

**The effects of venesection in renewing and increasing the heart's action under certain circumstances / by John Reid.**

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ON THE  
EFFECTS OF VENESECTION

IN  
RENEWING AND INCREASING THE  
HEART'S ACTION

UNDER CERTAIN CIRCUMSTANCES.

BY JOHN REID, M. D.

Demonstrator of Anatomy, President of the Royal Physical and  
Medical Societies of Edinburgh.

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(From the *Edinburgh Medical and Surgical Journal*, No. 127.)

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I HAVE observed in several experiments on the lower animals, that disgorging the right side of the heart, when its contractions are enfeebled or suspended, by opening the external jugular, has in some cases a decided effect in renewing its action, which I am convinced may be of considerable practical advantage in promoting the return of the circulation under certain circumstances.

*1st Exper.* While assisting my friend Mr Cormack in some experiments upon the physiological effects of Creosote, we found, on opening the thorax of a dog, into whose femoral vein 25 drops of creosote had been injected, immediately after it had ceased to breathe, that the heart was perfectly quiescent, and remained so even when pricked and cut superficially with a scalpel. As the right side of the heart appeared much engorged, a small opening was made into the auricle, and part of the blood allowed to escape. As soon as the blood began to flow the heart

immediately resumed its contractions, and continued to act vigorously and spontaneously between two and three minutes, and only ceased after five minutes. The same quantity of creosote was injected into the jugular vein of another dog. On exposing the heart it was perfectly quiescent, and refused to contract when irritated. On emptying the right auricle of part of its blood, it gave two or three contractions, and then ceased.

The poison appeared to have acted more powerfully and rapidly in the last dog than in the first. On applying the hand over the chest of the first dog, an irregular fluttering was felt for a short time after the creosote had passed into the vein, while in the second dog the action of the heart was never felt after it had fairly entered the vein. It is important to remark, that the respiration continued for a short time after the heart's action had become arrested.

Struck with the effect which disgorging the right side of the heart had in renewing its contractions under circumstances where no external stimulus was of any avail, I was anxious to ascertain if the same results would follow the unloading of the heart when arrested from other causes.

*2d Exper.* Three dogs were killed by hanging, and as soon as they had ceased to breathe, the thorax was laid open. In all of them the heart was acting pretty vigorously, particularly in one of them, which was only a few months old. When the contractions had become feeble the external jugular vein was opened. This was followed by a decided but temporary increase in the contractions of the heart in two of them, which were large and full-grown. In the third and young dog the effect was very trifling. The opening of the external jugular was found rapidly to empty the right side of the heart.

The marked difference between the results in the first experiment and those which follow, can, I think, easily be explained. It is well known that there are several poisons which produce death by arresting the contractility of the heart, and Mr Cormack's experiments\* show that among these creosote must be placed when injected into the veins. When these poisons are administered in sufficient quantity, they destroy at once and for ever the irritability of the heart, and no remedial agent can be of the slightest avail. We can, however, easily suppose, and facts could be adduced in confirmation of it, that the substance may be given in a quantity merely sufficient to act transiently upon the heart, so as to diminish or arrest its contractility for a short time only; it would appear that after the action of the poison begins to pass away, and when the contraction of the heart would be renewed, it has, during the temporary suspension of its contractility,

\* The results of Mr Cormack's accurate and laborious investigations on this substance will be published before this Number of the Journal can appear.

become so much engorged with blood, that no external stimulus can excite it to action, until it has been first emptied of part of its blood. The more rapid action of the poison in the second dog, in which the renewal of the heart's action was to a trifling extent compared with the first, is in exact accordance with this view. In death from asphyxia the contractility of the heart appears to be but little affected at first, but gradually ceases after the circulation through the lungs has been suspended. And though the right side of the heart, as its contractility diminishes, becomes so engorged with blood that its contractions are suspended, and though opening the jugular vein, if not deferred too long, has generally the effect of relieving the right side of the heart of part of its blood, and renewing its contractions, yet we cannot expect the same decided results, as in those cases where the action of a deleterious agent has produced a temporary and fleeting effect upon the contractility of the heart.

*3d Exper.* While witnessing, along with my friend Dr J. Y. Simpson, the effects of prussic acid upon some dogs doomed to death at the Police-office, on applying the hand over the chest of a dog, immediately after it had ceased to breathe, to whom a large dose of the acid had been given, the heart was felt beating slowly and irregularly. On opening some of the vessels at the lower part of the neck, among which was the external jugular vein, the action of the heart instantly became rapid, regular, and stronger.

*4th Exper.* A rabbit was killed by a large dose of strychnia. When the heart was exposed its contractions were slow and labouring. On opening the jugular vein, the right side of the heart began to disgorge itself, and this was accompanied by a very decided increase in the number and strength of its contractions.

*5th Exper.* Two rabbits were killed by a blow on the head sufficient to injure a portion of the brain. On exposing the heart, its movements were feeble, and the right side of the heart was engorged. The escape of blood from the external jugular was followed by a decided increase in the number and strength of its contractions, which lasted for a considerable time.

*6th Exper.* I was now anxious to ascertain what influence artificial respiration, by favouring the passage of the blood through the lungs, would have in renewing or increasing the contractions of the heart in these cases. These experiments (six in number) were performed upon rabbits, and were far from being so satisfactory as I could have wished. We, however, saw sufficient to lead us to believe that though in cases of asphyxia, the artificial inflation of air into the lungs is sufficient, as numerous experimenters have ascertained, to renew the circulation through the

lungs, if commenced when the contractions of the heart are still going on pretty vigorously, yet if these are less active, they may be assisted by disgorging the right side of the heart.

