tumor still remained pervious, as also did the axillary.

CASE X. The ligature was applied near to the common origin of the right carotid and subclavian, on the 26th of September, 1836, in a hospital of Leipsic, by *M. Kuhl*. This operation was for a cancerous tumor in the neck, on a patient forty-three years of age. The external jugular was wounded during its performance and was tied. The surgeon thought he had tied

only the carotid; but the patient dying on the third day, it was ascertained that the ligature had embraced both the carotid and subclavian, three lines above their origin from the innominate, and their coats were found ruptured.

CASE XI. LIGATURE TO THE ARTERIA INNOMINATA FOR ANEURISM OF THE SUBCLAVIAN. By *Prof. John Lizars, F. R. S. E., etc., etc.*

May 31, 1837, this surgeon, assisted by Mr. Fergusson, now surgeon to Prince Albert, tied the innominate for aneurism of the subclavian in a patient, aged thirty, a carter by occupation; who fifteen months previously had been injured by a fall, and then by another, a few months after receiving the first, which fractured his left clavicle.

Six weeks before his admittance into the hospital he had complained of wandering pains in different regions, which were supposed to be rheumatic, but as he now referred these mostly to the right clavicle, a small tumor was detected above it.

The aneurismal needle was carried around the artery, from the right side, upwards, towards the trachea. During the operation only about two ounces of blood were lost. The pulsation in the tumor was completely suspended by the ligature, and as it was tied the patient exclaimed, "Oh my heart!" After its application the pulse was full, and varied from 74 to 78.

June 1st.—The day after the operation, the patient was getting along without accident and the wound looked well.

June 3d.—Pulsation had returned in the tumor; patient complained of the heat of the weather, and a small quantity of blood was distilled from the wound.

June 4th.—The pulsation in the tumor (which now feels quite hard) has disappeared. Pulse is now 110, and there have been three copious evacuations from the bowels with relief.

On the ninth day from the operation the wound had nearly healed, and the pus was thick and laudable. The urine had generally been drawn off, otherwise the patient continued to improve up to the fourteenth day, when he experienced some fever, for which he took calomel, and then vomited bilious matter. The sixteenth day he was again better, and the wound

had healed with the exception of a small sinus leading to the ligature, the knot of which (for both ends of it were cut away) was found amongst the pus the next day. The ligature was thus detached spontaneously in this case on the seventeenth day from the operation.

The patient again became worse, had pain in the right side and difficult breathing, nausea and then diarrhoea with fever. He awoke on the twentieth day with a severe paroxysm of dry cough, which unfortunately produced *hemorrhage* to about eight ounces, but which was controlled by pressure. It however returned during this and the next day, and then proved fatal.

The examination of the body had to be made hurriedly. Twenty ounces of coagulated blood was found at the root of the neck and upper part of the right pleura, which presented recent adhesions throughout its extent. At the point of deligation the arteria innominata had separated, and there was some coagulated blood extending a very short distance into the aortic portion of this vessel, and up the right carotid; but the other artery, the subclavian, with its branches were all pervious. The aneurismal tumor was found collapsed.

We learn from a subsequent number of the London Lancet, from which we have condensed the above account of the case, that a more minute examination of the pathological specimen, which had been preserved in alcohol, was made. The aortic portion of the innominata and the right carotid were found filled with coagula, none of these presenting the appearance of recent formation; while the thyroid, internal mammary, transverse cervical and vertebral, with the subclavian from its origin to the aneurism, were all pervious. The writer, under the signature of Edinensis, dated Edinburgh, Nov. 27, 1837, supposes the fatal hemorrhage in this case was derived from the vertebral artery.

In this case it is reported, with how much truth we know not, that there was room between the aneurism and arteria innominata to have tied the subclavian. Indeed, the Lancet says, Prof. Lizars is now inclined to believe that first tying the subclavian just at its origin from the innominata, and then the carotid, would promise better success than the operation he per-

formed. This, however, would not, in all probability, have affected the result, since a ligature to the first portion of the subclavian is about as fatal as that to the brachio-cephalic.

