

**Reflections on securing in a ligature the arteria innominata : to which is added, a case in which this artery was tied by a surgical operation / by Valentine Mott.**

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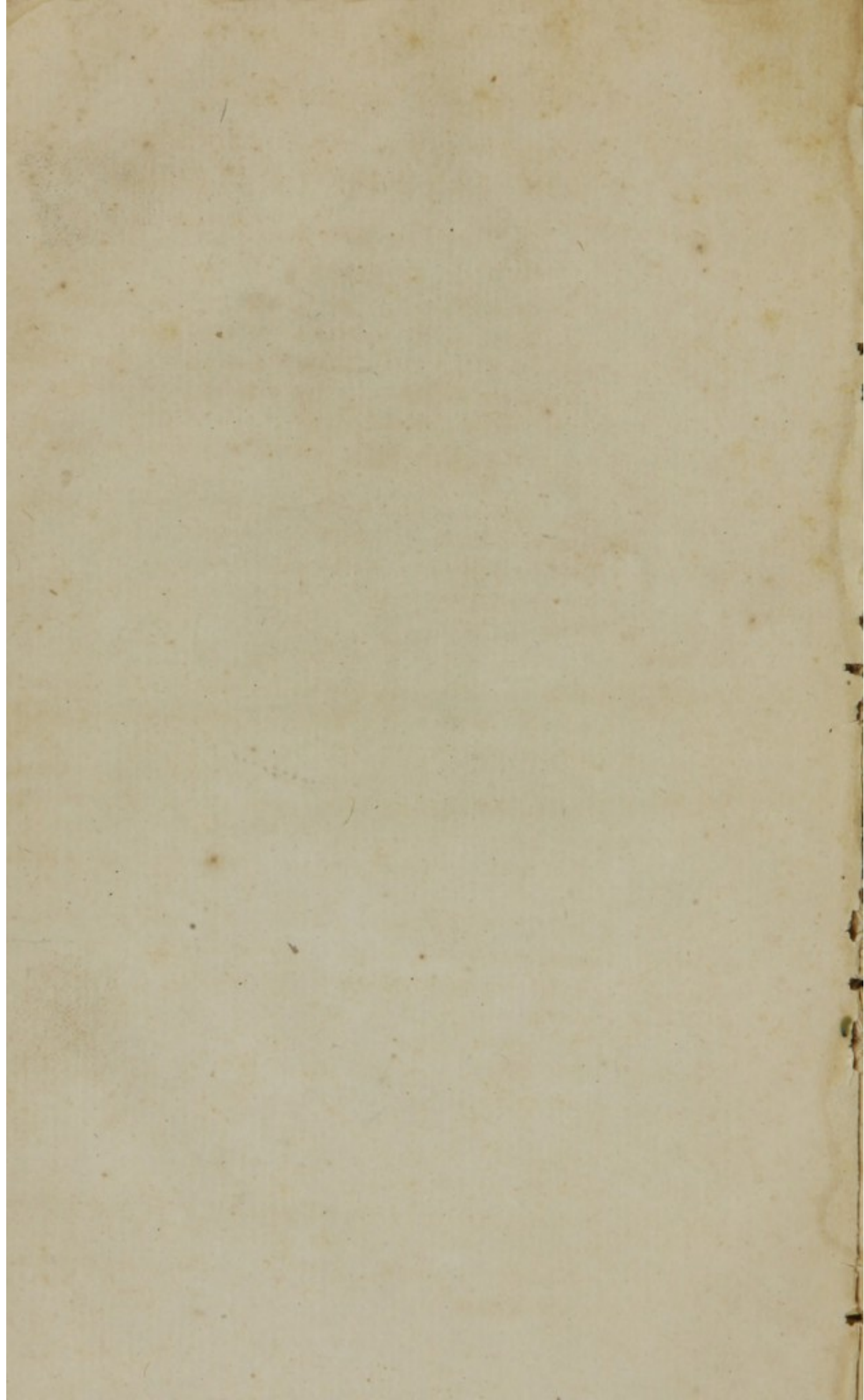
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*A. Anderson Sc.*



## EXPLANATION OF PLATES.



### PLATE I.

Represents the tumour very correctly, with its elevation above and below the clavicle, and the extent of it towards the acromion scapulæ, and likewise as it encroached upon the trachea. The form of the external incision with the subsequent steps of the operation, as far as can be given in a drawing, are also shown.

*a, a, a* The angles of the integuments as turned over upon the tumour.

*b* The sternal and a part of the clavicular portion of the sterno cleido mastoid muscle, raised, and reflected over upon the integuments.

*c* The sterno hyoid muscle laid over upon the trachea.

*d* The sterno thyroid muscle also raised and reflected inwards over the trachea.

### PLATE II.

Exhibits the morbid appearances which were found upon dissection.

*a, a, a* View of the ulcer as it extended under the clavicle, and towards the trachea.

*b* The upper part of the arteria innominata, about which the ligature had been applied, appearing rough and irregular from the erosion of the ulcer.

*c* A coagulum of blood adhering pretty firmly to one side of the innominata.

*d* Contracted and puckered appearance of the upper part of the innominata, and particularly of its internal coat.

*e* Arteria innominata cut open from the aorta.

*f* Anomalous branch of the innominata.

*g, g* The aorta.

*h* Left carotid.

*i* Left subclavian.

*k* The heart collapsed.

*l* Sternum and clavicle turned up.

*m, m* Pleura much thickened.

*n* Probe introduced into the axillary artery, passed through the subclavian, and appearing in the cavity of the ulcer.

*o* A small bougie passed along the common carotid, and its extremity also seen in the ulcer.

THE HISTORY OF THE  
CITY OF BOSTON

The history of the city of Boston is a subject of great interest and importance. It is a city of many centuries, and its history is full of interesting events and incidents. The city was founded in 1630, and since that time it has grown and prospered. It has been the seat of many important events, and it has played a prominent part in the history of the United States. The city is a beautiful one, and it is well worth a visit. It is a city of many interesting sights and places, and it is a city that is full of life and activity. The history of the city is a story of growth and progress, and it is a story that is full of interest and excitement. The city is a city of many achievements, and it is a city that is well known throughout the world. The history of the city is a story that is full of many interesting and important events, and it is a story that is well worth reading.

