ON THE LIGATION OF THE EXTERNAL ILIAC
ARTERY FOR ILIO-FEMORAL ANEURYSM AND
OTHER TUMOURS.

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I WISH to bring under the notice of this Section of the Royal Academy of Medicine three cases of ligation of the external iliac artery—one performed recently for ilio-femoral aneurysm, the other two to facilitate the removal of malignant growths in the groin and to safeguard the patients from sudden and fatal hæmorrhage. Before detailing the cases, and in order to make the subject of my communication more interesting, instructive and practical, I shall refer as briefly as possible to the surgical anatomy of the external iliac artery with special reference to the relation of its accompanying vein, the surrounding sheath, the position in which the branches are given off, and, in my opinion, the proper site to select for the application of the ligature to the artery.

The external iliac artery takes an oblique course downwards, outwards and forwards, indicated by a line extending from the left of the umbilicus to the centre of Poupart's ligament. Its length is from three and a half to four inches; it lies on the psoa-iliac aponeurosis and psoas muscle. The peritoneum covers the artery completely above and on its inner side through the greater part of its course. The ureter, especially at the right side, dips into the pelvis, internal to the artery, close to its origin.

The external iliac vein, at the crural arch, is internal to the artery, and nearly on the same level and *separated from the artery by a septum*. As the vein ascends it is internal and gradually becomes posterior to the artery, and lies on a plane internal to the pelvis, its outer edge looking somewhat upwards and outwards; still higher the vein gets posterior, and lies in the interval between the bifurcation of the common iliac into external and internal iliac. The genito-crural nerve lies to the outer side of the artery, sometimes enveloped in the sheath, and at the lower part of the artery the genital branch passes in front of the artery.

The artery and vein are invested by a cellular membrane—fascia propria or subperitoneal fat, also called Abernethy's fascia; it is joined to the fascia iliaca at either side of the vessels, and I have *demonstrated a process of the sheath or fascia propria passing between the artery and the vein so that the artery can be ligatured without the vein appearing*. One or more oblong lymphatic glands are situated close to, or anterior to, the external iliac artery near its termination, and where it is crossed by the spermatic vessels, also by the circumflex iliac vein. The artery at the right side has the termination of the ileum and the cæcum in close relation. The external iliac artery gives off no branches of importance until within a quarter or half an inch of its termination. It then gives off from its outer side the anterior or circumflex iliac, and from its internal or anterior surface the deep epigastric artery. It is therefore quite obvious that the *lower portion of the artery should not be selected for tying*.

ILIO-FEMORAL ANEURYSM.

CASE.—P. K., aged forty-two years, residing near Dublin, driver of bread cart, served as gunner in the Mounted Train Battery, Royal Artillery, for eight years, during the Egyptian campaign; had syphilis twelve years ago. Cicatrix in left groin where bubo was opened; has been a moderately hard drinker.

Except for the illness alluded to he enjoyed good health. Consulted me in April, 1901, for a swelling in his right foot, leg and thigh, which he attributed to jumping up and down off bread cart. He said the swelling commenced in his ankle and gradually went up his leg and thigh to his groin. On examination of the affected limb it was swollen not unlike phlegmasia alba dolens. There was no pitting on pressure. No glandular or other swelling in groin. There was an erysipelatous blush on the front of the leg. He was placed in one of the observation wards; limb elevated; warm boric stupes applied. The swelling gradually disappeared, and he was sent to the Convalescent Home, where he remained a fortnight, and then feeling quite well he returned home on May 17th, resumed his work on the bread cart, exactly one month from the day I first saw him. The day after he resumed his work he felt a stiffness in his right groin, and as he did not get relief from resting at home he came in to see me on June 3rd. I examined his groin and limb, and found nothing except a slight enlargement of the thigh. He was again admitted into the Convalescent Home, where he remained resting the limb for twelve days. June 17th he came in to consult me, when I at once detected an ilio-femoral aneurysm. At that time all other swelling had left his leg and thigh.

Treatment.—He was placed in a very comfortable bed. Tufnell's diet and iodide of potassium were prescribed and carried out. A flannel bandage was applied from the foot to the knee and an ice-bag was applied to the tumour. Perfect rest and instrumental and digital pressure got a full trial. The tumour, which occupied about the circumference of a small orange, gradually enlarged, pulsated strongly, and there was a very distinct *bruit de souffle* heard over it. The patient carried out all instructions in a most praiseworthy way.