CASE XII. In this instance, like that which occurred to M. Kuhl of Leipsic, the two branches of the brachio-cephalic, and not the innominata itself, were tied close to their origin. We have, however, the authority of Prof. Velpeau for placing these two in the category of ligature to that large vessel itself. The operation was performed for aneurism of the right subclavian in July, 1838, by the late distinguished surgeon, *Mr. Liston*, assisted by Profs. S. Cooper and Quain of the London University. The patient was a tailor, aged 31 years. He had been intemperate, and six months ago fell with his right arm behind him, and sprained it a good deal. A tumor, size of a hen's egg, is now situated above the right clavicle, and pulsates synchronous with the action of the heart. The innominata with the carotid and subclavian was exposed, and the two latter tied close to their origin from the former. The patient perished from hemorrhage on the thirteenth day after, when the ligature was found loose in the wound of the carotid and that artery divided, but its orifice closed with a firm coagulum; but that around the subclavian had not separated; the brachio-cephalic was blocked up with solid blood, the hemorrhage having proceeded from the subclavian which was open and ulcerated. The vertebral and all the arteries derived from it were pervious. A coagulum then in the innominata or even its obliteration, did not cure an aneurism of the right subclavian in this instance.

CASE XIII. *Failure to tie the Arteria Innominata for Aneurism of that vessel and origin of the Subclavian.*

This case was reported by Mr. Oldfield to the Physical Society of Guy's Hospital, and is published in the London Medical Gazette, December, 1844. He says, the late *Mr. Key* was induced to attempt the operation as a last resource for the well-doing of the patient, because it was not certain how far the disease had progressed or that the arch of the aorta was involved in it. After reaching the arteria innominata, he found it impossible to surround it with a ligature, in consequence of a

tumor connected with it, and the attempt to tie it was finally abandoned. The operation lasted one hour; the wound was nearly filled with granulations at the time of the patient's death, which took place the 23d day after, when she sank with symptoms of pulmonary distress and exhaustion. The tumor which prevented the completion of the operation as intended, proved to be an aneurismal enlargement of the upper part of the arteria innominata and origin of the subclavian; the carotid being comparatively healthy. The aneurism, together with a mass of enlarged glands, pressed on the right bronchus, and produced the failure to pass the ligature.

CASE XIV. On the authority of my friend Prof. George C. Blackman, now of the Medical College of Ohio, Cincinnati, Dr. *Hoffman* of New York City, cut down to the arteria innominata with the design of applying a ligature to it. It was found, however so diseased, that further proceedings were suspended, and the case terminated fatally. This is the operation connected wrongfully with the name of the late Dr. Post.

CASE XV. *Dupuytren*, is said, by Mr. Erichsen, to have performed the operation with a fatal result. We have no particulars of the case, but the authority is good. Mr. Fergusson says, Dupuytren only refers to a case which occurred some years ago in Paris, and Prof. Blackman thinks the operation was never performed by him, since M. Pariset, in his *History of the Members of the Royal Academy of Medicine*, does not allude to it, and would not likely have omitted such an achievement to add to the lustre of the great French lights of surgery.

In all the foregoing cases the tying of the brachio-cephalic artery was designed for aneurism of that vessel itself, or a diseased condition of one of its branches, the right subclavian, in nearly every instance, or the right carotid. We have now to notice one in which it was tied for a wounded artery.

CASE XVI. A military surgeon, *M. Hutin*, operated upon a patient whose axillary artery had been wounded, and for which the subclavian outside of the scaleni muscles had been tied. On the ninth day thereafter a dreadful hemorrhage ensued, leaving no other recourse but to secure the innominata. This

was done at midnight, but the man, already exsanguined, died at eleven o'clock the next day. This case is published in the *Lancet* for May, 1842.

In the foregoing *sixteen* cases, which are all we have found recorded, and are more than ever collected before, for Velpeau himself only enumerates ten, and Erichsen only nine, not one was successful from the ligature. In this connection we notice the following case bearing upon this important subject:

SUPPOSED OBLITERATION OF THE ARTERIA INNOMINATA BY LIGATURE TO THE CAROTID. *By M. Peixoto of Rio Janeiro, South America.*

The corresponding editor of that excellent Journal, the *Virginia Medical and Surgical*, Dr. Otis, states, that in the Bulletin of the French Academy of Medicine, for March 15, 1854, appeared a report by the distinguished Prof. Velpeau on certain operations communicated by Dr. Peixoto of Rio Janeiro. The most curious of these cases, says the reporter, "is incontestably that of the obliteration of the innominate artery by a temporary ligature."