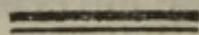
*For Dr. DuRoi, with the  
author's respects*

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**REFLECTIONS**  
ON  
SECURING IN A LIGATURE  
THE  
**ARTERIA INNOMINATA.**

TO WHICH IS ADDED,  
**A CASE**  
IN WHICH THIS ARTERY WAS TIED BY A  
*SURGICAL OPERATION.*

BY VALENTINE MOTT, M. D.  
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SINCE the publication of Allan Burns's invaluable work on the Surgical Anatomy of the Head and Neck, I have been in the habit of showing in my surgical lectures the practicability of securing in a ligature the Arteria Innominata; and I have had no hesitation in remarking that it was my opinion, that this artery might be taken up for some condition of aneurisms; and that a Surgeon, with a steady hand and a correct knowledge of the parts, would be justified in doing it. I felt myself warranted in this, from the singular success which this celebrated anatomist informs us attended his injections, and from my.

own investigations of this subject. If the right arm, right side of the head and neck, can be filled with injection, after interrupting its passage through the innominata, as we believe they can, who can doubt the possibility of the blood to find its way there also, as it will pass through thousands of channels, which art could not penetrate even by the finest injections? The well known anastomoses of arteries, and the great resources of the system in cases of aneurism, encouraged me to believe, that this operation might be performed with reasonable prospects of success. With all this sanction, and the analogy of the other great operations for aneurism, I could not for a moment hesitate in recommending and performing the operation.

The following operation, as the steps of it will show, was performed with the two-fold intention: 1st, of tying the subclavian artery before it passes through the scaleni muscles, if it should be found in a fit state; and 2dly, to tie the arteria innominata in case the former should be diseased or too much encroached upon by the aneurismal tumour.

Michael Bateman, aged 57 years, was born in Salem, Massachusetts, and by occupation a seaman. He was admitted into the New-York hospital on the 1st of March, 1818, for a catarrhal affection, having at the same time his right arm



and shoulder much swollen. At the time of his admission the catarrh being thought the most considerable disease of the two, he was received as a medical patient, and placed under the care of the physician then in attendance. During the three first weeks of his residence in the house, the catarrh had greatly yielded to the remedies prescribed. The inflammation, which had produced an enlargement of the whole superior extremity, extending itself to the muscles of the neck on the right side, was also gradually subsiding.

A tumefaction, however, situated above and posterior to the clavicle, at first involved in the general swelling, and not to be distinguished from it, began to show itself. This resisted the remedies which were effectual in relieving the other, and became more distinct and circumscribed as the latter subsided; at length assuming the form of an irregular tumour.

The history which he gave of the case is as follows: He said, about a week before he entered the hospital, while at work on ship-board, his feet accidentally slipped from under him, and he fell upon his right arm, shoulder, and the back part of his head; that he felt but little inconvenience from the fall, and after a short time returned to his duty. Two days subsequent to this, however, he felt pain in the shoulder, and the succeeding night was unable to lie upon it

in bed. The whole arm and shoulder then began to swell, and became so painful that he was unable any longer to perform his duty as a seaman. The ship having arrived in New-York, he was admitted into the hospital.

For some time after the general swelling had subsided, leaving the tumour distinct and circumscribed, no circumstance occurred which gave rise to a suspicion of its being aneurismal. The enlargement was thought to be a common indolent tumour, and was repeatedly blistered, with a view to discuss it. The tumour gradually diminished under this treatment; though a considerable time elapsed before any very striking change took place.

At length a faint and obscure pulsation was perceived; still it was a matter of doubt whether the tumour was aneurismal, or whether the pulsatory motion was communicated to it by the subclavian artery, immediately over which it was situated. From its firm unyielding nature upon pressure, the latter was considered as the most probable, and the blisters were continued as before. During the whole of this time the patient had worn his arm in a sling, the motions of it being very limited, and always attended with pain.

The patient remained in this state for several days, without any marked change either in his feelings or in the appearance of the tumour.

On the 3d of May, at 6 o'clock in the afternoon, the patient complained that he "felt something give way in the tumour," that his shoulder was very painful, and that he was able to raise it only a few inches from his side. The tumour at this time suddenly increased about one third, and a pulsation was distinctly perceptible. Its most prominent part was below the clavicle; at which place the pulsation was most distinct. The portion above the clavicle was also much enlarged; it still however had its usual firmness, except in one point near its centre.

May 4th.—The tumour is evidently increased, that portion of it more particularly which is below the clavicle; it is not as firm and resisting as it has been. Pulsation is not so distinct as yesterday, but appears to be more diffused.

He was this day transferred to the surgical side of the house, and became my patient. The cough having become comparatively slight, the tumour appeared to be the most urgent disease, and, in my opinion, to call for prompt attention. The arm is now perfectly useless, and any motion at the shoulder joint gives him severe pain. The patient is naturally of a spare habit, and from the nature of his disease, and the confinement to which he has been subjected, has become much reduced in strength.

May 5th and 6th.—The tumour is still pro-

gressing, and the pain in the shoulder is also more severe. During the three last days his medicines have been discontinued, except that he is allowed to rub the parts about the clavicle with volatile liniment.

On the 7th I directed a consultation of my colleagues to be called, consisting of Drs. Post, Kissam and Stevens. I now stated to them that I wished to perform an operation which would enable me to pass a ligature around the subclavian artery, before it passes through the scaleni muscles, or the arteria innominata, if the size of the tumour should prevent the accomplishment of the former. This I was permitted to do, provided the patient should assent, after a candid and fair representation was made to him of the probable termination of his disease; and that the operation, though uncertain, gave him some chance, and, as we thought, the only one of his life.

Dr. Post, at my request, communicated with him privately on this subject, and after a full explanation of the nature of the case, my patient requested to have any operation performed which promised him a chance for his life, saying that in his present state he was truly wretched.

May 8th, 9th, and 10th.—The tumour is acknowledged by all to be increasing, and it is thought proper not to defer the operation any

longer. I therefore requested that preparation be made for performing it to-morrow.

It is difficult to give an idea of the size of a tumour so irregular in its form, and so peculiarly situated. A thread passed over it, from the lower part of that portion of it which is below the clavicle, extending upward obliquely across the clavicle toward the back of the neck, will measure five and a quarter inches.—Another crossing this at right angles one inch above the clavicle, will measure four inches; two and a half inches of the thread are on the sternal side of the former, and one and a half on the acromial. It rises fully an inch above the clavicle, which, added to the depression below the clavicle on the opposite shoulder, will make the size of the swelling above the natural surface about two inches.

May 11th.—One hour before the time assigned for the operation, the patient appeared perfectly composed, and apparently pleased with the idea that the operation afforded him a prospect of some relief. He was directed to take of Tinct. Opii. 70 drops.

No difference can be perceived in the pulsation of the arteries in the two extremities; his pulses are uniform and regular, each beating 69 in a minute.