The patient was naturally anxious, as indeed I was, to give the treatment by rest, pressure, diet, and medicine every trial before resorting to operation. The tumour, as seen by the cast, extended from the pubic spine close to the crest of the ilium, and extended downwards below the origin of the profunda femoris; it could be felt dipping into the pelvis. I was out of town for a holiday during September, and on my return I was pleased to find the tumour much firmer at the circumference, and smaller. The patient's health was excellent. He did not suffer in any way

from the long confinement to bed, and at no time did the skin become irritated, as the part was kept constantly shaved and dusted. At one time in October the aneurysm showed signs of being cured, but the pulsation returned as forcibly as ever, and then the patient expressed a strong desire to have the operation performed. I operated on October 31st.

I weighed carefully in my mind all the facts of the case—the possibility of the aneurysmal tumour extending into the pelvic cavity, and the artery being diseased high up. The operation known as Abernethy's I never liked; the one modified by Sir A. Cooper I thought unsuitable for the case. I therefore decided on an incision like the one made for removal of the vermiform appendix to give plenty of room to go high on the artery, and if necessary to ligate the common iliac.

The skin wound was not deepened in the vicinity of the internal abdominal ring, and the deep epigastric therefore was not endangered. The fascia transversalis was opened to the outer side of the "deep ring"; the internal oblique and transversalis were separated low down; the cæcum and small intestine were drawn up by means of a broad spatulæ made specially for Professor Hargrave's case of ligation of common iliac (at which I was his chief assistant). When the intestines in the unwounded peritoneum were drawn well up I saw the aneurysmal sac dipping into the pelvis. The whole length of the external iliac artery enclosed in its sheath was exposed; not a drop of blood was seen, and the parts looked so like an operation on the dead body that I said so at the moment (on looking into various papers since my operation I find that Sir Philip Crampton made a similar remark at his operation on the iliac artery).

The external iliac in its strong sheath *did not pulsate*. I placed my finger on the vessel and felt its pulsation. I raised portions of the sheath with a fine pointed forceps, and cleared with a small scalpel a sufficient space to allow a long-handled aneurysm needle to pass round the artery from within outwards. The *vein was not seen*, and no nerve came into view. The needle was threaded with ox peritoneum (goldbeater's skin), the loop being held; the needle was withdrawn, the loop divided, leaving a double ligature under the vessel. The ligature on the cardiac side was tied first by first half of reef knot; the artery, which was very large, but *normally soft*, grooved like a director as I *approximated* (by

Scarpa's method) the *internal coats* of the artery; the second ligature was then tied in a similar way, then the two ends from each side, treated as a single ligature, were tied, thus completing the stay-knot of Ballance and Edmunds. When the first knot was tied all pulsation in the aneurysm ceased and never returned. The tumour, though silent, *did not alter in size*, showing that there was a very considerable amount of fibrin deposited in the sac, the result of pressure and rest.

The patient bore the operation well, and for about four hours after his removal to bed he complained of a numbed sensation in his foot. That passed off, and he never complained of any discomfort afterwards.

The patient, who made an uninterrupted recovery, was in attendance, and inspected by the members. There is no tendency to hernia. Photographs and casts of the case, taken before and after operation, and original drawings by Dr. Paul Carton, showing the *relation of the artery and vein with SEPTUM*, were also exhibited.

Through the courtesy of Professor White, curator of the museum, three casts were taken by the museum porter. The first shows the size and extent of the aneurysm, the second shows the change after operation, the third shows the present condition of the limb.

When the trunk of the external iliac artery is ligated the limb is abundantly supplied with blood by the branches of the internal iliac which leave the pelvis. The gluteal transmits blood to the femoral artery through the internal and external circumflex branches of the latter. The sciatic transmits blood to the femoral artery by the internal circumflex and perforating arteries, and to the popliteal through the cava nervi ischiatici. The obturator supplies the femoral through the branches which communicate with the internal circumflex, and the pudic artery supplies the femoral by its communication with the pudic branches of the latter.

Examination of limbs where the cases ended fatally showed

the portion of the femoral artery below the origin of the profunda to be normal. The portion between the ligature and origin of the profunda was normal or reduced to one-half its size (case of Sir Astley Cooper).

The case just detailed of spontaneous ilio-femoral aneurysm is full of interest, and the highly satisfactory termination is, in my opinion, in no small degree attributable to the preparatory course to which the patient was subjected—namely, perfect rest, Tufnell's diet, digital and instrumental pressure, which gave time for fibrinous deposition in the very large sac and the establishment of a free collateral circulation.

