Thesis

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The Pathology

and

Surgical Treatment

of

Aneurism

By

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Aneurism

By Aneurism is meant a pulsating tumour composed of a cyst, the contents of which may be either fluid or coagulated blood. The Cyst communicating with the Artery upon which it is situated. John Hunter defines Aneurism as the dilitation of the Coats of an Artery, arising probably either from disease or accident, producing weakness which becomes the remote cause, While force of the circulation is the immediate cause; it probably also may arise however from a disproportion in the bloods motion and then the disproportion between the force of the circulation; and the Strength of the Artery is both the remote and the immediate cause; but this probably only in the larger Arteries where the force is greatest. Aneurism Com-
=prehends a variety of diseases which have no Common character; except that they involve the Arterial System. Aneurism properly so Called Comprehends the True and the False Aneurism, Although the True, the False, the Varicose; and Aneurismal Vary receive the same general title differing very much

however in their pathological character.
The True Aneurism is formed in several
different ways; before treating of which I
shall shortly describe the three tunics which
form the coats of an Artery — 1st The
external coat. This coat is cellular or
fibrocellular; it contains the nutrient vessels
and nerves of the vessel; it is composed of
a filamentous areolar tissue; some few
glistening fibres are seen in it some of
which are circular and the rest longitudinal.
2nd The Middle or Proper Coat. This consists of
yellowish, elastic but brittle fibres, these are
arranged in a circular form, this coat is the
most elastic of the three. This coat has been
divided into three Lamina; an external one
which is thin and elastic, a middle one
composed of circular fibres; and an internal
one composed of fibres running in a longitudinal
direction. 3rd The internal Coat. This Coat has
been subdivided into two Lamina; the one
is composed of tesellated epithelium this
rests on a basement membrane the fibres
of which are chiefly longitudinal; they
interlace with each other and leave

numerous openings between them. These are what are usually called the Surgical Coats of an Artery; but strictly speaking there are seven Coats which are formed by the subdivision of the internal and middle. I have only described the three Coats as they alone are mentioned when speaking of the effects of ligature upon an Artery. Having described the Coats of an Artery I shall proceed to state how by circumstances effecting these Coats an Aneurism may be formed.

1st True Aneurism may be the result of dilitation of the Coats of the Artery; when it is produced by dilitation the Coats do not rupture but simply dilate; all the three Coats become so weak and inelastic that they yield to the impulse of the circulation of the blood; at the part where this takes place a pouch is formed which is termed the Sac of the Aneurism into this blood is poured at each contraction of the heart, this may be either fluid or coagulated. The dilitation may be on one side of the Artery only when it is saccuform, or the vessel may dilate and it is then Fusiform; or the dilitation

may be uniform and it is then Cylindroid. Scarpa maintained that the Aneurismal Sac was never formed by dilitation of the proper Coats of the Vessel; but by the Cellular Sheath which the Artery receives in Common with the parts Contiguous with it and that there are none of those marks regarded by Medical Men as Characteristic of Aneurism from dilitation which may not be met with in Aneurism from rupture. The 2d way in which Aneurism may be formed is by dilitation, along with rupture, of one or more of the Coats; in this form dilitation first takes place of all the Coats; then the internal either by ulceration or rupture gives way the middle Coat & parts or ruptures; and the Sac is formed by the External Coat alone. This Sac gradually enlarges, within fibrin is deposited from the Blood; and without the Sac Condensation of the sur=rounding Cellular tissue takes place; Some=times a Membrane is formed in the interior which is formed by organization of the fibrin; this Membrane is in most cases

Continuous with the internal Coat of the Vessel. This process at the beginning is slow and gradual; but when the Coats dilate and give way it proceeds rapidly and in a short time acquires a considerable size. 3d An Aneurism may be formed by rupture of the internal and middle Coats; this takes place most frequently during violent muscular exertion. An Aneurism formed in this way attains in a short time a large size the patient often is aware from the first of this having taken place. The predisposing cause of Aneurism formed in this way is generally steatomatous degeneration; it takes place in a system ruined by mercury and syphilis. Scarpa says that Aneurism is invariably produced by rupture of the proper Coats of the vessel. There are different varieties of Aneurism. Dissecting. When Blood is infiltrated between the Coats of the Artery and more or less seperated it is called dissected Aneurism. The external Coat may be seperated from the internal and middle; or the middle may appear split. The seperation may be complete or it may be

partial; the opening between the Coats may terminate in a "Cul de sac" in which the blood will stagnate. or it may be complete; there being two apertures communicating with the Artery through which the blood flows and joins the main stream. The Aorta is the Artery in which this variety is most frequently met with; or the external or Middle Coats may give way and the inner one remain entire which forms the walls of the Cyst; this is however of very rare occurrence; or the Middle Coat may rupture leaving the external and internal Coats entire. An Aneurism is said to be limited when it is covered and bound down by its proper cyst. Or diffuse when it has either no proper Cyst or the Cyst has ruptured. True Aneurism at first is always limited. In False Aneurism it may either be diffuse or limited from the beginning. False Aneurism. by this term is meant an Aneurism in which the Arterial Coats have been divided by wound or ulceration; and consequently has none of the Coats covering it, the Cyst being composed of the tissues exterior to the

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vessel. This variety of Aneurism is most frequently the result of wound; it is often met with at the bend of the Arm as the result of wound inflicted on the Artery during venesection; if this accident is discovered at once we may prevent the formation of the Aneurism by applying pressure on the part, and at the same time bandaging the Arm from the fingers. If no means are taken to prevent it the blood collects in cellular tissue beneath the fascia; the cellular tissue is condensed into the form of a cyst, this is strengthened by deposits from the blood internally; and also from the tissues externally. The internal deposites being organized and constituting a lining membrane to the Cyst, the Aneurism may become diffuse by the Cyst giving way or it may be diffuse from its commencement.

The formation of False Aneurism takes place independently of any degeneration of the coats of the Artery; and this is of great practical importance as we are enabled to apply a ligature close to the sac, the coats there being as sound as in any other part of the Artery. In regard to False Aneurism

Scarpa maintained that the division into True and False Aneurism was erroneous and only the production of a false theory; "since" he says "observation shows that there is only one form of this disease, or that caused by a rupture of the proper Coats of the Artery, and an effusion of Arterial blood into the Cellular sheath which surrounds the ruptured Artery". There are two varieties of False Aneurism. 1st Aneurismal Varix. This Variety of False Aneurism is found when a Vein and its Artery have been injured, and when by the adhesion of the two edges of the wounded vessels a Communication is established between the vessels; it generally occurs at the bend of the Arm, but it has been met with in other situations; in consequence of this the blood flows directly from the Artery into the Vein. The size of the tumour is generally not great, but this will depend on the size of the communication between the vessels. The vein is dilated, and when the ear is applied to the tumour a peculiar jarring sound is heard. The blood in the tumour is entirely fluid as it is kept in a state of

Constant Motion. The Pulse at the wrist of the affected limb has been observed to be much smaller than that of the opposite limb. Dr. Hunter explains this by saying "If the blood can escape directly from the trunk of the Artery into the trunk of the vein; it is natural to think that it will be driven along the smaller branches with less force and in less quantity. 2d Varicose Aneurism. This results also from wound both of the vein and artery, but on account of the oblique direction of the wound; or by the Compression used; the blood escapes into the Cellular tissue between the vessels, and there forms an Aneurismal Sac; through which the two vessels communicate. The tumour in this case is solid. This is a much more dangerous form of the disease than the former variety as the Sac has a greater tendency to enlarge and burst. In Considering any disease it is of great importance that the Causes which favor its production and the Changes produced should be well understood. When an Aneurism is formed a knowledge of

its exciting Cause will aid us little in our attempts to produce a cure; but in certain circumstances a knowledge of this will aid us much in determining upon any means being employed and a possibility of cure resulting. For example. An Aneurism results from a wound or any injury to the Coats of an Artery, we have good grounds for supposing that the Coats of the artery around the tumour are sound, in this case a chance of cure is much greater than if an Aneurism is the result of disease affecting the Coats of an artery, if two Aneurisms exist at once, we have good grounds for supposing that the Arterial System Generally is affected, in cases such as this we must only employ palliative means and not expect anything like a cure. The investigation of the history of Aneurism is very difficult. Experiments upon Animals afford no assistance.