He was placed upon a table of the ordinary

height, in a recumbent posture, a little inclining to the left side, so that the light fell obliquely upon the upper part of the thorax and neck. Seating myself on a bench of a convenient height, I commenced my incision upon the tumour, just above the clavicle, and carried it close to this bone and the upper end of the sternum, and terminated it immediately over the trachea; making it in extent about three inches. Another incision about the same length, extended from the termination of the first along the inner edge of the sterno cleido mastoid muscle. The integuments were then dissected from the platisma myoides, beginning at the lower angle of the incisions, and turned over upon the tumour and side of the neck.

Cutting through the platisma myoides, I cautiously divided the sternal part of the mastoid muscle, in the direction of the first incision, and as much of the clavicular portion as the size of the swelling would permit, and reflected it over upon the tumour. The internal jugular vein was encroached upon by the swelling, which made this part of the operation of the utmost delicacy, from the morbid adhesion of that part of the clavicular portion of the muscle to it, which was detached. I separated this portion of the muscle to as great an extent, however, as the case would possibly allow, to make room for the subsequent steps of the operation; only a part of the vein

was exposed. The sterno hyoid muscle was next divided, and then the sterno thyroid, and turned upon the opposite side of the wound, over the trachea. This exposed the sheath containing the carotid artery, par vagum, and internal jugular vein. A little above the sternum, I exposed the carotid artery, and separated the par vagum from it; then drawing the nerve and vein to the outside, and the artery towards the trachea, I readily laid bare the subclavian about half an inch from its origin. In doing this, the handle of a scalpel was principally used, nothing more being required but to separate the cellular membrane, as it covers the artery. I judged it would be very imprudent to introduce a common scalpel into so narrow and deep a wound, especially as it would be placed between two such important vessels or parts, as the carotid and par vagum, and where the least motion of the patient might cause a wound of one or the other of them. The proper instrument, in my opinion, for this part of the operation, is a knife, the size of a small scalpel, with a rounded point, and cutting only at the extremity; this was used, and found to be very convenient for this stage of the operation. It can be introduced into a deep and narrow wound, among important parts, without the hazard of dividing any but such as are intended to be cut.

This knife is contained in a set of instruments admirably calculated for this and other operations on arteries deeply seated, and which I shall mention more particularly hereafter.

On arriving at the subclavian artery, it appeared to be considerably larger than common, and of an unhealthy colour; and when I exposed it to the extent of about half an inch from its origin, which was all that the tumour would permit, to ascertain this circumstance more satisfactorily, my friends concurred with me in opinion that it would be highly injudicious to pass a ligature around it. The close contiguity of the tumour would of itself have been a sufficient objection to the application of the ligature in this situation, independent of the apparently altered state of the artery. Art in this case could not anticipate any thing like the institution of the healthy process of adhesive inflammation in an artery in the immediate vicinity of so much disease. The Pathology of arteries has long since taught us, that ulcerative inflammation, and all its train of consequences, would have been the inevitable result. This was the fate of the only case, in which a ligature has been applied to the artery in this situation. The operation was performed by that eminent Surgeon of Dublin, Dr. Colles.

While separating the cellular substance from



the lower surface of the artery, with the smooth handle of an ivory scalpel, a branch of artery was lacerated, which yielded for a few minutes a very smart hemorrhage, so as to fill the wound perhaps six or eight times. It was about half an inch distant from the *innominata*, and from the stream emitted, was about the size of a crow-quill. It stopped with a little pressure. I can scarcely believe this to have been the internal mammary, from the hemorrhage ceasing so quickly; though, from its situation, it would appear so; and if from some irregularity it were not the superior intercostal, it must have proceeded from an anomalous branch.

With this appearance of disease in the subclavian artery, it only remained for me either to pass the ligature around the arteria innominata, or abandon my patient. Although I very well knew, that this artery had never been taken up for any condition of aneurisms, or ever performed as a surgical operation, yet with the approbation of my friends, and reposing great confidence in the resources of the system, when aided by the noblest efforts of scientific surgery, I resolved upon the operation.

The bifurcation of the *innominata* being now in view, it only remained to prosecute the dissection a little lower behind the sternum. This was done mostly with the round edged knife,

taking care to keep directly over and along the upper surface of the artery. After fairly denuding the artery upon its upper surface, I very cautiously, with the handle of a scalpel, separated the cellular substance from the sides of it, so as to avoid wounding the pleura. A round silken ligature was now readily passed around it, and the artery was tied about half an inch below the bifurcation. The recurrent and phrenic nerves were not disturbed in this part of the operation.

As most surgeons who have performed operations upon large arteries, in deep and narrow wounds, complain of the embarrassment which has attended the application of the ligature, I am happy in the present opportunity to have it in my power to recommend an instrument, or contrivance, which, in my opinion, is calculated to surmount all difficulties. This set of instruments consists of several needles of different sizes and curvatures, with sharp and blunt points, and having in each two eyes. The needles screw into a strong handle or shank of steel: two strong instruments in handles, with a ring or eye in the extremity similar to a tonsil iron, and perhaps they may be called ligature irons: a small knife rounded at the extremity like a lancet for scarifying the eyes, and a small hook at the extremity of a steel shank, also fixed

in a strong handle. These instruments are the invention of Drs. Parish, Hartshorne, and Hewson, of Philadelphia. They are the result of investigations made upon the dead body, as to the best mode and place for tying the subclavian artery on the *acromial side* of the *scaleni muscles*\*.

With the ligature introduced into the eye of one of the smallest blunt needles, which was nearest the shank of the instrument, I pressed down the cellular substance and pleura with the convex part, and very carefully insinuated it from below upwards, under the artery. The point of the needle appearing on the opposite side of the artery, I introduced the hook into the other eye of it; then unscrewing the shank, the needle was drawn through with the utmost facility, leaving the ligature underneath the artery.

In the application of the ligature to this artery, I would invite the attention of those who perform it, to a circumstance which, in my opinion, is somewhat important: it is to pass the ligature from below upwards, in order to prevent the pleura from being wounded. From the use of these instruments repeatedly, I would also recommend that the hook be fixed in the eye of the needle before the shank is unscrewed, otherwise very considerable difficulty will be expe-

\* See Dr. Parish's Paper, Eclectic Rep. vol. iii. p. 229.

rienced in finding it, and even when felt, not easily introduced, from the want of firmness which the handle part of the instrument would afford.

I now made a knot in the ligature, and with my forefingers carried it down to the artery, and drew it a little so as partly to close its diameter and arrest the column of blood gradually. This was continued for a few seconds to observe the effect produced upon the heart and lungs; when no change taking place, it was drawn so as to stop the circulation entirely, as was shown by the radial artery of the right arm, and the right temporal immediately ceasing to pulsate. The knot was drawn more firmly by the ligature irons, and a second knot applied in the same manner.

