After about the tenth week, when the ulcer improves, the serum calcium returns to normal, usually in about three weeks. If the animals survive much longer, during the remaining weeks it continues normal or slightly higher. This is in striking contrast with the results obtained after intraperitoneal inoculation. In the latter experiments the pulmonary lesions were mainly submiliary in character. With subcutaneous inoculation they were always much more extensive, and the weight of the lungs, generally, was over 80 grams (normal 8 grams). They consisted entirely of solid caseous masses, and such extensive disease must inevitably interfere mechanically with pulmonary gas exchange, and give rise to alterations in the acid-base balance. Evidence exists to suggest that acidosis results in an increase in the serum calcium.¹¹ How far this may be operative during the later stages of my experiments, and thus mask the fall that might be expected, remains for further investigation.

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THE MODERN TREATMENT OF VARICOSE VEINS:

THE HISTORY OF ITS EVOLUTION.*

BY

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THE passing of the operative treatment of varicose veins may be regarded as a merciful release for the surgeon, but a tribute is due to those who made the modern operative treatment eminently effective in male, and on the whole fairly effective in female, subjects, and so led directly to the success of the injection treatment.

Briquet,¹ in his famous thesis of 1824, showed that varices were most common where the deep veins communicate with the superficial, and many French surgeons at the time confirmed this fact. Callender,² in addition, demonstrated that the united capacity of the communicating vessels was relatively very large. Verneuil³ from twenty-one dissections concluded: (1) That whenever spontaneous superficial varices existed in the lower limb the corresponding deep veins (intra- or inter-muscular) were also varicose. (2) That the correlative position was not proved. (3) That phlebectasis in the lower limbs began in the deep veins in general. These vessels first dilated, the valves then became inefficient and the lesions extended to the second and third rank of subcutaneous veins. (4) That phlebectasis never began in the trunk of the internal saphenous, but in its secondary and anastomosing branches. (5) That deep varices were more common than subcutaneous varices. Specimens illustrating these points are found in the Musée Dupuytren. Gay,⁴ in an exhaustive review of the whole subject, showed that ulceration was not a direct consequence of varicosity alone, but of incompetence of the circulation as a whole. He noticed that in many cases the blood disappeared from the veins of the leg, but not from those of the thigh, on elevating the limb. From his injection experiments on the cadaver he concluded that tegumentary (veno-capillary) injection denoted obstruction of the femoral

vein, and began round the patella, while subtegmentary (venous) injection denoted obstruction of the saphenous. The intramuscular veins were not found to be injected in the experiments, and appeared to be difficult to inject.

THE PHYSIOLOGY OF TREATMENT.

Trendelenburg's Sign.

Sir Benjamin Brodie,⁵ at least fifty-four years before Trendelenburg's¹⁶ publication, gave a lucid description of the patient with Trendelenburg's sign. He said:

"If the veins are but little dilated, or dilated only in particular places, the valves will still continue to answer the purpose for which they were designed. If the vena saphena be not at all dilated, while the smaller veins of the leg are dilated, the valves of the vena saphena act perfectly, and take off the weight of the column of blood pressing on the veins below; but if the vena saphena be itself considerably dilated, its valves, of course, are rendered inefficient. Now observe the result of this. I had a patient in whom there was an unusually large cluster of varicose veins on the inside of the leg, while the vena saphena major was of enormous diameter, so that the valves were evidently good for nothing. If I put on a bandage and squeezed the blood out of the veins below, and then put my thumb on the vena saphena above, so as to stop the circulation through it, I found, on taking off the bandage, the patient being in the erect posture, that the cluster of veins below filled very slowly, and only from the capillary vessels. But if, the patient being in the erect posture, I removed the pressure from the vein, the valves being of no use, the blood rushed downwards by its own weight, contrary to the course of the circulation, and filled the varicose cluster below almost instantaneously."