I have thought that, instead of prosecuting the subject farther experimentally at present, for the purpose of endeavouring to ascertain the extent of its application to the human species, I should leave it in the hands of those practical men, who have ample opportunities of putting it to the test of experience, if they should think it worthy of their consideration.

In these experiments I was assisted by Dr Pollexfen, Messrs Cormack, Skae, and G. Newbigging.

Bleeding from the external jugular vein has been long practised in all cases of asphyxia. Though some may still open this vein in these cases for the purpose of relieving congestion of the brain, it cannot act in this manner, since accurate dissections have shown that no such congestion exists; so that the principal object in bleeding in asphyxia must be to renew the heart's action.\* It is with this view alone that some ~~men~~ recommend its use. To produce this effect, the best plan (to judge from the experiments which we have detailed,) is to open the jugular vein and encourage, by all possible means, provided that no air be allowed to pass into the vein, the flow of blood from the lower orifice, and from the lower orifice alone, if we are anxious that much blood should not be drawn. By pressing upon the lower orifice, as is usually done, the blood will be prevented from regurgitating from the right side of the heart, and the most effective method in which blood-letting can favour the renewal of the contractions of the heart will be lost.† Conducted in a proper manner, we believe that in many cases it may act as a valuable adjuvant to the artificial respiration, friction with warm flannels and other remedies which are put in force to restore suspended animation.

The experiments of Legallois show, that injuries extending to a considerable portion of the spinal chord kill by arresting the heart's action; and Wilson Philip has also proved that the same effect follows similar injuries of the brain. On the other hand, injuries of a circumscribed portion of the brain kill by destroying the sensation, the action of the heart being only arrested by the impediment to the passage of the blood through the lungs from the cessation of the respiration. We have here the important distinction between the nature of concussion and compression. No doubt, these are generally intermixed in in-

\* Though it can have no effect in diminishing the quantity of fluid within the cranium, it may yet assist in removing any irregularity in the distribution of the blood induced there during the disturbed state of the circulation.

† Though the external jugular vein in the human species has pretty generally a valve near its termination, and occasionally another about its middle, yet these rarely present any decided obstacle to the passage of fluids from the heart.

injuries of the brain, but the symptoms of the one may preponderate over the other and demand its appropriate treatment. Many surgeons are decidedly opposed to the extraction of blood during the stage of collapse from concussion, when the pulse is small, rapid, and feeble. But we can easily suppose that during its weakened state, the blood which continues to flow along the veins, may embarrass the action of the right side of the heart, and interfere with the recovery of its contractility, and that opening the jugular vein, and allowing a few ounces of blood to escape from its lower orifice, would in some cases materially assist the action of the other remedies. There may be even a few rare cases in which the injury done to the central organs of the nervous system, may be just sufficient to arrest the contraction of the heart for a short time, and thus resemble the effects of the poison in the first experiment, where stimulants would be of no avail in restoring the heart's action, until the vein was first opened, and where, under proper management, the circulation might be restored.

Sir B. Brodie and others have shown, that poisons produce their fatal effects in one of two ways, either by suspending sensation, or by arresting the contractility of the heart,—in other words, inducing death in a manner similar to compression and concussion.\* In these cases, where the action of the poison has only been sufficient to enfeeble transiently the contractility of the heart, opening the jugular, and allowing the blood to escape from the lower orifice, must materially assist the renewal of the heart's action. Of course, care must be taken that we do not, by the withdrawal of a certain quantity of blood, favour the absorption of the poison. It is, however, evident, that we can only expect a decided effect from the blood-letting in those cases, where the action of the poison has been transient, and where, either from the manner in which it has been applied or from the interference of art, no repetition or renewal of its action can take place. The flow of blood from the lower orifice of the jugular vein when opened appears to depend upon two causes. 1st, Upon the contractions of the right side of the heart, more particularly when the blood in the veins is nearly stagnant, and the heart is congested. At each contraction, the heart attempts to force a certain quantity of blood along the vessels connected with it, and as there is no *vis a tergo* to prevent the action of the heart, moving the blood along the veins in its immediate neighbourhood, a certain quantity is forced out through the opening in the jugular. This I have often witnessed. During the con-

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\* For an admirable exposition of the action of the causes of sudden death, see the second chapter of Dr Alison's *Outlines of Pathology*.

gested and enfeebled state of the heart, the blood passes readily from the ventricle into the auricle, as Haller has remarked. *2dly*, Upon the principle of derivation, as laid down by Haller, to whose observations upon this subject my attention was directed by Dr Alison, after I had commenced these experiments.

Haller\* ascertained by repeated experiments upon the lower animals, that when a vein is opened, the blood rushes towards the opening on the proximal side of the heart as well as on the distal, and from the veins communicating with the opened vein; that this in some cases extended to the neighbouring arteries after the blood had ceased to flow through them, and even after the blood appeared thickened in the veins; that, as the blood continued to flow, the globules resumed their figure and their natural mobility. All this was found to take place independent of the heart, and after the aorta had been tied. These experiments were confirmed by Spallanzani.† Haller, as appears from different parts of his works,‡ was fully aware, that opening the jugular vein would empty the right side of the heart, and so assist the renewal of the circulation in asphyxia. He seems, however, to have attributed this entirely to the derivation of blood, as neither the account of the experiments themselves, nor in the deductions from these, does he make mention of the contractions of the heart. He was also aware, that congestion of the right side of the heart arrested its contractions sooner than if it had remained uncongested, but he makes no mention of the effect of unloading the heart in renewing its movements.§ Indeed, the experiments of Haller and Spallanzani on the derivation of blood, made on the large veins in the neighbourhood of the heart, seem to have been liable to a source of fallacy in the renewal of the heart's action, of which they do not appear to have been aware. This could not, however, affect the accuracy of the other experiments made on other parts of the body upon this subject by those two distinguished individuals.

