

## History of Medicine

# Dr Murray's case of ligation of the abdominal aorta — Somerset Hospital, 1834

### A forgotten historical event

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While reading a recent article on the extraperitoneal exposure of the abdominal aorta,<sup>1</sup> my attention was drawn to a comment in the discussion by Dr Charles Rob, who referred briefly to an operation carried out in Cape Town in 1834 by a Dr Murray. The operation consisted of the extraperitoneal exposure and ligation of the aorta for an expanding iliac aneurysm. The reference provided by Dr Rob was to a brief description entitled 'Dr Murray's case of ligation of the abdominal aorta', which had appeared in the *Annals of the Royal College of Surgeons of England* in 1984.<sup>2</sup> The original description of this operation is to be found in both the first (1839) and second editions (1850) of *Surgical Anatomy of the Arteries and Descriptive Anatomy of the Heart* by Valentine Flood.<sup>3</sup> Despite the obvious historical significance of this operation, its performance is not recorded or noted in the standard texts that deal with the early history of medicine in the Cape,<sup>4-7</sup> nor was its performance known to knowledgeable medical historians (J. H. Louw and J. C. de Villiers — personal communications).

### Ligation of the abdominal aorta<sup>3</sup>

The first surgeon to ligate the abdominal aorta was Sir Astley Cooper, who performed the operation on a patient with a ruptured external iliac aneurysm at Guy's Hospital, London, in April 1817. Before this, Cooper had experimented on dogs and noted that: 'If the aortic plexus be tied with the artery, the lower extremities are rendered paralytic and the animal dies.' In Cooper's original operation a 76 mm incision was made in the linea alba and the aorta approached transperitoneally. The patient died on the second postoperative day.

The second recorded operation was by a Mr James on 5 July 1829 'in the manner practiced by Sir A. Cooper'. In the description provided it is clear that the aorta was approached transperitoneally. The patient died the same day.

Dr Murray's operation, recorded in the *London Medical Gazette* of 4 October 1834<sup>3</sup> is notable for a number of reasons. It was the first recorded instance of a purely retroperitoneal approach to the abdominal aorta. The incision used was different from that used by Cooper and James and similar to contemporary incisions. It was also a far more detailed case report and thus provides a fascinating insight into major surgery in the early 19th century. It is clear from Dr Murray's description that he was aware of Cooper's case and his views on the preservation of the aortic plexus.

Flood's book describes the operation as follows:

### 'Dr Murray's case'<sup>3</sup>

'A Portuguese sailor applied at the Civil Hospital, at the Cape of Good Hope, with a large aneurismal tumour over the site of the external iliac artery.

"The tumour now presents the greatest size and prominence immediately above Poupart's ligament, in the site of the external iliac artery. The most prominent part is tense, shining, and circumscribed, about the size of an orange, and its hard irregular base extends upwards to an imaginary line drawn from the umbilicus to the lower ribs, and downwards to a couple of inches below Poupart's ligament; its lateral boundaries being formed by the ilium and linea alba. Pulsation is felt in the prominent part of the tumour, and a sort of whizzing sound is indistinctly discovered in it on the application of the ear or stethoscope; but there appears to be no circulation in the femoral artery. He does not complain of much pain in the tumour at present, but says it is often excruciatingly severe along the thigh bone, and in the knee. The limb is much swollen, and he keeps it constantly in the bent position, and cannot bear to have it extended. The skin is nearly insensible to the touch, and even to pinching, particularly on the inner part of the thigh; yet he describes having a feeling as if worms and flies were creeping over it. Temperature of the diseased limb 92 degrees, and of the sound one 97. Pulse 96, and intermittent; and the action of the heart has a corresponding irregularity. Two or three days ago he had an attack of epistaxis. Tongue covered, respiration natural; intellect clear. Has had scarcely any sleep for many nights, and no motion in his bowels for eleven days."

'He was accordingly taken into the Hospital, and medicines calculated to palliate his symptoms were exhibited. After a few days, however, matters were getting manifestly worse. His features were shrunk, and exsanguine, limb cold and insensible, and the tumour enlarging and assuming a dark bluish appearance at its prominent part. He complained that the friction employed to preserve the temperature of the limb was only increasing his pain, and the greatest agony was felt in the thigh and knee. Under these circumstances it was resolved no longer to defer the operation.

"The Operation had to be performed by candle-light, and, moreover, as he lay in bed, that he might not be put to the pain of being moved before and after it,

"The size and position of the tumour precluding the possibility of reaching the aorta by cutting from the right side of the abdomen, rendered this necessary to be done from the left, which fortunately, at the same time, had the advantage of affording the readiest and easiest access to the vessel, on account of its anatomical situation, but greatly increased the difficulty of reaching the right common iliac, to tie it, which it was hoped might be found possible.

