

Simultaneous double aneurism of the femorals on the same side and of the femorals and popliteal on the same side : also, cases of simultaneous triple and quadruple aneurism on the same lower limb / by Edmond Souchon.

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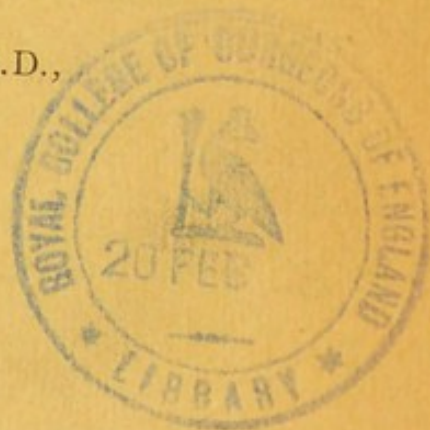
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SIMULTANEOUS DOUBLE ANEURISM,
OF THE FEMORALS ON THE SAME SIDE AND OF
THE FEMORALS AND POPLITEAL
ON THE SAME SIDE;

*ALSO, CASES OF SIMULTANEOUS TRIPLE AND QUADRUPLE
ANEURISM ON THE SAME LOWER LIMB.*

BY

EDMOND SOUCHON, M.D.,
OF NEW ORLEANS, LA.



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BY EDMOND SOUCHON, M.D.,
NEW ORLEANS, LA.

UPON taking charge of my surgical service at the Charity Hospital on October 8, 1894, it was my good fortune to find in Ward 2 a case of double aneurism of the superficial femoral artery on the left side.

The man presenting this most rare affection was Richard Perry, a mulatto, forty-three years of age, well built, having always enjoyed good health. His work is a rather hard one; he is a teamster, often doing heavy lifting. He remembers of no injury at that part of his body at any time. His personal history is good; he has not had syphilis; he says he does not drink, and he shows not the slightest evidence of alcoholism; he has always enjoyed good health, and cannot remember that he has ever been sick. His parents, as far as he remembers, were also very healthy.

He recounts that two months previous to his admission into the hospital his attention was called by a pain to the lower part of his left thigh, where he detected the presence of a tumor about the size of a large hen's egg.

Upon examining that region we found in fact a tumor at the point corresponding to the opening of the third adductor, *i. e.*,

at the lower and inner part of the thigh; but the tumor has acquired the size of a cocoanut. It presents all the signs of an aneurism; specially the pathognomonic expansion, with mobility upon the deep parts, which differentiates it at once and for good from a pulsating encephaloid.

Upon a closer examination another similar tumor is found at the apex of Scarpa's triangle, but of the size of a hen's egg only. This tumor is also pulsating, with expansion, and is disconnected from the deep parts—*i. e.*, with the femur.

The whole leg is painful, swollen, œdematous, with dilated superficial veins plainly delineated and filled; all of which indicate serious pressure symptoms.

No other aneurism was found on any other artery, external or internal. All the other organs were in a normal condition.

Remembering how aneurisms will sometimes cure upon using the most simple means, we decided, of course, to try some of them. Accordingly, the limb was elevated, but with no benefit, not even to the pain and swelling. Continuous digital compression failed to be carried on satisfactorily. Compression with the Massachusetts General Hospital compressor was used without any good result; on the contrary, its application below Poupart's ligament was so painful that to give it a full test the patient had to be kept under the influence of chloral and bromide; besides, it bruised the tissues considerably to arrest all pulsations in the two tumors. Finally, the Esmarch bandage was applied, observing carefully the rules laid down for its use in such cases. Its application was also very painful and required the exhibition of chloral and bromide. The Esmarch did no more good than the other means employed, and it was near time to consider the use of the ligature.

The case had caused somewhat of a stir in the hospital circle, and when it was heard that all the other means having failed, it was deemed time for the ligature, the interest in the case grew greater, and advice, solicited and unsolicited, was not lacking.

Some advised the ligation of the common femoral, it was so close by, so superficial, so easy to expose, so tempting; others

the ligation of the external iliac; others that of the superficial femoral in the middle of Scarpa's triangle.

We, upon whom the responsibility rested, were perplexed for awhile; there was no mention of any such case in any of the authorities at our command, and the course of the case did not look as though it would give us time to appeal to our great comforter, the Library of the Surgeon-General's Office in Washington, through the National Bureau of Medical Bibliography.

The ligation of the common femoral we rejected at once. Although the easiest operation, its performance, shutting off the collateral circulation through the deep epigastric and the circumflex iliac, condemned it in our minds as being worse than the ligation of the external iliac.

The ligation of the external iliac, for whatever cause it was practised, having frequently been followed by gangrene, we would not consider, except as a last resort.

The only ligation to perform, then, was that of the superficial femoral at equidistance between the origin of the deep femoral and the upper aneurism.

We thought that that would surely cure the upper aneurism, but we had some misgiving about its effect on the lower aneurism, by far the larger, and which we thought would be kept alive through the anastomoses of the deep femoral with the muscular branches of the superficial femoral given off by this trunk beyond the upper tumor. Still, as this was a simpler and a safer operation than the remaining one to be considered, that is, removal of the sacs of the aneurisms, we decided upon doing this first, and to be guided ultimately by what was accomplished by it.

We decided also to delay any immediate operative procedure until the skin and the tissues which had been bruised by the compressor had resumed their natural tone.

However, the lower tumor grew so rapidly and was causing such swelling of the leg and such pain that we feared a rupture of the sac and the formation of a diffuse aneurism. This we will see later happened in three cases (Morton, Munro, Walton). Therefore we, very reluctantly, saw ourselves forced into ope-

rating upon unsound tissues and to have to face the consequences, that is, inflammation, suppuration, hemorrhage. In a similar case (Damaschino) the great Velpeau took the same risk. It was, however, the lesser of the two threatening evils, and we decided in its favor. We had, of course, settled upon using aseptic animal absorbable ligatures, and upon placing two ligatures, after the Senn principles, and without rupturing the coats, hoping that if suppuration took place we might possibly still escape hemorrhage.