The tumour was so much under the control of pressure on the inguinal portion of the artery that I was not altogether without hope that by *diminishing* the current of blood in the trunk of the artery, so as to favour the coagulation of the contents of the sac, a cure *without operation* might be effected; at all events it was obvious that by giving time to the collateral arteries to be dilated the success of the operation would be rendered less uncertain.

"The cases of popliteal aneurysm" (says Todd, *vide* Dublin Hospital Reports, Vol. III., 1820) "are chiefly related with a view of recommending a more general adoption than is at present practised of a preparatory course previously to operation."

I can scarcely doubt but that in many cases of aneurysm in which operations have failed from mortification of the limbs succeeding, the patient might have been saved by a delay sufficient to allow some progress to be made in establishing the collateral circulation; and I feel confident that this desirable object may be promoted in most instances of recent disease situated at a sufficient distance from the trunk by compressing the principal artery of the limb for a few hours every day for a period which must vary according to the circumstances of the case.

CASES OF LIGATION OF THE EXTERNAL ILIAC ARTERY AS A
PRELIMINARY TO REMOVAL OF MALIGNANT GROWTHS FROM
THE GROIN.

CASE I.—A young man employed in a butcher's shop in Baggot-street came under my care suffering from a melanotic sarcoma in the groin. I laid bare the external iliac artery by Sir Astley Cooper's incision, ligatured the external iliac and deep epigastric, finding the femoral artery in the centre of the growth. I tied that artery also below the profunda and removed the entire growth. The circulation in the limb was thoroughly established. The patient subsequently developed melanotic growths over his abdomen and chest, and sank from exhaustion in some months.

CASE II.—A young man was admitted into hospital last year under my care suffering from a large watery ulcer of cicatrix on his leg. I removed the limb above the knee and the stump healed. In a short time the glands in the vicinity of the saphenous opening became enlarged and were excised; a large growth soon followed. I ligated the external iliac artery, and cleared all the growth from the groin and pelvis. A fresh growth was rapidly developed at the opposite side. The patient was admitted into the Royal Hospital for Incurables, where he died a few months since from exhaustion.

The following truly sad case led me to decide on ligating the external iliac in malignant growths in the groin:—

A young clergyman from the country consulted me some years ago for an ulcer on the prepuce, which I at once pronounced to be malignant; the growth was removed, and the part healed satisfactorily. The patient returned home and resumed his duties; in a few months he returned to town with a glandular enlargement in his groin. I removed the glands; the wound healed, and the patient returned again to his duties. In a few months he returned to consult me, and I was horrified to see a huge mass of cancer occupying the groin and dipping into the pelvis. I advised the unfortunate sufferer against any further operative interference. This opinion was confirmed in consultation with a late distinguished senior member of the profession.

The patient remained near town, where I saw him occasionally. Small bleedings occurred from time to time. One day I was sent

for in great haste, and when I got to the house I found the patient dead ; sudden arterial hæmorrhage flooded the bed.

I at once made up my mind if I met such cases again to ligate the main artery on the same principle as I adopt in tongue cancer, of cutting off the main blood supply and prevent sudden death from hæmorrhage.

HISTORY OF THE OPERATIONS ON THE EXTERNAL ILIAC ARTERY.

Mr. Abernethy is said to have been the first surgeon who tied this artery (in the year 1796) for femoral aneurysm. He had previously tied the femoral on the distal side of the aneurysm (Bradsor). Severe secondary hæmorrhage set in on the fifteenth day. He made an incision over the course of the artery. He experienced much difficulty until the fascia which covered the artery and vein was opened. In his second case he made his incision not over, but a little external to, the artery. Both cases ended fatally. In 1806 Abernethy had a successful case. Mr. Abernethy's operation was condemned at the time as a rash and useless operation, whilst some disbelieved that it was ever put into execution. Mr. Abernethy's cases showed that it was an operation highly justifiable, and he afterwards had the gratification of seeing it successfully practised.

Freer, of Birmingham, performed the operation in 1806 ; Tomlinson in 1807 and 1809 ; in 1811 Kirby, of Dublin, had a successful case. He is said to have experienced the same difficulty from the fascia as Abernethy. Sir Astley Cooper, in 1814, had seven cases ; four were successful, three died.

The external iliac artery has been tied in Dublin by Todd, Wilmot, William Henry Porter, Houston, and Bellingham.

Dupuytren lost his case by wounding the epigastric artery ; Béclard by tying immediately below its origin.