"The patient lying inclined to the right side, the first incision was commenced a little in front of the projecting end

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of the tenth rib, and carried for more than six inches downwards, in a curvilinear direction, to a point an inch in front of the superior anterior spinous process of the ilium, its convexity being towards the spine. The skin, the subcutaneous cellular tissue, and the aponeurosis of the external oblique muscle, were first incised; next the fibres of this muscle; and successively afterwards the layers of the internal oblique and transversalis muscles were displayed and divided; which was found rather a delicate part of the operation, as their fibres contracted spasmodically when touched by the scalpel. The fascia transversalis was now brought beautifully into view, and cautiously divided by a pair of scissors upon a director, to avoid wounding the peritoneum. This membrane being now completely laid bare to nearly the whole extent of the external wounds, was next detached from the fascia covering the iliacus internus, and psoae muscles, chiefly by the hand, introduced flat between these parts, to separate the loose cellular substance connecting them, which was easily effected.

"Whilst detaching the peritoneum in the fossa of the psoae I found my fingers get into a soft pulpy mass, and a good deal of dark bloody fluid began to ooze out by the side of my hand, which made me withdraw it and examine the parts, by throwing a ray of candle-light into the bottom of the wound, when, from the dark appearance of the parts, my first impression was that they were in a gangrenous state; but I soon discovered that it was caused by ecchymosis, or effusion of bloody serum into the loose cellular texture. I then re-introduced my hand, and gradually prosecuted the detaching of the peritoneum in the direction of the spine, till I came to a large pulsating vessel, which I found to be the upper part of the left common iliac, and in another minute the aorta itself was under my finger; to satisfy myself of which, I requested one of the gentlemen assisting me to place his ear on the tumour, and his hand on the left femoral artery, when he heard and felt the pulsation to stop and recommence in each, as I compressed the vessel, or the contrary. I now endeavoured to reach the right common iliac, but found that the walls of the tumour extended nearly close up to the bifurcation of the aorta; and even had this obstacle not existed, I do not think there is scope for the hand to perform the necessary manipulations to place a ligature upon the vessel from the left side, without using a degree of force, and causing a laceration of parts, that would be inconsistent with due professional caution, humanity, and judgment.

"A tedious and rather difficult part of the operation succeeded; viz. the making a division in the aortic plexus of nerves, and in the membranous sheath covering the aorta, to get betwixt the vessel and the spine, which I effected partly by the steel end of an elevator crani, but chiefly by my nails, *with my mind at my fingers' ends*; and I was not a little rejoiced when I had got a sufficient separation, to be able to insert the point of the aneurism needle beyond and behind it; after which I was soon able to get it, with the ligature, round the vessel, without including any portion of nerve or other extraneous substance. In the manoeuvre, it was with difficulty that the longest-handled aneurism needle could be made to reach the necessary depth. The ends of the ligatures being brought out, the aorta was gently raised upon it, which enabled us, by holding up the peritoneal bag, to see this great vessel pulsating at an awful rate.

"The noose of the ligature was then gradually tightened till all pulsation and circulation was found to have decidedly ceased in the left groin; and we anxiously watched the general effect upon the patient whilst this and the second knot were being tied.

"The pulse at the wrist, during the time, underwent no sensible alteration either in strength, fulness, or frequency; nor did the vascular organization of the head seem to be abnormally congested or excited by the sudden check to this great stream

of the circulation. The tightening of the knot did not seem to occasion him any great pain, not to cause any unusual sensation or shock in the vascular, nervous, or respiratory systems. His first complaint was, that his *left leg had become as benumbed and useless as his right*, and that we had done him bad service in laming his good leg, which he did not expect, and lamented it bitterly: on feeling the aorta, it was found to be full, and pulsating with very great strength, above the ligament [ligature?], but empty and motionless below it. The ends of the ligature were now brought out exteriorly, and the lips of the wound drawn together by three sutures and adhesive straps, over which a compress and bandage were applied.

"The operation was more tedious than difficult; and being effected chiefly out of sight by the hand, it had not the terrific appearance which that by the method of cutting into the cavity of the abdomen must have, and it was accomplished with the loss of less than two ounces of blood. At one time, during its performance, he required to get some brandy and water to support him; but when it was over, he seemed quite as well as before its commencement; and the pulse was 128, steady and regular."

'After the operation he felt deadness of the left thigh and leg, and complained of painful distension of the bladder, though it was empty. Afterwards he became easier, and smoked a cigar, and slept a little at intervals. Soon, however, he began to complain of violent pain in the pubic region and loins. Tongue was now dry and dark, strong pulsation of the carotid, and feeble pulse at the wrist, followed by jactitation: cold clammy sweats. No natural warmth ever returned to the lower limbs, and he died twenty-three hours after the operation. On dissection, it was found that the artery had been secured opposite the interval between the fourth and fifth lumbar vertebrae; no extraneous substance was included, and the "aortic plexus of nerves had been accurately divided". Specks of ulceration were observed on the mucous membrane of the bladder.