Accordingly, on October 24th, aided by our staff and by the house-surgeon, Dr. J. D. Bloom, we proceeded to ligate the superficial femoral in the middle of Scarpa's triangle. The tissues traversed were blended together by plastic lymph and the artery comparatively deeply seated. After exposing it two strong kangaroo ligatures were placed around it. Then Dr. Bloom having placed his hands upon the aneurism below, and having well detected the pulsations, the proximal ligature as recommended by Senn was first tightened gradually, gently, very gently, and as soon as Dr. Bloom said the pulsations were stopped the tightening of the ligature was also stopped. Some thirty seconds were allowed to elapse, and, no pulsation returning in the aneurism, the second knot was made and the first ligature completed. Then the second or distal ligature was applied in the same manner. A third knot was made over the second knot, and the ends of the same ligature were tied together with fine silk to make sure against any untying from the swelling of the ends. The sheath of the vessel was stitched over the ligatures with catgut and the other layers approximated in the same way. The ordinary dry dressing was applied and the patient was carried back to his bed. He expressed the sense of a great relief.

All went well for the first four days, when (October 29th) the dressing being stained was removed; it was then found that the lower or larger aneurism was not pulsating, but that the upper or smaller one was as alive as ever. Now this was quite a surprise. We had expected the upper or smaller aneurism to be cured, and had anticipated trouble from the lower one, and

the very opposite had taken place. A similar occurrence happened in a case of Boughter.

How did the blood penetrate to the upper aneurism? Surely the two stout ligatures had not been absorbed in five days' time, and the blood was not again finding its way through the main channel of the artery. It could then only be through a collateral branch given off by the superficial femoral above the ligation or by the deep femoral, and anastomosing with a branch given off also from the superficial femoral, but below the point of ligature, emanating from the sac itself, perhaps.

There was some consolation, however, in having cured the larger of the two, since the only resort left, extirpation of the sac, would be an easier and a less dangerous operation on the smaller aneurism than on the larger one.

Upon removing the dressing for the second time a few days later (November 2d), there was evident suppuration in the operative wound. Accordingly the sutures were removed, the small cavity irrigated and packed with iodoform gauze. The much-dreaded hemorrhage might now occur at any moment, although we hoped that the use of animal ligatures without rupturing the coats might prevent it. However, we instructed the student, the nurse, and the patient himself of what might happen and what to do until surgical aid could be procured; the bandage was also kept tighter than usual over the region and the region left uncovered so as to detect the first speck of blood.

All these precautions were not in vain, because the so frequent secondary hemorrhage took place here (November 3d) as in so many other cases before, but the patient and the nurse compressed the wound and the artery until Assistant House-surgeon Parker enlarged the operative wound and ligated the bleeding end of the artery. This bleeding end was the upper or proximal end. This at once stopped the hemorrhage and also the pulsations of the upper small aneurism.

Three days later the pulsations had returned again, and for the second time in the upper small aneurism. How could that be? Such hemorrhage and return of pulsation occurred in the case of Solly, to be described later. There must have been an-

other anastomotic branch similar to the one above described. The patient and everything were doing well, when on (November 9th), that is, six days later, a second hemorrhage took place. The nurse and patient, ever watchful, controlled this also until the same assistant house-surgeon came, and, again enlarging the operative wound above, ligated the proximal end for the second time. This only partially stopped the bleeding, and as it was found that the distal end also was bleeding that end was in turn ligated. All bleeding stopped then, all pulsation again stopped in the upper smaller aneurism. No further trouble was experienced in the way of bleeding or pulsations. Evidently the ligature on the distal end had caught the branch which anastomosed directly or indirectly through the substance of the muscles, with the branches coming from the main trunk above the point of ligature. Surely the lower anastomotic branch did not come from the sac itself.

In view of the possibility of another return of the *hemorrhage from the upper end* we advised, if it should occur, to ligate again in the wound, and then ligate also the external iliac, so as to give the artery a better chance of closing, in preference to ligating the common femoral, since the latter would shut out the collateral circulation of the deep epigastric and circumflex iliac. We thought that the ligature of the external iliac at this stage would have a better chance of not producing gangrene, because the collateral circulation had developed to some extent by this time. In case the recurrent hemorrhage took place *from the lower end*, we advised the extirpation of the sac. Some advocated that all this should be done at once, without waiting for the recurrence of the hemorrhage; but since the patient was surrounded by all possible safeguards and watchfulness, we thought it would be better to wait until the positive indication presented itself, and thus the patient was saved these ordeals and the danger of possible gangrene from the ligation of the external iliac.

During all this time the larger lower aneurism had shrunk rapidly about one-third its original size, and no pulsations had returned into it, but there it remained, neither diminishing nor

gaining. It was fluctuant, and this was surely due to fluid blood or to soft black clots.

It was about that time (January 2d) that the Charity Hospital and Tulane Medical College were favored by a visit from our distinguished surgeon, Dr. Nicholas Senn. He expressed much interest in the case, having never seen such a one or heard of any such before. Indeed, it is to his kind encouragement that the writing of this essay is due.

We were much gratified to have our diagnosis corroborated by so high and reliable an authority. Accordingly we punctured the lower tumor with the large needle of the aspirator, but no blood came. We were so confident that it was the presence of clots that was keeping the tumor from shrinking and curing that we incised it (January 4th), when about three ounces of soft black clots were removed. The cavity was packed, and four days later a drainage-tube was inserted into it. Henceforth the tumor diminished uninterruptedly and was finally cured.

However, the operative wound in Scarpa's triangle had become fistulous, and we were always apprehensive of some more hemorrhage from that point, as so many cases in the history of aneurisms prove. This aneurism, although much reduced and deprived of pulsations, was still fluctuant, as was recognized also by Professor Senn, and we waited patiently for some time. After awhile, the tumor having disappeared almost entirely, it was thought high time and safe to enlarge the fistulous tract and explore it. This being done it was found, as surmised, that the silk ligature used was at the bottom of the tract and keeping up the suppuration; it was removed; the wound was packed and made to heal from the bottom, which it did rapidly.

We believed that now the poor and much tried patient would surely soon be well, but we had reckoned without erysipelas (February 9th). It is a very rare complication here, but a colored patient with the disease had been admitted into the ward and remained for a few hours before the case was well recognized on account of the patient's very black skin. The man was transferred to the ward for contagious surgical diseases. A

remarkable feature was that the first patch showed itself in the middle of the outer part of the thigh, independently of any one of the two operative wounds of the region. The case was also sent to the proper ward, where he remained some twelve days.

When he was sent back to our ward (February 18th) he was awfully emaciated, had high temperature, specially at night, and his left knee-joint was full of pus. We all thought that surely poor Dick's end had come. It was a great and general disappointment to all to lose the case after it was really practically cured, and after such struggle and such care—a case so rare and so pathetic. There was one solace, however, and that was that we would know exactly what circulation had taken place in that limb.