John Hunter attempted to form an Aneurism artificially in Animals; for this purpose he laid bare the Carotid Artery of a Dog; no dilatation of the vessel

took place, in three weeks the animal was killed and the artery was found thickened at the part where the sheath had been taken off, by the inflamed and subsequent condensation of the adjacent cellular tissue.

There are some facts which are deserving of attention as they bear on the subject of Aneurism.

1st It is a disease which does not exist in early life; it has not been found before the age of puberty. It is a rather rare disease in old age, although it is sometimes met with. It is most frequently found between the age of 30 and 50.

2nd Aneurism is oftener met with in Males than in Females, external Aneurisms more particularly.

3rd Particular parts of Arteries as well as particular Arteries also are more liable to it than others, the seat of an Aneurism being generally the part where a branch is given off, or where a curve takes place in the vessel.

4th Aneurism was supposed not to exist in the lower animals; but at a

late meeting of the Medical Chirurgical Society in this City, Mr Dick showed that Abdominal Aneurisms were very common in the Horse and Ox, and that they were often connected with the worm termed the Istrongylus.

Aneurism is more frequently met with in persons of the lower ranks of life, who follow laborious avocations, particularly those who have to keep their limbs long in a bent position as, postitions Horse Soldiers, Tailors &c; but it has been argued by some that particular trades do not predispose to the disease, but that a diseased Condition of the Artery led to the formation of the Aneurism.

The Aneurism may be produced by Muscular exertion alone, as for example the case of a man with Popliteal Aneurism who was in the Infirmary here, under the care of Professor Miller, he distinctly stated that while using great exertion he felt something "Crack" in his ham and in a few days he felt the tumour pulsating.

An Aneurism may also be

produced by a predisposing cause, in this case, it is not unreasonable to suppose that a diseased condition of the vessel first took place, and in consequence of the coats of the Artery becoming weak and inelastic an Aneurism resulted.

In an Aneurism which has terminated rapidly and in which we find an unhealthy condition of the Artery the following appearances are presented on slitting up the vessel.

The vessel exhibits on its internal surface the lining membrane less smooth and polished than in its natural state, its colour is changed to a deep roseate Carmine, and it seperates from the subjacent fibrous coat with comparative facility. This latter structure is also changed in colour but not to so bright a red as the other.

Between these coats, but more closely attached to the internal, (for they peel off with it) are numerous specks of a soft steatomatous material, of a white or pale grey appearance, presenting on a superficial

inspection somewhat of the Calcareous deposit so often seen in the Arteries of old persons. An Artery in this Condition has lost more or less of its elastic properties, it is distended and its Calibre increased equally around. As the Arteries are always full, the impulse of every new wave of Blood driven on the greater quantity contained within the distended Vessel increases its apparent pulsation, for it is in the diastole, or in the expanded Condition of the Artery that the pulse is felt.

This loss of elasticity must obviously weaken the Vessel, and cause it to be less resisting, a fact that can be proved by experiment after death, When an Artery so circumstanced will be found to yield and tear under a distending force that would have little effect on it in health, and will explain how an apparently trifling exertion may produce Aneurism in one Man, whilst Numbers of others exposed to similar or greater Violence escape unharmed."

These appearances says Porter have been usually ascribed to inflammation,

but it is necessary to bear in mind that inflammation may present itself under two very different characters; both as to its pathological appearances and the results produced, this we may call by the following opposing names. Acute and chronic, healthy and unhealthy.

We can scarcely appreciate the early effects of inflammatory action in Arteries, but judging from analogy it is not unreasonable to suppose that this species of the affection is ushered in by increased vascularity and redness, this is soon followed however by an effusion of coagulating lymph on the internal membrane; this will unite in a short time the two surface together so as to close the vessel at that point.

The unhealthy inflammation produces a very vascular state of the lining membrane, here and there; there are patches of deepened, in this state the Coats being inelastic will yield; and become distended under the impulse given by the circulation, hence we can

understand how some of the Conditions of the Artery are produced.

1st The Vessel may become equally dilated and form a Fusiform Aneurism, in this form as no portion of the blood is Coagulated, it can scarcely be called an Aneurism, after death a Coagulation is always found, a proof a weak state of the Coats, one part of the dilitation however may be weaker than the rest, which will yield and a true Aneurism be formed, in which the blood will be Coagulated, True Aneurism however is not always preceded by fusiform dilitation, but generally a true Aneurism is preceded by a general dilitation of the Vessel.

An Artery so inflamed is spotted over its surface with Steatomatous deposits, and when the disease has gone on so far, Aneurism is most likely to follow, but then a process to which the Arterial System is not very liable takes place, The Membrane over one of these spots becomes soft, and soon an Ulcer is formed this may erode

the Middle Coat, & go on so far that by the slightest shock the Coats give way and an Aneurismal tumour is formed.

The following case described by Porter will explain the formation of Aneurism in this way.—

Edward Lynch, ætat. 26, a Shoe-maker, of intemperate habits was admitted into Heath Hospital, March 19th 1833.

Ten days previously he was seized with pain in the back, and stitches in the side and chest, more especially towards the lower part of the Sternum, in which latter situation he experienced a dragging sensation also. These symptoms continued without the intervention of any other during a week, when, (on the 16th) he felt soreness low down in the Chest on swallowing solid food, which increased to great difficulty of deglutition on the following day: And since the 18th he has taken no solid whatever, the attempt to do so always producing great pain and a sense of weight, followed at first by hiccup and then Vomiting. Being desired to swallow a Morsel of bread, he did so, and said it

stopped in the passage. After repeated draughts of Whey it passed down, but not without a good deal of Spasm, resembling hiccup. It was not vomited.

On examination, the chest sounded well on percussion, and the Stethoscope discovered no sign of the disease in the heart or Aorta. The action of the heart was a little stronger than natural, but the sounds were healthy. Respiration, feeble, but pure, in the upper part of the right Lung.

This case was considered and treated as one of Dysphagia. So much so, that on the 21st I passed a probang down the Oesophagus. I did not meet only decided obstruction, but was sensible of the instrument passing over a soft tumour. I recollect to have mentioned to several of the pupils the possibility of it being an Aneurism, and the awful consequences that must result if the passage of the probang had chanced to rupture it.

On the 27th in the evening, he had an attack of Cough and Vomiting, in which he threw up about a pint of blood

blood, and died immediately.

— Dissection —

The trachea and œsophagus being cut across in the neck, the entire of the thoracic viscera, together with the stomach, were removed from the body in doing which no tumour of the œsophagus was observed.

The stomach was distended, and of a dark colour: on opening it, a large coagulum of blood was found completely filling it.

