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LYMPHANGIOPLASTY: HANDLEY'S METHOD.*

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IN the *Lancet* of March 14, 1908, W. Sampson Handley¹ published a preliminary note on "A New Method for the Relief of the Brawny Arm of Breast Cancer and for Similar Conditions of Lymphatic Oedema."

The term "lymphangioplasty" was proposed by Handley for a method of producing new channels for the flow of lymph, in other words, new or artificial lymph-ducts. Handley has accomplished this to his satisfaction by the introduction into the subcutaneous tissues of strands of tubular silk.

When Handley proposed this method he was doubtless not aware that Lambotte² had used the same principle in an attempt to drain the abdominal cavity in a case of ascites. Of this I shall speak in its proper place.

Handley states that brawny arm occurs in 16 per cent. of cases of breast cancer. He believes the pathology of this condition is to be found only in accepting his theory as to the permeation of cancer. If his conception of the condition be true, then brawny arm exists only in cases where cancer is present and is progressive. I am not prepared to agree with Handley in his idea of the pathology and pathogenesis of this condition. I have had cases in which brawny arm has

* Read before the New York Surgical Society, February 12, 1913.

occurred after the radical operation for cancer and in which there were no other evidences of the recurrence or the continuance of the original disease.

Be that as it may, it is not my purpose in this paper to enter into a discussion of the etiology of brawny arm and like conditions, but rather to confine myself to the consideration of the operative procedure which Handley has proposed, and to place before the profession data which will serve to determine whether the operation has proved successful or not.

To do this I have made a search of the literature since Handley's original proposition, with the idea of collecting all reported cases and classifying them as to the conditions for which the operation was employed, and tabulating the results obtained by Handley himself and by other operators. In going over the literature I find that the operation has been employed for the following conditions: brawny arm the result of breast cancer; elephantiasis; chronic œdema of the leg; chronic or hard œdema of the face and eyelids following erysipelas; and ascites due to cirrhosis of the liver. I have purposely omitted from this review cases of hydrocephalus and serous meningitis, as well as one or two other conditions for which the operation has been suggested, feeling that the examples I have taken are sufficient for our purpose.

I find that the operation has been performed in 20 reported cases of brawny arm; in 17 cases of elephantiasis; in 3 cases of chronic œdema of the leg; in 3 cases of solid œdema of the face and eyelids; and in 10 cases of ascites. This does not include a number of cases reported as having been operated upon, but in which no details are given.

The above is the result of a careful study of the literature for reported cases. While it is not claimed to be complete, it certainly covers most of the cases thus far recorded.

I was so much impressed with the possibilities of this operation that I have employed it in two cases, one of brawny arm following cancer of the breast, and one of ascites due to cirrhosis of the liver.

The case of brawny arm has already been recorded, having been exhibited before the New York Surgical Society on January 8, 1913.* In that particular case there was no other evidence whatever of recurrence or continuance of carcinoma. The swelling came on about a year after the operation for removal of the breast, which was performed three years ago. The patient is in perfect health and vigor, she has perfect use of the arm and hand, and is free from pain. I performed Handley's operation for the swelling of her arm on March 23, 1912, more than two years after the first operation. As far as I can estimate, the result of this lymphangioplasty was a failure. There is no pain now, but there was no pain before this operation. There has been no diminution in the size of the arm. I performed the lymphangioplasty after the method of Handley, except that I used a single loop of silk at the anterior and at the posterior aspect of the limb instead of a double one as advised by Handley. I have not had the woman keep her arm in an elevated position as advised by Handley.

FIG. 1.



Syms's probe for lymphangioplasty.

For the purpose of this operation I devised a special probe which was exhibited at the New York Surgical Society on January 8, 1913 (Fig. 1). It has a bulb and an eye at the same end. This is a great advantage when it comes to that part of the operation in which we desire to unthread the silk.

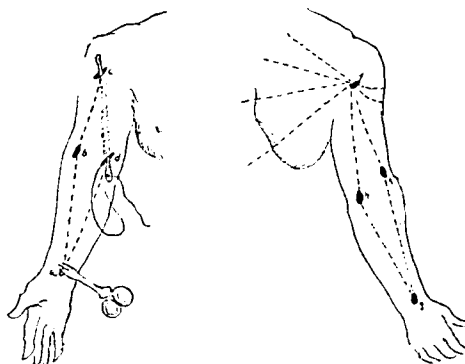
My second case was one of ascites due to cirrhosis of the liver. In this case I did an omentopexy after the manner of Narath, and I also employed lymphangioplasty as described by Handley. Immediately after the operation the abdomen refilled, but it soon began to subside and a few days after the operation there was no evidence of fluid within the abdomen. There was swelling in the region of the thighs where the threads terminated, the lower wound had partly separated, and some drainage along the silk threads could be seen. There was also evidently some drainage in the subcutaneous pocket where the omentum was placed. My impression is that this case was being satisfactorily drained and I had hoped to be able to report a good result, for the progress was encouraging. Unfortunately the patient went into a sudden

collapse 15 days after the operation and died. The patient's untimely death and the fact that there was no autopsy obtained unfortunately make the case of little value as a clinical report.