But the lucky possessor of such rare aneurisms was also the possessor of a remarkably fine and enduring constitution, so that after draining the knee thoroughly he immediately began to improve, and made an uninterrupted and final recovery, all wounds having thoroughly and finely healed (February 29th).

He stands to-day the first and only case on record of a simultaneous double aneurism of the superficial femoral cured by ligation.

All those around him and connected or not with the case did all in their power to help him through his ordeal, but none so continually, so faithfully, and so efficiently, as the devoted and untiring interne student, Mr. W. A. Carnes.

RÉSUMÉ OF THE CASE.

Simultaneous Double Aneurism of the Superficial Femoral on the Same Side (Left Side).

Richard Perry, mulatto, aged forty-three years, is a teamster and is exposed to raising heavy weights.

No alcoholism; always enjoyed good health; family history good.

Admitted to Charity Hospital October 8, 1894.

He presents at the opening of the great adductor of the left thigh an aneurism of the size of a cocoanut.

Also at the Scarpa's triangle another aneurism the size of a hen's egg.

All the signs of aneurism are present.

Also œdema of the foot and leg; much pain.

No other aneurisms of any of the other arteries. All the organs healthy.

The leg was elevated without benefit; the digital compression was used but not thoroughly; the Esmarch bandage was applied but without any good; the Massachusetts General Hospital compressor was used over the superficial femoral, but bruised the tissues and caused such pain that its use had to be discontinued.

The lower tumor grew so rapidly that its rupture was apprehended, and the superficial femoral was ligated in the middle of Scarpa's triangle (October 24th) in spite of the bruised condition of the tissues.

This was considered less dangerous in its possible consequences than the rupture of the lower aneurism or the ligation of the common femoral or of the external iliac.

A double kangaroo ligature was applied without rupturing the coats of the vessel.

October 29th. The dressing removed and the upper aneurism found pulsating just as strong as ever.

30th. Suppuration of wound.

November 2d. Hemorrhage from wound; the patient and nurse, who had been instructed beforehand, compressed the artery until Assistant House-surgeon Parker came, enlarged the operative wound and placed a silk ligature on the bleeding upper end. The hemorrhage stopped, also the pulsations in the upper aneurism.

3d. Return of pulsation in the upper aneurism; the lower aneurism has no pulsation and has diminished one-third.

7th. Another hemorrhage; enlargement of the wound; ligation of both ends of the bleeding vessel. All bleeding and pulsation stopped and never returned.

January 4th. Incision of lower aneurism and turning out of

black clots. Also incision of a fistula at the operative site and removal of a silk knot.

20th. Erysipelas from an outside case just admitted.

February 17th. The patient returns from the erysipelatous ward much emaciated, with high fever, and knee-joint full of pus. Incision, drainage.

Gradual healing of wounds.

Cured February 29th.

Conclusions from the foregoing Case.

1. Should such another case present itself we would surely not apply the compressor over the superficial femoral, specially with a tumor of a certain size, which may take a rapid growth and force an operation through bruised tissue. In one of the cases reported below the great Velpeau himself decided to operate on bruised tissues.

2. The ligatures should be applied as close to the sac as the condition of the artery will allow, that is, if it is not thinned and dilated, so as to shut out the collateral branches which caused the return of the pulsations in the upper tumor.

3. Should this fail extirpation of the sac is the next thing in order, after applying or not the Esmarch bandage and band.

In cases of high femoral aneurisms, a provisional loop ligature after the manner of Rivington¹ and Treves² should be applied to the artery above (common femoral or external iliac). Also when it is deemed impossible for some reason or other to use Esmarch's band. By applying it around the common femoral when extirpating lower aneurisms the bleeding from the branches of the deep femoral is also controlled.

It is more effectual than digital compression, because then the assistants will become tired.

By provisional loop ligature we mean to pass a strong, thick silk thread under the artery, using, if necessary, an aneurism needle with a movable point; then without attempting to make any knot, but simply pulling firmly on the two ends of the thread so as to raise the artery and arrest the circulation through

it. If needs be, the index finger of the other hand may compress the artery against the thread.

Treves says that no local inflammation nor obstruction followed in the cases where he had used it.

If a knot be tied it should be tightened just enough to stop the circulation, and not more; surely not to rupture the coats.

There is no risk of occluding the artery, because Ballance and Edmunds³ state, from experiments, that if a ligature be applied to a vessel and then immediately removed, the vessel will not, as a rule, be occluded, even if the coats are ruptured. And we are here careful not to rupture the coats.

The effect of this procedure will be to allow as bloodless an operation as possible under the circumstances, to allow of a thorough examination of the affected artery and to decide where the permanent ligature can be placed with greatest safety. Then the provisional ligature is removed. It may be found that the provisional ligature should be converted into a permanent one by exchanging or not the silk for a single or double catgut.

4. Upon perusing the cases below it will be seen how fortunate was our course in resisting the ligation of the common femoral or of the external iliac, since the two cases where this was done died.

5. Would it not have been better to extirpate the upper aneurism rather than to ligate the artery above it? This would have cured both aneurisms at once!

History of the Cases on Record.

Upon having researches made in the Library of the Surgeon-General's Office at Washington, by the National Bureau of Medical Bibliography,⁴ the following cases are all that could be found on record.

They comprise not only the simultaneous double aneurism of the femoral on the same side, but also those of the femoral and of the popliteal existing also simultaneously on the same side. The popliteal being really the prolonged femoral, we thought that instructive points might be gained from the study also of such cases.