On slitting up the œsophagus, a clot, much larger than a pigeons egg, and covered only by the mucous membrane, was seen projecting into it. Its situation was nearly three inches from the cardiac extremity. The mucous membrane had given way on one spot, and thus this furnished the blood that filled the stomach, and which had been vomited. The pressure of this Aneurismal tumour had occasioned ulceration on the surface of the œsophagus opposed to it.

On opening the Aorta, the pathology of Aneurism as connected with Arteritis,

was beautifully illustrated. The lining mem-
-brane was of a bright Crimson or Carmine
Colour, Varied with small spangle like
patches of a paler and more opaque tint.
This vascularity resided principally in the
lining membrane; for, on stripping off a
portion of it, the fibrous tissue, although
evidently inflamed, was much paler.
The patches above mentioned were caused
by depositions of a soft white cheesy substance,
which were either in the lining membrane
or between it and the fibrous coat; they
came off attached to the lining membrane.

There were three Aneurisms in
different stages of progression. One, the largest,
communicated with the clot, which had burst
into the Oesophagus; the opening into the aorta would
admit the joint of the little finger. Another,
within about half an inch of the former, was
about the size of a Hazel Nut, its opening
into the Aorta being about the diameter
of a Crow-quill; its internal surface was
smooth, as if lined by the inner coat of
the vessel; the middle coat terminated abruptly
by a thick cellular edge at the opening, and

its external Covering seemed to be formed of the Cellular Coat together with the Pleura. The third was only in its Commencement; a slight deviation from the level of the lining Membrane was seen in the centre of one of these Opaque spots, under which the fibrous Coat was thinned and beginning to be absorbed.

The larger tumour had made pressure through the oesophagus, on the right bronchus, at its posterior part, and thus caused the feebleness of respiration observed during life in the right Lung.

The Lungs were healthy. the heart paler and softer than natural.

Scarpa, Richerand, Corvisart and others who have studied the subject carefully seem all to agree that intemperance, and the abuse of Mercury are among the chief exciting Causes of Aneurism.

Arteritis in Connection with Gangrene of the extremities is found mostly in those who are addicted to the use of Spiritous Liquor and stimulating food;

and in those who have suffered from Chronic disease of the heart, of the Mitral Valves, or great Trunks.

Another disease of the Arteries which may lead to Aneurism is the senile degeneration; which consists of a deposit of earthy matter between the internal and Middle Coats. As this degeneration is almost always found in old persons, while Aneurism is rare in advanced years it cannot be supposed to be always a cause of Aneurism; if however the deposit goes on to any extent, the vessel becomes more or less narrow, on the Cardiac side of this Constriction a dilitation takes place, this may go on so as to form an Aneurism, or at this part the Coats yield either by rupture or by ulcer-ation. And Aneurism is produced in the usual way.

From the period of its formation the Cavity of the Sac is always full, and at every fresh wave of blood it has a tendency to expand equally in every part of its Circumference; by this expansion the elasticity of the surrounding parts is

brought into action and a small portion of the blood is returned to the circulation, hence the pulsation formed in a circumscribed Aneurism. At each pulsation of the artery a portion of blood is forced into the sac, in most cases this becomes coagulated, so that in examining an Aneurism we find the sac filled with Coagula, which are in concentric lamina the Coagula are formed by myrin seperated from the blood.

When the sac is full of fluid blood the influx of each wave has a tendency to dilate it in every direction; and therefore the greater the quantity of blood within the sac the greater will be the pulsation, but if the sac contains a large coagulum; the pulsation may not be felt at all, or perhaps only very indistinctly.

Symptoms of True Aneurism

In Aneurism the first symptom is a small swelling which is soft and compressible in consequence of the contents of the Cyst being fluid. This gradually increases in size

and the interior of the Cyst is occupied by a Coagula more or less hard; There is distinct pulsation from the first, this pulsation Corresponds to the hearts action, it is equally felt in all parts of the tumour

Pressure on the distal aspect increases it, While pressure on the Cardiac aspect diminishes it; or may arrest it Completely By applying the ear to the tumour a peculiar bruit is heard "bruit de soufflet, it Conveys the impression as if a rush of air took place into the Sac at each pulsation. This "bruit" is not however to be depended on as a Symptom of Aneurism, as artificial pressure on the tumour may produce it, or it may be produced by the pressure of another tumour near the Aneurism, or in a fungoid tumour (which has also a pulsatile movement) the "bruit" may be heard.

The Growth of An Aneurism is generally slow unless it has been produced by Rupture, in which case it increases with great rapidity. in Consequence of the tumour pressing on the adjoining Nervous

trouble pained is Complained of, which is sometimes so great as to constitute in the patients eyes the only part of his disease, a Numbness, and tingling sensation is Complained of in the hand, and sometimes weakness and inability to use it.

Porter Affirms that in every case of Axillary Aneurism which Came under his notice, the fingers of the hand were crooked and rigid, in one case he remarked rigidity of the wrist joint, and that in Popliteal Aneurism if the tumour was large the toes were contracted more or less, these appearances he referred to the pressure on the nerves; as they were relieved, and disappeared after Operation.

The Aneurismal tumour may also be so situated in relation to the veins as to interfere with the circulation of the blood through them, the veins increase in size and become flattened out, and subsequently oedema of the limb takes place, after the Operation and when for a short time the Contents of the Cyst are hard and firm, the pressure may be so increased;

and the supply of blood to the limb is diminished; that Congestion is very likely to take place, the edema to increase and run on to gangrene. After the tumour has existed for sometime, its contents become solid, fibrin is deposited in Concentric lamina; in consequence of this the pulsation of the tumour is affected, at some points it may be less distinct in consequence of the form of the Coagula, its compressibility is also affected, for if the Coagula be hard and in considerable quantity while the communication between the artery and Cyst be small, pressure will have little effect in diminishing the bulk of the tumour.

As the tumour increases, the parts around are displaced, the function of some of these parts may be interfered with and change in their structure be produced. Some of the surrounding parts may become incorporated with the Cyst, absorption or ulceration of these may be produced.

When an Aneurismal tumour presses upon a bone, the corresponding part of the Cyst is removed, and the bone forms

a part of it, being in contact with the blood, absorption of the bone takes place and the surface becomes rough and irregular. When cartilage is thus exposed to pressure it suffers much less than bone, probably from being more sparingly supplied with absorbents.

When an aneurism becomes diffuse its pulsation is diminished, blood is infiltrated into the surrounding tissues, in consequence of which gangrene of the limb may be brought on, or the circulation may be only partially intercepted, the vitality of the part is much impaired and inflammation with suppuration take place, this may run on to gangrene which may involve the whole limb.

Sometimes when an aneurism becomes diffuse a spontaneous cure is effected, but this is of very rare occurrence.

Aneurisms terminate fatally in different ways.

I. By pressure on some important organ, Aneurism of the Arch the aorta generally proves fatal by pressing on the treache-

II When the Aneurism is bound down by fascia the patient generally dies worn out by irritative fever, pain and hectic.

III The most frequent form of fatal termination of Aneurism is by the bursting of the Cyst, and fatal Hamorrhage of course ensuing, sometimes the sac bursts at once but more frequently as the slough is seperating slowly, the blood oozes out. Sometimes in large quantities; perhaps a coagulum may stop up the aperture; or syncope occur and stop the bleeding for a short time, but the Hemorrhage again comes on and the patient gradually sinks exhausted.

Diagnosis of Aneurism

As pulsation is the general characteristic of Aneurism it should be attended to with attention, otherwise we may make an error in diagnosis and mistake an Aneurism for an enlarged gland or an abscess over the course of an Artery.