Jeannel,¹⁶ in his masterly summarizing of the whole of this part of the subject in 1910, stated that no one clearly comprehended the importance of valvular insufficiency or its consequences and operative indications until the publications of Tobold (1889)¹⁵ and Trendelenburg (1880),¹⁶ which gave us the conceptions of the passive or superficial reflux (abdominal or superior of Delore),¹⁷ and of the active or deep reflux (inferior or muscular) from the deep veins of the leg towards the superficial veins. V. Meisen²¹ finds the venous pressure in the valveless saphena to range from 25 cm. of water in the thigh to 80 cm. in the leg just below the knee, and to be increased by static muscular action.

THE MODERN OPERATION.

Coming as it did at the time when complete saphenectomy was being made easy by the new avulsion methods, Jeannel's summary was helpful to surgeons everywhere. Keller¹⁹ in 1905 published the first inside-out extraction method, and Mayo²⁰ in 1906 the enucleation method. Babcock²¹ in 1907 introduced an important modification by means of which the vein is not turned inside out, but is removed in a bunched-up state on one end of the wire. This method, with certain modifications by Sir Henry Gray²² in 1909, being more certain than inside-out avulsion, became the operation of choice in the great majority of cases. O'Sullivan²⁴ and Mamourian²⁵ were early advocates of the method in England. Combined with local excision and ligation of the remote ends of the tributaries, especially at their junction with the deep veins and with the external saphena system, the whole of the internal saphena system is put out of action with ease and rapidity, thus greatly simplifying and shortening what is otherwise a very tedious procedure, and one involving absurdly long incisions. The trunk of the internal saphena is seldom very tortuous, whereas the tributaries are, so that the efficiency of the method is very great, and the results, in males at any rate, are distinctly good. Thus, for example, out of 22 cases* operated on in the Aberdeen Royal Infirmary by this method since the war, and in which it has been possible to trace the patients, the results are as follows: In 9 male cases traced up to six years after operation, 6 results are very good and 3 are good; whereas in 13 female cases traced up to four years, only 3 results are very good, 6 good, and 4 moderate or bad; 7 of the female patients have since had further treatment by injection. The differences in the results seem to be due to three chief factors: (1) Pregnancy and the harder forms of work in the female. (2) The greater degree of fatness, so that the tributaries are not well seen before operation. (3) Postponement of operation. (The question of hyperthyroidism

* A post-graduate lecture delivered at Aberdeen University during the summer term, 1928.

* For some of this material I am indebted to Professor Sir John Marnoch, K.C.V.O., under whose care the patients were treated when I was his assistant surgeon.

is omitted here.) One of the chief factors in this type of operation is its early performance before the superficial reflux has caused extensive disease in the smaller veins. Thus the soldier patient comes under treatment early as a rule. In five such patients traced thirteen years after operation it is apparent that a good result at the five-year period is likely to be permanent. On the whole, the trial of the method which was begun in August, 1914, has fully justified the work of the older surgeons. In the 94 consecutive cases, representing 149 limbs and involving the extraction of about 112 yards of vein, there has been no mortality, no pulmonary embolism, no infarction, and little suppuration, but a fatal case of embolism is recalled before 1914, in which a venous cyst in the groin was excised in a female patient who had been in bed for a fortnight after an operation for femoral hernia on the opposite side. Both wounds had healed by first intention. There was no *post-mortem* examination. It is very remarkable that embolism is so rare in an operation in which large numbers of deep communicating venous channels are broken across and left open. Before 1914, also, one case of extensive varix in a male treated by Babcock's method and local excision turned out a complete and absolute failure, due apparently to a duplication of the internal saphena and perhaps other veins. Many authors mention this duplication, but we do not know the frequency of its occurrence or whether it has any bearing on the causation of varicose veins. It has been present at least three times in the last 37 cases operated upon.

TREATMENT BY INTRAVENOUS INJECTION.