The cases are divisible into four groups :

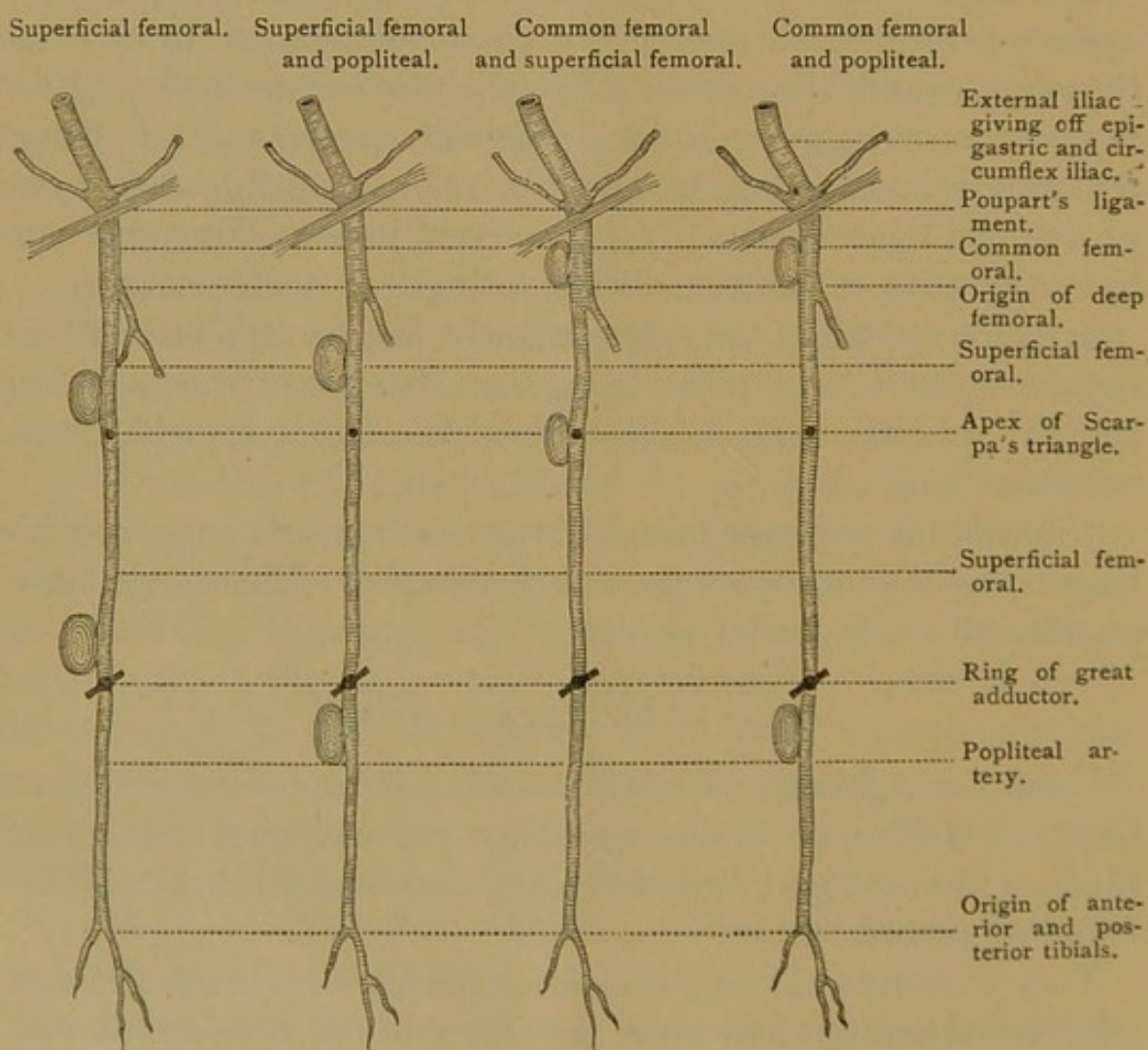
First. Simultaneous double aneurism of the superficial femoral alone on the same side.

Second. Simultaneous double aneurism of the superficial femoral and of the popliteal on the same side.

Third. Simultaneous double aneurism of the common femoral and of the superficial femoral on the same side.

Fourth. Simultaneous double aneurism of the common femoral and of the popliteal on the same side.

These important clinical varieties are made much more plain by the accompanying diagram.



Simultaneous double aneurism of femorals and popliteal on same side.

We will now proceed to describe the cases of each group, and afterward we will endeavor to point out the remarkable

features of the cases and to draw all practical conclusions possible.

A. Simultaneous Double Aneurism of the Superficial Femoral Alone on the Same Side.

There are four cases of double aneurism of the superficial femoral alone on the same side.

CASE I., 1863. *Damaschino*.⁵—Two traumatic aneurisms close to each other in middle of thigh. Digital and mechanical compression of no benefit; ligature performed over the spot of compression, because the tumor was too high to do otherwise; ligature of common femoral; cessation of pulsations; sudden comatose condition on fourth day, and death on seventh day.

CASE II., 1866. *Gignoux*.⁶—First tumor on upper part of thigh size of child's head; second tumor above the ring of the great adductor; ligation of the external iliac. Death.

CASE III., 1869. *Cooley*.⁷—One aneurism above Hunter's canal and the other about the commencement of that canal. No treatment stated. Also aneurism of the other superficial femoral artery; gangrene of foot; suppuration of that last aneurism; pneumonia. Also an abdominal aneurism. Death.

CASE IV. *Godwin*.⁸—A man of twenty nine years was wounded just above the knee by a pointed spike; twenty-one days afterward two aneurismal tumors appeared; they were treated by digital pressure for fourteen hours daily for a considerable time; the tumors grew smaller and gave no inconvenience; no further treatment was thought necessary.

B. Simultaneous Double Aneurism of Superficial Femoral and of Popliteal on the Same Side.

There are three cases of simultaneous double aneurism of superficial femoral and of popliteal on the same side.

CASE I., 1846. *Hawkins*.⁹—Femoral aneurism five inches below Poupart's ligament; ligature of external iliac. Gangrene; death.

CASE II., 1861. *Fontaine*.¹⁰—Femoral aneurism on middle of the thigh; compression of the tumors by agglutinative (sic) compresses around the limb; cure.

CASE III., 1887. *Gaston*.¹¹—Femoral aneurism three inches below the pubic bone, ligation of the superficial femoral below the femoral aneurism; cure of the popliteal aneurism; increase of the femoral aneurism; later, ligation of the external iliac and cure of femoral aneurism.

C. Simultaneous Double Aneurism of Common Femoral and of Superficial Femoral on the Same Side.

There are two cases of simultaneous double aneurism of the common femoral and of the superficial femoral on the same side.

CASE I., 1861. *Morton-McGhire*.¹² Aneurism of the superficial femoral on the middle of the thigh; digital and mechanical compression; rupture of lower tumor; incision of sac; ligature above and below the aneurism; death.

CASE II., 1871. *Boughter*.¹³—Compression of common femoral; cure of lower tumor; upper tumor much diminished but not cured.

D. Simultaneous Double Aneurism of Common Femoral and of Popliteal on the Same Side.

There are five cases of simultaneous double aneurism of common femoral and of the popliteal on the same side.