An Aneurism is soft and compressible from its commencement, and then become hard from the fibrin being deposited in its interior; while an abscess is generally

hard from its Commencement, the pulsation of an Aneurism is felt equally in every part of the tumour, whereas in an enlarged gland or other tumour pulsation is felt only at the apex; and if an Aneurism exists we can often stop the pulsation by drawing the tumour to one side.

An abscess situate over the Course of an artery has an undulatory thrill felt in the line of the vessel and fading gradually away in the more remote parts of the tumour. Some fungoid tumours have a slight pulsatile movement and if they are situate over the course of an artery they may be mistaken for an Aneurism.

Aneurism has both thrill and "bruit", another tumour may have one but not both, but this "bruit" as before stated is not to be depended on, as other tumour may have a "bruit", or it may be produced by artificial means.

Pressure upon the Cardiac side of an Aneurism causes it to collapse and the pulsation to stop. Pressure on the distal side produces an increased

size and pulsation in the tumour.

Spontaneous Cure

A Spontaneous Cure of Aneurism sometimes takes place, this may occur in several different ways

I The Sac of the Aneurism may be strengthened and filled up with coagulable lymph that no blood passes into it While the original Canal remains pervious and carries on the Circulation

II Pressure on the Cardiac side of the Aneurism by another tumour may produce a Spontaneous Cure; or the Aneurism itself may conduce to produce this, by enlarging chiefly on its Cardiac side and being bound down strongly by the fascia.

III Both the Sac and the Artery may be filled up by lymph, the Artery being obliterated at that part.

IV The Aneurism may become diffuse. The blood is infiltrated into the surrounding tissues and exerts pressure on the Cardiac side of the tumour, but a Spontaneous Cure in this way does not often

happen, as suppuration of the part or gangrene of the limb is very likely to follow.

Spontaneous cures do sometimes occur in very hopeless cases. Thus Porter mentions a case of Aneurism at the arch of the Aorta which had produced absorption of the Sternum; and which threatened to burst momentarily; yet without any obvious cause the pulsation ceased. The tumour diminished in size and at last completely disappeared. The patient lived for many years after.

Surgical Treatment

Having considered the pathology and symptoms of Aneurism, I shall now proceed to the surgical treatment.

Various have been the modes of treatment followed by surgeons at different times. In the time of Celsus the tumour was opened by the knife, and a heated iron thrust into the wound to restrain the Haemorrhage.

Aetius in the 6th Century performed the operation for Aneurism

at the bend of the arm, by exposing the vessel and drawing it up with a blunt hook, he then applied two ligatures and divided the vessels midway between them, the tumour was then laid open and the coagula turned out, the artery from whence the blood flowed was then sought for and when found it also was tied and cut across. Aneurisms at the bend of the arm seem to be the only cases in which he operated, as he says, Aneurisms of the other parts of the body are considered by Surgeons to be past remedy.

Paulus Aegineta a century after recommended the following Method.

When the tumour arose from a dilated artery (as he expresses it) a straight incision was made through the skin, and the artery having been cleared from the surrounding parts, a needle was passed under it and the artery tied with a double ligature, having previously punctured it in the middle, Suppuration was then promoted until the ligatures fell out; if the Aneurism was caused by rupture

he seized the tumour along with the skin and passed a needle armed with a double thread, below the part that was to be included in the ligature, the Aneurism was thus included between the two ligatures, sometimes he passed four ligatures below the tumour. The same practice was followed by Surgeons for some time after but as may be supposed it was not very successful, and we find that Severinus and others preferred in most cases to open the Sac by escharotics and the Cautery.

And in 1710. was the first to introduce a new Mode of treatment for false Aneurism; he cut down upon the vessel and secured it by a ligature above the tumour without opening the Sac. This treatment does not seem to have been adopted by the Surgeons in those days. As in 1753. we find Foubert operating in the old way.

In 1785. John Hunter tied the femoral artery in the thigh for the cure of popliteal Aneurism. He was led to propose this mode of cure from the

unsuccessful results of the old Method;
the Artery being tied in a part where the
Coats were more or less diseased, and hence
he tied the Vessel at a part remote from
the tumour, and where the Coats were
healthy. The force of the circulation being
thus taken off the Aneurismal Sac; the
Cause of the disease would in his opinion
be removed, and he thought it highly
probable that the Sac if left to itself as
well as the Coagulated blood in it would
be absorbed, and the whole of the tumour
removed by the action of the "Animal
economy"; which would consequently render
any opening into the Sac unnecessary.

Hunter in his first Operation used
four ligatures but he afterwards dis-
-approved of using so many, as he found
they could not come away without Pro-
-ducing Ulceration and of course were
exciting Causes of Secondary Hamorrhage,
it was owing to this that his first Operation
failed. After the obliteration of the
trunk of the Vessel the Circulation of the
limb is carried on; by the Collateral branches

which enlarge considerably and are connected by Anastomoses.

Upon the different ways in which the Collateral circulation is produced, and partly also on the point of time at which the limb is examined after the obliteration of the Principal trunk, may depend whether the Collateral branches appear more or less, or even not at all enlarged.

The following is Sir Astley Coopers account of the dissection of a limb, seven years after the femoral was tied for the cure of Popliteal Aneurism.

"The femoral artery which is necessarily obliterated by the ligature was converted into a cord, from the origin of the Arteria Profunda down to the ham, the whole of the Popliteal artery was also changed into a similar substance, and thus the natural channel of the blood from the groin to the ham was destroyed. The muscles therefore which usually receive blood from the femoral artery, as the Adductors, Rectus, and Vastii, had no branches

except from the Arteria profunda and Circumflex Arteries, and the Articular Arteries, from the Popliteal, although they were still capable of receiving blood, derived it not from the Popliteal, but from the communicating vessels of the profunda.

The Arteria profunda formed the new channel for the blood, considerably enlarged in its diameter, although not equal to the femoral Artery at the groin, it took its usual course to the back of the thigh on the inner side of the thigh bone, and sent branches of a larger size than usual to the flexor muscles of the leg, and just midway on the back of the thigh it began to send off those Arteries which became the support of the new circulation. The first Artery sent off shaped down close to the back of the thigh bone and entered the two superior Articular branches of the Popliteal, which vessels supply the upper part of the knee joint. The second new large vessel arising from the profunda at the same part with the former, shaped down by the

inner side of the biceps muscle to an artery of the popliteal, which was distributed to the gastrocnemius muscle, whilst a third artery dividing into several branches gaped down with the sciatic nerve behind the knee joint, and some of its branches united themselves with the inferior articular arteries of the popliteal, with some recurrent branches of those arteries, with arteries gaping to the gastrocnemii; and lastly with the origin of the anterior and posterior tibial arteries, and these new large communicating branches were readily distinguished from the others by their tortuous course. It appears then that it is those branches of the profunda which accompany the sciatic nerve, that are the principal supporters of the new circulation.