In no instance did I ever view the countenance of man with more fluctuations of hope and fear, than in drawing the ligature upon this artery. To intercept suddenly one fourth of the quantity of blood, so near to the heart, without producing some unpleasant effect, no surgeon, *à priori*, would have believed possible. I therefore drew the ligature gradually, and with my eyes fixed upon his face, I was determined to remove it instantly if any alarming symptoms had appeared. But, instead of this, when he showed no change of feature or agitation of body, my gratification was of the highest kind.

Dr. Post now asked him if he felt any unpleasant sensation about his head, breast, or arm, or felt any way different from common, to which he replied, that he did not.

Immediately after the ligature was drawn tight, the tumour was reduced in size about one third, and the course of the clavicle could be distinctly felt.

The parts were now brought into coaptation, and the integuments drawn together by three interrupted sutures and straps of adhesive plaster; a little lint and additional straps completed the dressing. Three small arteries were tied in the course of the operation: the first was under the sternum, and divided with the sternal part of the mastoid muscle, and from its course may have been a branch of the internal mammary reflected upwards; the second, in raising the inner edge of the mastoid muscle, about the upper angle of the longitudinal incision, and must have been the most descending branch of the superior thyroid; and the third, was a branch of the inferior thyroid, and cut while raising the sternothyroid muscle. The patient lost perhaps from two to four ounces of blood, most of which came from the ruptured branch of the subclavian. The operation occupied about one hour.

The curved spatulas recommended by Dr. Colles, I found of great use in the operation. I

provided three for this purpose, two broad, and one narrow, bent at right angles, and sufficiently firm. After raising the muscles, they were of the greatest advantage in keeping separated the carotid artery and par vagum, as likewise the divided muscles; they served also another very useful purpose, that of preventing by their equal pressure the constant oozing from the smaller vessels; and the little room taken up in a small and deep wound, will give them a great superiority over the fingers introduced.

Ten minutes after the operation the pulse is regular, and not the least variation can be perceived; it beats 69 strokes in a minute; the patient says he is perfectly comfortable, and has no new or unnatural sensation, except a little stiffness of the muscles of the neck, which he thinks is owing to the position in which his head was placed during the operation; the temperature of the right arm is a little cooler than the left; his breathing has not been the least affected by the operation, but is perfectly free and natural.

2 o'clock, P. M.—Patient expresses a desire to eat, and is directed a little thin soup and bread; the temperature of both arms is very nearly the same; breathing perfectly natural; pulse as before.

3 o'clock P. M.—There is still a trifling difference in the temperature of the two arms; ordered the right to be wrapped in cotton wadding; not the least unpleasant symptom has as yet made its appearance.

6 o'clock P. M.—Complains of a little pain in his head, not more on one side however than the other; describes it as a common head-ache: the pain of the shoulder and arm much less than before the operation: no difference can now be perceived in the temperature of the two arms; pulse a little accelerated, and perhaps a little full.

9 P. M.—Patient complains of head-ache; skin is rather hotter than natural; pulse strong and full, and beats 75 in a minute; the carotid on the left side of the neck is observed to be much dilated and in strong action; tongue moist and clean.

9½ P. M.—Symptoms continuing the same, directed him to be bled from the left arm to ʒ xvj. After bleeding the pulse fell 7 beats, and was less full. Complains of some thirst; let him drink common tea.

12 P. M.—Patient has slept a little; is free from pain; pulse full and less frequent, beats 60; skin moist and of a natural temperature.

*Second day*, 2 o'clock A. M.—Patient enjoys a

natural and undisturbed sleep; respiration free, and performed without the least difficulty.

5 A. M.—He has rested well the last three hours. Says he has a slight head-ache, and a little pain in the right elbow: the latter he attributes to the position in which his arm has lain during sleep; pulse full, but not so tense as before the venesection; skin natural and moist; temperature of both arms the same. He states that he can now incline more upon the right shoulder than he has been able to do since the second day after he received the injury,

9 A. M.—Pain in the head no way troublesome; skin moist and of natural temperature; tongue clean; says his neck feels stiff, but is not painful; has no difficulty in swallowing. His cough has thus far been much less frequent than before the operation: expectoration is also attended with less difficulty; pulse 75, full, but not tense; has taken a dish of coffee, and some bread; complains of some thirst; directed a solution of supertartrate of potass to be drank occasionally.

10 A. M.—Symptoms as before; the veins of the fore-arm and hand since the operation have been as much distended as previous to it, and upon compressing them so as to stop the circulation, and allow the vein to become empty for some distance above, the column of blood is seen



to distend the vein immediately upon the removal of the pressure, plainly showing that the circulation is going on with considerable rapidity, although no pulsation has been felt in the brachial or radial arteries. The radial artery can be easily distinguished by the fingers, and seems to be filled with blood. There is evidently a pulsation in the anterior branch of the temporal artery, just as it is passing a little above the exterior canthus of the orbit; the left external carotid is beating with increased action, and appears larger than natural.

3 P. M.—Has taken a light dinner, and complains of a little head-ache; pulse has become tense, and is also increased in frequency; skin is considerably hotter than natural; tongue too indicates a febrile action: was bled to  $\bar{z}$  viij. and directed to drink freely of a solution of the super-tartrite of potass.

10 P. M.—Since the last report he has become more comfortable; complains of no pain, and says he lies perfectly easy; pulse increased in frequency to 78, but of the natural soft feel; the right side of the face has been at times a little cooler than the left, and is so at the present time: it is, however, not so much so as to be perceptible to the patient; temperature of the right arm natural: that of the left, and the whole body, is above the natural standard, but it is

moist; tongue is clean: having had no evacuation from his bowels since the operation, is directed to take a saline cathartic, in divided doses.

1 A. M.—Complains of nothing; has not slept any; cathartic has operated twice.

*Third day, 5 A. M.*—Has had no sleep in consequence of the operation of the medicine, it having produced free evacuations in the course of the night; skin not so moist, but of natural temperature; the two arms have equal warmth; pulse full, and rather more frequent than last evening: says his right elbow is a little painful, and the arm feels tired. The complete flexion of the arm at the elbow is prevented by a little rigidity of the extensor muscles.

9 A. M.—He is now comfortable, has slept a little, and feels refreshed; pulse is full, and rather more frequent than natural; skin natural and moist: the size of the tumour is considerably diminished; has taken a dish of chocolate and some rusk.