Since the engorging of the right side of the heart arrests its contractions sooner than they otherwise would stop, it will be necessary to bear this in mind in experimenting on the length of time during which the heart remains contractile after death, as the circumstance of the large veins being cut or kept entire, in laying open the thorax, may considerably modify the results.

\* Sur le Mouvement du Sang. Opera Minora, Tom. i. p. 99.

† Experiments on the Circulation of the Blood. Translated by R. Hall. M. D., p. 387.

‡ Sur le Mouvement du Sang, p. 103-104. Elementa Physiologiae, Tom. ii. p. 349.

§ Memoires sur la Nature Sensible et Irritable des Parties du Corps Animal, Tome i. p. 378.



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## ANATOMICAL OBSERVATIONS.

By JOHN REID, M. D.

Demonstrator of Anatomy, President of the Royal Physical  
and Royal Medical Societies of Edinburgh, &c. (Read before  
the Anatomical and Physiological Society of Edinburgh.)

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(From the *Edin. Med. and Surg. Journal*, No. 128.)

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### I.—*Case in which accidental Cartilages were found in the interior of several of the Serous Membranes.*

ON exposing the *abdomen* of one of the subjects in the Dissecting-Rooms, we found within the cavity of the *peritoneum*, and lying in the upper part of the *pelvis*, a round cartilaginous-looking body, somewhat larger than a billiard ball, and without any attachment to the surrounding parts. With the exception of a few depressions in its surface, it was perfectly round

and smooth. On making a section of the tumour, it was found to consist of a number of concentric laminæ, with a calcareous deposit in the centre. It was very elastic, and the fresh section was exactly similar to the fibro-cartilage, placed between the bodies of the *vertebrae*, with this difference, that the centre of the intervertebral substance is soft and pulpy, while the centre of the tumour was occupied by the calcareous deposit.\*

After a careful examination of all the parts within the *abdomen*, the only other morbid appearance that presented itself was a cartilaginous deposit on the surface of the spleen. Within the cavities of the *tunicæ vaginales* of this subject, who had a double hydrocele, we also found a number of cartilaginous-looking bodies, the largest of which were loose and floating in the fluid contained there, while the smaller were connected to the inner surface of the *tunica vaginalis* by thin membranous pedicles. In making a section of the largest of these, which was oblong, and about the size of a field bean, it differed slightly in its structure from that found within the cavity of the *peritoneum*, in approaching more to the nature of cartilage than to fibro-cartilage. It also contained a calcareous deposit in its centre. Several of these bodies were also found adhering to the inner surface of both *pleurae* by slender membranous pedicles. None of these cartilages presented themselves in the articulations.

I may mention, though no way connected with the object of this communication, that, while taking out the brain of this subject, we observed a very distinct depression in the outer table of the frontal bone below its middle, apparently the effect of an injury. From the inner surface of the internal table, exactly opposite to the depression on the outer, a narrow spicula of bone about an inch in length had been thrown out. This spicula, in all probability, had made an opening through the membranes of the brain, or, at least, these had adhered so firmly to it, as to have been torn in removing the skull-cap. Upon the corresponding portion of the anterior lobe of the brain, there was a depression which might have held a hazel-nut, and which, in all probability, had been partly occupied by some serous fluid, which was observed to escape on removing the skull-cap. The surrounding portion of brain was perfectly healthy.

This subject was about eighty years of age, and had been for some time under Dr Smith's care in the City Charity-Work House. He died gradually exhausted from severe asthmatic attacks.

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\* A section of this tumour, with several of the smaller cartilaginous bodies, to be described immediately, were shown at a meeting of the Medico-Chirurgical Society of Edinburgh.

Dr Smith never observed him complain of any uneasiness arising from the presence of the fibro-cartilaginous body within the cavity of the *peritoneum*. Though he had occasional delirium for a few days before death, yet it was nothing more than what is frequently observed in patients, in a very exhausted state, with an impeded circulation through the lungs.

This loose fibro-cartilaginous body found within the *abdomen* is evidently of the same origin, though differing slightly in structure from those observed within the *tunicæ vaginales* and *pleurae*, and must at one time have been attached to some portion of the *peritoneum*.

The loose cartilages within the synovial membranes of the articulations, particularly that of the knee, have attracted more or less attention since the time of Ambrose Paré, as they are often attended with very disagreeable consequences, and are the subjects of surgical operation. They have been occasionally seen in great numbers in the synovial membranes of the tendons; in the *bursae mucosae*, particularly that enveloping the flexor tendons, as they pass below the annular ligament of the wrist; \* and in the interior of serous cysts developed where they do not naturally exist. † In the splanchnic serous membranes, they have been seen most frequently in the *tunicæ vaginales*, and rarely within the *peritoneum*, *pleurae*, and arachnoid. I am not aware of their having been found within the *pericardium*.

These cartilaginous bodies of the serous membranes appear to be of two kinds; the one of more frequent occurrence approaches nearly to cartilage in its structure; the other has a greater or less resemblance to fibro-cartilage.

I have found the following cases of the presence of these cartilaginous bodies within the cavity of the *peritoneum* recorded. Laennec states, that Littre once observed one of these bodies loose within the cavity of the *peritoneum*. Andral mentions that he has found them more than once, sometimes loose, and sometimes adhering to the inner surface of the *peritoneum*. Beclard once saw one of these bodies, which had been found loose within the *peritoneum*, of the size of a nut, consisting of concentric laminæ, with a calcareous deposit in the centre. It, in fact, exactly resembled the largest one in the case before us, except in being of a smaller size.