The injection treatment* may be said to date from the invention of the Pravaz syringe in 1851.³⁰ Septic phlebitis, sloughing, septicaemia, and embolism frequently followed the earlier injections of iron perchloride. Socquet in 1854 discovered the iodotannic solution, which Desgranges³¹ and Barrier adopted, and reported six successful cases without accident. Large hard clots formed in twenty-four hours with considerable pain, and took several months to disappear. The patients had to lie up, and relapse sometimes occurred owing to the clot dissolving in the alkaline plasma. In 1876 began the era of perivenous injections for the cure of varicose veins and ulcer, varicocele, haemorrhoids, and rectal prolapse by the injection of solutions of ergot, alcohol, iron perchloride, chloral, or carbolic acid, notably by English at Vienna in 1875 with 5 per cent. alcohol. Trouble arose from sloughing, scarring, and recurrence, but there were many successful cases. Delore¹⁷ in 1894 defended the intravenous iodotannic method, and showed that its efficiency depended on the chemical endophlebitis set up with the thickening of the wall of the vein. Tavel of Berne³² in 1904 tied the saphenous vein and injected 5 per cent. carbolic acid below the ligature. Schiassi of Bologna³³ in 1908 similarly injected 30 to 50 c.cm. of 1 per cent. iodine in a 1 per cent. potassium iodide solution, and resected the part of the vein where the cannula had been. About this time Zirn³⁴ was trying mercurial preparations with success, 1 to 2 c.cm. of a 1 per cent. solution of sublimate being injected into the internal saphenous vein above the knee. Borchers³⁵ in 1910 injected 300 c.cm. of salvarsan into a varicose vein with the patient recumbent. Three days later the vein was not to be seen, and the patient has remained well ever since. He has obtained the same effect with galy, kharsivan, neo-kharsivan, and novarsenobillon. Scharff³⁶ in 1912 used weak perchloride solutions. Hanschell³⁷ noticed the cure of a varicose vein in 1913, after the injection of 10 grains of quinine in 10 c.cm. of water. There was thrombosis and periphlebitis; he noticed the same effects with salvarsan. In 1916-17 Professor Sicard³⁷ observed obliteration of the veins following numerous intravenous injections of luargol in which there was free soda, and in March, 1918, began to inject varices with neutral sodium carbonate in doses of from 5 c.cm. of 5 per cent. solution to 15 c.cm. of 15 per cent. solution, publishing his results in 1920. On account of the scarring which may follow escape of the soda into the subcutaneous tissues, a solution of sodium salicylate in strengths of 20 to 40 per cent. was later adopted.

* Bazelis³⁸ in his thesis gives an admirable summary of the whole of this subject up to 1924.

Génévrier and Cibré³⁸ employed a 13 per cent. solution of neutral quinine hydrochloride with 6½ per cent. urethane as an analgesic. Other solutions tried with success are sodium citrate 100 per cent., sodium chloride 20 per cent. (Linser⁴⁶); 50 and 66 per cent. grape sugar (Nobl⁴⁷)—the last in 2,960 cases after having used sublimate 1 per cent. with success in numerous others. The chief objection to the mercurial preparations is their toxicity; we must also remember that quinine sometimes produces blindness⁴¹; the risk is said to be about 1 in 1,600.

CLINICAL PATHOLOGY OF THE INJECTION METHOD.