11½ A. M.—Patient still free from pain, or any uneasiness; medicine has operated seven times; skin not hotter than natural, and moist; tongue clean; the right facial and anterior temporal arteries communicate a distinct pulsation to the fingers: having slept but little during the last night, directed him to take an anodyne of Tinct. Opii.gtt.

xxx. and to have the room made dark, and kept quiet, in order to procure him some sleep: let him have sago or panada as often as he inclines to take nourishment.

4 P. M.—Has slept the last two hours, and is still sleeping; respiration free and easy; nothing the least unnatural in his appearance.

10 P. M.—He has slept four hours, and is much refreshed; is free from pain, except a little in the elbow; pulse small and soft, beating 105 strokes in a minute; tongue clean; feels a little soreness in the wound when swallowing; has taken a considerable quantity of sago and panada; his appetite is good; temperature natural and uniform in both arms.

12 P. M.—Patient has slept the greater part of the time; is free from pain, and perfectly comfortable; skin moist and natural; pulse soft, small, and frequent.

*Fourth day, 6 o'clock A. M.*—Patient has passed a good night; says his right elbow gives him some uneasiness, but complains of nothing else; tongue is clean; skin moist and natural; can move the right arm with considerable ease; says he takes as much light nourishment as he has been accustomed to for some time past: no unfavourable symptom has as yet made its appearance.

11 A. M.—Symptoms continue much the same; tongue slightly furred; pulse comparatively small and soft, beats 105, and regular; respiration has been uniformly natural since the operation; suppuration has begun to appear through the dressings, and is attended with a little fœtor; let them be covered with a yeast poultice: it is thought that a faint pulsation or undulation is at intervals felt in the radial artery of the right arm: the left external carotid continues its increased action.

6 P. M.—No change is observable in the patient's symptoms; he still continues comfortable, and complains of nothing.

*Fifth day, 11½ o'clock A. M.*—The wound was dressed to-day: on removing the poultice the dressings were soft and easily came away; the suppuration was considerable, and of a healthy appearance; it was found that the extremities of the two incisions were united as far as the sutures, each about one inch in extent; one suture at the angle of the wound was removed; the wound was dressed with dry lint, gently pressed into it; adhesive straps and a compress: his pulse beats 110, is fuller and stronger than yesterday.

6 P. M.—Patient is very comfortable, subject to no pain or unnatural sensation; pulse still 110, but softer.

*Sixth day, 6 A. M.*—Patient sleeps; respiration not attended with the least difficulty; skin moist and natural.

9 A. M.—He has rested well during the night, and is perfectly free from pain; pulse 110, and soft; skin moist; tongue clean: having had no alvine evacuation since the 13th, directed to take of sulphate of soda  $\bar{z}j$ , in divided doses.

11 A. M.—The dressings were again removed, and the discharge seemed more considerable than at the former dressing; the sides of the wound are granulating, and appear perfectly healthy; on the ends of the muscles that were divided in the operation, there are small sloughs which are beginning to separate, leaving a healthy surface underneath; wound was dressed with lint spread with Ung. Res. Flav. and adhesive straps: pulsation is now perfectly distinct in the branches of the right external carotid artery: complains a little of the back part of his head, which he says is sore from lying; in other respects is comfortable.

6 P. M.—Has no pain, and is in every respect much as usual; tongue clean; skin natural; says he feels “no weaker than before the operation.”

*Seventh day, 6 A. M.*—He has passed a comfortable night, and is free from pain or any uneasiness; pulse regular and soft, and beats 105 in a minute; skin moist, and of natural temperature.

11 A. M.—The wound was again dressed: suppuration considerable and healthy; some of the small sloughs came away, leaving a healthy and florid surface beneath: sprinkled the wound with powdered carbon, then filled it lightly with lint, and over this applied the yest poultice, which was secured with adhesive straps: temperature of the two arms is the same, cathartic having produced no effect, *Habeat enema purgans statim.*

9 P. M.—Symptoms have not varied materially: the enema has produced a copious evacuation: says he feels more comfortable, and desires to set up in bed, which was allowed, taking care to have him raised up very cautiously, in order to prevent any exertion being made with the right arm and shoulder.

*Eighth day, 6 A. M.*—Patient has rested well during the night; says he feels some pain on swallowing, and that when the attempt is made, it gives rise to a fit of coughing, which fatigues him; it also occasions some soreness in the wound: pulse still soft, and less frequent than yesterday: he takes a reasonable quantity of light food every day:—Directed a cetaceous mixture for his cough, and is permitted to set up for a short time, if he feels disposed.

11 A. M.—Pulsation of the radial artery of the right arm to be felt occasionally pretty distinct; cough has become more troublesome; pulse

100; skin natural and moist. The dressings were again removed, and the suppuration is more profuse, apparently healthy, though attended with considerable fœtor; appearance of the wound every way favourable; small portions of the sloughs are removed at each dressing, and the sides of the wound look perfectly healthy; the same dressings to be continued.

9 P. M.—Complains only of his cough, which troubles him frequently; can move his arm with much more facility, and has no pain in it; circulation as before, and the temperature uniform and natural. The wound was dressed this evening in consequence of the fœtor being unpleasant to the patient; continue the dressings.

*Ninth day, 7 A. M.*—Patient was found sitting up in bed, supported by a bed-chair, having passed a good night; is in good spirits, and expresses his gratitude for the relief afforded by the operation; says he can move the arm with greater ease, and it gives him no pain; pulse 105, regular and soft; skin natural; every symptom as favourable as could be wished.

10 A. M.—Pulse less frequent, regular and soft; temperature perfectly natural; wound has a more favourable appearance, discharges less in quantity, and it possesses less fœtor: dressed the wound as yesterday; tumour has diminished two

thirds, is soft, and less florid. The apex of the tumour is now below the clavicle.

6 P. M.—Patient still in every respect as comfortable as at the last report.

9 P. M.—Pulse 110, regular and soft: the dressings were removed this evening; the wound is much contracted in size, and is perfectly healthy, except a small slough which still remains in the deepest part of the wound; granulations are shooting up rapidly from the sides.—When preparing to renew the dressings, an unexpected and an unaccountable hemorrhage took place, which suddenly filled the cavity of the wound. The rapidity with which the blood flowed, and the size of the stream, gave rise to fearful apprehensions for the man's safety: dry lint was immediately placed in the wound, and as much pressure made as the patient could conveniently bear, which quickly stopped it. After continuing the pressure for a short time, the lint was removed, when no hemorrhage recurring, the usual dressings were repeated: the patient experienced no ill effects from the bleeding, nor did he seem to be much agitated. At 10 o'clock P. M. has no pain, nor has he as yet had any sleep.

*Tenth day, 7 A. M.*—Has passed a comfortable night, except that he has been frequently disturbed by his cough: tongue clean; skin moist;



pulse soft, and has much less strength than before.