Travers' well-known case was lost in consequence of the ligature having been placed on the artery between the epigastric and circumflex ilii. In 1810 the external iliac was

tied for the first time in France by Delaporte, of Brest. The patient died. Goodlad had a successful case in 1811, and Dorsey, of Philadelphia, another in the same year. In 1812, Bouchet, of Lyons, operated with success. The same year Albert's case died of tetanus. Mr. Norman and Mr. Brodie had each a successful case in 1813, and Lawrence in 1814. Mr. Samuel Cooper states that out of twenty-five cases gangrene occurred in three—one of Sir A. Cooper's; second, Bouchet, of Lyons; the third, Mr. Collier's. Arendt tied both external iliacs in succession, with an interval of eight days only between the operations, and was successful.

Erichsen disposes of the subject of ligation of external iliac in a few words—gives no history of the operation, and only performed it once; the patient died of hæmorrhage on the same day.

In regard to the obliteration of the iliac artery, certain facts were known at an early period of the last century. Gualtain and Scarpa's injections clearly established that although a ligature had been previously placed on the external iliac artery, the coloured fluid passed freely into the arteries of the thigh and leg.

Cases in which the external iliac may require to be ligated :—

1. Aneurysm of the femoral or popliteal artery.
2. Ilio-femoral aneurysm.
3. Wound of the artery (as in Velpeau's case).
4. Secondary hæmorrhage in compound fracture.
5. To facilitate the removal of tumours in groin.
6. And avoid sudden death from hæmorrhage in cases of malignant tumours.

Velpeau records a case of a young man, aged seventeen, who inadvertently stabbed himself in the groin while cleaning a table, opening the external iliac artery transversely immediately above the epigastric. The artery was tied and the patient recovered.

The following are the principal dangers in performing ligature of the external iliac artery :—

(1) Puncturing the peritoneum in the extra-peritoneal (Sir A. Cooper's method); (2) wounding the epigastric artery; (3) wounding the spermatic cord; (4) wound of circumflex iliac vein.

Chief dangers after operation :—

(1) Secondary hæmorrhage (especially if the operation is performed low down on the artery); (2) gangrene; (3) peritonitis.

MR. T. MYLES had listened with much pleasure to Mr. Croly's very interesting paper—interesting from both its anatomical and its clinical aspects. He quite agreed with Mr. Croly in selecting a site some distance from the deep epigastric artery for ligation; but he was not so sure that the secondary hæmorrhages which were so common in the past were due to the site of ligation. The *locus in quo* did not account for everything. The good result was no doubt partly due to the better site of ligation chosen by Mr. Croly; but there was something more—to-day we had aseptic methods—aseptic ligatures, aseptic handling of the wound. He would like to hear from Mr. Croly how he prepared the ligatures; also if he found the pulse of the posterior tibial in the limb operated on soon after the ligation. When we think of the care taken by surgeons to-day to ensure aseptic conditions, and recall the methods of the past, we can only ascribe the successes of the older surgeons to the providential mercy of God.

MR. L. H. ORMSBY felt that they should all be very much obliged to Mr. Croly, one of their senior surgeons, for taking the trouble of coming there and describing to them his operation. He had never had an opportunity of tying the external or common iliac artery; but if he should be called on to perform such an operation he would adopt Mr. Croly's methods and be well satisfied if he obtained equally good results.

MR. LANE JOYNT by the reference to the old surgeons and their methods was reminded of a painting he saw not long since on the wall of a house in Pompeii, which represented a surgeon in the

act of cutting down on the femoral artery in Hunter's canal. The line of incision was that followed by Hunter.

MR. LENTAIGNE thought that perhaps the older surgeons were too much blamed. He looked on secondary hæmorrhages as the result of sepsis—sepsis by silk ligatures and ligatures of other absorbent material, which retain septic matter in close union with the arterial wall, so that it soon becomes infected. All this was carefully avoided to-day with the excellent and brilliant results which they had just heard from Mr. Croly.

MR. CROLY, in reply, stated that he prepared his ligatures by leaving them for twenty-four hours in ether and then placing them in a solution of carbolic acid in water, of a one in twenty strength. He looked upon the fear of wounding the peritoneum as the reason the older surgeons tied the external iliac so near its distal end. This fear paralysed their action in cases of wounds of the deep epigastric and internal iliac arteries—they looked on wounds of the peritoneum as necessarily fatal, and rather than open it they left patients to die of internal hæmorrhage. He (Mr. Croly) did not divide the muscular tissue by his incision; on coming down to the muscle tissue he pushed the fibres aside with his fingers and readily exposed the artery. He failed to find the posterior tibial pulse either after the operation or since, though, as was seen, the man makes no complaint of any want of circulation in the limb.