This is the history of the case: A Dr. Moura had an erectile tumor of the right ear, to relieve which several ligatures had been applied in Paris to the external and internal carotids. On the 14th of November, 1851, Dr. Peixoto tied the primitive carotid in its middle portion. This was followed by frightful hemorrhage on the separation of the ligature, and a temporary one was then applied at the origin of the carotid, from the brachio-cephalic. This was said to have produced a clot in the innominate itself, after twelve days compression, but resulting in neither sufficient ulceration or inflammation to divide the artery. To this treatment complete cure succeeded, in two months the patient enjoying the best possible health.

Prof. Velpeau goes on to say, this is, I believe, the first example of *cure* after artificial obliteration of the brachio-cephalic trunk. This, then, is a fact gained; the *arteria innominata* may be obliterated by means of the ligature. But he furthermore adds, "the case of Dr. Peixoto scarcely falls within the category of ligation of this artery." The carotid had been tied, hemorrhage succeeded, and a riband was placed around this vessel at

its origin from the innominata, but without dividing its coats. The patient having recovered, we are unable to say positively, definitely, or absolutely what parts were embraced by it, or if the brachio-cephalic has been obliterated by it. Prof. Malgaigne expressed his doubts as to the reality of the ligature having been applied so as to close the innominata in this case. He thought, too, that a riband which simply flattened the vessel, would not interrupt the circulation in such a trunk as the brachio-cephalic. Finally, M. Velpeau said that he was not positive on this point. There were some particulars in the operation which he did not understand; an examination of the parts could alone determine the question, and this could not yet be done, as the patient still lived. And at this meeting of the Academy of Medicine, he, moreover, maintained his former opinion expressed on this subject in view of its uniform fatality, viz: *ten cases, ten deaths: a ligature to the arteria innominata cannot be otherwise than a murderous operation, an operation which should never be attempted, again, which cannot be considered pardonable hereafter.*

In reporting the above case, we wish it to be understood that the facts are detailed in an American Journal from the French, and the language may vary from the original, which is Portuguese or Spanish. No one can be too particular in presenting every circumstance connected with or bearing upon an important case in medicine. Dr. Otis has no doubt given as faithful a representation of the one here considered, as he could under the circumstances; but the operator has failed to describe it even to the comprehension of a Velpeau or a Malgaigne. He does not, moreover, present it as a case of successful ligature to the brachio-cephalic artery, but simply that of a temporary ligature at the origin of the carotid, producing in twelve days a clot in the innominata, which resulted in the cure of his patient, and this without affecting sufficient ulceration or inflammation to divide the vessel. We cheerfully grant him all he asks, and yet contend that the obliteration of brachio-cephalic by ligature has not yet been proved, and the position is therefore still true, that death has occurred in every instance in which the arteria innominata has been tied.

In noticing this wonderful case, the New York Journal of Medicine copies it from the *Gazette des Hospitaux*, March 1854. The language there used is this: "A terrible hemorrhage before the fall of the ligature of reserve at the origin of the artery, (carotid), from the brachio-cephalic trunk; formation of a clot in the trunk itself, after twelve days of compression by the temporary ligature, which neither ulcerated nor inflamed the artery at the point cut down to tie it." The New York editor says, "it seems remarkable that the constriction of the ligature, not sufficient to inflame or ulcerate the artery, should so obstruct the current of the circulation through the trunk of the innominate, as to have produced its obliteration; and he does not wonder that M. Malgaigne should have expressed some doubts as to the value of this case, doubts in which M. Velpeau confesses he himself participated."

We entertain no idea that this case of M. Peixoto has in the least changed the published opinion of Prof. Velpeau, who ten years ago declared the recorded facts were sufficient to decide the question without appeal; *that so far as aneurisms were concerned, a ligature to the innominate, or brachio-cephalic artery, ought to be proscribed from practical surgery.* And the subsequent experience of the profession has unanimously confirmed this decision, since no one within the last ten years, we believe, has ventured to perform this most formidable and hazardous operation.

Mr. Thomas Wakley, the distinguished editor of the London Lancet, coroner of Middlesex district, and member of the British Parliament, held the following language in 1841, "Ligature of the arteria innominate has, we believe, in all instances in which it has been practiced, terminated unsuccessfully." And Mr. Erichsen, one of Liston's successors to the professorship of surgery in the London University, declares that "as its performance has hitherto in every instance entailed death, and in all cases but one, a speedy death to the patient, it should without doubt be banished from surgical practice." See his *System of Surgery*, p. 528, American edition, 1854.