CASE I., 1771. *Donald Munro*.¹⁴—One inguinal aneurism, one popliteal; rupture of the popliteal; application of the tourni-

quet; increase of upper aneurism; removal of tourniquet; hemorrhage; death.

CASE II., 1853. *Walton*.¹⁵—Rupture of popliteal aneurism; amputation proposed but rejected; death.

CASE III., 1854. *Solly*.¹⁶—Ligature of external iliac; cessation of pulsations; return of pulsations in both aneurisms; secondary hemorrhage at point of ligation; final cure.

CASE IV., 1874. *Diver*.¹⁷—Ligature of external iliac; gangrene, amputation; recovery.

CASE V., 1893. *Ensor*.¹⁸—Aneurism in groin, size of a large egg; popliteal, size of a cocoanut; ligation of external iliac; cure.

CASE VI., 1895. *Thomas Bryant*,¹⁹ of London.—Man, aged seventy-five years; ligation of right external iliac, high up; cured. The man died the following year from an aneurism of the left iliac artery.

The following tables of all these cases will assist in grouping the salient points of each case:

REMARKS. *Almost all the operated cases were complicated and troublesome.*

Two cases only were traumatic (Damaschino, Munro).

Of the four cases of double aneurism of the superficial femoral alone on the same side, one was cured without operation (Godwin), three were operated but only one was saved (Souchon), the other two died, one from the ligation of the external iliac (Gignoux), and the other in whom the common femoral was ligated, from some intercurrent complication, not connected apparently with the aneurism (Damaschino).

Of the three cases of double aneurism of the superficial femoral and of the popliteal simultaneously on the same side, one was cured

TABLE A.—Simultaneous Double Aneurism

Number.	Date.	Name of surgeon.	Situation of aneurisms.	Treatment.
Case I.	1863	Damaschino,	First, middle of thigh ; second, close to the first.	Ligature of common femoral.
Case II.	1866	Gignoux,	First, upper part of thigh —child's-head ; second, above ring of great adductor.	Ligature of external iliac.
Case III.	1869	Coyley,	First, above Hunter's canal ; second, at beginning of Hunter's canal.	No treatment stated.
Case IV.	1888	Godwin,	First, above the knee ; second, close to first.	Digital compression.
Case V.	1895	Souchon,	First, at apex of Scarpa's triangle ; second, at ring of abductor.	Ligature of superficial femoral.

TABLE B.—Simultaneous Double Aneurism of the

Number.	Date.	Name of surgeon.	Situation of aneurisms.	Treatment.
Case I.	1846	Hawkins,	Femoral aneurism, five inches below Poupart's ligament.	Ligature of external iliac.
Case II.	1861	Fontaine,	Femoral aneurism, middle of thigh.	Compression with bandage around tumors.
Case III.	1887	Gaston,	Femoral aneurism, 3 inches below the pubic bone.	Ligature superficial femoral below femoral aneurism.

TABLE C.—Simultaneous Double Aneurism of the Common

Number.	Date.	Name of surgeon.	Situation of aneurisms.	Treatment.
Case I.	1861	Morton,	Femoral aneurism in middle of thigh.	Incision and ligation above and below after rupture.
Case II.	1871	Boughter,	.....	Compression of common femoral.

TABLE D.—Simultaneous Double Aneurism of the

Number.	Date.	Name of surgeon.	Situation of aneurisms.	Treatment.
Case I.	1771	Munro,	.....	Tourniquet for rupture.
Case II.	1853	Walton,	.....	None ; amputation proposed but refused because of rupture.
Case III.	1854	Solly,	.....	Ligature external iliac.
Case IV.	1874	Diver,	.....	Ligature external iliac, amput. for gangrene.
Case V.	1893	Ensor,	.....	Ligature external iliac.
Case VI.	1895	Bryant,	.....	Ligature external iliac.

of the Superficial Femoral, on the same side.

Complications.	Results.	Remarks.	References.
Cerebral symptoms.	Death.	Traumatic cause.	Bull. Soc. Anatomique, Paris, 1863, xxxviii. 438.
.....	Death.	.....	Gazette Médicale Lyon, 1866, xviii.
Also aneurism of right superficial femoral; sup- puration of aneurism.	Death.	Also an abdominal aneu- rism.	Transactions Pathological So- ciety London, 1869, xx. 114.
.....	Cure.	Traumatic.	Boston Med. and Surg. Journ., 1888; and Sajous's Annual, 1888, iii. 255.
Secondary hemorrhage; ligation in wound.	Cure.	Cure of lower aneurism on first ligation; upper aneu- rism cured only after ligation in wound for the sec- ondary hemorrhage.	Inaugural Thesis, Amer. Surg. Assoc., New York, May 28, 1895.

Superficial Femoral and Popliteal, on the same side.

Complications.	Results.	Remarks.	References.
Gangrene.	Death.	.....	Lancet, 1846, ii. 90.
.....	Cure.	.....	Gazette des Hôpitaux, Paris, 1861, xxxiv. 263.
Increase of upper aneu- rism.	Cure of popliteal aneurism.	Later, ligature of external iliac; cure.	Southern Med. Rec., Atlanta, 1887; Gaillard's Journal, 1887, for a full account.

Femoral and of Superficial Femoral, on the same side.

Complications.	Results.	Remarks.	References.
Rupture of sac of femoral aneurism.	Death.	.....	Glasgow Med. Journal, 1860- 61, viii. 450.
.....	Cure of lower tumor.	Upper tumor not cured.	Philadelphia Medical Times, 1871, ii. 7.

Common Femoral and of Popliteal, on the same side.

Complications.	Results.	Remarks.	References.
Rupture popliteal aneu- rism, increase upper aneurism, removal of tourniquet, hemorrhage	Death.	.....	Essays, Physical and Literary, 1771, 111-184; also Gillette in Dechambre's Dictionary, Artère Crurale, 1879, p. 666.
Rupture of popliteal aneurism.	Death.	.....	Trans. Path. Soc. London, 1853, i. 54.
Return of pulsations in both aneurisms; sec- ondary hemorrhage at point of ligation.	Cure.	.....	London Lancet, 1854, i. 533.
Gangrene.	Cure.	.....	London Lancet, 1874, i. 509.
.....	Cure.	.....	London Lancet, 1893, ii. 27.
.....	Cure.	.....	Private communication to writer.

without operative procedure (Fontaine), and one died from ligation of the external iliac (Hawkins); in one case the lower was cured by ligation of the superficial femoral, but the upper aneurism was only cured after the ligation of the external iliac (Gaston).