There is a delineation and description given of one of these tumours found adhering to the surface of the *pleura*, by Mr Wardrop, in the ninth volume of the Edinburgh Medical and Surgical Journal, which also exactly resembled in its structure

\* Cruveilhier's Anatomie Pathologique, Tome i.

† Andral's Anatomie Pathologique, Tome

the largest of these bodies in the case before us. It was of the size of a hazel-nut, and composed of concentric laminæ, surrounding a calcareous central portion.

It must occur but very rarely to find these bodies of so large a size; and in so many of the splanchnic serous membranes in the same subject. Andral states that he has never seen them larger than a bean.

Laennec\* seems to have satisfied himself, in examining a *tunica vaginalis*, containing some of these bodies in different stages of their growth, and where the circumstances were highly favourable for ascertaining the nature of their formation, that they were first deposited behind the serous membranes; that, as they increased in size, they pushed it before them, so as to become completely enveloped by it, and only retained in their place by a thin band of serous membrane. This band at last gives way, and they fall loose into the interior of the serous sac. Andral, while he believes that the accidental cartilages found within the original serous membranes of the body are formed in the manner described by Laennec, yet supposes that those found in the interior of cysts developed in other parts of the body may be formed in the fluid effused from the inner surface of the sac.

Dupuytren† and Raspail‡ have both affirmed that the small cartilaginous bodies which occur occasionally in considerable numbers, and which have been most frequently found in a cyst connected with the annular ligament of the wrist-joint are entozoa. § The former rested his belief upon some supposed spontaneous movements which he observed in them; the latter draws his arguments from their structure and chemical composition, in which he supposes they resemble the eggs of an animal, which would form a new genus between the *Cysticercus* and *Coenurus*. Bosc and Dumeril, to whom Dupuytren submitted specimens of these bodies for examination, both came, however, to a different conclusion.

In dissecting a subject lately, we found a fibro-calcareous tumour about the size of a hazel nut, surrounded by a serous membrane, lying loose in the lower part of the *pelvis*, and within the sac of the *peritoneum*, which evidently owed its origin to a different source from those which we have mentioned above.

\* Dictionnaire des Sciences Medicales, Tome iv.

† Cruveilhier, Oper. cit. Tome i. p. 324.

‡ Organic Chemistry, translated by Dr Henderson, p. 314.

§ The history and description of these cysts point them out to be the *bursa mucosa* surrounding the flexor tendons, as they pass below the annular ligament of the wrist, distended with fluid and these cartilaginous bodies. The appearance of the double cyst is produced by the annular ligament being stretched across the distended bursa.

Deposited in the body of the *uterus*, and among loose cellular tissue between the *uterus* and external surface of the *peritoneum* in this subject, we found a great number of rounded tumours of various sizes, the largest of which were almost entirely calcareous, some of the smaller were fibro-calcareous, and others again were entirely fibrous. Two of the smaller tumours had pushed the *peritoneum* before them, and were only attached loosely by a fold of this membrane. The origin of this fibro-calcareous tumour, and the manner in which it passed into the cavity of the *peritoneum*, are sufficiently obvious, and afford an excellent illustration of Laennec's explanation of the mode by which the cartilaginous bodies found in serous membranes escape into their interior. Tumours of various kinds may in this manner become loose, and pass into the interior of any of the serous membranes of the body. My friend Dr J. Y. Simpson informs me, that he examined a preparation at Guy's Hospital Museum, in which there were continuous rows of small carcinomatous tubercles running along the course of the intercostal vessels, some of which showed a tendency to pediculation. He saw in the same museum an irregular, nodulated, roundish, white, and glistening body of the size of a walnut, which was found loose in the cavity of the *pleura*.

II.—*On the Varieties of the Obturator Artery, and the relation of these to the Femoral Ring.*

I strongly suspect that the obturator artery runs a greater risk of being wounded during the operation for strangulated femoral hernia, than many surgeons are inclined to admit; and if this be the case, the varieties in the origin and course of this artery deserve a fuller consideration than what is generally allotted to them, in the systematic works on anatomy and surgery of this country.

Mr Guthrie states, in his Essay on Femoral and Inguinal Hernia, when speaking of the danger of wounding the obturator artery in operations for strangulated femoral hernia, "that he has been made aware of more than one accident of this nature having occurred in operations performed by some of the best anatomists and surgeons in London, and the patients subsequently bled at intervals, until they died from hemorrhage." Robert \* mentions, that the celebrated Mursinna, in operating for strangulated femoral hernia, in a case where the obturator artery had surrounded the neck of the sac, wounded the external coat of the artery, and that the patient died eight days after, from hemorrhage arising from a rupture of the injured artery.

\* Journal des Progres des Sciences Medicales, Tome viii. p. 193.

In 1831, I witnessed a somewhat similar case in the practice of Dupuytren at the Hotel-Dieu. The patient was a female about 60 years of age, who was brought into the hospital with well marked symptoms of strangulated femoral hernia. All the urgent symptoms ceased after the operation, and she seemed to be going on well for a fortnight, when she was seized with severe diarrhœa, which soon carried her off. On dissection, a broad sheet of effused blood was observed through the *peritoneum*, evidently placed between that membrane and the *fascia transversalis* of Sir A. Cooper, extending from the lower part of the *pelvis*, up nearly to the *umbilicus*. This was found to have taken place from the obturator artery, which in this case had arisen from the external iliac by a trunk common to it with the epigastric, and had nearly surrounded the neck of the sac, and which, during the operation, had been completely cut across. Dupuytren remarked, that the blood which escaped externally during the operation was greater than usual, but this soon ceased. Had this woman not died from the effects of the diarrhœa, it would never have been discovered that the obturator artery had been wounded. The extent of the hemorrhage was in all probability diminished, by the artery having been completely cut across.