11 A. M.—The dressings were again removed, and the wound made clean; its appearance is in every respect favourable; does not appear to have been the least injured by the hemorrhage: the dressings were renewed as before: he is directed to take half an ounce of the cold infusion of cinchona every hour, and to drink occasionally of ale when thirsty: has had an evacuation from his bowels to-day.

6 P. M.—Symptoms much as before; complains a little of his elbow, and a numbness in his hand, to relieve which he is directed to have the arm and hand rubbed well, and wrapped in wadding.

*Eleventh day*, 6 A. M.—Patient has rested well during the night; cough has not been so troublesome; says he has no pain, and feels perfectly comfortable; pulse better than yesterday; other symptoms as before.

11 A. M.—The wound is dressed daily at this hour; its appearance is still very favourable, although there is still some fœtor in the suppuration: the wound has contracted perhaps one third: the tumour is also considerably diminished, and softer than before; pulsation in the right temporal and radial arteries as before: the same dressings to be continued.

6 P. M.—No change in the patient's general symptoms; pulse soft, and rather more frequent; appetite is as good as usual.

9 P. M.—Appearances have not varied.

*Twelfth day*, 6 A. M.—Our patient was visited as usual this morning, but there is no evident change in any of his symptoms; says he now rests well at night.

11 A. M.—To-day, when the dressings were removed, that portion of the slough which occupied the bottom of the wound (apparently a portion of the sheath of the vessels) came away: every part of the wound now, where its surface can be seen, has a healthy look: the most depending part is obscured by a quantity of pus, which cannot be wholly removed by lint, and it is not thought safe to permit the patient to lie in such a position as will allow it to be discharged: with the slough came away the ligature which had been applied to an artery under the lower portion of the sterno-thyroid muscle; it was followed by no hemorrhage: the wound was now dressed with pledgets of lint, spread with Ung. Resinæ Flavæ and adhesive straps. He remains much as yesterday, has drank freely of ale; pulse rather stronger than yesterday.

*Thirteenth day*, 7 A. M.—No perceptible change in his symptoms; complains of no pain, and says he feels very comfortable; cough has given him

very little trouble for the last two days; he is evidently considerably weaker than before the operation, but is not sensible of it himself.

11 A. M.—The wound was again exposed; it is not as florid as yesterday, and there is a greater secretion of pus; the cavity of the wound was filled with dry lint only; the pus appears well formed, and has very little fœtor.

The same dressings were repeated in the evening; there is still a quantity of pus at the bottom of the wound, which rises and falls at each inspiration and expiration: it continues to contract above, leaving us uncertain of its extent beneath: during the last three days, the patient has set up for several hours each day.

9 P. M.—Pulse and skin perfectly natural; has had a natural evacuation from his bowels to-day; continues the infusion of bark as prescribed before.

Wound was again dressed, and is as healthy as usual; suppuration just sufficient to moisten the lint: the same dressings to be continued.

*Fourteenth day, 7 A. M.*—Patient has slept well during the night, and is as well as usual; complains of soreness of the ulcer which he has had for some time between his shoulders; it is improving in its appearance, and is directed to be dressed as usual with Ung. Resinæ Flavæ. The erysipelatous blush which surrounded it, is not

as florid as heretofore ; it is beginning to granulate, and assume a healthy appearance : in other respects he is perfectly comfortable : he is now able to raise the right arm to his lips, which he has not done since the fourth day after the accident by which his shoulder was injured ; says too that he is getting stronger, and that he walked across the floor this morning without any assistance.

11 A. M.—On removing the dressing, the granulations appear perfectly florid and healthy : the bottom of the wound is not visible, owing to the small quantity of matter which collects there, and from its depth cannot be easily removed, and perhaps not altogether safely ; the position of the patient in bed must necessarily make the bottom of the wound the lowest : when he coughs or swallows, a small quantity of fluid pus at the bottom of the wound is seen to rise and fall ; from the general appearance however of the wound, the man's feelings, and many other circumstances, it is not probable that there is any considerable quantity : the large ligature lying very loose in the wound, was taken hold of, merely however to see if it was separated ; no force was used : pulsation of the right radial artery more distinct than heretofore : countenance of our patient is improving ; says he feels more comfortable than before the operation : he

can now straighten his arm, and raise it to his mouth with facility: as yet he has not recovered his strength, but is improving daily; has been setting up all day: directed him when lying down, to assume a more recumbent posture; continue the sulphuric acid and infusion of cinchona, as before: complains of the ale being too strong; let it be diluted and made pleasant with sugar and nutmeg.

9 P. M.—The large ligature since the operation, has been confined upon the upper part of the sternum by a piece of adhesive plaister, to prevent any accident during the dressings. Upon dressing the wound this evening, the large ligature as it lay in the wound, appearing to be loose, was again taken hold of with the forceps, and found floating upon the pus, being completely separated from the artery below. The ligature was drawn so firmly upon the artery, that the noose was only large enough to admit the rounded end of a common probe. The wound looks healthy, and is contracting rapidly; it is now perhaps not more than one third of its original size. Suppuration is now only sufficient to moisten the lint through.

*Fifteenth day, 12 o'clock.*—The patient is comfortable in every respect; pulse and skin perfectly natural; is sitting up in bed, and occasionally amusing himself with a book; not the

least symptom about him indicating indisposition: wound is healthy, and continues to improve in appearance. The right arm at intervals gives him a sensation of numbness,—not more, however, than can be accounted for from the uniform position in which the arm rests, and no doubt a more languid circulation, as it is readily removed by a little friction and motion of the arm. His appetite improves, and he expresses a desire to walk about the room. The bark and sulphuric acid to be continued.

9 P. M.—In the afternoon he was removed down stairs, from the private room in which he was placed immediately after the operation, to the ward in which he formerly lay, and appeared highly gratified with the idea of again seeing his friends, whom he had left with very little hope of ever returning to. The wound, upon being dressed, did not appear to have undergone any perceptible change.

*Sixteenth day, 11 A. M.*—Our patient's strength is improving. To-day he made an effort, and with success, to visit his friends in Ward No. 7, where he lay previous to his being transferred to the surgical department, and returned, without having any support; pulse as strong as before the operation, and in every respect natural; appetite better than before the operation; cough a little troublesome, but less so than for several days previous; wound dressed with dry lint.

9 P. M.—Dressings removed; patient as before; suppuration small in quantity, and appears to be well-formed pus, and is not attended with the least foetor,

*Seventeenth day, 11 o'clock.*—The ends of the divided muscles are nearly in contact, and the surfaces of the wound are rapidly granulating, and in every respect looks well: patient's health continues to improve; he walks about the room with perfect ease, and into several wards in the same story; the ability to move the arm increases; pulse and skin natural. The dressings were removed at 4 P. M., and also at 10 P. M.

