

On the operative treatment of popliteal aneurism / by Thomas Annandale.

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Annandale, Thomas, 1839-1908.
Royal College of Surgeons of England

Publication/Creation

Edinburgh : Printed by Oliver and Boyd, 1886.

Persistent URL

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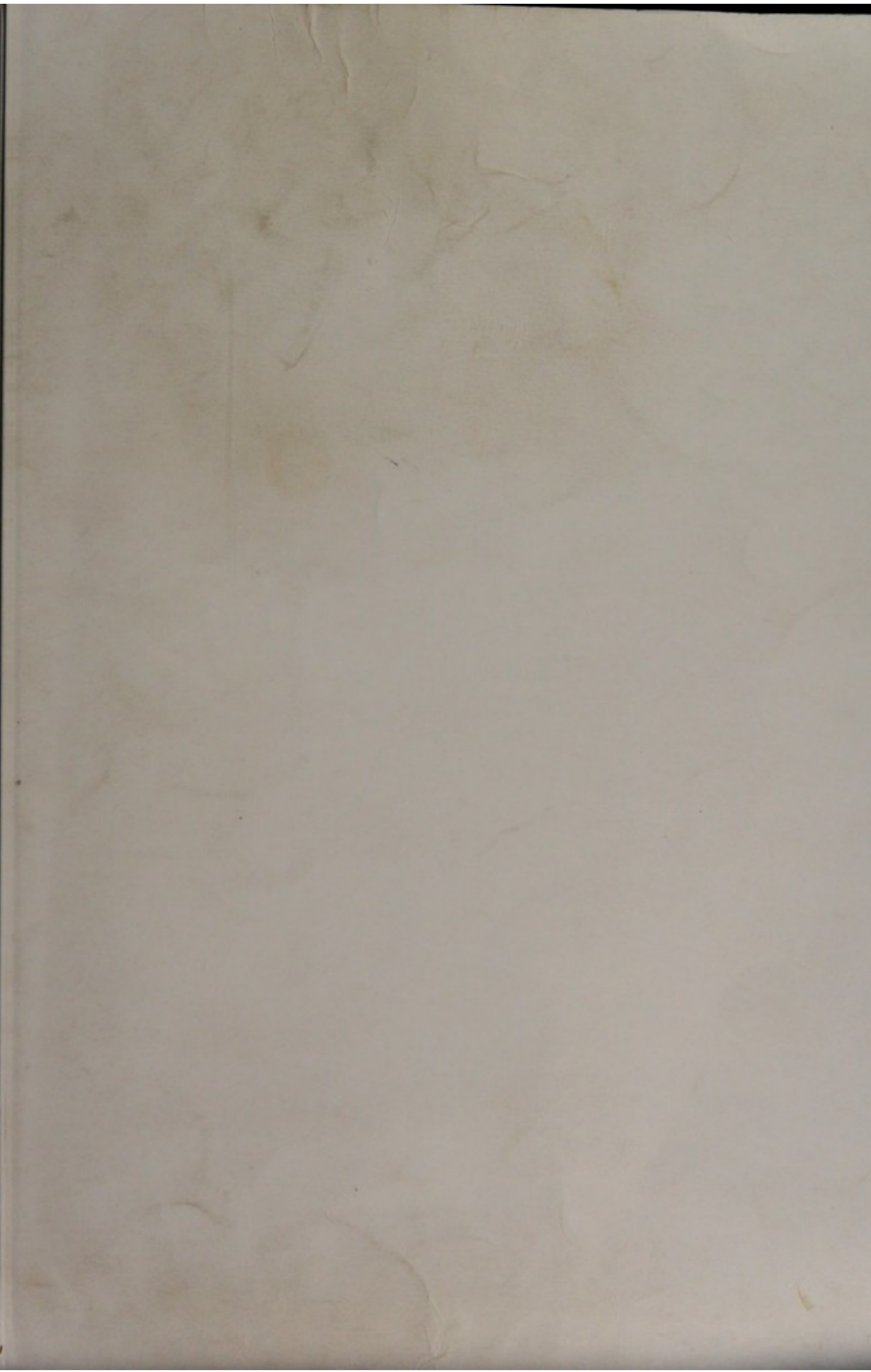
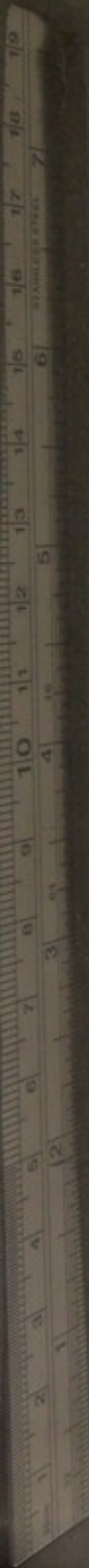
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ON THE