Brawny Arm.—Inasmuch as it was for brawny arm that Handley first proposed this operation, I shall proceed at once to a consideration of this phase of our subject.

I feel that I cannot make a better introduction than by quoting Handley's own description of the method of operating:

FIG. 2.



Handley's lymphangioplasty. (Binnie).

"The tissues of the arm are drained by two long U-shaped lines of silk, each line composed of two threads of No. 12 tubular silk. One of these lines drains the front of the arm, the other the back. The bend of each U lies immediately above the wrist, and its two limbs occupy respectively the radial and ulnar sides of the limb. Thus, along the whole length of the limb, are found four double lines of silk, spaced out around the limb as nearly as possible at quadrant intervals. Toward the shoulder the lines of silk on the flexor aspect curve outward around the deltoid muscles, and converge to meet the ascending threads from the posterior aspect at a point near the posterior border of the deltoid. From this point the silk threads again radiate in the subcutaneous tissue of the back, terminating by free ends in the subcutaneous tissues of the scapular region. It is perhaps still better to lead some of them to the scapular region of the opposite side, and others to the lumbar region of the same side, if there is any sign of the œdema extending from the arm to the trunk.

"The operation is done as follows (Fig. 2): Take a double line of silk rather more than twice as long as the arm, and mark its mid-point by clipping on it a pair of artery forceps. Wrap up one-half its length in gauze. Thread the two free ends of the other half through the eye of a long probe. Make an incision one-half inch long through the skin at the middle of the front of the forearm, just above the wrist-joint. Thrust the probe in the desired line upward in the subcutaneous tissues well away from the skin toward the region of the elbow, as high as is convenient, and cut down upon its point. Withdraw the probe through the incision last made, and draw the silk after it as far as it will come. Introduce the probe through the incision from which it has just emerged, thrust it upward again in the selected line, and repeat the foregoing steps until the point selected for the convergence of the threads is reached. Here an incision one inch long is made, through which the probe with its two silk threads is drawn out. The other half of the silk loop is now led upward in the selected line along the other border of the flexor surface. The limb is turned over and the extensor loop of silk is similarly introduced. When this has been done eight free ends of silk are hanging out from the incision of convergence at the posterior border of the deltoid. Two at a time these are tucked away in various directions in the subcutaneous tissues of the back by the following manœuvre:

"Clip a forceps on the selected pair of silk threads just where it emerges from the topmost incision. Take a long probe, cut off the ends of the two threads so that they are four inches shorter than the probe, and thread them into the eye. Thrust the probe downward from the incision in the desired direction until the probe unthreads itself. Withdraw the probe carefully, leaving the two silk threads to occupy its track. When all the threads have thus been tucked away the operation is completed by sewing up the incisions with horsehair."

It was found that lymphangioplasty has been performed for brawny arm in 20 recorded cases. Of these, 9 cases were reported as successful, 9 as failures, and in 2 cases there was no report as to whether the swelling had subsided or not. These 20 operations were performed as follows: 15 times by Handley;⁴ twice by Gamgee;⁵ once by Clarke;⁶ once by Goebel;⁷ once by Syms.³

Handley had some success in 8 cases and failures in 7. Gamgee reported 2 cases in which he claimed improvement as to pain, but in which he made no record as to whether or not there was a reduction in the amount of swelling. Clarke claimed success in his case, stating that the swelling was reduced. He did not, however, give comparative measurements. Goebel's case was a failure, and, as previously stated, my own was a failure.

It is to be noted that Handley states that the patients after operation must keep the arm on an elevated plane for several hours during the day, and that otherwise the swelling is liable to recur. Handley's cases have been reported in detail and some of his results are very gratifying, but in none of his cases did the arm return to its natural size, though there was great reduction in the swelling. And it must not be forgotten that he insists upon elevation of the limb during several hours of each day as a part of the routine after-treatment. Of course gravitation exerts a very determining influence in such conditions of swelling.

Elephantiasis.—Let us now consider elephantiasis. Lymphangioplasty has been performed for this condition by Handley⁸ in 2 cases; by Deaudt⁹ in 2 cases; by Lexer¹⁰ in 2 cases; by Goebel⁷ in 1 case; by Lanieris¹¹ in 2 cases; and by Madden, Ibrahim and Ferguson¹² in 8 cases.