There seems to be a general agreement among those who have examined the veins after injection with various solutions that for about the first hour there is no naked-eye change in the endothelium. The vein contracts, and the walls may stick together, giving a splendid result surgically. With some solutions sudden clotting occurs, resulting later in a thick fibrous cord, which takes months to disappear. Gradual thrombosis allows the excess of blood to be slowly removed, and this, surgically speaking, is greatly to be preferred. In twenty-four hours the endothelium is tumefied, and there may or may not be infiltration and peripheral clot. The clot, when formed, is always firmly adherent from the start. In one of V. Meisen's cases it was not separated by strong massage, which is comparable with the degree of molecular adhesion found between an aseptic clot and a piece of dull-gilt wire inserted into an aneurysm. The clot in this case in the recent state has actually to be scraped off the wire. In forty-eight hours the vein is still contracted, the endothelium swollen and covered with fibrinous deposits. In seventy-two hours the endothelium is proliferating strongly. In a week the clot is undergoing organization and the lumen of the vein is greatly narrowed. At this stage one can gauge fairly accurately the most suitable site for the next injection. In a fortnight the clot is well organized. Later it does not soften or degenerate, but becomes a firm fibrous cord. Sir Sidney Alexander⁴⁴ suggests that the term "chemosis of the intima" would be better than "endoventitis." The vein may die, the tissues around it may necrose. Both remain aseptic if protected from infection, the dead tissue forming a scab which separates in about six weeks and leaves a slowly healing ulcer; or healing may take place under the scab.

VARIATIONS IN THE EFFECTS.

Douthwaite⁴³ states that thrombosis produced by the quinine solution does not spread rapidly, as it may do with the salicylate solution, and that the risk of persistent ulceration from faulty injection is less. Hanschell's³⁷ experience differs from this, and Hepworth⁴⁰ noticed phlebitis extending downwards from the site of injection. Sometimes the walls of the vein adhere at once with immediate and permanent obliteration of the channel; sometimes there is an extensive reaction in both directions from the site of puncture; sometimes no reaction occurs at all, and yet on repeating the injection a week later in the same way a marked reaction occurs. There is therefore little doubt that the chief variables—namely, the blood volume and the blood current at the site of injection—have a great effect. We know that in a horizontal varicose vein the blood may be moving slowly in either direction, or that it may be stagnant. In the vertical position, or even raised 45 degrees, the circulation is centrifugal. These facts have been confirmed radiographically.⁴⁶ We do not know, and apparently have no certain means of finding out, the effect at any given moment of the anastomoses close to our point of injection. Although most who practise the treatment try to empty the vein of blood after the needle is in the lumen and before making the injection, so as to bathe the endothelium with the concentrated drug, and then either let the patient lie or stand a few minutes or a pad and bandage is applied, they have no sure knowledge that the injection has not gone quickly into a deeper loop of vein or been rapidly diluted by blood from another channel. It seems to me unnecessary to blame the keeping properties of a solution when these other obvious variables are present. These variables also help to explain the excellence of the results in general, because the injection

reaches, though doubtless in a less concentrated form, the smaller tributaries, and especially the anastomotic and perforating branches which join the deep veins. At that moment the dilution becomes excessive. The respiratory change noticed by Barber⁵⁵ may also be intimately related to the matter. That we have not got the whole truth yet is also clear from the case recorded by Wilson⁵⁶ of the disappearance of a group of varicose veins below the knee six weeks after six punctures had been made for the withdrawal of blood. Sir William Bennett¹⁴ recorded six cases of the spontaneous disappearance of large varicoceles after injury to them. Both these observations are interesting also in view of the treatment of aneurysm by scratching the inner wall of the sac with a needle, for in such cases the amount of clot formed has been minimal or nil, and no embolism has ever occurred in the absence of sepsis.

The danger of embolism in aseptic cases of varix treated by injection is evidently very small. Olson⁵⁸ records one in a woman, aged 33, on the fifth day after the second injection of salt solution and calomel. At the necropsy the thrombosis in the internal saphena was found to have its end broken off and pulmonary embolism was present. McPheeters⁵⁹ noted that two deaths had been recorded up to October, 1927, one due to fat embolus and one due to mercurial poisoning. Hohlbaum⁶⁷ had a fatal case in a man, aged 54, who was injected with 80 c.cm. of an isotonic solution of iodine, and had been kept in bed. V. Meisen,⁶¹ up to January, 1927, had seen two cases of pulmonary infarction, both in association with doses which he considered to be too large, and two others in patients with phlebitis. There were three sloughs in his series and one severe haemorrhage, but as 133 out of 135 ulcerated legs healed, many of the ulcers being of long clinical duration, and as eczema cleared up rapidly, the complications are hardly worth considering. Jorgensen⁵² has seen symptoms resembling serum sickness after sodium salicylate, and others have had similar experiences, but they are rare. As an offset we have the many thousands of cases of excellent results now recorded everywhere, and apparently likely to be permanent.