OPERATIVE TREATMENT OF POPLITEAL ANEURISM.

By THOMAS ANNANDALE, F.R.C.S. ED.,

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*(Read before the Medico-Chirurgical Society of Edinburgh, 2nd December 1885 ;
and reprinted from the Edinburgh Medical Journal for February 1886.)*

THERE are now few surgeons who, when called upon to treat a case of uncomplicated and limited popliteal aneurism, do not first try the treatment of it by some form of compression. My own experience leads me to prefer either digital compression or a modification of Reid's method in these cases. My two last cases in private practice were treated successfully in the following way. An Esmarch's bandage was applied to a point immediately below the aneurism, and then pressure was made by means of a horse-shoe tourniquet upon the femoral artery at the groin. From time to time this tourniquet was slackened slightly, so as to allow some blood to flow into the sac, and was again immediately tightened. This treatment was carried on for from two to three hours at a time, an elastic bandage being applied, but not so as to stop the circulation in the limb, after the tourniquet and Esmarch's bandage had been removed. An interesting point in both cases was that the patients were not confined wholly to bed during the treatment, but were allowed to lie on a sofa, and even to sit up with the limb resting upon a chair. Both cases were completely cured,—the one in two weeks, and the other in about three weeks. In the one case only one application of the tourniquet was employed, the patient

having after the application an elastic bandage constantly round the limb, but not used so as to interfere with the circulation. In the second case two applications of the tourniquet, at an interval of a week, were required, and the use of the elastic bandage for two weeks after the second compression. It is a well-known fact that cases of popliteal aneurism are occasionally very easily cured, and it may be that my two cases belonged to this class; but, as they were both under treatment about the same time, I have thought a brief note of them might be interesting.¹

When compression fails to cure a popliteal aneurism, or when the case is one unsuitable for it, the treatment almost invariably suggested and practised is ligature of the femoral artery at the apex of Scarpa's triangle. Should ligature of the femoral artery fail to cure the disease, or should pulsation in the sac return and persist after this operation, the usual advice and practice is to try compression above the seat of ligature, or to try the flexion method; or, these failing, to tie the external iliac or common femoral arteries. Should these plans not succeed, there is, as Erichsen² (*Science and Art of Surgery*, 8th edition, vol. ii., page 130) remarks, only the choice between "amputation and opening the sac." He further says:—"Of these measures I should certainly prefer amputation, as offering the most favourable chance to the patient." Mr Erichsen continues:—"The operation of opening the sac, turning out its contents, and ligaturing the vessel supplying it, is in any circumstances a procedure fraught with the greatest danger to the patient, and full of difficulty to the surgeon, even when he knows in what situation to seek the feeding vessel."

There are certain local conditions of a popliteal aneurism which are recognised by all surgeons to render the case unsuitable for compression. Among the principal of these local conditions are:—

- (1.) Large and rapidly growing aneurisms.
- (2.) Diffused and ruptured aneurisms.
- (3.) Aneurisms tending to involve or involving the knee-joint.
- (4.) Inflamed and suppurating aneurisms.

In addition to these local conditions may be mentioned an unhealthy state of the arterial system.