They were five in number, besides the two deep seated arteries which do not accompany the nerve; The external circumflex was considerably larger than usual for the supply of branches to the muscles on the fore part of the thigh,

but it had no branches for the new circulation. The Obturator artery did not appear larger than usual, and although much pains were taken to trace any enlarged communicating branches between the ischiatic arteries and the profunda, yet no vessels capable of receiving so large an injection could be found." When the ligature is applied there is a rest of the flow of blood at the part, the internal and middle coats are cut through, and the ligature is held by the external Coat alone; Sometimes a clot is formed above the ligature; but the formation of this is of little consequence, for the extremity of the artery begins to inflame soon after the ligature is applied, and the internal surface adheres, and converts the vessel into an impervious canal, then as before described the collateral branches begin to enlarge, from the circulation in the main trunk being impeded. After a short time ulceration is produced by the presence of the ligature; as long as the ligature remains; pus in small quantities

escapes, and finally the ligature itself escapes, and the part granulates and fills up in the usual way. Dr Jones has proved that a Coagulum is chiefly formed when a Considerable distance intervenes between the ligature and the first lateral branch, when the distance is short the ligature excites a sufficient degree of irritation to produce an effusion of lymph, but when it is Considerable the part near the ligature is sufficiently excited, which is not the case with the more remote part. By the stagnation of the blood a coagulum is formed, which acting as a foreign body excites an action in that part of the vessel with which it is in Contact, and produces an effusion of organized lymph, hence it would appear that all that is required for the obliteration of the vessel is a certain amount of irritation applied to a healthy artery. Sometimes the ligature fails to produce the desired effect, and in place of exciting a healthy action in the part it produces an unhealthy action. This effect will be received to When speaking of

Secondary Hæmorrhage. As soon as the ligature is applied, the tumour becomes flaccid and ceases to pulsate, the limb becomes cold and weak, it does not remain long in this state however, for in a few hours its temperature is restored; sometimes its temperature rises 2 or 3 degrees above that of the opposite limb. After the operation the tumour ceases to be painful, its contents are gradually absorbed but it is not until some months have passed that the tumour disappears altogether—

Scarpa in speaking of the cure of popliteal Aneurism, recommends us to use two waxed tapes of convenient breadth, placed behind and around the Artery, near each other, with the interposition of a roll of linen of a cylindrical form, between the Artery and the Vein, his reasons for using two waxed tapes and the linen roll are the following—

"The two waxed tapes which I propose to employ, placed contiguous to each other, each of which is two lines in breadth, rest upon a convenient space

of denuded Artery on which account they with difficulty produce its division, as the ligatures are only tightened on the Artery by the intervention of a cylinder of linen placed on the Artery lengthwise, and as the transverse diameter of this cylinder projects a little beyond the sides of the Artery, it therefore follows, that when the knot is conveniently tightened, the sort of ligature formed by it is not as commonly happens a circular, strangling, or puckering of the proper Coats of the Artery, but strictly speaking an approximation of the two opposite sides of the Artery for the space of four lines, or as if the Artery in all that space were kept compressed and held between the points of the two fingers.

This in my opinion is the best mode the Surgeon can take to prevent the rupture of the Coats of a great Artery, and to hinder their too rapid mortification; to excite in them a due degree of Adhesive inflammation, to promote the union and obliteration of the Cavity of the

artery; and thereby remove the danger of Secondary Hamorrhage. He also denied the use of a ligature of reserve and in this he was Correct- but what difference is there between a roll of linen and a ligature of reserve? one is as hurtful as the other, for the linen roll used by him is prejudicial in proportion to the degree of reaction it excites. This practice however seems to have been very successful in his hands, the only explanation of which is, by supposing as Burns does, that the roll of linen was chiefly applied to the insulated and dead part of the Artery, between the ligatures.

Abernethy advocated a modification of the practice of Astus, namely to apply two ligatures round the Artery and the Artery to be cut between them; but it has been proved by Dr Jones that one ligature is as safe and as certain as two.

Both Hunter and Scarpa, as also the Surgeons who were their cotemporaries

seem to have entertained the greatest dread of cutting the internal and middle Coats of Arteries; hence they used two or more tapes, applied loosely, and the principal object of Scarpas using the linen rolled was to protect the vessel from being ruptured by the ligatures. It is known that it is essential for the successful issue of the operation that the internal and middle coats be cut, the ligature is to be drawn with tightness to afford to the fingers, the sensation of the giving way of the two internal Coats. And it will be mentioned afterwards that When this rule is not attended to Secondary Hamorrhage is very liable to occur.

Sometimes the Cure may fail, this may depend on various circumstances

I There may be some unnatural state of the blood, which prevents its coagulation, or the blood in the Sac may be from some circumstance in a state of Constant Motion, which may hinder its coagulation; or peculiarity in the position of the Coagulum as mentioned

by Porter may be one cause of failure.
"Let it be supposed that the blood has
coagulated but by some unfortunate cir-
-cumstance the Coagulum does not press
upon the vessel, and then another con-
-dition is unpaired. This cause of fail-
-ure may arise from some particular
locality in which the disease occurs, it
is wholly accidental and fortunately
is of rare occurrence".

II "A want of support from
the surrounding textures. This is often
the cause of failure in operations on
the upper part of the Carotid.

Towards the pharynx the Artery has only
the Mucous Membrane, the Constrictor
of the pharynx, Cellular tissue, and a
few twigs of the superior laryngeal nerve,
externally it has the Styloid process, the
three styloid Muscles, the digastric,
the Mastoideus, and fascia, hence during
the growth of the tumour, it extends towards
the internal aspect, while after the operation
it may fail to solidify and Contract.

"There are two other modes of

treating Aneurism by ligature, namely the modes proposed by Brasdor and Wardrop. Brasdors operation. This operation consists in placing a ligature upon the distal side of the tumour. It was proposed but never performed by Brasdor, Deschamps, and Sir A. Cooper both performed it but unsuccessfully.

It seems to have fallen into oblivion until it was revived by Wardrop in 1822; he considered that the changes which such an operation produced both in the Artery and in the Sac, are precisely those which nature employs when she cures the disease by a Spontaneous process. as regards the difference of the state of the blood in an Aneurismal Sac, When the ligature is placed on the Cardiac, or on the distal side of the tumour. he made the following observations, When the ligature is placed on the Cardiac side; the blood cannot make its escape and cannot be pushed through the

Capillaries into the veins. It must remain in the sac, and must either be absorbed, or be evacuated by a process of inflammation and ulceration of the sac."

"When the ligature is placed on the distal side of the tumour there is immediately a diminution of the bulk of the tumour; the fluid blood can in such a case find a ready exit into the trunk from whence it came and thus again pass into the circulation in place of as in the other case having to pass through the Capillaries into veins, and as nature immediately finds a new channel there is no more blood impelled into them afterwards.

Now as regards his reasons against tying the ligature on the Cardiac side, it must be remembered that unless the disease is of long standing and of such size that whatever practice be pursued the sac will burst. It is rare that the contents are absorbed: the greater quantity of blood is generally fluid and

the rapid diminution of the tumour after ligature on the distal side clearly proves that the blood does make its way into the veins without any "pushing", while what has coagulated may, as has been proved by Sir A. Cooper remain for years without causing any inconvenience.

When inflammation and suppuration of the sac are fortunately of rare occurrence; his explanation of the diminution of the tumour after ligature on the distal side is quite as difficult to understand. For how can the blood find a ready exit into the trunk from whence it came and it must be an extraordinary new channel which indeed nature finds if this takes place; or in other words, Wardrop would have us believe that by application of a ligature on the distal side of the aneurism a retrograde motion of the blood in the vessels takes place, the aneurismal sac and artery are emptied of blood, no blood is sent in again, and the artery and aneurismal sac are

obliterated by adhesion of their opposite sides. However although the explanation Wardrop has given of Brasdors operation is faulty and must be explained in some other way; yet the operation may be performed when a ligature cannot be applied on the cardiac side of the tumour. Thus if an Aneurism exist low down in the Carotid, Brasdors operation may succeed as no lateral branches are given off; and probably the Carotid is the only Artery in which it has any chance of success. To avoid any lateral branch the vessel must be tied near the tumour where in all probability the Arterial Coats are deased, and hence ulceration and Haemorrhage are very likely to follow although Wardrop insists that the chance of Haemorrhage is much less in Brasdors than in Hunters Operation.