Nor have we greater encouragement from a ligature placed upon the subclavian artery within the scaleni muscles. In

1811, the late Mr. Abraham Colles, one of the recent professors of Anatomy and Surgery in Dublin, first tied the subclavian artery to the trachæal side of its course, and the patient died of nervous exhaustion at the end of a week. In this case there was an aneurismal dilatation of the arch of the aorta and of the *arteria innominata*; of course, therefore, there had been a grave error of diagnosis. In 1831, Dr. Mott tied this artery in the same portion of its course, in a young woman for a small indolent tumor, but she died of repeated hemorrhage in twenty-one days. Mr. Liston next operated in 1838, on a tailor, aged thirty-one years; he also died of hemorrhage about the thirty-sixth day. Then Mr. Patridge in 1841, on a patient thirty-eight years old, and he died on the fourth day of pleurisy, after having experienced the evening after the operation, a sort of venous hemorrhage. This case was published in the Dublin Press in 1841; and these four having been unsuccessful, Velpeau declared in 1844, he had no hesitation to conclude that the ligature to the subclavian within the *scaleni*, with the view to cure aneurisms of the hollow above the clavicle, ought absolutely to be proscribed from practical surgery. Since then Hayden and O'Reilly have also performed this operation; death from hemorrhage occurred to each patient, to one on the twelfth, and to the other on the thirteenth day.

In one of the very latest works on Surgery, Mr. Erichsen's, we find of the three methods of applying a ligature to cure aneurism of the *arteria innominata* up to 1854, the following was the result: 1st, of ligature to the subclavian only, three cases, viz: Dupuytren's, Laugier's and Wardrop's; the last lived two years, but its partial success was attributed to the accidental occlusion of the carotid. 2d, of ligature to the carotid only, we have seven cases, viz: Evans', Mott's, Key's, Fergusson's, Campbell's and Hutton's. In one alone was there material benefit, and that again owing to an incidental circumstance, the inflammation and suppuration of the aneurismal sac. 3d, in which both carotid and subclavian were tied, three cases, Hearn's, Wickham's and Rossi's; in the last instance both vessels were simultaneously tied, and the patient died in six days. In the other two, more than two months in one,

and nearly two years intervened between the tying of the carotid and then the subclavian, still the patients died; one in two and a half, and the other in three weeks after the second operation.

In these ten cases then, where a ligature was applied to the subclavian or carotid, in six, death was accelerated by it, in two, the disease was not interfered with by it; in one the patient lived two years, and in one only was the disease cured. Mr. Erichsen says, "these results would not in my opinion justify any surgeon in again undertaking either of these operations." The ligature to both branches of the brachio-cephalic at once, he adds, are too few yet to draw any important inference from them.

From the foregoing history of the ligature applied to the *arteria innominata*, it must not be inferred that a patient laboring under an aneurism of the brachio-cephalic artery, or near its bifurcation, is necessarily hopeless, remediless, or beyond the aid of our noble art. For though he may be, so far as ligation to either of the great vessels, *innominata*, subclavian or carotid is concerned, yet some have been recovered by medicinal treatment, and a few from spontaneous obliteration, or destruction of the aneurismal sac. But the positions of Velpeau are still true; the *arteria innominata* and subclavian to its tracheal side have never yet been successfully tied, and probably never will be.

The imminent danger of these operations, viz: ligature to the brachio-cephalic and tracheal side of the subclavian artery, is simply in the impossibility to obliterate by active means the first portion of the latter vessel. The right subclavian between its origin from the *innominata* and the giving off of its branches, cannot be successfully ligatured. In every instance yet attempted this portion of the vessel after death has been found pervious, kept so undoubtedly by the branches derived from it; and it was this collateral circulation which preventing mortification in the right upper extremity, induced surgeons to hope for success by the operation. There is no difficulty about the carotid; that has generally been found closed with coagula in the cases examined; so also has the *innominata*

been seen occasionally in the same condition after the operation for aneurism situated near it; it is solely the *subclavian* which has never yet been obliterated by a ligature at the point already indicated, and this because of its branches anastomosing so freely with the surrounding arteries, the intercostals, occipital, and even the distant epigastric. A ligature to a sound *innominate* might possibly obliterate it and the primitive carotid, but never the *subclavian*. Applied to a diseased *brachio-cephalic* or *subclavian* in an aneurismal condition, success is out of the question. It is better then under the circumstances, when other means fail, to let the patient die, rather than tie either of these arteries.