In the first three of these conditions the common rule followed is to try ligature of the femoral artery, but most authorities qualify this opinion by stating that the ligature of the artery is a very uncertain treatment in these cases, and that amputation will not unfrequently be required. In aggravated examples of these conditions immediate amputation is advised by some, as the ligature

¹ A third case recently treated by this same method was not cured, and ligature of the femoral artery was required.

² I quote Erichsen because he is a deservedly high authority upon the subject, and his work on Surgery has been quite recently carefully revised and brought up to date.

of the femoral artery frequently tends to produce gangrene of the limb.

In the fourth condition amputation has generally been resorted to, although laying open the sac has been performed under these circumstances. Erichsen (*loc. cit.*) observes:—"Though this plan has been several times tried, I am not aware that by it the surgeon has ever succeeded in arresting the bleeding from a suppurating aneurismal sac."

The present state of opinion in regard to the treatment of popliteal aneurism may therefore be summed up as follows:—

(1.) Compression in favourable cases, and when it can be borne.

(2.) Ligature of the femoral artery when compression fails, or is unsuitable.

(3.) Amputation when certain local conditions or complications exist.

The "old" operation, or laying open the sac and securing the artery at its point of communication with it, is occasionally referred to by authors, but it is certainly never advocated in the case of popliteal aneurism, and in the passage quoted from Mr Erichsen the general opinion in regard to this proceeding is, I think, correctly expressed.

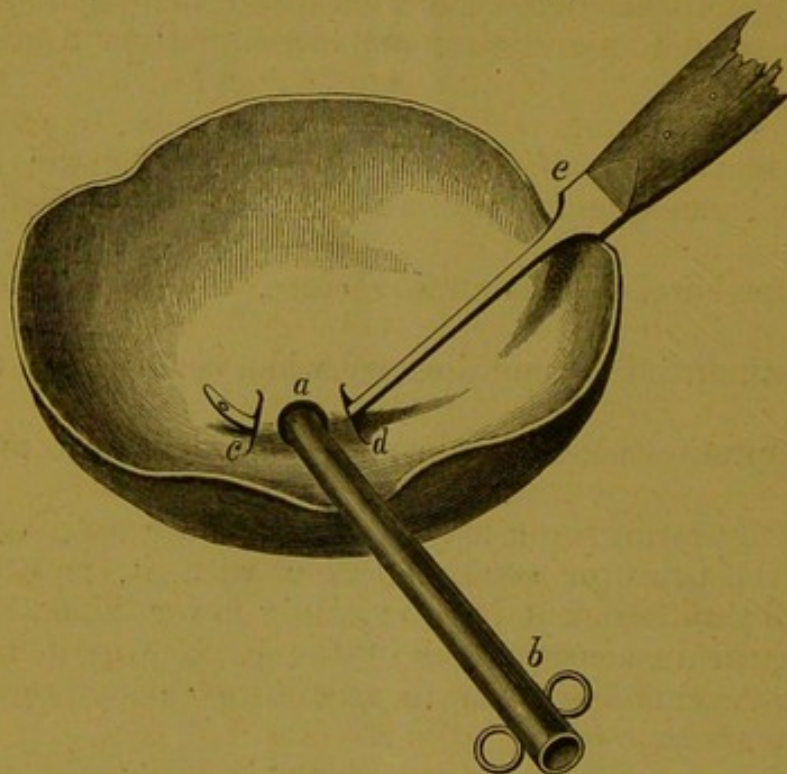
While, then, I advocate the treatment of popliteal aneurism by some form of compression in suitable cases, and this failing, by ligature of the femoral artery, my object in this paper is to express the opinion that the "old" operation has hitherto been too much ignored by surgeons, and that in certain cases of this disease it will prove to be a more safe proceeding than those methods which are usually adopted.

It may be well to remark here that, before the introduction of the Hunterian ligature, popliteal aneurisms were not unfrequently treated by laying open the sac, but the success then of such a proceeding was very slight, and this is not to be wondered at when we consider what this operation was. It consisted in freely laying open the sac, and then stuffing its cavity with some dressing, or in some cases pushing a hot cautery into its interior. If any attempt was made to ligature the artery at the site of the aneurism, it was simply a dive with a needle and thread in the position of the vessel, with the result that, when such a ligature was passed and tied, it usually included vein, artery, and other structures.