Of Aneurism Cured by Brasdors Operation.

Wardrop gives four cases in which the operation was performed, two were successful and two unsuccessful.

Wardrop proposed a modification of Brasdors operation; which was to apply a ligature on one of the branches only of an artery, supposing an aneurism to exist immediately at its bifurcation; he was led to propose this operation from what Nature had done in an Aneurism of the innominata.

"The carotid Artery was plugged up by and the large Aneurismal dwelling was filled with Coagulum, leaving only a comparatively small channel for the blood to pass into the Subclavian Artery" Wardrop performed this operation once, and that with success, having tied the Subclavian for Aneurism of the innominata.

This mode of operating has not been as far as I am aware followed by any other Surgeon the great objection to the operation is the great probability of a Collateral circulation between the tumour and ligature, which would of course produce a great aggravation of the disease.

It has been proposed to employ Galvanism in the Cure of Aneurism;

The manner in which this acts has been explained in two ways. When Galvanism is applied to the blood removed from the body, the Albumen is coagulated at the positive pole, and it is supposed it acts in the same way when applied to blood in an Aneurismal tumour, as to the cause of the Coagulation it appears to be due to the decomposition of the salts of the blood, and the action on the serum of the acids developed at the positive pole, in order that the Coagulation of the blood takes place it is necessary that the blood be retained in the Sac for sometime therefore Compression is to be made above and below the Sac during the operation, the other mode in which Galvanism may produce a cure is by exciting inflammation in the Sac and surrounding parts; this would be followed by swelling from effusion of Lymph or serum, which would press on the Artery leading from the Sac. The employment of electro puncture is attended with great risk more especially if the tumour be of

any size and situate on a large artery; and it is doubtful if a coagulum can be formed however long continued the current be applied; (A successful case of Aneurism has been communicated in a late Number of the "Medical times") ~~In this way~~ four cases have been published in which it was tried in Dublin and of these only one was successful the other three having proved fatal

On the whole therefore as electro puncture can never be employed without great risk, we can never expect much from it in Cure of Aneurism

Wardrop proposed to inject Acetic acid into the Aneurismal sac, with the view of producing coagulation of its Contents, but I am not aware that this proposal was ever carried into practice. Heat has been employed also to Coagulate the blood in the Sac. Sir E. Home endeavoured to do this in a case of Aneurism of the external iliac which had been tied on the distal side of the tumour, but when the pulsation continued, he introduced an

Acupuncture needle into the centre of the Sac the needle was heated by a Spirit lamp, the integuments being guarded by means of a Cork, this operation was performed three times at different intervals, but in the end the limb was attacked by Gangrene and the Patient sunk forty four days after the last application of the heat Compression of the Artery above the tumour is often employed with success; previous to the time of Hunter When Compression was used in the treatment of Aneurism, the pressure was applied to the Aneurismal tumour itself and the whole limb was supported with a bandage, by the pressure on the Sac it was supposed that the blood was forced back into the vessels, and at the same time prevented the further dilitation of the Artery; it was also supposed that by the pressure the sides of the Artery were brought into opposition and that adhesion took place between them, the practice was mostly confined to the Cases of Aneurism at the bend of the Arm,

And only when the tumour was recent and of small size, but after John Hunters Operation; when Aneurism became better understood the pressure was applied between the tumour and the heart, but even then the mode in which Compression was supposed to produce a cure was erroneous for it was supposed that it acted in the same way as a ligature by obliterating the Artery, the consequences of which was that in the few cases in which it was tried it Completely failed.

By the application of pressure at the period Mentioned Surgeons endeavoured either to excite an inflammatory process in the vessel at the point where the pressure was applied; they supposed that this obliterated the Artery by the adhesion of its opposite sides, or to excite inflammation of the surrounding parts and between the Coats of the vessel by which it would become impervious to the further passage of the blood. Acting on this supposition they

used such an amount of pressure as would act like a ligature and produce obliteration of the Artery — But it is now known that it is not essential that the Circulation of the Vessel leading to the Aneurism should be checked altogether, for a diminished current through an Aneurismal Sac will lead to the deposition of fibrin in its interior, and cause it in a short time to be filled and obstructed in such a manner as no longer to permit the blood to pass through it, It is better that the blood should not be completely checked, for the patient will bear the necessary amount of pressure required to produce a diminished flow of blood through the vessel, better than he would do pressure applied so as to stop the circulation altogether, and also by the amount of blood being lessened the deposition of fibrin is increased in the sac and it is well known that the treatment employed by Valsalva effected a Cure in the same way —

It is argued by those who oppose Compression that there are only a few Arteries in which it can be employed

The following Table from Liefranc shews that out of a hundred and seventy nine Cases, Aneurism occurs most frequently in the very Arteries upon which Jrefpure can be best applied

Popliteal	59	Anterior Tibial	3
Femoral at groin	26	Gluteal	2
Other parts	18	Internal Iliac	2
Carotid	17	Temporal	2
Subclavian	16	Internal Carotid	1
Axillary	14	Ulnar	1
External Iliac	5	Radial	1
Brachio-Cephalic	4	Palmar Arch	1
Brachial	3	Peroneal	1
Common Iliac	3		179

It has been argued also that it is painful, wearisome, and ineffectual; all these objections have been answered by Mr Jufpude in a Japer which he read before the Surgical Society of Ireland

and which is published in the tenth volume of the half yearly abstract of the Medical sciences; he proves that the pain is owing to not attending to the amount of minimum pressure which the patient can bear, he recommends Dr Cautes apparatus, being composed of India rubber has an elastic pressure and does away with the dead, unyielding force which a screw apparatus produces; as regards the objection to compression being wearisome and prolonged he states that this is not borne out by facts, although some cases may have been prolonged to an unusual length of time, granting he says that twenty nine days are required for the cure, by compression let us contrast this period with the average duration of treatment by the ligature and knife.

"From the time that a patient with Aneurism is admitted into the Hospital, until he is placed on the operating table we may I think safely regard it as a week, from the application

of the ligature until its separation we may consider sixteen days, and for the closure of the wound we may reckon seven days more, or a time upon the whole fully as great as hitherto occupied by compression.

I have taken the average of all cases hitherto treated by compression, and find it to be twenty nine days, were I to do the same in every case where ligature has been employed it would greatly exceed that time. He mentions two cases in one of which the pulsation had ceased ten hours after the application of the pressure, and the other in which the pulsation of a large femoral aneurism ceased in thirty three hours, lastly as regards it being ineffectual, he states that for the last four years in Dublin both in Hospital and Private practice, the ligature has only been applied once, and that for aneurism at the bend of the arm, where subsequently a high bifurcation was found to exist; the appearances observed in an artery after compression had been applied

for the Cure of Aneurism, were well ob-
-served in the Case of a Patient who had
been cured by Compression, first of a
Popliteal Aneurism of the right side,
and then of a Femoral Aneurism of
the opposite limb, and who died Several
Months after from Aneurism of the Arch
of the Aorta. I shall first give the
report of both Cures and then the
Appearances observed in the Arteries

"Patient, A Servant aged 32,
healthy, admitted into St Vincent
Hospital under Mr Bellingham —
March 25th 1843 Labouring under Popliteal
Aneurism of the right side, Tumour
noticed three Months previously. Patients
attention attracted to it by a feeling of
weakness in the limb. No Cause assignees
for it. The Aneurism seated high in
the Popliteal Space, measures three
inches transversely, and a little more
from above downwards, the Sac can
be completely emptied by pressure upon
the Artery in the thigh, stiffness and
weakness in the knee, with numbness

down the Calf of the leg to the Ancle, Complained of, There is some oedema about the Ancle, and the veins of the leg are slightly Varicose, Compression Commenced on April 3d the pressure applied upon the Artery, as it passes over the Ramus of the pubis; discontinued on the following day, reapplied April 6th, pulsation ceased on the following day, at which period the Tumour is reported to have been about the size of a small Orange, solid and hard. No bandage was applied to the limb, instrument removed April 11th, The pulsation of the Articular Arteries about the knee was evident to the eye, and the Femoral Artery pulsated as low down as the tendon of the triceps.