If we consider the double aneurism of the superficial femoral alone, and the double aneurism of the superficial femoral and popliteal simultaneously, as cases of the same kind, which we think they are practically, then we have in all eight cases, of which one was not treated (Coyley), two were cured without surgical operation (Godwin, Fontaine), one required two separate operations to be cured (Gaston); while three died, one from intercurrent disease not connected apparently with the aneurism (Damaschino), the other two from the effects of the ligation of the external iliac (Hawkins, Gignoux).

Our case stands the first and only case on record ever cured by ligation alone.

It stands the only case of double aneurism of the superficial femoral alone ever cured by any operative measure.

Considering the treatment applied and the results, we find :

No treatment stated, 1 case (Coyley).

Compression by adhesive compresses, 1 case, cured (Fontaine).

Digital compression, 1 case, cured (Godwin).

Ligation of femoral between the two tumors; cure of lower tumor, increase of upper tumor; later, however, ligation of external iliac and cure of upper tumor (Gaston).

Ligation of femoral above upper tumor, 1 case, cured (Souchon).

Ligation of common femoral, death from intercurrent complication (Damaschino).

Ligation of external iliac, 2 cases, died (Gignoux, Hawkins).

If now we study the cases of simultaneous double aneurism of the common femoral and of the superficial femoral on the same side, or of the common femoral and popliteal on the same side, we have 8 cases, of which 4 were cured (Solly, Diver, Ensor, Bryant) by the ligation of the external iliac; 1 of these had to be ampu-

tated for gangrene (Diver); 1 partly failed to cure, also the upper tumor by compression alone (Boughter); 3 died, 1 from rupture of the lower tumor with ligature above and below (Morton), the other from rupture of the lower aneurism and rejection of amputation (Walton); the third from rupture and hemorrhage (Munro).

Let us now consider the results of the ligation of the external iliac.

In cases of double aneurism of the superficial femoral and of the superficial femoral and popliteal, it was ligated twice (Gignoux, Hawkins), and both patients died.

In cases of double aneurism of the common femoral and superficial femoral and of those of the common femoral and of the popliteal, it was ligated four times (Solly, Diver, Ensor, Bryant), and they all recovered; however, 1 case had to be amputated for gangrene (Diver).

The comparatively good results from ligation of the external iliac may be explained by the fact that the presence of the aneurism on the common femoral being somewhat an obstacle to the unbroken course of the blood, formed or caused the development of the collateral circulation through the ischiatic and obturator with the deep femoral, so that when the external iliac was ligated the parts beyond were more quickly supplied than when the external iliac was ligated for an aneurism on the course of the superficial femoral.

There is, therefore, as regards the ligation of the external iliac, an important clinical distinction to make between aneurisms of the common femoral and those of the superficial femoral, or between aneurisms situated below or above the origin of the deep femoral.

Considering the treatment applied and the results in all the cases of simultaneous double aneurism of the common femoral and of the superficial femoral on the same side, or of the common femoral and popliteal on same side, i. e., all the cases where the upper tumor is situated above the deep femoral artery, we find:

Two cases of rupture of the lower aneurism (Walton and Morton), both died; one rejected amputation (Walton), in the other (Morton) the artery was ligated above and below.

Three ligatures of external iliac cured without accident (Solly, Enson, Bryant).

One ligature of external iliac, with gangrene and amputation, cured (Diver).

Dr. Gaston's mode of treatment in two sittings is worthy of special notice. It was really treating the upper aneurism after the method of Brasdor ; very probably the first ligation favored the development of the collateral circulation.

SUNDRY REMARKS. In one case ligature above and below tumor was applied (for suppuration of sac); it died (Morton).

In two cases the lower tumor was cured, but the upper tumor persisted (Boughter, Souchon).

In one case neither tumor is permanently cured by ligation (Solly).

In one case suppuration of lower tumor occurred and the artery was ligatured above and below; it died (Morton—same case as above).

In two cases secondary hemorrhage at point of ligature occurred; they finally cured (Souchon, Solly).

In two cases gangrene from ligature on external iliac took place, one died (Hawkins), and one is amputated and recovered (Diver).

In one case compression on tumors was practised and they were cured (Fontaine).

Of the two cases of compression on the artery, digital and mechanical, one failed (Morton), in the other it cures the lower tumor only (Boughter).

The *complications* which occurred were :

Cerebral symptoms, 1 case (Damaschino).

Suppuration of aneurism on the other limb, 1 case (Coyley).

Secondary hemorrhage, 2 cases (Souchon, Solly).

Gangrene, 2 cases (Hawkins, Diver).

Increase of upper aneurism, 1 case, (Gaston).

Rupture of aneurism, 3 cases (Morton, Munro, Walton).

Return of pulsations, 3 cases (Souchon, Boughter, Solly).

[*N. B.*—Several cases had also aneurisms of the other arteries, our case had no other aneurism.]

FINAL RECAPITULATION. Altogether 16 cases of double aneurism on the same side :

Eight cured (Godwin, Souchon, Fontaine, Gaston, Solly, Diver, Ensor, Bryant). Of the 8 cured 2 were cured without operation (Godwin, Fontaine), 1 was also partially cured without operation (Boughter). Of the 5 cases cured by operation, 1 was amputated (Diver).

Seven died (Damaschino, Gignoux, Coyley, Hawkins, Morton, Munro, Walton).

One failed to cure upper tumor (Boughter).

Below profunda, 8 cases: 4 cured (Godwin, Souchon, Fontaine, Gaston); 4 died (Damaschino, Gignoux, Coyley, Hawkins).

Above profunda, 8 cases: 4 cured (Solly, Diver, Ensor, Bryant); 1 case amputated (Diver); 3 died (Morton, Munro, Walton); 1 failed partially (Boughter).

ABSTRACTS FROM AUTHORITIES.

Upon searching through the various authorities within our reach, we gleaned the following facts bearing upon our subject, which carry their lessons with them :

References to Double Aneurism.

The two quotations below, from Erichsen and Gross, are all the references we could find to double aneurism :

Aneurisms occasionally take place in the groin and ham of the same side ; here the ligation of the external iliac will cure both tumors. Of four cases it succeeded in three, one dying of gangrene.

In two of these cases that recovered pulsation returned in the original aneurism, but disappeared after a time.²⁰

Gross²¹ says it occasionally happens that the femoral artery has two aneurisms.

Regarding the Frequency of the Disease.