The "old" operation at the present time is a very different proceeding, and, in my experience of it, which has not been small, I have failed to meet with those difficulties so graphically related by Mr Erichsen. With the antiseptic ligature and dressing, I now look upon this operation as a very simple proceeding in properly

selected cases, provided you can stay the circulation in the sac during the operation, and you can always do this in a case of popliteal aneurism.

In order to explain my method of operating, I have had this diagrammatic sketch prepared. It is supposed to represent the



cavity of the aneurismal sac after it has been laid open and all the clots removed. *a* is the opening of communication with the artery, into which a bougie, *b*, has been inserted, and passed along the canal of the vessel upon its cardiac aspect. *c* and *d* are the two small incisions made through the wall of the sac, immediately above the opening, and the aneurism needle, *e*, is shown after its point has been passed through these incisions and under the artery, with the contained bougie. By means of the aneurism needle the ligature is drawn through and tied round the vessel upon the bougie, the latter being gradually withdrawn as the ligature is tightened. Should there be only one opening, and this is the case in a very large majority of instances, the same proceeding is carried out upon the distal end of the artery, the bougie being inserted into the opening again and passed downwards. If two openings exist they must be treated separately. The employment of the bougie was first suggested to me several years ago by Sir Joseph Lister, when I was operating upon a case of femoral aneurism.

I will now relate a case in illustration. U. N., æt. 42, was sent to me in August of this year by Dr Hern, of Darlington, on account of a popliteal aneurism affecting the right leg. The patient had suffered from obscure pains, attributed to rheumatism, in this leg for one year and three months before his admission into my wards, but he only noticed a swelling in the popliteal region of this same

leg about three months ago. Since first observed, the swelling, which pulsated strongly, has rapidly increased in size.

On examination, his condition of health was not very favourable. There was a slight systolic murmur over the mitral area, and the radial and temporal arteries were tortuous and affected with atheroma. The other organs were healthy. In the right popliteal space there was a large pulsating and expansile tumour, which filled the whole space, bulging out on each lateral aspect, but more particularly upon the inner side. A portion of the tumour felt firm and solid, but other portions were soft and fluctuating. A well-marked bruit was heard when the ear was placed over the aneurism, and the pulsation was especially marked over its centre. The leg below the knee was slightly swollen and œdematous, and the pulsation in the tibials at the ankle was very feeble.

After consideration, I decided to treat the case by the "old" operation, and upon the 2nd of September I made a small incision into the aneurism, the circulation of the limb being controlled by a tourniquet applied round the upper third of the thigh. Having introduced my finger into the wound, and by means of it loosened the adherent clot in the sac, I laid the whole sac freely open, and removed all the clots contained in it, and I then found that there were two openings communicating with the sac,—one corresponding to the upper end of the popliteal artery, just at its junction with the femoral, and the other to the lower end of the popliteal artery. Both of these openings were pervious, and admitted a No. 10 bougie, which passed freely into the canal of the artery. The sac of the aneurism was entire, and its inner surface was lined with many layers of firm and laminated clot, and in addition there was a considerable amount of soft and recent clot in its cavity. The two openings in the sac were now separately secured, after the manner shown in the sketch. By means of the aneurism needle catgut ligatures, prepared with chromic acid, were applied, and when the tourniquet was removed there was no bleeding from the vessel. The external wound was now stitched and a drainage tube introduced. Irrigation with a solution of corrosive sublimate (1 in 2000) was employed during the operation, and the wound was dressed with corrosive sublimate wool. His progress was perfect. Before the 10th of September the drainage tube was removed; upon the 27th of September the wound was healed, except at one small spot, the site of the drainage tube, and the patient sat up in an arm-chair. Three days after this he was allowed to walk a little in the ward with crutches, an elastic bandage being applied round the limb as a support. Upon the 15th of October he was discharged cured. On the 3rd of November, Dr Hern, in a note to me in regard to another patient, writes:—"Norris is quite well, and at work."

