

taken that the heat thus applied is not much above the normal body heat, lest it should cause blisters.

Suppuration of the sac may occur, and either cause spontaneous rupture or make an incision necessary. The opening may be followed by dangerous hemorrhage, or the communication between the sac and the patent portion of the artery may have previously become permanently obliterated. Sometimes pressure is sufficient to arrest the hemorrhage and lead to a final cure by granulation; in other cases, the clots will have to be turned out and all bleeding points secured, or a second ligature may be applied *between* the first one and the sac. A second ligature *above* the first greatly exposes to gangrene.

If pulsation returns permanently in the sac and the tumor again begins to grow, several courses are open to the surgeon. If the aneurism is at the knee, groin, or elbow, flexion should first be tried, and this failing, perhaps galvanopuncture, the injection of persulphate of iron, or acupuncture; if resort to operation becomes necessary, the artery may be tied again between the first ligature and the sac, or the "old operation" of incision into the sac and ligature of all vessels entering it may be done. Both methods have proved successful.

The numerous statistics that have been collected of the various results following treatment by ligature do not furnish a fair basis for estimating the chances after ligature with antiseptic catgut or with silk, and treatment of the wound by modern methods. Mr. Holmes' statistics, in 1874,⁵ gave 13 deaths in 87 cases of popliteal aneurism treated by the ligature, a mortality of nearly 15 per cent., say 1 in 7; while 9 cases of ligature of the femoral, 3 of the external iliac, and 1 of the primitive iliac under the antiseptic method, collected by myself in 1880,⁶ gave no deaths, no secondary hemorrhage, and only partial gangrene in 1, that of the primitive iliac. There is, therefore, good reason to believe that the operation has become, under antiseptic methods of treatment, much less serious than it formerly was.

In like manner the aseptic ligature has caused the entire abandonment of various devices (metallic ligature, artery constrictor) designed to diminish the chance of the occurrence of secondary hemorrhage.

(b) Compression of the artery, direct, indirect, and digital. Direct compression is made upon the artery by acupressure needles or wires, threads, or forceps, after incision of the skin and exposure of the vessel; indirect compression is made by suitable instruments or weights resting on the surface over the artery; digital compression is made by the fingers.

Indirect compression is an older method even than ligature of the artery, and was employed, although unsuccessfully, by Desault in the treatment of an axillary aneurism a few months before he first treated a popliteal aneurism by ligature, as mentioned above. It is claimed for Hunter, also, that he was the real originator of the treatment by compression, because he showed that complete arrest of the circulation was unnecessary, and that the compression might be partial or intermittent, and because all previous operators sought to effect a cure by obliterating the artery at the point pressed upon, a statement which does not appear to be borne out by the reports of their cases. However that may be, the former theory that a passive clot was a source of danger, and that persistent pressure upon the artery to arrest the circulation for several hours was, therefore, a more dangerous method than intermittent or incomplete arrest, which would give a laminated clot of slow formation, is now abandoned, and, as a rule, when compression is used, it is with the aid of anesthesia or morphine, is forcible enough completely to arrest pulsation in the sac, and is continued until the contents of the sac have coagulated. Intermittent, incomplete arrest is occasionally used under exceptional circumstances. In a few cases in which pressure above the sac could not be made, complete arrest of the circulation below it, usually by the elastic bandage, has effected a cure (see Distal Ligature, further on).

The method of cure by this means varies in the different cases; in some it is by the deposit of laminated clot, in others by a soft passive clot. The changes in the aneurismal sac are the same as those above described, and the dangers of the method are the same as after ligature, with the exception of secondary hemorrhage. A unique consequence, reported by Mr. Pemberton,⁷ was the formation of a communication several months afterward between the artery and vein at the point where pressure had been made, resulting in an arterio-venous aneurism that finally caused the patient's death.

The operative methods include the use of weights or of special instruments having the general character of a truss. The latter are numerous and varied, but all consist essentially of a branch to make counter pressure without circular constriction of the limb, and of a pad which can be screwed or bound down upon the artery with suitable force. For weights, bags of shot are used, or pieces of lead moulded to fit the parts. They may be allowed to rest entirely upon the limb, or may be suspended by an elastic cord.

Prolonged complete arrest of the current requires the aid of anesthesia, for the pressure soon becomes very painful; anesthesia may be safely prolonged for many hours. It is well to aid the control of the circulation above by pressure also below, or by tightly bandaging the limb below the aneurism.