The most common origin of the obturator artery is from the internal iliac or some of its branches; but in a great number of cases it is found to arise either directly, or much more commonly indirectly from the external iliac, by a trunk common to it with the epigastric. When it arises from the internal iliac, it is evident that it can in no way be implicated in the operation for femoral hernia, in whatever manner it may be performed. Even when it arises from the external iliac, it is but very rarely endangered in the ordinary methods of performing this operation, as it generally proceeds downwards and inwards, first passing along the outer or iliac side of the femoral ring, and then along part of its posterior margin, to reach the upper portion of the obturator *foramen*. In the rarer cases, which seem to be principally those in which the common trunk of the obturator and epigastric is longer than usual, the obturator takes a more circuitous course, passing along the upper margin of the femoral ring, and then along its inner or pubic margin. It must be evident that when a femoral hernia descends, the relative position of the artery to the neck of the sac, in these two cases, is very different, and, in a practical point of view, involves very important considerations.

We have stated that the most common, or what is considered the normal origin of this artery, is from the internal iliac, or one of its branches. The origin next in frequency is by a com-

mon trunk with the epigastric from the external iliac. More rarely it springs directly from the external iliac, and still more rarely from the femoral. Though the artery may thus arise from points placed at a considerable distance from each other, it invariably makes its way out of the *pelvis* by the same opening, viz. the upper part of the *obturator foramen*. When it is a branch of the femoral it mounts upwards along that artery, passes below Poupart's ligament, and places itself in the same position as if it had arisen within the *abdomen*.

Cloquet\* examined 250 subjects; 125 females, and 125 males, for the purpose of ascertaining the relative frequency of the origin of the obturator, from the hypogastric, external iliac, and epigastric. In these the obturator arose from the hypogastric in both sides in 160; from the epigastric on both sides in 56; from the epigastric on one side, and the hypogastric on the other, in 28; from the external iliac in 6. Including both sides of the body, thus increasing the number of arteries examined to 500, and taking all the obturator arteries which arose from the hypogastric arteries, and all those which arose from epigastric arteries, or directly from the external iliac, he found that the obturator arose from the hypogastric in 348; from the epigastric or external iliac in 152. According to these results, the frequency of the origin of the obturator artery from the hypogastric are to those from the epigastric and external iliac as 3 to 1. The obturator was found to arise rather more frequently from the hypogastric in males than in females. Monro believes the relative proportion between the origin of the obturator artery from the internal iliac and its branches, and from the epigastric and external iliac, to be as 20 to 1. Velpeau † states that his observations, drawn from the examination of nearly a thousand cases, led him to coincide in Monro's opinion. Hesselbach ‡ thinks that the origin of the obturator from the external iliac and epigastric is not very common, and strangely asserts, that it rarely occurs except in females. Manec states the proportion to be 1 in 6; Scarpa and Lawrence as 1 in 15. According to other researches § the obturator was found to arise in common with the epigastric in 12 out of 63 subjects, affected with crural hernia, and in all passed behind the neck of the sac. Meckel || is of opinion that the obturator arises nearly as frequently from the epigastric and external iliac, as from the internal iliac and its branches. My own dissections have furnished me with results approaching very nearly to those

\* Recherches Anatomiques sur les Hernies de l'Abdomen, p. 72.

† Traité Complet d'Anatomie Chirurgicale, 2d Edit.

‡ Origine, &c. des Arter. Epig. et Obturat.

§ La Medecine Operatoire par Sabatier, p. 609. Tome iii. F. 1830.

|| Manuel d'Anatomie Descriptive, Generale, &c, Tome ii.



of Cloquet. Of course the only conclusion that can be drawn from these discordant statements is, that the obturator arises very frequently from the external iliac, in common with the epigastric. The epigastric has been observed by Monro, Hesselbach, Lauth, and Velpeau, to arise from the obturator or some of the branches of the internal iliac, so that it might in some cases, such as in that detailed by Hesselbach, be carried to the inner side of the sac in femoral hernia. Some, as Cruveilhier,\* maintain, that these descriptions of the origin of the epigastric from the obturator ought to be considered as nothing more than the branch which generally passes between those arteries increased beyond the usual size; but Velpeau † seems quite convinced of the accuracy of one at least of these descriptions from actual observation.

Dr Barclay was the first to dissect and prepare a case of femoral hernia, in which the obturator artery passed along the pubic side of the neck of the sac. This preparation, unique at the time, was delineated in Sir A. Cooper's work on Femoral Hernia, and is now in the Barclayian part of the Museum of the Royal College of Surgeons of Edinburgh. Mr Wardrop shortly after this described a similar case, also referred to by Sir A. Cooper in the same work. Dr Monro has seen the artery passing on the pubic side of the neck of the sac three times. Dr Knox is in possession of a very beautiful preparation of this kind, in which the artery was firmly tied to the outer edge of Gimbernat's ligament. ‡ Similar cases in which the obturator artery took that course have been seen by Cloquet and Dr Thomson. Brechet § also refers to one. I have no doubt, indeed I know, that similar cases have been seen by others; but the extreme rarity of the occurrence having passed over, these are not now made public.

Allen Burns relates a case in which there were two femoral herniae on the same side; one protruding into the femoral ring, the other into the sheath of the vein. If the obturator artery had arisen in this case from the epigastric, it would in all probability have surrounded the greater part of the neck of the sac of the smaller hernia, protruding into the sheath of the vein. || Mr

\* Anatomie Descriptive, Tome iii.