The two cases examined this year of supposed aneurism of the *arteria innominata*, one was traumatic, the other apparently spontaneous.

CASE I.—Was a patient from South Carolina, who had been wounded by a pistol-shot. The ball entered directly over the fossa in the upper bone of the sternum, and passing outwards was lost. The night after, retiring to bed the patient detected the aneurismal whiz, and soon a tumor gradually augmenting appeared above the claviculo-sternal junction of the right side. When seen, six months after the gun-shot wound, it had acquired the size of a small orange. The thrill could be detected in this case in both the carotid and axillary arteries of the right side. I think it not improbable that a vein was involved in the injury, making it an aneurismal varix, similar to a case published last year in the *New Orleans Medical News and Hospital Gazette*.

The patient died last winter of typhoid fever, and to my deep regret, notwithstanding every effort on my part, was buried without a post-mortem examination.

CASE II.—This is that of a young woman in this city, of good constitution, leading an irregular life. To no known cause can the disease be traced. Complaining of malaise—compared by the patient to rheumatism, for more than a year; a tumor was perceived to project last April, apparently through the articulations of the clavicle and first rib, with the sternum on the right side. It pulsates strongly and synchronous with

the heart's contractions. It has continued progressively to increase; it has the peculiar aneurismal whizzing sound; it expands in every direction; the thrill is felt in the totality of the swelling, the margins as well as the centre; it pulsates violently when compressed, though it is compressible to a certain degree, but is then painful. The patient has a persistent, troublesome cough, experiences difficult respiration in the horizontal position, can take but little exercise, and says her heart feels as if it were in the lump.

April 4, 1856. Dr. Newnan and myself have just examined the tumor in this case. It measures about three and a half inches over the surface each way, perpendicular and transverse, and projects about two and a half inches. It still pulsates throughout its totality. The patient refuses to have it handled. Her appearance is somewhat anæmic, and the general health is evidently failing. She is under the care of an irregular doctor, and is still persuaded she is improving, and that the tumor which projects as it were directly through the right clavicular-sternal articulation, and that of the first rib with the sternum, she insists is diminishing.

The value of my statistics may be estimated by comparing them with those heretofore collected.

In Dr. Brittan's translation of the Operative Surgery by Malgaigne, 1846, he asserts in a note that the operation of tying the brachio cephalic has been performed five times, viz: by Mott, 1813, (typographical error, probable in the American edition, 1851, for 1818,) by Graefe in 1822, by Norman in 1824, Lizars in 1836, and M. Hutin in 1842. Prof. Erichsen gives *nine* cases, viz: Mott's, Graefe's, Hall's, Dupuytren's, Norman's, Bland's, Lizars', Hutin's and Arendt's. He also alludes to the artery having been cut down upon but not ligatured, by Porter, Post, (for Hoffman), and Key. Prof. Velpeau refers to the following *ten* cases, namely, Mott's, Graefe's, Bland's, Hall's, Lizars', Arendt's, two of Bujaski's, Hutin's and Kuhl's. M. Vidal says there have been ten operations, and neither he nor M. Velpeau refers to the case of Dupuytren. The presumption then is no doubt true, as Prof. Blackman writes me, "this great-

est of French surgeons never actually performed the operation, but only saw it done."

STATISTICS OF ATTEMPTS TO OBLITERATE THE BRACHIO-CEPHALIC.