Digital pressure, which had previously been employed in two cases as an aid to compression by instruments, was first used as the sole means of cure by Dr. Jonathan Knight, of New Haven, Conn. The case was one of popliteal aneurism, and a cure was effected in about two days. The plan has since been employed in a large number of cases, and with a large measure of success. Fischer's statistics, quoted by Holmes, contain 90 cases, with 76 complete cures, and 8 deaths; 6 of these deaths occurred after subsequent ligature, the remaining 2 after amputation. In about one-third of the successful cases the cure was effected within twenty-four hours.

Digital pressure can be made only with the aid of a considerable number of assistants, and it is usual to employ them in pairs, one making pressure while the other feels for pulsation in the sac. The skin should be covered with French chalk at the point where the pressure is made, and the assistants should be carefully instructed as to the amount of pressure needed and the place where, and direction in which, it should be made. When the change is made from one assistant to another, the latter should place his finger or thumb upon the artery immediately above or below that of the one whom he replaces, and this one should not remove his finger until after the artery is duly compressed by the other. Ether or morphine should be used when the patient begins to complain of the pain.

Direct compression of the artery by needles or wire or forceps, after incision of the overlying parts, is a substitute designed to arrest the current more certainly than is done by indirect pressure, and yet to avoid the risk of secondary hemorrhage. It is to be regarded rather as a substitute for the ligature, and as such has become much less important since the introduction of the catgut ligature and the antiseptic method, although under exceptional circumstances, as with large arteries and near large branches, it may still be advisable to resort to it. The instances in which the method has been used are not numerous, and the varieties in the means employed are almost as numerous as the cases. Acupressure, after use in a very few cases, seems to have been entirely abandoned. Mr. Bickersteth⁸ compressed the innominate with a leaden wire drawn loosely around it; the wire broke on the second day; a ligature was then applied, and the patient died of hemorrhage on the sixth day. Mr. Dix⁹ cured an aneurism of the carotid and another of the femoral by passing a wire under the vessel, bringing both ends out through the tissues at the side of the wound, and twisting them over a piece of cork tightly enough almost to stop the pulsation. The wire was tightened on the third day and removed on the fifth or

sixth. Porter¹⁰ compressed the innominate for three days with an instrument resembling a small lithotrife; fatal hemorrhage from the vessel at the point compressed occurred on the tenth day. Robert Perissé White¹¹ compressed the external iliac for one hundred and sixty-two hours with a modified form of Porter's instrument, and thereby cured an inguinal aneurism. Dr. W. Stokes, Jr. compressed the abdominal aorta with a silver wire tightened over a ring, after a plan recommended by Porter, and Mr. Holmes says the vessel was so firmly closed after pressure for a few hours that at the autopsy water could not be forced through it; the patient died of peritonitis.

Mr. McGill¹² compressed the first portion of the left subclavian with ordinary torsion forceps; after nine and one-half hours the aneurism was solid and pulseless, and the instrument was removed. The patient died of pleurisy; the pleura having been opened during the operation; previous to this operation the aneurism had been much benefited by galvanopuncture.

(c) Compression by Esmarch's elastic bandage. This method was first employed in 1875 by Dr. Walter Reid, of the British navy, in a case of popliteal aneurism. The bandage was applied tightly to the leg, loosely over the tumor, and then tightly over the lower third of the thigh; then the cord was put on and the bandage removed. At the expiration of fifty minutes the pain had become so great that the cord was removed, two Carté's compressors on the upper portion of the femoral artery having been substituted. At the expiration of three hours from the commencement the aneurism was found to be pulseless; intermittent pressure was kept up for two days, and then the patient was pronounced cured. The condition of the parts found at the death of the patient a few months later, and the method by which this treatment appears to effect a cure, have been described above. In January, 1881, I collected 62 cases treated by this method,¹³ which may be grouped in three classes, according to differences in detail. In the first class, 52 cases, Dr. Reid's method was followed exactly or very closely; in the second class, 5 cases, the rubber tubing or the elastic bandage was used repeatedly and alternately with the tourniquet or digital pressure to arrest the circulation for several hours; in the third class, 5 cases, the bandage was used for a short time daily for many successive days, without any compression of the artery in the intervals, or with a tourniquet loosely applied. In the first class there were 28 cures, 22 failures, and 2 deaths; and of the cures 24 were obtained by a single attempt continued for about an hour on the average, the extremes of time being fifty minutes and three and one-half hours, and 4 by two attempts each, separated by an interval of from one to four days. After the removal of the bandage the artery was compressed with a tourniquet or the fingers, usually for a few hours, but in one case for only one hour, and in another for five days. In 2 or 3 cases pulsation returned in the aneurism on the following day, and was then definitely arrested by compression for a few hours. In 12 of the 22 failures the same method was used in nineteen different attempts; in the remaining 10, with eighteen attempts, no pressure seems to have been made after the removal of the bandage. In at least 5 of the 12 the method was skillfully employed, with every detail used in most of the successful cases; they show, therefore, when added to the 28 cases treated successfully by this method, that it may be expected to fail in at least 15 per cent. of the cases. As for the remaining failures, there is some reason to suppose that the method was not carried out with as much care and attention to details as it was in the others.