† Oper. cit.

‡ This preparation is delineated and described in a very excellent probationary essay on the Obturator Artery, by Dr H. B. Macfarlane.

§ Thèse sur la Hernie Femorale, p. 133.

|| The protrusion of a hernia into the proper sheath of the vessels, by which I mean the tendinous septa passing backwards from the posterior surface of Poupart's ligament, and upper part of the iliac portion of the *fascia lata* between the artery and vein, and also on the pubic side of the vein, to the pubic portion of the *fascia lata*, must be an exceedingly rare occurrence, since this is not only prevented by the close manner in which the sheath envelopes the vessels, but more particularly by the reflexion of the *fascia transversalis* from Poupart's ligament upon the anterior sur-

Lawrence infers that the obturator artery may surround the neck of the sac, so as to become endangered in 1 of 80 cases of femoral hernia. As this calculation, however, must be formed from imperfect data, we can only regard it as an approximation to the truth.

When the obturator arises in common with the epigastric, we generally observe a small branch running in the more usual course of the obturator, and *vice versa*. Meckel supposes that in the foetus, the obturator is always formed by two branches, one from the internal iliac, and one from the epigastric or external iliac; that these are at first of equal calibre, but, as the growth proceeds, one of them becomes arrested in its development, and never proceeds beyond the foetal state, while the other enlarges in proportion to the increasing size of the parts which it supplies.

The epigastric generally sends two small branches over the posterior surface of Gimbernat's ligament, one of these ramifying upon the posterior surface of the pubis, the other proceeding downwards to the upper part of the obturator *foramen*, to connect itself with the obturator artery. This last branch, if we admit Meckel's views to be correct, must be regarded as forming part of the obturator artery in the foetus, and which often becomes enlarged, while the other branch remains of the foetal size; so that what is generally considered as the abnormal origin of the obturator artery is only the enlargement of a normal branch. In a preparation made by Mr Liston, and described and figured by Dr Monro, this branch passing between the epigastric and obturator is of unusual size. This resembles cases alluded to by Cruveilhier, where the branches from the epigastric and internal iliac forming the obturator were of equal calibre.

The obturator vein often passes up to join itself to the epigastric vein. In this course it may surround the neck of the sac. Allen Burns has seen an instance of this kind. Michelet found the internal circumflex artery in one case arising in common with the epigastric, and he supposes that if a femoral hernia had descended, it might have been pushed to the pubic side of the neck of the sac. I had an opportunity of dissecting a similar variety two winters ago; but in that case the artery would, in all probability, have lain on the iliac side of the neck of the sac. In one subject last winter I found the converse of this variety; the epigastric arose from the inter-

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face of the vessels. If, however, we with some anatomists describe the *fascia cribri-formis* as the anterior part of the sheath of the vessels, and the pubic portion of the *fascia lata* which lies behind the vessels as the posterior part of their sheath, then every femoral hernia lies in the sheath of the vessels.

nal circumflex an inch and a quarter below Poupart's ligament. The artery in this case would also in all probability have been placed on the outer side of the sac, had a femoral hernia descended.

Besides the constant danger of cutting directly outwards from the position of the common femoral vein, of carrying the knife upwards and outwards to any great extent from the proximity of the origin of the epigastric artery, of cutting directly upwards, for much more than two lines in the male from the presence of the spermatic chord, we find that there are other blood-vessels, deviating from their usual course, which may occasionally present themselves to the cutting edge of the knife, in whatever manner the operation may be performed. Though no surgeon in this country would, in consequence of this, be inclined to adopt the method of dilating the stricture, yet it must deeply impress upon his mind the necessity of not extending his incisions for enlarging the stricture, beyond what is absolutely necessary for returning the contents of the hernia without violence.\*

If the obturator should happen to be divided during the operation, are we to stand idly by, and not attempt to secure the cut extremities of the artery? Mr Guthrie has very properly strongly protested against such inactivity, and lays down the following directions for securing the artery. "In the male a transverse incision should be made in the line of Poupart's ligament, the tendon of the external oblique muscle cut through, and the spermatic chord exposed; this is to be drawn upwards, and kept in that situation by a bent probe. Poupart's ligament is then to be cut through until the first incision for dividing the stricture is met by that just made. The blood will now easily lead to the artery, which must be secured by a ligature, and to render this easy of execution, sufficient space and a blunt knife only can be wanted in addition to the forceps and ligature. In the female the operation is very simple, as the round ligament requires little attention being paid to it."

### III.—*Malposition of the Large Intestines in two individuals, apparently causing fatal Ileus in one of them.*

CASE I. When attending two years ago an autopsy of an individual who had died of some thoracic disease, I found the following abnormal position of the large intestines. The *caput cæcum* was placed in the upper part of the left lumbar region; the colon first passed through the left lumbar region,

\* In some of the cases in which the obturator surrounds the neck of the sac, the incisions for enlarging the stricture may probably be carried for a line or two without endangering the artery.

to the lower part of the left iliac *fossa*, it then turned up again to the left lumbar region, the ascending portion lying internal to, and nearly in close apposition with the descending portion; in the left lumbar region it again formed an acute angle and again traversed the left lumbar region and left iliac *fossa*, close to and internal to the ascending portion, and then passing over the sacro-iliac synchondrosis, it terminated as usual in the *rectum*. All the large intestines were thus coiled up in the left lumbar region and left iliac *fossa*; and were firmly tied in their situation by the reflexions of the *peritoneum*. The small intestines consequently occupied that portion of the umbilical region and of the right side of the *abdomen* where the large intestines are usually placed. On dissecting out the superior mesenteric artery, I found that the arch formed by this artery, instead of presenting the usual form, was reversed; the convexity instead of looking downwards and to the left side, looked downwards and to the right. From the convexity of the arch the arteries supplying the *jejunum*, and *ileum* arose as usual, and from the concavity sprung the usual branches distributed to the large intestine. The textures of the intestine were perfectly healthy.