Patient discharged a Month afterwards the tumour being then very small, he had a perfect use of the limb. Duration of the pressure two days"

Patient, a Servant, healthy, aged 32 admitted into St Vincent Hospital under Mr Bellingham June 30th 1844, labouring under Femoral Aneurism of the left side,

This Patient fifteen Months before had been the subject of popliteal Aneurism of the opposite limb which had been Cured by Compression, about a Month ago he began to suffer from pain in the knee like Rheumatism, but the Tumour was only noticed ten days since No cause assigned for it—

The Aneurism is seated in the lower third of the femoral artery engaging that part of the vessel which passes through the tendinous canal formed by the Vastus internus and triceps Muscles, size from two to three inches from above downwards, and two inches transversely, Pulsation very strong— The patient complains of much pain which increases at night— Compression Commenced June 2nd— the pressure applied to the artery as it passes over the ramus of the pubis, Continued at intervals until August 8th on that day a second instrument was applied, Pulsation ceased August 9th, Compression discontinued August 20th at which date

the tumour was very firm and solid, and about the size and shape of a Smale hen egg. Patient dismissed Sept. 10th. The limb reported to be as strong as the opposite. Duration of Compression 43 days."

This patient was again admitted for the 3d time in December 1845 labouring under Aneurism of the Aorta, and died towards the end of the month, 2 years and a half after the cure of the popliteal Aneurism, and 16 months after the cure of the femoral Aneurism.

Upon examination at the site of each Aneurismal sac, the Artery was converted into a thick, flat, solid band, and its channel was quite obliterated. The femoral arteries in their course down the thigh were perfectly sound and uninjured, and there was nothing to indicate the points at which Compression had been applied. The sacs besides seemed to be rather smaller than usual, while the profunda and all the branches proceeding from

it; particularly the perforating and circumflex arteries were much enlarged. The branches which came off before the femoral artery divided, were likewise increased in size. Below the site of the original aneurismal sac the calibre of the Artery was contracted on both sides, and the anterior and posterior tibial arteries in each limb were diminished in diameter near their origin. From this it appears that the Aneurismal sac, is the only part which is obliterated when compression is applied, the point at which the vessel is compressed not being obliterated, as is the case when the ligature is used, the Artery still continues to be the main channel for the convegence of the blood; the lateral branches being dilated only so much, as to make up for the slight contraction which takes place in the vessel, Whereas in Sir A. Coopers case which was described before, the whole femoral artery from the joint where the ligature had been applied to the ham was found

obliterated and the Profunda was the branch which supplied its place.

The treatment of Aneurism by compression may be tedious from a variety of causes, it may be so from the form of instrument used, from the manner in which it is applied, or from the situation of the vessel, or the state of the patient himself may cause the cure to be tedious, the state of his blood, his tolerance of pain, or irritability of character, or the cure may be tedious owing to the situation of the Aneurism, its size, or the period at which the pressure commenced.

The treatment of Aneurism by compression is obviously a much more certain mode than by the ligature, there is no injury done to artery, and therefore no fear of secondary Hæmorrhage, the Arterial supply is not cut off as it is by the ligature; so that gangrene cannot occur; as the sac is gradually filled up by fibrine there is no risk

of Suppuration of the Sac, which although a rare occurrence sometimes follows the application of the ligature.

Dr Bellingham gives in his work on Compression as a cure for Aneurism, a list of 27 Cases treated by it Of these 25 were cured, one died from erysipelas, before the cure was completed, and in the remaining one the Hunterian operation was performed at the patients own request.

There are some cases of Aneurism in which the ordinary operation cannot be performed, and then it comes to be a very important question whether or not we can save the patients life ~~under~~ by Amputation, under certain circumstances It is to be performed before the ligature Some of the older Surgeons deterred by the great danger which followed ligature of the vessel and opening of the Sac, resorted to Amputation as a safer mode of treatment.

I When by the presence of the

Aneurismal tumour Caries of the bone is produced we would hesitate to tie the vessel, as it is obvious that a limb in circumstances would not be in a condition favourable to recovery, but as none of the great vessels are situated near bone except the popliteal, this complication is not often met with, when however it does occur it forms a sufficient reason for performing amputation.

II When the diffuse form of Aneurism is established and when inflammation of the surrounding tissues has set in.

III When there is obstruction to venous return owing to disease of the vein, in this case from the diminished quantity of blood sent to the limb, after the vessel is secured, gangrene is very liable to occur, and hence it will be a question of great importance whether our patient will have a greater chance of recovery by tieing up the vessel in the first place and running the risk of gangrene coming

on or by amputating at once.

IV When the Aneurism is of large size we would hesitate to apply a ligature; the Chief Cause why this should be considered unfavorable is that the Sac runs a greater risk of suppuration.

Secondary Hamorrhage

After the application of a ligature for the cure of Aneurism it sometimes happens that at a period more or less remote what is termed secondary Hamorrhage comes on. Practically we meet with it under two different conditions, first Where there has been previous bleeding, as for example When a bleeding vessel has been secured but after a time the bleeding again occurs; secondly Where there has not been previous bleeding as When a ligature has been applied to an Artery for the cure of Aneurism. I shall only dwell on Secondary Hamorrhage as it occurs in the treatment of Aneurism.

This may occur about the time When the ligature ought to come away;

It may also occur sometime after the seperation of the ligature; when it occurs about the time of the seperation of the ligature (between the 16th & 20th day) it rarely ends favourably. In some cases both the Practitioner and patient receive warning of what is about to happen by the appearance of "febrile symptoms a full throbbing pulse, great heat of skin, flushing of the countenance, headache, restlessness, uncontrolable anxiety, and a peculiar sensation of tightness about the chest." But far more frequently, the Haemorrhage comes on without any previous warning, the slightest exertion on the part of the patient producing it, a small quantity of blood is lost at first, from the bottom of the wound this may yield to pressure or cease spontaneously; if it is not properly restrained at first in each succeeding Haemorrhage the loss of blood is more abundant." The patient when exhausted lies pale and exsanguine, yet at the same time irritable and anxious, but whilst under the influence of the febrile

Paroxysm his face is flushed, his skin hot, and dry, his pulse light and bounding, but affording the sensation of a double beat, and it is during a period of such exacerbation that each successive Hemorrhage occurs.