A very important fact is that the method appears not to involve any serious risk, and not to diminish the chances of success if resort is subsequently had to the ligature. Of the two fatal cases, in one the bandage was applied twice with an interval of three days, and retained in the last trial for nearly eight hours. The patient died twenty-seven hours afterward with symptoms of heart failure or shock, the dorsum of the foot remaining cold.

In the other the aneurism (of the anterior tibial artery) had ruptured externally, and amputation was strongly urged, but refused by the patient; gangrene of the foot and lower part of the leg followed, and the patient died during the second week. The circumstances in each case were quite exceptional. Mr. Bryant applied the bandage twice for three hours each time, with an interval of four days, in a case of popliteal aneurism in a man forty-five years old. A fortnight after the second attempt he tied the femoral artery with catgut, the wound healed by immediate union, but "anæmic gangrene" followed and the leg was amputated. This is the only instance of gangrene in the 16 cases in which the ligature was resorted to after the bandage had failed to produce a cure.

The conclusion to be drawn from all these cases seems to be that we have in the elastic bandage an efficient means for safely shortening the duration of the treatment by compression of popliteal and some femoral aneurisms. The greater efficiency, the more speedy action of the method is apparently due mainly, if not entirely, to the arrest of the circulation through the collateral channels as well as through the main artery, thus securing absolute stagnation of the contents of the sac. Consequently the rubber tubing, which is drawn tightly twice or three times about the limb above the aneurism, is to be deemed the efficient part; and the principal, perhaps the sole benefit from the bandage is that of making a less severe constriction by the tubing sufficient.

The method of carrying out this procedure is simple; thus, in popliteal aneurism, the bandage should be applied tightly to the leg, loosely over the aneurism, and tightly again above it, and the bandage or the tubing should be kept in place for one or two hours; then the artery should be compressed by a tourniquet or, the fingers for several hours afterward, the compression being occasionally intermitted for a moment to see if pulsation returns in the sac. If pulsation returns within a few hours, the artery must be again compressed. The introduction of needles or a coagulating injection might be proper in connection with a second trial after a failure.

(d) Compression by flexion of the limb. When an aneurism is situated at the bend of a joint, pulsation in it may sometimes be diminished or arrested by flexion of the joint, and this fact has been occasionally utilized, either as the principal means of treatment or as an adjunct thereto.

The method appears to have been first suggested by Fleury, a French surgeon, in a paper published in the *Journal de Chirurgie*, in 1846, as an inference from his success in curing a wound of the brachial artery at the elbow by flexion. In 1852 the suggestion was put into practice by Thierry in a case of traumatic aneurism at the elbow, and in 1857 a large popliteal aneurism was cured by flexion of the knee by Maunoir, of Geneva. He tried at first to keep the leg forcibly flexed upon the thigh, but the patient could not endure the pain, so he had to be content with keeping it partly flexed by a strap crossing the shoulders, while the patient went about on crutches. This was kept up about three weeks, at the end of which time the tumor had ceased to pulsate.

Flexion has been used successfully in aneurisms of the popliteal artery, at the groin, and at the elbow. Of 49 cases of popliteal aneurism treated by flexion, analyzed by Liégeois, 26 were cured, in 11 of which flexion alone was used, in 11 others flexion in combination with other means, and in 4 flexion after other means had failed. It was first used at the groin by Dr. Gurdon Buck¹⁴ at the New York Hospital in an aneurism which had recurred sixteen months after apparent cure by compression. Pressure on the external iliac did not arrest the pulsation, and flexion was tried as the only alternative for treatment by laying open the sac. In a case of inguinal aneurism treated by Dr. Eldridge, of Yokohama, a cure was obtained by keeping the thigh flexed upon the pelvis for twenty days.