CASE II. During last summer, I assisted my friend Dr Weir of Bathgate, to examine the body of a boy about 17 years of age, who died of *ileus*. The disease had lasted ten days, and had resisted the most active and judicious treatment. The position of the large intestine in this boy exactly resembled that already described, with this trifling difference, that the *caput cæcum* was not so firmly fixed in the left lumbar region as in the other. We had the same folding of the large intestine in the left side of the *abdomen*, and the same acute angles formed at the turns of the intestine. Circumstances prevented us from ascertaining the position of the vessels in this case. Almost the whole of the *jejunum*, the *ileum*, *caput cæcum*, and colon down to the point where it formed an acute angle with the portion that turned up, were greatly distended, of a livid colour, and contained a great quantity of air and fluid feces. That portion of the large intestine below the dilated portion was much contracted. This boy had long been subject to colic pains, and these, as well as the fatal attack of *ileus*, were in all probability to be attributed to the malposition of the intestine, and the close manner in which it was bound in its situation by the *peritoneum*.

The malposition in both cases was evidently the original formation of the parts, and not the effect of disease or any other agency.

From what I have been able to learn from authors, and from

conversation with several experienced anatomists, I am led to believe that the abnormal position of the large intestines here described must be a very rare occurrence.

Besides the cases of transposition of the whole of the *viscera*, various irregularities in the position of the large intestines are mentioned by practical authors, and by those engaged in elucidating the developement of the *fœtus*; some of these undoubtedly arising from original conformation, and others from disease. The most common of the former of these seems to depend upon the unusual length of the intestine, particularly of the transverse arch of the colon. Morgagni describes several cases of this kind, where the transverse arch of the colon, in passing across the upper part of the umbilical region, proceeded downwards to a greater or less extent; in some cases as far as the *pelvis*, and again turned up to the umbilical region to pursue its usual course. Mr Annesley\* gives descriptions and delineations of similar cases. The sigmoid flexure of the colon sometimes makes a very unusual bend into the margin of the umbilical region, occasionally producing a retardation of the contents of the intestinal canal. An example of this is given by Dr Abercrombie, and another also by Mr Annesley. The ascending colon sometimes makes a similar curvature. In some cases all the different portions of the colon are of unusual length, and the large intestine takes a very irregular and winding course through the cavity of the abdomen. Annesley gives a very remarkable example of this kind. Dr Wells † also relates a somewhat similar case, and G. St Hilaire found it in a monstrous *fœtus*, assuming the great length peculiar to some of the lower animals. The *caput cæcum*, may be placed higher than usual, so as to lie in the right lumbar region, or towards the *umbilicus*. Annesley gives one case where it was placed in the middle of the *pelvis*, but he seems to consider this as the effect of derangement of the functions of the intestinal canal. ‡ Connected with the high position of the *cæcum*, we may have the colon passing from the umbi-

\* On the Diseases of India, Vol. ii.

† Vol. 3d of the Transactions of a Society for improving Medical and Chirurgical Knowledge.

‡ I have just examined the body of an aged female, who died of pleurisy, in whom the *caput cæcum* was placed loose in the lower part of the *pelvis*, and the ascending colon was firmly fixed by the peritoneum in the right iliac fossa. The sigmoid flexure, after passing into the *pelvis*, turned upon itself at an acute angle, and re-entered the left iliac region, about the middle part of which it formed another acute angle, and returned to the *pelvis*. All the abdominal viscera were quite healthy.

In examining the abdomen of a boy seven years of age, the *caput cæcum* was found lying in the right lumbar region; from this it followed its usual course, until it reached the left iliac fossa, when it crossed the spine to the right iliac fossa, where it turned upon itself and then passed into the *pelvis* on the right side. The trunk of the inferior mesenteric artery, after sending off the left colic and sigmoid branch, passed to the right of the spine, accompanying the intestine. The testicles had descended.

lical region, down the centre of the *abdomen*, to terminate in the rectum.\* These are the more interesting, as they approach nearly to the position which the large intestine occupies in the first months of foetal developement. Meckel† has ascertained, that, in the early months of utero-gestation, the colon does not consist of ascending, transverse, and descending portions as in the adult, but is nearly straight; and that it is only towards the end of the fourth month that the *caput cæcum* reaches the right lumbar region. According to Serres, the position of the *caput cæcum* in the right iliac *fossa* is intimately connected with the descent of the testicle in the male, and that of the ovary in the female. In these cases, where the descent of the testicle has been arrested, he has found that of the *cæcum* also arrested.

The high position of the *caput cæcum* and the descent of the colon through the centre of the *abdomen* are only the persistence of an arrangement which is perfectly normal in the foetus, at a certain stage of its developement. According to Meckel, the descending colon describes a larger curvature in the left iliac *fossa* in the *fœtus*, during the latter months of utero-gestation, so that this appearance in the adult is only the continuance of the arrangement peculiar to the foetus at that period.

Though many of the abnormal appearances in the adult can be beautifully and most satisfactorily accounted for by the arrestment of the developement, yet there are others which have as yet baffled all the ingenuity and industry of those celebrated anatomists and physiologists who have thrown so much light upon this subject; and among these we may at present class the two cases of malposition of the larger intestine which I have here detailed.