My reasons for deciding upon the "old" operation in this case were—

- (1.) The unhealthy condition of the general arterial system.
- (2.) The large size of the aneurism, and its rapid growth.
- (3.) The œdema of the leg, and feeble condition of its circulation.

The case was quite unsuitable for pressure, and it belonged to that class of cases already referred to, in which ligature of the femoral artery is acknowledged to be not only uncertain as regards the cure of the aneurism, but to be attended with a considerable risk of gangrene of the limb, secondary hæmorrhage at the seat of ligature, a risk not now so great as formerly, or inflammation and suppuration of the sac.

It may be said, and has been said, that if the arterial system is unhealthy it is most likely that the artery in the region of the aneurism will be especially affected and unsuitable for ligature; but Mr Syme proved the fallacy of this in connexion with his brilliant operations after the old method; and having myself performed many operations of a similar kind, I can confirm his opinion, for I have never seen secondary hæmorrhage occur when the old operation has been carefully performed with anti-septic precautions.

In favour of the "old" operation in my case, was the certain and speedy cure and obliteration of the sac provided all went well; the immediate removal of the large tumour, which was pressing upon the veins, and probably also upon the arteries, and interfering with the proper circulation of the limb,—so that in this way two of the principal risks, gangrene of the limb and suppuration of the sac, were in great part done away with; and, lastly, that if any of the risks already mentioned had followed my proceeding, and amputation been necessitated, an amputation could have been performed lower down in the thigh than in the case of ligature of the femoral artery, and therefore with less risk to the patient. But I have additional experience to support my opinion. In the *British Medical Journal* for 17th April 1880, I published the notes of a case of popliteal aneurism treated successfully by the same proceeding. This case was that of a man, æt. 36, who, seven years before he came under my care, had his femoral artery ligatured in Australia, after pressure and flexion had failed to cure the aneurism. The ligature of the artery was successful, and the disease apparently remained cured until a few weeks before he consulted me, when pulsation had returned, and the tumour steadily increased in size. In this case I laid open the sac, and secured the popliteal artery at the point of its communication with the sac. This patient was perfectly well in six weeks, and remains well. In some remarks upon this case I then wrote:—"The case is an additional proof that the popliteal artery may be successfully ligatured;" and again, "I have hopes that the successful result of this case may in the future cause it (the "old" operation) to be practised with more encouragement in some of those cases which

have hitherto been treated by amputation." Further, I have proved that both popliteal artery and vein may be successfully ligatured; for in the *Lancet* for 24th April 1875, I reported a case of arterio-venous aneurism of the popliteal artery, the result of a wound, involving the artery and vein, in which I laid open the sac and secured both popliteal artery and vein at their points of communication with the sac. This patient was completely cured in five weeks. These are the only cases of popliteal aneurism in which I have performed the "old" operation, and therefore I have no unsuccessful cases as yet to record. From my experience of these three cases, and from my experience in other varieties of aneurism, I feel justified in expressing the opinion, that the "old" operation is to be preferred to ligature of the femoral artery in Scarpa's triangle in the following conditions of popliteal aneurism:—

(1.) In cases of large aneurism filling up the space, and interfering by pressure with the venous and other circulation of the limb below, or causing serious nerve pressure.

(2.) In rapidly growing aneurisms, which have attained some size.

(3.) In ruptured and diffused aneurisms.

(4.) In aneurisms which have involved the knee-joint by pressure.

(5.) In aneurisms attacked with inflammation and suppuration.

(6.) In aneurisms which the ligature of the femoral artery and compression have failed to cure.

(7.) In arterio-venous and other aneurisms of traumatic origin.

(8.) In cases of general arterial disease, provided surgical interference is considered necessary or advisable.

In such of these conditions, which are of an acute nature, there must be no delay in performing the operation; and I need scarcely add, that should symptoms of gangrene already be present in any case, amputation is the rule.