Jeannel concluded his report in 1910 by insisting that it was of the first importance to determine in each case whether either the superficial or the deep reflux, or both together, were concerned. Trendelenburg's operation was indicated in the first case, and femoral or crural excision in the second. When both refluxes were concerned total saphenectomy was required. Diagnostic errors were the cause of disappointing results. As suggested in 1921,²³ we need a clinical plethysmographic method to give us more accurate information about the carrying capacity and general state of the deep venous circulation than do the Trendelenburg, Perthes,²⁸ or other muscle pump and elastic stocking tests. This is particularly required in women and in patients with a history of deep phlebitis. The hydrostatic treatment of ulcer by Unna's paste depends upon it. In the meantime, by applying the injection treatment in the manner indicated by Jeannel's collected results, we shall attain a much larger measure of success than by operation, and at very much less risk and inconvenience to the patient.

RESULTS OF THE INJECTION TREATMENT.

It is quite common now to obtain an almost complete obliteration of a valveless internal saphena system after one injection. The procedure is as follows.

The patient stands on a chair near a table and a single band tourniquet is lightly applied around the upper part of the thigh, to help to prevent the veins from emptying too rapidly during recumbency. The patient then lies down on the table and the vein is entered, preferably above the knee or in the main trunk of it below the knee; the tourniquet is loosened, the vein is emptied of blood near the needle, and a finger is placed on it above the middle of the thigh; 2 to 6 c.cm., according to the size of the veins, of 30 per cent. sodium salicylate, with 10 per cent. sodium chloride solution (P. D. and Co.), are injected, preferably towards the groin; the limb is elevated to 30 degrees for three seconds, and then the patient rises slowly and stands on the chair. The finger is removed and the charge of solution sweeps downwards into the saphena system. This is painful for half a minute. The patient describes the pain as continuous and stinging or as cutting, lancing, or cramplike, and feels it travelling down the leg to the foot. These omens are favourable. By letting the patient lie down at this stage and again elevating the limb for

a few seconds the solution may perhaps be tipped back again or kept a little longer in the saphena. Active muscular movement as once sucks the solution away and dilutes it rapidly. No bad effect has been noticed. Sometimes the solution must miss outlying varicose groups because these may require separate injections a week or a fortnight later, when the effect of the first injection has become manifest. At this time also the external saphena system, or the large anastomotic vein from the external to the internal system, which is often present in front, below, or above or behind the knee, may be injected. A week after the first injection the internal saphena system is generally hardening from the middle of the thigh to the lower third of the leg. Exceptions seem to be explicable by the well-known common sites of the chief deep anastomosing channels which dilute the solution.

Taken as a whole this method has answered very well and seems to me to be better than beginning at the distal radicles and working against gravity with multiple injections. The results have been as follows.

In the first seventeen limbs sixty injections, each of seldom more than 3 c.cm., were used, and one small scab formed. In the next twenty limbs only forty-seven injections were required of 4 to 6 c.cm., seven of which were in a limb in which the excessive blood volume diluted the solution quickly. Three small scabs formed in these limbs. In nearly all the limbs the degree of varicosity was marked and there was an impulse to the ankle on coughing. Tiredness, weight, fullness, and cramp had been the chief symptoms.