Crisp²² affirms that aneurisms of the thigh are much rarer—1 to 3.

Erichsen²³ says that aneurisms affecting the groin are by no means infrequent.

Gross²⁴ mentions also that he has never seen an instance of spontaneous aneurism in the lower third of the thigh, and general experience concurs in admitting that such an occurrence is extremely uncommon.

Vidal de Cassis²⁵ states that aneurisms of Hunter's canal are very rare, because of the presence of the strong fibrous sheath.

Although the following remark of Erichsen²⁶ has no immediate application to such cases as we have under study, yet it carries an invaluable idea which we should remember when the sac ruptures:

In the different traumatic aneurisms—*i. e.*, in ruptured artery where there is no sac, properly speaking, it is doubtful whether there is a case on record in which the Hunterian operation for aneurism has not terminated in danger and death to the patient and disappointment to the surgeon.

Remarks Referring to Ligation in General.

Erichsen²⁷ recalls the sensible rule that we should not ligate if compression on the artery stops all pulsations in all the arteries beyond, lest gangrene will follow.

Also that in cases where there is no pulsation in the vessels beyond the aneurism, it is useless to attempt ligation on the distal side.

Points Applying to the Ligation of the External Iliac.

Erichsen²⁸ dogmatically asserts that it may be laid down as a rule in surgery that in all those cases of aneurism that are situated in the upper part of the thigh, in which compression has failed and sufficient space does not intervene between the origin of the deep femoral and the upper part of the sac for the application of a ligature to the superficial femoral, the external iliac should be tied.

However, asepsis and catgut ligatures without rupturing the coats may alter this. (The writer.)

Gross²⁹ states that ligation of the external iliac is generally reported as a much safer operation than ligation of the common femoral.

According to Holmes,³⁰ the mortality in ligation of the external iliac exceeds that of amputation of the thigh.

The statement of Ashhurst³¹ is that the ligation of the external iliac alone for aneurism gives a mortality of 39 per cent.

Norris and Cutler's³² tables show that out of 143 cases of ligation of the external iliac for all aneurisms, 47 died, of which 17 of gangrene and 9 of hemorrhage.

According to Poulet and Bousquet,³³ in high aneurisms of the superficial femoral and those of the common femoral, out of 67 cases of ligation of the external iliac 42 recovered; death-rate 16 per cent.

Ashhurst³⁴ makes the statement that ligation of the external iliac gives a mortality of 22 per cent.

The mortality from gangrene in ligation of the external iliac is 11 per cent.³⁵

Ashhurst³⁶ also says that after ligation of the external iliac the risk from hemorrhage is 15 per cent.

Dr. J. T. Williams³⁷ reports a successful case of double ligation of the external iliac with section of the artery between the ligatures for upper femoral aneurism.

Remarks Concerning the Ligation of the Common Femoral.

Ashhurst³⁸ holds that the ligation of the common femoral is attended with more risk than the ligation of the external iliac.

According to Erichsen,³⁹ in Ireland the ligation of the common femoral was performed nine times, with six recoveries and three deaths, for wounds and for aneurisms.

In the American Civil War it was performed eighteen times with only four recoveries.

Barwell says that in 31 cases in which this artery was tied for aneurism hemorrhage occurred in 18, and of these 12 died.

In explanation Holmes⁴⁰ writes that the reason of the supposed danger of the ligation of the common femoral is the proximity of the ligature to the large branches.

Another reason is the probability of gangrene in consequence of the vessel being blocked up above the origin of the great nutrient arteries of the limb.

Rabe's⁴¹ table shows that death from gangrene after the ligation of the common femoral is 18 per cent.

As for the risk from hemorrhage after ligation of the common femoral, it is 39 per cent.⁴²

Remarks Referring to the Ligation of the Superficial Femoral.

Erichsen⁴³ contends that the ligation of the superficial femoral is attended with more success than that of any of the larger trunks.

Ashhurst⁴⁴ remarks that ligation of the superficial femoral appears to be a more successful operation when performed for femoral than for popliteal aneurism; the reason being that the risk of gangrene from venous congestion is much greater in the latter than in the former.

Crisp's⁴⁵ tables show that the mortality after ligation of the superficial femoral for femoral and popliteal aneurisms is 22.7, or 1 in 4.5. However, Syme tied the femoral thirty-five times with only 1 death.⁴⁶

Norris⁴⁷ states that in 22 cases of ligation of the superficial femoral for femoral aneurism there was only 1 death from hemorrhage.

In 154 ligatures of superficial femoral for popliteal aneurisms there were 39 deaths, of which 19 were from gangrene.

Dr. J. T. Williams⁴⁸ reports, also, a successful case of double ligation of the superficial femoral with section of the artery between the ligatures for popliteal aneurism. He believes the relief of tension insures the rapidity of repair and prevents recurrent or secondary bleeding.

Erichsen⁴⁹ very pithily says that the occurrence of secondary hemorrhage after the ligation of the superficial femoral is a

troublesome accident and one in which the surgeon, to use Ferguson's expression, will assuredly find himself in an eventful dilemma, and at which it is necessary that his line of action should have been well considered beforehand, as he may not have much time to spare for reflection when such an event takes place. In cases of this kind four lines of treatment present themselves, viz., the employment of pressure, ligature of the vessels at a higher point, ligature of the bleeding artery in the wound, amputation of the limb.

Holmes⁵⁰ makes the statement that in recurrent aneurisms of the lower extremities it is best to tie the artery below the ligature already applied between it and the sac, whereas in the upper extremity it is best to open the sac and tie the ends.

We must bear in mind that all the figures given above are of the preaseptic period. Asepsis improves them very much. (The writer.)

Remarks Concerning Extirpation.

Rose,⁵¹ in a case of aneurism of the high superficial femoral and of the common femoral, extirpated the sac, and although the vein was opened the patient recovered.

Poulet and Bousquet⁵² say that in eight cases the sac was incised and the vessel ligated above and below, with one death.

That is the best treatment, because the ligature of the external iliac numbers many failures, has a high mortality, and exposes to ventral hernia.

Kubler⁵³ thinks extirpation of the sac of peripheral aneurisms is the most rational and certain and the least dangerous method, in spite of the undoubted difficulty of the operation. Out of 40 cases 39 were completely successful.

In extirpating the sac, the valuable use of the provisional loop ligature must not be forgotten.