| Surgeon. | Year. | Age | Sex. | Result and Cause of Death. |
|----------------|--------------|-------|---------|---|
| 1. Mott, | 1818, | 57 | Male, | Death on the 26th day from repeated hemorrhage. |
| 2. Graefe, | 1822, | adult | " | Death on 65th day from hemorrhage. |
| 3. Norman, | 1824, | " | | Death. |
| 4. Arendt, | 1826, | | | Death on the 8th day from inflammation of sac, pleura and lung. |
| 5. Hall, | 1830, | " | " | Death on the 6th day from dyspnoea and hemorrhage. |
| 6. Bland, | 1832, | 31 | " | Death on the 18th day from repeated hemorrhage. |
| 7. Bujalski, | before 1840. | | | Death on the 2d or 3d day. |
| 8. Bujalski, | " | | | Death on the 2d or 3d day. |
| 9. Lizars, | 1836, | 30 | " | Death on the 21st day from repeated hemorrhage. |
| 10. Dupuytren, | | | | |
| 11. Hutin, | 1842, | adult | " | Death the 11th hour; antecedent hemorrhage and exhaustion. |
| 12. Porter, | 1831. | | | No ligature, patient recovered. |
| 13. Kuhl, | 1836, | 43 | | Death on 3d day of hemorrhage. |
| 14. Liston, | 1838, | adult | Male, | Death on the 13th day. |
| 15. Key, | 1844, | " | Female, | Failed, yet patient died of pulmonary distress and exhaustion. |
| 16. Hoffman, | about 1840, | | | Died. |

In reality the ligature was tied around the innominate in only ten of these cases, viz: Mott's, Graefe's, Norman's, Arendt's, Bland's, Bujalski's, Bujalski's, Lizars', Dupuytren's and Hutin's. In Hall's, the ligature was passed through the artery—in Kuhl's and Liston's the carotid and subclavian were tied just beyond the bifurcation—and in Porter's, Key's and Hoffman's the operation was abandoned and no ligature employed.

In every case where a ligature was applied either to the brachio-cephalic, or near its division into right subclavian and right carotid, *i. e.* thirteen cases, death has followed; even in two where the operation was abandoned, there was a fatal result in one; and in the sixteen cases one alone recovered, and in that no ligature was used, the vessel having been simply exposed, the cure in this case was spontaneous, and in all probability entirely independent of the operation.

In this collection, embracing sixteen cases in which the ligature was attempted to the arteria innominata, I have given, as far as I could obtain it, the history of each one. Other similar operations may have been made, but these are all that are found on record.

In conclusion, after this exposition, let me ask, who will again venture to tie the brachio-cephalic artery?

| | | | |
|-----------------|-------|-------|-------|
| 1. Hall, 1810. | 1810. | 1810. | 1810. |
| 2. Hall, 1810. | 1810. | 1810. | 1810. |
| 3. Hall, 1810. | 1810. | 1810. | 1810. |
| 4. Hall, 1810. | 1810. | 1810. | 1810. |
| 5. Hall, 1810. | 1810. | 1810. | 1810. |
| 6. Hall, 1810. | 1810. | 1810. | 1810. |
| 7. Hall, 1810. | 1810. | 1810. | 1810. |
| 8. Hall, 1810. | 1810. | 1810. | 1810. |
| 9. Hall, 1810. | 1810. | 1810. | 1810. |
| 10. Hall, 1810. | 1810. | 1810. | 1810. |
| 11. Hall, 1810. | 1810. | 1810. | 1810. |
| 12. Hall, 1810. | 1810. | 1810. | 1810. |
| 13. Hall, 1810. | 1810. | 1810. | 1810. |
| 14. Hall, 1810. | 1810. | 1810. | 1810. |
| 15. Hall, 1810. | 1810. | 1810. | 1810. |
| 16. Hall, 1810. | 1810. | 1810. | 1810. |

In reality the ligature was tied around the trachea in only ten of these cases, viz: John's, George's, Leonard's, Arnold's, David's, Benjamin's, and Isaac's. In Hall's the ligature was passed through the artery—in John's and Leonard's the carotid and subclavian were tied just beyond the bifurcation—and in John's, George's and Leonard's the operation was abandoned and no ligature employed. In every case where a ligature was applied either to the brachiocephalic, or near its division into right subclavian and right carotid, a fatal result has followed; even in two where the operation was abandoned there was a fatal result in one; and in the sixteen cases one alone recovered, and in that no ligature was used, the vessel having been simply exposed, the cure in this case was spontaneous, and in all probability entirely independent of the operation.

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[WITH AUTHOR'S RESPECTS.]

HISTORY
OF
THE LIGATURE APPLIED
TO
THE BRACHIO-CEPHALIC ARTERY;
WITH
STATISTICS OF THE OPERATION.

(Paper Read before the Tennessee State Medical Society, May, 1856.)

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