In one limb with a vein of small blood volume an injection of 2 c.cm. was sufficient to cure. In one with a large blood volume one of 6½ c.cm. cured. In three limbs with large blood volumes one 5 c.cm. injection cured in each case. In one case an injection of 6 c.cm. cured the internal saphena, and one of 3 c.cm. the external. In another case an injection of 6 c.cm. (and 5 c.cm. for a large cyst) cured. In one instance the walls of an anastomotic vein stuck together with no sign of thrombosis after the introduction of 2½ c.cm. In two cases with large blood volume injections of 5 c.cm. above the knee and 5 c.cm. near the ankle resulted in cure. In one case injections of 6½ c.cm. and 5 c.cm. cured, and in another instance the introduction of 5 c.cm. and 3 c.cm. cured the condition. By cured is meant that the whole of the visible internal saphena system, which was the one chiefly involved, became thrombosed in a week or a fortnight from the middle of the thigh to near the ankle, and that in five weeks there was, for practical purposes, no sign or symptom of the disease.

These results show clearly that the hydrostatic principles of Trendelenburg (Brodie) and the operative indications of Jeannel are the lines along which the injection method should be practised when using salicylate-saline solution. Whether this method is possible with smaller injections such as with the quinine solution or not remains to be settled. The larger volume of the salicylate-saline solution is certainly more manageable in this respect and is yielding the results with negligible risk and little inconvenience; results which are so much better than were possible by laborious and somewhat risky operations that operation seems to be no longer justifiable except in certain very isolated cases.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

THE TECHNIQUE OF INJECTIONS FOR
VARICOSE VEINS.

INJECTIONS for varicose veins should not be undertaken in a haphazard manner nor by one who is unfamiliar with other intravenous injections; he should, preferably, have watched the procedure in the hands of others before attempting it himself. Should that not be possible the following description of the essentials may be of help to him.

After a complete examination of the patient, including the heart, lungs, urine, and internal organs—especially the pelvic in women—the legs should be observed first in the upright and then in the recumbent position. Ask the patient to take a deep breath and look for the effects of respiration in the enlarged veins of the thigh—if they are present—and note its effect either by sight or touch with the finger applied over the vein.

Select the lowest dilated vein or swelling in it; this corresponds to the site of incompetent valves. With a pledget of cotton-wool dipped in tinct. iodi paint the skin over the proposed site for injection and well beyond it. Remove the iodine with spirit. Disinfect the hands with soap and water, and rinse with spirit.

Use an all-glass 5 c.cm. syringe with a nickel needle 0.45 mm. in diameter and having a very sharp, short, bevelled point. It must be boiled before use.

To insert the needle exactly into the lumen of the vein is of primary importance. Two methods can be used—namely, the patient either stands or is lying down. The former position will be useful for small veins, which are often associated with ulcers or eczema; they cause greater pain and give rise to more symptoms than do the larger ones, which are easily punctured with the patient lying down. If the patient is standing, the needle is alone inserted; as soon as blood begins to drip from it he lies down. Connect the already filled syringe to it and inject the fluid while the patient is taking a deep breath (*British Medical Journal*, April 7th, p. 594). If the vein is large insert the needle, already attached to the syringe, and watch for blood to flow into the barrel, then—and then only—inject. In very large veins I sometimes put the patient in the Trendelenburg position after inserting the needle and then inject. The injections are always given towards the trunk; often, however, it will be seen that the vein has been blocked below the site of puncture, and not, as one might expect, above it. Three or more injections can, if desired, be given at the same sitting, but it is well to test the reaction obtained at the first one by giving only one injection of from 2 to 5 c.cm. of the solution.

As the injection proceeds ask the patient repeatedly if he feels any stinging or burning; if he does stop the injection at once, for either the needle has become displaced or the fluid has ruptured a dilated vas vasorum, causing leakage into the surrounding perivascular tissue. Should a swelling appear over the vein during the injection, with or without pain, stop the injection at

once. This pain, however, must not be mistaken for cramp, which is felt in many cases and is of good omen as regards end-results; it only lasts a few minutes and passes off—"the wasp sting," on the contrary, increases. As soon as the injection has been given wait for a full minute, then remove the needle quickly, and apply at once firm pressure over the site of puncture with a piece of cotton-wool to prevent any of the blood charged with the solution from escaping into the tissues. This detail is of great importance; it is one way of preventing pain and a possible slough.