We must regard the contracted portion of the intestine, situated below the dilated portion in the fatal case of ileus, as quite healthy. A contracted state of a greater or less portion of the intestinal canal is so frequent an appearance after death, where we have no reason to suppose that its functions were deranged during life, that it cannot of itself be considered morbid. That the intestine below the dilated portion should become contracted is, in fact, nothing more than what we would expect, since it is a general law in the animal economy, that when the usual substances cease to pass along any tube or duct, its calibre soon becomes diminished, and is ultimately entirely obliterated. So

\* For example of the passage of the transverse arch of the colon down the centre of the abdomen to terminate in the rectum, see Morgagni de Sed. et Caus. Morb. Lib. II. Epist. 17 et Lib. III. Epist. 34.

† Manuel d'Anatomie Generale, Descriptive, &c. Tom. ii.

in a case of *ileus*, when the *ingesta* are retarded for many days together at a particular point, it is nothing remarkable that the portion of the intestine below this should contract upon itself.

While performing a series of experiments upon frogs some short time ago, with the view of illustrating how far the contractility of the muscular fibre is dependent upon the central organs of the nervous system, I was often struck with the rapidity with which inflammation of the muscular tissue destroyed its contractility, so that it refused to contract even upon the application of galvanism. This is in perfect accordance with Dr Abercrombie's theory of the pathology of *ileus*.

#### IV.—*Permanent Flexion of the Fingers from Shortening and Thickening of the Palmar Aponeurosis.*

IN a muscular and aged male subject in the Dissecting-Rooms, the little and ring-fingers in one hand were firmly and permanently bent; and the same fingers in the opposite hand were also flexed, but in a much less degree. On removing the integuments of the palm of the hand, this was found to depend upon very great thickening and shortening of the palmar *aponeurosis*. The *aponeurosis* in the fingers most affected extended beyond the metacarpal phalangean articulations, towards the distal end of the proximal *phalanges*. On cutting through the palmar *aponeurosis* we observed a circumstance which has not been alluded to by Dupuytren,\* and on account of which I have thought the case worthy of notice.

We found that the ring-finger could only be extended very partially, and the little finger still less, after the *aponeurosis* and tendons had been freely divided. All the articulations of the affected fingers were perfectly healthy, and the only explanation of the continued flexion that we could give, was, that the ligaments connecting the articulations, from their being long constrained to one position, had accommodated themselves to their altered circumstances. We have seen the same thing twice in the knee-joint. In two cases of disease of the hip-joint, the knee-joint of the same side presented every appearance of having been also affected, but on dissecting them we found that all the textures entering into the formation of the joint were perfectly sound, and the only cause which we could discover for the bent position of the limb was a shortening of those ligaments which are relaxed in flexion.

If an operation had been attempted in this case, the division of the palmar *aponeurosis* would have produced little immediate benefit, and might have prejudiced the minds of some

\* *Leçons Orales*, Tome i.

against performing the operation in the cases favourable for it. It is probable that continued extension would have the effect of restoring the ligaments to their former state.

I would not wish it to be inferred that the muscles had not also accommodated themselves to the circumstances under which they had been for a long time placed, and that they would not also have strongly resisted for a time any efforts made to move the articular surfaces upon each other. Upon the extent of the muscular shortening in these cases we had no data to offer any opinion, as it would have been necessary to have first cut through the ligaments of the joint to have enabled us to ascertain this.

The previous history of this man could not be obtained.

Since the above description was written, I have perused a short but excellent paper on the permanent flexion of the fingers by M. G. Geyrand, Surgeon to the l'Hotel-Dieu d'Aix, contained in the 4th fasciculus of the *Memoires de l'Academie Royale de Medecine* for 1833. M. Geyrand there gives a very minute and detailed account of a dissection of a case of this kind, where the palmar *aponeurosis* and flexor tendons were perfectly natural, and where the fingers were held in flexion by fibrous chords, which he considered to be of new formation, running from the palmar *aponeurosis* to be inserted into the fibrous sheaths surrounding the flexor tendons. Some of these chords were attached to the first phalanx, others went on to the second, and others again passed between one phalanx and another. All these bands were composed of parallel fibres. In the fresh state they were very resisting, altogether inextensible, and had the whiteness and aspect of ligaments. M. Geyrand argues from the facts ascertained in this dissection, from the appearances observed in two other cases which he had an opportunity of examining on the living body, and also from the account given by Dupuytren himself, of the different steps of one of his operations where he must have cut one of these fibrous bands, running upon the anterior surface of the first phalanx, that Dupuytren must have misunderstood the cause of the retraction of the fingers, when he attributed it to a crimping up of the palmar *aponeurosis*. But as Sanson, in his report upon this memoir of M. Geyrand states, it is quite impossible that Dupuytren could have made any mistake of this kind in the case which he dissected after death, and which first unfolded to him the true nature of the disease, so that we must conclude that the developement of these fibrous bands may produce permanent retraction of the fingers in the same manner as the shortening and thickening of the palmar *aponeuro-*



*sis* does, and that these may effect this independently of each other. Sanson is inclined to believe that these fibrous bands are the exaggeration of a cellulo-fibrous tissue passing from the *aponeurosis* forwards to the *phalanges*, the rudiments of which exist in the sound state.

In the dissection which we detailed above, the flexion evidently depended both upon a thickening and shortening of the palmar *aponeurosis*, and upon the presence of the fibrous bands passing from its anterior part towards the distal end of the first phalanx, and exactly resembling it in structure. The alteration in the palmar *aponeurosis* itself was to a considerable extent, and perfectly obvious.