In making use of the method it seems to be usually necessary to carry the flexion to a point at which it markedly diminishes the pulsation in the tumor, and

perhaps arrests it entirely, and then to keep the limb in this position for a long time by suitable bandages or apparatus. It is well, also, in popliteal aneurism, to bandage the leg up to the knee to prevent swelling. The merits of the method lie in the facility with which it can be carried out, and in the freedom from the chance of accidents if care is taken not to make too forcible pressure.

3. Permanent arrest or obstruction of the stream on the distal side.

(a) By distal ligature (Brasdor's and Wardrop's methods). Distal ligature, first suggested by Brasdor and Desault toward the end of the eighteenth century, was first performed by Deschamps in 1798; the femoral artery was tied in the middle of the thigh for the cure of a large aneurism, the upper border of which was less than a finger's breadth below Poupert's ligament. As rupture of the sac threatened on the fourth day, the artery was compressed on the pubis, the sac opened, and the vessel tied above and below; the patient died eight hours afterward. The operation was next performed by Sir Astley Cooper, who tied the common femoral artery below the epigastric for a large aneurism of the external iliac; the patient recovered from the operation, but the aneurism continued to pulsate and soon afterward ruptured. In 1825 Wardrop obtained the first success, tying the common carotid on the distal side of a large aneurism in a woman fifty-seven years old. Wardrop's efforts to popularize the operation, and especially his extension of it to aneurisms of the innominate artery, have permanently associated his name with it as distinctive of that form in which the current is not completely arrested, but continues only through branches given off from the artery between the ligature and the sac; while the name of Brasdor is given to that form in which there are no such branches and the arrest of the current is complete.

The operation is practically limited to aneurisms at the root of the neck, those of the common carotid, subclavian, and innominate. In some cases in which an aneurism of the arch of the aorta has been mistaken for an innominate aneurism, and the carotid and the subclavian in its third portion have been tied, marked relief of symptoms has followed, and in two or three cases the left carotid has been tied for recognized aortic aneurism. The operation benefits by arresting or retarding the circulation in the vessel and sac and thus favoring the formation of a laminated clot. The anticipation that the pressure within the sac would be increased by the distal ligature has proved unfounded, and the first effect of the operation has often been an immediate decrease in the size of the aneurism and in the force of its pulsation.

The proportion of successes previous to the introduction of the antiseptic ligature was very small, but with the introduction of this form of ligature the operation appears to have entered upon a new career of usefulness and of applicability to cases that have heretofore been beyond aid by surgical art. In eight cases of ligature of the carotid and subclavian for innominate aneurism in which catgut was used,¹⁵ death was caused by the operation in only one, and other successes have been since reported. It is, of course, less certain in its action than ligature on the proximal side, and its use will therefore be restricted to cases in which the proximal ligature or compression is impossible or too dangerous—in other words, to aneurisms at the root of the neck, and perhaps of the external or common iliac. It is to be judged not by comparison of its proportion of successes with that of other methods, but rather as a grave alternative in a limited class of cases that are open to few other means of treatment, and that lead inevitably, if left to themselves, to prompt and certain death.

(b) Manipulation or malaxation of the aneurism. This method, introduced by Ferguson in 1852 and employed twice by him, rests upon the same principle as the distal ligature—arrest or diminution of the current by an obstacle placed upon the distal side of the sac. In this method the obstacle is a fragment of old clot mechanically displaced from the wall of the sac and lodged with-

in the artery. This displacement of a clot is thought to be the mechanism by which many of the so-called spontaneous cures have been obtained. The conditions essential to its employment are the presence of enough laminated clot in the sac to make the detachment of a piece of sufficient size possible and practicable by external manipulation, and the impossibility of safely resorting to other methods of treatment. The latter condition limits the method to a small number of cases, mainly those situated upon the subclavian artery. It is inapplicable to those situated upon the carotid, because of the certainty that small fragments will pass into the arteries of the brain and become cerebral emboli, with consequent paralysis. This accident has been observed also in cases of aneurism of the right subclavian treated in this manner, and in one of the arch of the aorta, mentioned above, in which the projecting sac was pressed back through an opening in the sternum. Rupture of the sac, which has been feared on theoretical grounds, has not occurred in any of the reported cases.