*Eighteenth day.*—The patient's strength continues to improve; every symptom remains highly flattering; cough less troublesome. The dressings were again removed to-day three times.

*Nineteenth day.*—Continues the same as yesterday; wound dressed three times.

*Twentieth day.*—To-day he passed down two pair of stairs, and walked several times across the yard, and was highly delighted with his performance, and felt not the least inconvenience from it; sleeps uniformly well during the night, and takes more food during the day than he did previous to the operation; continues the infusion of cinchona and sulph. acid as before, and directed to use dry lint as the dressing.

*Twenty-first day.*—Dressed the wound three times again to-day; it is nearly closed at the bottom; the power of motion in the right arm continues to increase: he can now move it with as much facility as the left, though not to the same extent: his strength is daily improving, and the operation is considered by all to have been completely successful; size of the tumour continues the same, no diminution of it having been perceived for the last week; the most prominent part of the tumour is yet below the clavicle, that above rises to about the height of the clavicle, which gives a little convexity to the place between the clavicle and trapezius muscle.

*Twenty-second day.*—Continues to improve in every respect; dressings renewed as often as yesterday; owing to the weather he has not left his ward to-day; pulse full and strong; temperature of both arms the same.

*Twenty-third day.*—A few minutes before the hour of visiting to-day, a message was brought that the patient was bleeding from the wound. The dressings were immediately torn off, and dry lint crowded into the wound, and slight pressure applied for a few minutes, when the hemorrhage ceased. The patient lost at this time, perhaps, about 24 ounces of blood, and was very much prostrated. Pulsation ceased in the radial artery of the left arm, and the coun-



tenance, gasping, and convulsive throes of the patient, threatened immediate dissolution; all present apprehended the instant death of the patient. The first impression was, that the trunk of the arteria innominata had given way. The conjecture afterwards was, that the subclavian artery, from the diseased state of it, had not united by adhesion, and that the fluid blood from the tumour had regurgitated through its ulcerated coats. This appeared to be the most probable, both from the suddenness with which the blood ceased flowing, and the cause the patient assigned for the hemorrhage. He says that he felt weary of lying on his left side and back; that he had just turned on the right, which he had not done before since the operation, agreeable to my request. At the instant of turning over, something arrested his attention, which caused him to turn his head to the opposite side suddenly, and he felt the gush of blood from the wound.

He was directed some wine and water frequently, which soon revived the circulation. The wound was dressed with dry lint and a compress. Pulse as frequent as natural, but very small and soft: he appears very languid, and complains of a numbness and painful sensation in his hands; says also that his back aches. During the last twenty-four hours he has taken a pint and a half of Madeira wine: he also took occasionally some

egg and wine, which was immediately rejected from the stomach.

9 P. M.—Patient has lost his appetite, and appears considerably depressed; circulation very languid in the right arm; temperature of it is a little less than the left: directed a hot brick to be wrapped in flannel, and placed close to the arm. For a profuse perspiration which he has been in for the last three hours, he was ordered to be bathed with cold rum.

*Twenty-fourth day, 6 A. M.*—Slept the greater part of the night, and feels comfortable; is still languid, and has no disposition to eat any thing; says he feels sick, and once last evening vomited after drinking some wine and water.

Wound looks exceedingly pale, and the discharge is thin and foetid, for which the carbon and yest dressings were applied. He has vomited several times to-day, and has some considerable difficulty in swallowing, and complains of a soreness in the wound upon pressure.

9 P. M.—Dressings removed; wound very pale; right arm of the natural temperature; feels occasionally a little numbness in the hand; has taken very little nourishment during the day; pulse natural as to frequency, but small and feeble; a few minutes after dressing the wound, information was brought that hemorrhage had

ensued, and before it could be commanded, he probably lost four ounces of blood. For his restlessness and pain in the bones he was ordered two grains of opium.

*Twenty-fifth day.*—Has rested well during the night, and is perhaps a little better this morning. The repeated hemorrhages have debilitated him exceedingly, and from the irritable state of the stomach he can take only a very little nourishment. In the morning he was directed the effervescing draught to be repeated every two hours; this allayed the irritability of his stomach, and enabled him to take a little breakfast.

His countenance has altered since the first bleeding surprisingly, his eyes are now heavy, and for the most part fixed; his cheeks are sunken, and an universal palor has spread itself over his countenance; and from every appearance, a short time will terminate his existence. He has not vomited since early in the morning; is advised to take a little soup, and to drink freely of wine and water; dressings were renewed at 3 o'clock P. M. shortly after which the patient again bled, but not to exceed, however, an ounce. He was dressed with dry lint as usual.

11 P. M.—Patient has not as yet had any sound sleep, is restless and apparently distressed, although he says he feels no pain; breathing

is attended with some difficulty; his hands and legs are continually in motion; pulse small and feeble.

*Twenty-sixth day, 6 A. M.*—Patient has not rested well; is occasionally falling into little slumbers, but is awaked by the least motion; Pulse small and feeble; respiration somewhat laboured; appears to be sinking; seems disinclined to take any thing; legs and arms constantly in motion.

11 A. M.—More feeble than before; has been forced to take a little chocolate; is evidently sinking; wound was dressed, but there was no secretion of pus in it; countenance of the patient foretells his approaching dissolution.

6 P. M.—Is extremely low; respiration very much laboured; is not able to articulate: for the last three hours there has not been such continued throwing of the legs and arms about the bed: he lays in a state of insensibility; *temperature of the two arms the same to the last.*—My pupil, Abraham I. Duryee, the House Surgeon, (to whom I am indebted for the correct reports, and the most unwearied attention to this case, and whose ingenious application of means for the recovery of many of my patients, will long be held by them in grateful remembrance,) having for a few minutes left the patient, he was sent for immediately, as there was

another bleeding from the wound, by which he lost probably eight ounces of blood: during the whole time he did not manifest the least appearance of consciousness, nor was the least motion perceptible, except that necessary for respiration and circulation: the hemorrhage was stopped with lint, after removing the former dressings; respiration is now performed with the utmost difficulty, and the patient appears as if every respiration would be the last: he expired at half past six in the afternoon: the temperature of the right arm after death, appeared by the touch to be the same as the left; it was as natural and uniform as other parts of the body.

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### EXAMINATION OF THE BODY.

About eighteen hours after death, I opened his body; there was considerable emaciation, and the surface of the wound was of a dark brown colour, and foetid; the wound was perhaps about one third of its original size; it had been enlarged by the pressure of lint into it, and other means to arrest from time to time the hemorrhage: the ulcer between his shoulders was ill-conditioned.