After the injection the patient should lie quiet for ten to fifteen minutes while the site is dressed. The puncture is closed with a drop of newskin or collodion. Five or six inches of a 3 or 4 inch bandage is soaked in a solution of zinc oxide, glycerin, and mucilage of acacia 2 oz., and applied, folded three or four times, to the part injected; this is kept in place by a few turns of the bandage and a safety pin, and is not removed till the next visit, the object being to lessen any inflammatory reaction.

The number of injections required varies considerably: in some cases one or two, in others ten to twenty are necessary. The length of the vein occluded is also variable; I have seen one injection of 5 c.cm., given below the knee, obliterate the whole of the great saphenous vein as far as the femoral ring. In other cases the same amount only blocked 3 or 4 cm. of the vein; on an average 5 to 8 cm. are dealt with by each injection.

The injection itself is painless except for the prick of the needle. Cramp is fairly frequent on the whole, but gives no indication from its severity as to the amount of vein acted upon; it, however, proves that the injection has been effectual. Stinging or burning should never occur; if it does, withdraw the needle at once and inject 5 or more c.cm. of sterile water into the surrounding tissues in the hopes of diluting the caustic solution and preventing a blister, the forerunner of a slough which, if formed, takes some weeks to heal. Sloughing is the only serious complication likely to happen; most often it is due to some fault in technique, but at times it seems to be unavoidable even while taking the greatest care. Periphebitis (aseptic), also endophlebitis may occur; although these are painful they are sure signs that the vein has been obliterated. The same condition can result without pain. If the reaction is acute prescribe rest for a day or so; the application of heat to the part gives relief, and the redness and swelling quickly disappear, especially if liberal applications of the zinc lotion are made several times daily. Some patients are liable to feel faint at the first injection, though not subsequently as a rule; this does not prevent the injections being given.

I have used this technique with most gratifying results for more than three years in a considerable number of cases, employing at first a solution of pure NaCl of from 15 to 20 per cent., but latterly of 15 per cent. My reason for using this substance to the exclusion of all others is that: (1) it is very effectual; (2) it can easily be prepared; (3) it can hardly be called a drug, and precludes any possible idiosyncrasy on the part of the patient; (4) if required, from 5 to 15 c.cm. can be given at one sitting without fear; and (5) the solution is self-sterilized. Small or large veins can be injected and cured by its use. I can see no advantage gained by using other substances, which can and have caused untoward symptoms of a more or less serious nature.

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"HERNIA" INTO THE BROAD LIGAMENT.

ALTHOUGH there are many possibilities of strangulation of the bowel through intra-abdominal peritoneal sacs, the following record of a case to which I have found no parallel in the literature may be of general interest.

A multipara had been operated upon nine years previously for a strangulated left femoral hernia. The bowel then implicated was found to have two perforations which were infolded. A complete recovery was made and the patient regained good health. Recently she was admitted to the hospital again with abdominal pain, distension, absolute constipation, faecal vomiting, and other signs of acute obstruction, but no cause for the condition could be deduced. Owing to the rather prolonged period of onset (the symptoms had been coming on for four days) it was thought that adhesions might be responsible.

An exploratory abdominal section was performed through a left paramedian incision. The major part of the small intestine was found to be greatly distended. The obstruction proved to be situated in a lower loop of the ileum, a portion of which, approximating to a Richter's hernia, was found to be strangulated at the neck of a peritoneal invagination into the posterior aspect of the left broad ligament. The neck of the "sac" was incised, thus releasing the bowel which could not be withdrawn otherwise, and was then sewn up. An uneventful recovery was made by the patient.

I am indebted to Mr. Reid for permission to record this case.

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