'The vessels of the lower part of the body having been injected, a few drops of the size injection were found in a small anastomosing vessel, discovered, passing between the inferior mesenteric artery and left internal iliac; it arose about 2½ inches below the origin of the mesenteric artery, (from the haemorrhoidal branch of it, which seemed larger than usual,) and joined one of the upper branches of the internal iliac, being in length about two inches; but its calibre was so small, having only admitted two or three drops of the coloured size, that it probably never carried red blood during life. No corresponding vessel was to be found on the right side, nor could any further anastomoses be discovered between the arteries of the abdominal aorta and those of the pelvis or lower extremities. The branches of the thoracic aorta were not injected, and therefore not examined.'

## Who was Dr Murray?

Reference to two standard South African historical texts<sup>4,5</sup> suggests that he was Dr John Murray, M.D. He is variously referred to as Surgeon to the Forces in Cape Town (1822-1829) or Principal Medical Officer to the Army. He is recorded as having worked at Somerset Hospital. In 1825 a ward was set aside for eye disease where Dr Murray, 'who had made a special study of this branch of surgery', saw patients on Tuesday and Saturday mornings. He was appointed a member of the Supreme Medical Committee when this was re-established in 1825, became the iast president of this committee (1828-1830) and the first president (1830-1838) of the Colonial Medical Committee that superseded it.

The suggestion that Dr Murray had a special interest in surgery is strengthened by his involvement in the acrimonious



'Bickersteth affair'. Henry Bickersteth, who arrived in the Cape in 1832, was a 19-year-old medical student who for unrecorded reasons had not completed his undergraduate training at St Thomas' Hospital, London. He was appointed as a 'hospital assistant' at Somerset Hospital under Dr S. Bailey in September 1832. In 1834 Bailey proposed to the Governor that a Resident Assistant Surgeon should be appointed and formally recommended Bickersteth. This raised a storm of protest among the medical practitioners of Cape Town. Since Bickersteth had never completed his medical degree, Bailey suggested to the Governor that his competence be assessed by an examination conducted by Dr J. Murray and Dr J. Liesching. Dr Liesching refused and at a private meeting of Cape Town doctors on 14 August 1834 a letter of protest was drafted referring to Bickersteth's illegal appointment. Despite this protest the Governor confirmed Bickersteth's appointment to the post of Assistant Resident Surgeon at Somerset Hospital.

## Discussion

While modern vascular surgery is now taken very much for granted as a defined subspecialty within surgery, it only became established in the last 35 years. In contrast, 'vascular surgery' in the 19th century was confined to the ligation of lacerated peripheral arteries and veins and arterial ligation proximal to expanding aneurysms in the hope of preventing rupture. John Hunter is credited with the first ligation of the superficial femoral artery in a patient with a popliteal aneurysm in 1785.<sup>3</sup> Ligation of the external iliac artery was first performed by Abernethy in 1796 and common iliac ligation by Mott in New York in 1827.<sup>3</sup> In both latter instances the arteries were approached by a lower abdominal, extraperitoneal incision. The anatomy of the collateral circulation was well known and many patients are recorded as having survived the procedure without loss of the limb.<sup>3</sup>

Murray's uniquely detailed and personal account of his operation vividly illustrates the courage and enterprise of surgeons (and the forbearance of patients) a century and a half ago.

Ether anaesthesia remained to be discovered and was first demonstrated to a sceptical medical audience by William Morton in Boston in October 1846. Dr W. G. Atherstone of Grahamstown is generally credited as having administered the first ether anaesthetic in South Africa in June 1847.<sup>7</sup> The discovery of micro-organisms as a cause of human infection and surgical sepsis awaited the work of Pasteur and later Koch

in the 1860s and the principles of antiseptics pioneered by Joseph Lister only began to be adopted at about the same period. Intra-abdominal surgery was generally unthinkable as it was widely believed that breaching the peritoneum would lead to fatal shock and peritonitis. The repair and anastomosis of blood vessels was described in experimental animals by Carrel at the turn of the century, but it was not until the 1950s that this knowledge was employed in patients and the techniques of modern bypass and prosthetic graft replacement was introduced.

Despite his academic isolation at the southern tip of Africa, Murray was clearly aware, as has been noted, of Cooper's research and writings on the subject of avoiding ligation of the aortic plexus of nerves. While it was clearly his intention to ligate the right common iliac artery, the size of the mass in the right side led to realisation that an approach from that side would be impossible. His decision to make an incision on the left from the tip of the 10th rib to 25 mm in front of the anterior superior iliac spine was innovative. An incision of this nature had not, as far as can be ascertained, been described before 1834 and he was thus the first surgeon to describe what is essentially the modern approach for the extraperitoneal exposure of the abdominal aorta.

Finally, one cannot but admire the spirit of enquiry implicit in the last two paragraphs of Murray's description where he details the autopsy findings. He was clearly asking himself the questions: 'Why did the patient die? Was the aortic plexus included in the ligature? What would have been the collateral pathway had the patient lived?'

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