For the purpose of examining the condition of the aorta, where the arteria innominata is given off, as also the origin of the latter vessel, as well as the state of the pleura at the part about which the ligature had been applied around the artery, the chest was opened in the following manner: after removing the integuments and muscles from the fore part of the chest, the sternum was carefully sawed through about an inch from its upper extremity, and raised by sawing through the ribs below the junction of the cartilages; this removed so much of the front part of the chest as to facilitate and expose fully to view the subsequent steps of the dissection; by thus leaving the clavicles attached, every part connected with the ulcer and great vessels could be seen and examined in situ.

The arch of the aorta and origin of the innominata being fairly exposed, not a vestige of inflammation or its consequences could be discovered, either upon them, the lungs, or the pleura, at any part. An incision was next made longitudinally into the aorta opposite the origin of the innominata, and upon introducing a probe cautiously up the latter vessel, it was seen to pass into the cavity of the ulcer; the innominata was then laid open with a pair of scissors into the ulcer; the internal coat of this vessel was smooth and natural about its origin, but for half

an inch below where the ligature had cut through the artery, it showed appearances of inflammation, and there was a coagulum adhering with considerable firmness to one of its sides; showing that nature had made an effort to plug up the extremity of so large a vessel, after the adhesion, which no doubt had been effected by the ligature, was swept away by the destructive process of ulceration. The upper extremity of this vessel was considerably diminished in its diameter by the thickened state of its coats, occasioned by the surrounding inflammation. The innominate about half an inch from the aorta, and a little to the left side, gave off an anomalous artery large enough to admit a small size crow-quill.

The ulcer at the bottom was more than twice the size of the wound in the neck; it extended laterally towards the trachea and under the clavicle towards the tumour. The tripod of great vessels, consisting of the innominate, subclavian, and carotid arteries, to the extent of nearly an inch, was dissolved and carried away by the ulceration. The extremities of the two latter vessels were found also to open into the cavity of the ulcer. The upper surface of the pleura was very much thickened by the deposit of newly organized matter, for the safety and protection of the cavity of the thorax. Indeed, instead of

having increased the danger of penetrating this membrane, the adhesive inflammation which preceded the ulcerative, seemed, by the consolidation of cellular membrane, and the addition of new substance, to have more securely and effectually shielded it from danger.

The internal surface of the carotid artery was lined with a coagulum of blood, more than twice the thickness of its coats, and extending above the division into internal and external, so as almost to give them a solid appearance, insomuch that a probe could barely be introduced. The subclavian artery, internally and externally to the disease, was pervious. The brachial and other arteries of the right arm were of their common diameter, and in every respect natural. The external thoracic or mammary arteries, as they went off from the subclavian, were larger than natural: the right internal mammary was pervious, and of the usual appearance. Upon opening into the tumour, which now gave (from its small size) no deformity to the shoulder, the clavicle was involved in it, and found carious, and entirely disunited about the middle. A number of lymphatic glands under the clavicles, and particularly the left, were considerably enlarged, and, when cut into, very soft, and evidently in a state of scrophulous suppuration. No other morbid appearances were observed.



SEVERAL very important facts are established by this operation—facts which no surgical operation has ever before confirmed. It proves very conclusively, that the heart, the brain, and the right arm, were not the least injured by it, in any of their functions. To tie so large a vessel, so near the heart, might very reasonably be expected to occasion some immediate derangement in the actions of that organ: but it was neither increased or diminished in its contractions, nor did it give rise to the least visible change in his respiration. All this could not have been anticipated. I apprehend there are no ingenuous surgeons, who would not have expected quite a contrary result. For my own part, I must confess that this was to me an anxious moment, when I drew the ligature upon this artery. Indeed, so apprehensive was I that some serious, if not almost immediately fatal consequences, would follow, from arresting so large a proportion of the whole mass of blood suddenly, that I drew the ligature very little at first. But when no change took place in the actions of the heart, or respiration, I felt a confidence in completely intercepting the whole current of blood through this great vessel.

The brain in no operation has been deprived of so large a quantity of blood as in this, and yet it suffered no inconvenience: from the effect of experiments however upon animals, I entertained no fear as to the consequences of my operation upon this organ.

The right arm, as the reports of the case from day to day will show, was in no want of a sufficient supply of blood for the purposes of its economy. That circulation went on to a degree adequate to its wants, the natural warmth and function of the skin fully prove; and although at no time could all be satisfied that a pulsation was perceptible in the radial artery, yet many at times were of the opinion, that an occasional undulatory motion was very evident: every one was confident of the distended and elastic feel of this artery, and could plainly see, from pressing on the distended veins upon the back of the hand, that a free circulation of blood was going on: but independent of these evidences, the natural warmth and free perspiration would alone be sufficient to establish the fact.

The route of circulation to the right arm was somewhat different, at first, from what took place after the ulceration had extended. The inosculation of the epigastric and internal mammary must have thrown a considerable retrograde current of blood through the latter vessel into the sub-

clavian directly, and which in all probability passed on into the arm: after the ulceration had extended, this communication was cut off by the destruction of the subclavian to some distance. It was now that the principal supply of blood to the arm must have been derived from the free communication of the intercostals with the thoracic arteries. From the large size of these, as found in the dissection, I apprehend they must have afforded the principal channels through which the blood was conveyed to the arm after the operation: the anastomoses of the infra-scapular and other arteries of the axilla, more or less with small branches of the intercostals, as also the occipital, with small ascending branches from the subclavian, may have given some trifling assistance.

The ulceration which went on so insidiously at the bottom of the wound, was the sole cause of the death of my patient. While the upper part of the wound put on a favourable appearance, and seemed healing, mischief was extending below. The separation of the ligature on the fourteenth day, spontaneously, without being followed by any hemorrhage for a number of days, and not until ulceration had extended, conclusively proves to my mind, that all the purposes of the ligature were completely answered—that adhesion was fully effected. Had it not been for the

ulcerative inflammation, no doubt will be entertained, I think, by surgeons, but that my patient would have recovered. From occupation, his constitution was indeed very old, and with an ill-conditioned habit, every thing favoured the process of ulceration. The position of the wound may be said by some to favour this process, but in a sound healthy habit it would only retard the wound in its recovery, but would never promote ulceration.

The practicability and propriety of the operation appear to me to be satisfactorily established by this case: and although I feel a regret, that none know who have not performed surgical operations, in the fatal termination of it, and especially after the high and just expectations of recovery which it exhibited; yet I am happy in the reflection, as it is the only time it has ever been performed, that it is the bearer of a message to Surgery, containing new and important results.