In a case reported by Mr. Little, the result was most satisfactory, and the method deserves all the more credit from the fact that apparently no other could have been employed with any hope of success. The patient was fifty-three years of age, the aneurism was of the right subclavian, had lasted nine months, was of considerable size, and pulsated strongly; the overlying skin was inflamed. January 1, 1856, Mr. Little¹⁶ made steady pressure with the thumbs on the sac, and succeeded in displacing some of the clot and directing it toward the distal opening. During the first two days no change was noticed; on the third the pulse, at the wrist, was weaker and the arm colder, and by the tenth day no pulsation could be felt in any of the arteries of the arm. The tumor became gradually solid and ceased to pulsate, and shrank to the size of a small walnut. The arm remained cold and partly paralyzed for a time, but a year after the operation the cure was complete and satisfactory in every respect.

4. Rapid coagulation of the blood in the sac, with or without temporary arrest of the stream.

(a) Coagulating injections. This also is a method of very limited applicability; it can be used only as an adjuvant to other methods, or in exceptional cases, as of recurrence or of pouched aneurisms. Dr. Joseph C. Hutchison, of Brooklyn, employed it unsuccessfully in a case of aneurism of the abdominal aorta. It has been considered essential to its use in the treatment of an aneurism of the common or encysted variety that the circulation through the sac should be completely commanded during the injection and for some time thereafter, but if this condition can be fulfilled, treatment by distal or proximal compression or ligature will usually be possible. In certain other varieties, as cirroid aneurism and varicose aneurism at the elbow, it has yielded good results.

The coagulating substance has almost always been a solution of an iron salt, the subsulphate, lactate, or perchloride. The coagulating power of the latter is great, but so, too, are its escharotic qualities, and its use has commonly been followed by suppuration of the sac. A strength of 20° Beaumé seems to be as great as should be used, and the quantity is set by Holmes at eighteen or twenty drops for an aneurism of the size of three and one-half ounces. Van Buren thought the preference should be given to the subsulphate, which is not at all escharotic. Dr. Hutchison made nine injections of from five to fifteen minims each, in a case of recurrent femoral aneurism, without obtaining any benefit or causing any irritation; the strength of the solution varied from one in five to one in thirty. In a case of aneurism of the innominate, for which Dr. Elliot¹⁷ tied the carotid and subclavian arteries, ten and one-half drachms of a solution of the subsulphate were injected on the seventeenth day after the operation to arrest hemorrhage from the sac. This was followed by a discharge of bloody serum for three days, and protrusion of a dry clot, which fell out on the twenty-fourth day, leaving a large cavity, from which fatal hemorrhage took place on the twenty-sixth day.

Hydrate of chloral has been recently recommended.

(b) Introduction of solid bodies. A few attempts have been made to induce coagulation of the blood in an aneurism by permanently or temporarily introducing foreign bodies, such as wire, needles, horsehair, catgut. The method rests upon the well-known facts that, if freshly drawn blood is whipped with a bundle of fine rods, the fibrin collects upon them, and that firm clot forms upon a foreign body introduced into an artery or vein. With one or two exceptions these attempts have been made upon aneurisms that were not open to treatment by any of the methods of ligature or compression, such as aneurisms of the aorta and subclavian. The first case of permanent introduction was that of Mr. Moore; the first of temporary introduction of needles, those of Rizzoli and Malago.

Moore's case was a large aneurism of the arch of the aorta, which had destroyed part of the bony wall of the thorax, and threatened to rupture the skin. He introduced, through a fine cannula, twenty-six yards of fine iron wire, moving the point of the cannula about so as to coil the wire within the sac. Coagulation promptly followed, and pulsation ceased for a time, but inflammation set in, pulsation returned, and the patient died on the fifth day. The large pouch outside the wall of the chest contained the wire embedded in a firm clot, which extended also into the inner pouch and the artery. The opening between the sac and the aorta was about half an inch in diameter.

Rizzoli's first case was an aneurism at the elbow; the bleeding which followed the withdrawal of the needles he inserted was so profuse that the limb was at once amputated. His second case was an ilio-femoral aneurism, and after failure of digital compression he introduced six needles in such a manner that their points, crossing, formed a sort of lattice within the sac. Two were withdrawn on the third day, the others on the fourth. The tumor had become smaller and firmer, and the pulsation was less. No further change taking place, instrumental pressure was made, and effected a cure. Malago's operations were upon popliteal aneurisms in 1850, 1852, and 1855, and all terminated fatally.

March 23, 1871, Dr. Domville introduced fourteen inches of fine iron wire into an aneurism of the aorta that projected through the sternum; the tumor became firmer but continued to increase, and on April 9th he introduced nine needles, each two and one-half inches long; fatal hemorrhage occurred on the 23d. The needles and the wire were found embedded in a "dark, fibrinous coagulum."