TABLE E.—Simultaneous Triple Aneurism of the External

Number.	Date.	Name of surgeon.	Situation of aneurism.	Treatment.
Case I.	1862	Lowe,	One ilio-femoral, one superficial femoral, and one popliteal.	Amputation for rupture.
Case II.	1870	McLeod,	Two tumors below Poupart's ligament, one at Hunter's canal, diffused.	Amputation above lower aneurism.
Case III.	1876	Pemberton,	Common femoral, superficial femoral at apex of Scarpa's triangle, and popliteal.	Ligature external iliac.
Case IV.	1892	Hulke, No. 1.	Right external iliac, right femoral, right popliteal.	.....
Case V.	1894	Hulke, No. 2.	External iliac, femoral, popliteal.	None.

TABLE F.—Simultaneous Quadruple Aneurism of the

Number.	Date.	Name of surgeon.	Situation of aneurism.	Treatment.
Case I.	.....	Scarpa,	Common femoral, two on superficial femoral, one at the ring of the great adductor.	.....
Case II.	1771	Munro,	One on end of external iliac, two on femoral, one on popliteal.	.....

Iliac, the Femorals, and the Popliteal, on the same side.

Complications.	Results.	Remarks.	References.
Rupture of the femoral aneurism.	Cure.	The ilio-femoral aneurism was left in the stump; compression of the external iliac cured the ilio-femoral aneurism.	Gaz. Hebdomadaire, 1862, from Med. Times and Gaz., 1862, p. 383.
.....	Cure.	Also two aneurisms on left femoral and one on left external iliac. The higher aneurism became consolidated.	Glasgow Medical Journal, 1870, iv. 328.
Gangrene up to middle of leg.	Cure.	.....	London Lancet, 1876, i. 212; 1877, iii. 114; also Dechambre's Dict., 1879, article Artère Crurale, 726.
.....	.....	Also an aneurism on left femoral and double aneurism of left popliteal.	International Med. Mag., Philadelphia, Dec. 1892, i. 1188; also Sajous's Annual, 1894, vol. iii. k. 7.
Rupture of an aortic aneurism.	Death.	Aneurism of aorta and aneurism of popliteal on the other side.	International Med. Mag., Philadelphia, Dec. 1892, i. p. 1188; also Sajous's Annual, 1894, vol. iii. k. 7.

External Iliac, the Femorals, and the Popliteal, on the same side.

Complications.	Results.	Remarks.	References.
.....	Scarpa, quoted by John Parker; also Gillette, in Dechambre's Dictionary article Artère Crurale, 1879, p. 666.
.....	Lefort, in Dechambre's Dictionary, 1866, article Aneurism, p. 536.

APPENDIX.

We append here several cases of triple and of quadruple aneurism which were discovered in our researches.

Simultaneous Triple Aneurism of the External Iliac, the Femorals and the Popliteal on the Same Side.

CASE I., 1862. *George Lowe*⁵⁴ mentions a case of a man with three aneurisms on the same left lower limb. One ilio-femoral as large as a chestnut, one on femoral as large as a turkey's egg, one on popliteal as large as a hen's egg. The femoral aneurism ruptured spontaneously and the thigh was amputated, leaving the ilio-femoral aneurism in the stump. After healing of the amputation, compression on the external iliac cured the ilio-femoral aneurism.

CASE II., 1870. *McLeod*.⁵⁵—On right side: two aneurisms high up between Poupart's ligament and the upper limit of the second or lower one, which is a diffused aneurism at Hunter's canal; amputation above the lower aneurism; cure. The higher aneurisms became rapidly consolidated, and one was quite absorbed before the patient left the hospital. On left side: One aneurism on left external iliac and two on femoral.

CASE III., 1876.—*Pemberton*⁵⁶ relates a case of triple simultaneous aneurism of left common femoral, of superficial femoral (apex of Scarpa's triangle), and of popliteal, on the same side. Man, aged forty-eight years; ligature of external iliac with a catgut aseptic ligature prepared by Lister himself; suppuration at site of ligature; the immediate result of operation was that all pulsations ceased in the three aneurisms and have never returned since. The circulation in the main artery extending from the seat of the ligature below the bifurcation of the common iliac to a little above the origin of the anterior and posterior tibials was arrested at four different points by absolute barriers to circulation by one ligature and three solid aneurisms. Dry gangrene set in on the second day, but was not definitely limited before three months after the operation; it extended to the middle of the leg.

CASE IV., 1892.—*Hulke*, No. 1.⁵⁷—Simultaneous triple aneurism on left side. Man, aged seventy-three years. On the right iliac slight bulging; right femoral and right popliteal.

Also double aneurism of the left popliteal; aneurism of the left femoral. No treatment mentioned; no result stated.

CASE V., 1894. *Hulke*, No 2.⁵⁸—An aneurism in each—external iliac, femoral, and popliteal (a seventh in the aorta). He died of rupture of the aortic aneurism.

Simultaneous Quadruple Aneurism of the External Iliac, the Femorals, and Popliteal on the Same Side.

CASE I.—*Scarpa*,⁵⁹ quoted by John Parker, reports four aneurisms of the right femoral; one in the groin, two below the deep femoral, and one at the ring of the great adductor.

CASE II.—*Donald Munro*⁶⁰ describes four fusiform aneurisms on same lower limb; one on the end of the external iliac, two on the femoral, and one on the popliteal.

Post-scriptum. The two following most interesting cases came to our knowledge too late to be incorporated in the tables and conclusions, but they speak eloquently of themselves.

CASE I.—S. Duplay,⁶¹ of Paris, reports a case of *simultaneous double aneurism* of the *superficial femoral* (about the middle third), and of the *popliteal* on the *same side*; elastic compression after Reid's method; cure.

Six years later the *same patient* returned with about the *same double aneurism* on the *opposite limb*; the elastic compression was applied but failed; ligature of the superficial femoral at the apex of Scarpa's triangle; cure.

CASE II.—Brown⁶² reports the case of a woman, aged forty-eight years, affected with *simultaneous double aneurism of the right limb*; the *upper*, the size of a cocoanut, extended *above Poupart's*

ligament, and was on the verge of rupturing; the *second* or *lower* aneurism in the *middle third of the superficial femoral*; on account of the high position of the first aneurism, which prevented any of the usual operations being performed, transperitoneal ligation of the external iliac was decided upon, in Trendelenberg's position; abdominal wound did well, but gangrene of the leg necessitated amputation, and the patient died two and a half months later.

Brown thinks that the transperitoneal method is the one to be generally adopted.

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