Secondary Hemorrhage When it occurs early may be owing to sloughing or ulceration of the Coats of the Vessel, This may arise from injury done to the Vessel, or from the Vessel being too freely detatched from its connections, or it may arise from the ligature being too loosely applied An unhealthy inflammatory action is excited in the part, This unhealthy action has no power to throw out Lymph to form adhesions The term unhealthy is used because as inflammation tends to opposite results in other structures, there can be no reason Why it should not do so in the Arteries, Viz one a healthy inflammatory action which tends to form coagulable lymph, and the obliteration of the Vessel and the other an unhealthy inflammatory

action which has the opposite tendency.

By the application of a ligature the internal and middle coats are divided and the ligature is only retained on the vessel by the cellular tissue which is embraced by it. This tissue may have lost its vitality, and is seperated by absorption of the surrounding sound parts that connect it with the rest of the tunics.

If an unhealthy inflammation has been established previous to this process no lymph is thrown out and there is no obstacle to the flow of blood, but if the healthy inflammation as before explained, lymph has been effused, adhesions have been formed, & there is an obstacle to the flow of blood.

Porter asserts that the inflammation which attacks the Cardiac side of the ligature is different from that which attacks the distal side; & he proves this assertion by the appearances which he saw in the femoral Artery before the seperation of the ligature in a patient who died the eighteenth day

after the Operation for the Cure of Popliteal Aneurism.

Sometimes the Hæmorrhage comes on after the Seperation of the ligature. This is almost sure to take place when the wound remains long open, when Abscesses or sinuses form around the Vessel, which by the pressure exercised on the Artery produces Ulceration of its Coats either above or below the original seat of the ligature, in Cases of this kind if the situation allow, Amputation is the only resource but if not pressure may be tried or a ligature may be applied higher up with little hope of success

Treatment of Secondary Hæmorrhage —

If any of the Symptoms before mentioned fore-warnings of the approaching danger are present, we may attempt to avert it by bleeding from the Arm so as to produce a sedative effect on the general circulation, after bleeding an Opiate may be given, and we may keep up the sedative effect by the exhibition of Aconite or Belladonna, but these means will afford no safe guarantee against the

occurrence of the Hemorrhage; in most cases the practitioner has no intimation of what is about to take place until the Hemorrhage begins, as the bleeding is generally if not always from the distal extremity of the artery, it will be obviously of no avail to apply a ligature to the Cardiac extremity, as it is owing to the Collateral circulation that the Hemorrhage takes place, the first thing therefore to be done is to enlarge the wound freely so as to expose the bleeding point, on this a Compress of lint is accurately laid and this is firmly retained by a bandage or what is better by relays of Assistants who relieve each other at intervals; should this not succeed our only resource is to apply a fresh ligature on the Cardiac side of the last, this may arrest the bleeding but it may prove the source of a second Hemorrhage the Hemorrhage from the second ligature always appears at an earlier period than the first little hopes of success are to be looked for in the application of the second ligature as if it is not the source of a second Hemorrhage

it is very liable to induce gangrene of the part; if Hæmorrhage take place in consequence of an Abscess having formed, the matter is to be evacuated completely and a ligature placed (if there is space) on the Cardiac side, but if not we must trust to pressure applied accurately to the bleeding point; even should the Hæmorrhage be arrested the patient is very liable to be affected by abscesses forming in the part periostitis; diseases of the neighbouring joint or gangrene of the limb.

Treatment of False Aneurism.

This form of Aneurism as before stated is most frequently met with at the bend of the Arm as the result of wound. If the Tumour has existed for a short time and if it is soft and compressible, a direct incision is to be made into it the Coagula is to be cleaned out, and the Aperture in the Artery to be sought for and a ligature to be applied above and below the punctured point; if however the tumour has existed for a length of time it is to be treated as a true Aneurism by tying the humeral.

An interesting example of this disease occured lately in the Hospital here in Professor Miller's wards. The Woman had been admitted about three months before in consequence of an extensive wound at the bend of the elbow, a few days after her admission severe Hemorrhage took place in consequence of which the wound had to be opened and the Arteries were secured, after this the wound healed well and she left the Hospital Cured; in about a month after her leaving the Hospital she again presented herself with a pulsating tumour occupying the front and the inside of her forearm, the cicatrix of the original wound being considerably elevated above the surrounding skin. A few days after, the tumour had evidently increased very much, and the skin was discoloured and attenuated, in consequence of which the ordinary operation for false Aneurism was immediately performed; great difficulty was experienced in finding the bleeding point it was at length secured, and the Woman has gone on well since the operation. This case

as regards the formation of the Aneurism is very interesting. The Woman when she left the Hospital had not the slightest appearance of any thing of the kind, but she stated that a few days after she left the Hospital she felt a pain and beating in the part, and in a short time pulsation appeared, now, it is very possible that an abscess had formed on the inside of the forearm this had gone on increasing until by pressure it ultimately had implicated the Ulnar Artery. (as was found on opening the sac) the opening in the Artery was very small, which would account for her not suffering any of the bad results which follow the absorption of pus in large quantities into the blood.

Treatment of Aneurismal Varix & Varicose Aneurism.

I Aneurismal Varix.

This tumour is soft, yielding, and compressible pressure on the Artery above and the vein below diminish its size, but is much increased by pressure on the vein above, as before stated a peculiar

jarring sound is heard when the ear is applied to the part, but this sound is not peculiar to this disease for it is heard in parts where upon dissection no such disease existed. As the disease does not generally cause any inconvenience to the patient it cannot be regarded as one demanding operation, we will only content ourselves by palliative measures, it will be sufficient to employ pressure so as to prevent in some measure the growth of the tumour and the mixture of the arterial with the venous blood.

But we may meet with a case in which we are compelled to operate either by the urgency of the case or the patients demanding a radical cure, in this case we may either cut directly down on the tumour and treat it as a case of false Aneurism, or treat it according to the Hunterian Operation but I shall proceed to describe Varicose Aneurism and as the treatment for both is the same, I shall then point out which of the two Operations we are recommended to perform.

II Varicose Aneurism

In this form of the disease as before stated there is a cyst between the Artery and Vein; thus differing from the former variety, if the Aperture leading from the Sac to the Vein is of the same size as that from the Artery, the blood flows out as freely as it flows in, the Sac does not increase in size, but the aperture leading from the Sac be less than from the Artery in which case the tumour will increase in size and the blood will Coagulate within the Sac; such a case would demand an Operation.

Suppose then we were called to Operate in any of the two forms of the disease Which Operation would we perform? Hunters operation is only a palliative and often fails, as Dupytien has shown on account of the numerous anastamosing branches which carry the blood round the seat of the tumour; It may seem to have some effect on the

disease for a time, but as soon as the Collateral circulation is fully established the tumour will be again the same size as it was before, in some cases however it may succeed.

The best treatment then if we must operate is to cut directly down on the tumour and tie the vessel above and below.

This is not however a very easy operation. in the first place the vein is much enlarged and lies directly above the Artery, and we must be very careful not to injure the vein in any way, then the Haemorrhage in this operation is very great more especially if the tumour has reached to any size, which although not so great as to endanger life yet obscures the parts to a great degree, this Haemorrhage is also difficult to arrest, for the same pressure which will arrest the flow of blood from the Artery, will increase that from the vein.

If the Artery is reached it will generally be found either in an unhealthy or abnormal state, or so intimately connected to the vein as to be seperated from it with difficulty, and as is now proved that this condition of the Artery predisposes to a Secondary Hæmorrhage.

Since then the Hunterian Operation generally fails and the only radical Cure is by a difficult and dangerous operation it will be better for us to use palliative measures only, gentle Compression, attention to diet, and avoiding everything which may excite the circulation.

Dalhousie Tait