In April, 1872, Mr. Murray presented a patient to the Royal Medical and Chirurgical Society, and read an account of three other cases, all treated by this method. In the first case, aneurism of the aorta and innominate, eighteen or twenty needles were introduced and left in for twenty-four hours; then twenty-four feet of wire was inserted. The patient had no bad symptoms, but died suddenly a fortnight after the last attempt. In the second case (aneurism of the aorta) needles were inserted twice; erysipelas began at the punctures and caused death. In the third case (aneurism of aorta and innominate) twenty feet of catgut was inserted; at the autopsy it was found softened and with no coagula upon it. The fourth case, the one shown to the Society, was a sacular aneurism of the subclavian. Five or six trials of complete transection with twenty or thirty long needles for several hours were followed each time by consolidation, lessening of size, and relief of pain.

Horsehair has been introduced by Dr. Levis (twenty-four feet nine inches) into an aneurism of the right subclavian—death occurred a few weeks afterward; by Bryant (thirty feet) in a rapidly growing popliteal aneurism in a patient affected with ulcerative endocarditis, "with the effect of causing almost complete consolidation of the tumor"; and by myself in a case of ilio-femoral aneurism in which other treatment was refused (about fifteen pieces, each six inches long), without any effect.

In January, 1879, Mr. Christopher Heath introduced three pairs of fine sewing needles, making each pair cross, into an aneurism of the left subclavian, for which he had amputated at the shoulder joint two months previously. The needles were withdrawn on the fifth day and the tumor became solid. The patient died a few days later of bronchitis, and the aneurism, which had been caused by fracture of the first rib five months before, was found full of dense fibrin and communicating with the artery by a very small opening.

It does not appear from the history of these cases that the interference is likely to do any great harm, or, on the other hand, that much benefit may be expected from it, and therefore it should be used, if at all, only when other means are unavailable and as a last resource in desperate cases.

(c) Galvano-puncture. In this method the constant galvanic current is employed to produce rapid coagulation of the blood in the sac. The details of the operation, as employed in different cases, vary greatly. Sometimes a single pair of insulated needles, one connected with the positive, the other with the negative pole of the battery, are introduced into the sac near each other, and the current passed directly through the intervening blood from one to the other; or several needles are connected with each pole and used in the same manner; or needles are connected with one pole only, and a sponge connected with the other and placed on the skin near by. When needles are connected with one pole only, it is commonly the positive pole; but sometimes the current is repeatedly reversed during the operation, and occasionally the negative pole alone has been connected with the needles. The strength of the current as employed in the different cases has varied greatly, as has also the length of time during which the application has been made.

Like both the preceding methods of producing coagulation by direct action upon the blood in the sac, and like most of the other exceptional methods, this method recommends itself only in cases that are not amenable to less dangerous and more certain methods. Inflammation of the sac and the formation of eschars about the needles, which were feared and have sometimes occurred, can be quite surely avoided by care; but the punctures sometimes suppurate, and clotting does not always take place to a sufficient extent to cure or even to relieve. A few strikingly good results have been obtained in cases of internal aneurism, either in effecting an apparently permanent cure or in averting immediate death by rupture. It has also cured some cirroid and arterio-venous aneurisms.¹⁸

The weight of experience is in favor of using several needles connected with the positive pole of a battery of high tension, and of passing the current for an hour or two.

5. Promotion of the formation of a laminated clot by irritation of the wall, "needling." This, recently introduced by Macewen, has led in a number of cases to marked reduction of the symptoms and even apparent cure. A long, stiff needle is pushed through the sac until its point reaches the opposite side where it is moved to and fro so as to scratch the surface. By changing its direction several areas may be thus irritated without withdrawal and reintroduction of the needle.

Traumatic Aneurism, and Rupture of an Artery.—A traumatic aneurism is one which owes its formation to a wound of the artery that has divided all its coats, or to an injury (stretching, bruising) that has divided one or more of them. The common cause is a penetrating or punctured wound; less common causes are overstretching in the neighborhood of a joint and fracture. The continuity of the artery is usually not entirely destroyed, and while some of its blood escapes into the adjoining tissues the remainder continues within it and is distributed through its branches. The effused blood is in part absorbed, and in part coagulates; and after a time a distinct sac forms about it, by condensation of the tissues, and it then differs in no essential way from the common encysted form of aneurism. Its symptoms and