The results in these 17 cases may be said to represent 17 failures. There was no case of cure. In practically all of the cases there was no improvement whatever. In one of Lexer's cases there was claimed to be partial success.

The most noteworthy contribution to the subject of lymphangioplasty in the treatment of elephantiasis is that of Madden, Ibrahim and Ferguson. These authors state that their clinical results are entirely in accord with the statements of Handley to the effect that lymphangioplasty has failed to establish its position in the treatment of elephantiasis. Their findings, however, in and around threads taken from the limbs two or three weeks after lymphangioplasty, and in others experimentally introduced into the subcutaneous tissue of guinea pigs, appear to show that failure is not due only to the action of gravity to which Handley refers but also to the fact that the artificial lymph channels will not persist for any length of time. There is finally an obstruction to the lymph return from obliteration of the lymphatics in the neighborhood of the inserted thread. Handley's technic was carefully followed in all of their cases.

The authors conducted three series of observations in order to determine the fate of the silk threads buried in the tissues.

The first series concerned the conditions after lymphangioplasty in a healthy patient. The second concerned the condition of the thread and surrounding tissues after lymphangioplasty for elephantiasis; the third concerned experimental lymphangioplasty in healthy guinea pigs.

The conclusions, drawn from their clinical observations and from their experimental investigations, are so interesting and important that I feel they should be quoted in full:

"1. Clinically, it is abundantly evident that lymphangioplasty fails to effect anything but a very temporary improvement in elephantiasis of the legs. The swelling is very markedly reduced within 48 hours after the operation; but the improvement persists only so long as the recumbent position is maintained. Within at most 21 days after the operation, or as soon as the patient begins to walk, the swelling invariably returns and no permanent improvement results.

"2. The examination of the tissues surrounding the threads introduced during the operation of lymphangioplasty in cases of elephantiasis, and also around threads introduced into healthy tissues of man and of guinea pigs, supplies very adequate reasons for the failure of the operation.

"Important as the action of gravity may be in contributing to the failure to maintain a new and artificial lymphatic circulation, it appears that this want of success is due in far greater degree to definite reactive changes in the tissues immediately around the thread, which soon isolate the new lymph tube from the surrounding lymphatic areas and eventually completely obliterate it.

"Briefly the series of changes in the tissues around the buried longitudinal threads in the subcutaneous tissues are as follows:

"1. For a short time the threads, by virtue of their capillary action, drain the surrounding tissues of the lymph contained in them.

"2. The threads in the tissues soon excite a definite cellular reaction, which leads comparatively soon—from 14 to 21 days—to the formation of a dense and progressively contracting fibrous tissue. This walls off the thread and crushes the ad-

jacent lymphatics out of existence, and thus effectually prevents any absorption of fluid into the space immediately around the thread itself. These fibrous changes, occurring around the ends of the thread, as well as along its whole length, eventually completely isolate it, and it may then perhaps be compared to a long worm lying within an impermeable sheath.

"3. The thread is later penetrated by rows of cells, running in along its fibrils, which must eventually lead to its complete disintegration; and the formation of a solid column of dense fibrous tissue along which no absorption of fluid of any kind can possibly occur."

Chronic Œdema of the Leg.—Lymphangioplasty has been performed in three recorded cases of chronic œdema of the leg. Clarke⁶ reported two cases, with improvement, and Haslam¹³ reported one case as cured.

Chronic Œdema of the Face and Eyelids.—Three cases have been reported in which lymphangioplasty has been performed in this condition, two by Mitchell,¹⁴ and one by Taylor.¹⁵ In each of these cases a permanent cure resulted.

Ascites.—As far as I know Lambotte² is entitled to the credit of originating the idea of attempting to drain the abdomen by means of silk threads. He reported his case in 1905, three years before Handley's first article on the subject.

Silk thread drainage has been employed in the treatment of ascites by several surgeons. Of the available recorded cases, ten may be specially considered. (Paterson¹⁶ mentions the fact that he employed this method unsuccessfully in several cases.) Lambotte² employed this method in 1 case, without success. Handley^{8,17} performed the operation 5 times, twice successfully and 3 times unsuccessfully. Stoney and Moorhead¹⁸ report 1 case, with success. Villard and Tavernier¹⁹ employed lymphangioplasty in conjunction with Ruotte's operation in 1 case, with partial success. Rosenberger²⁰ combined lymphangioplasty with Talma's operation in 1 case, with success. My own case as stated is of little value as a clinical report though it did show something as to early drainage.

For a description of the technic to be followed when employing lymphangioplasty for the drainage of ascites, I again quote Handley's own words:

The abdomen was opened in the left semilunar line; "a stout needle threaded double with lymphangioplasty silk was now passed in and out in a series of loops through the peritoneal cavity, whence they could suck up fluid by capillary attraction. The process was repeated with two other threads. The four threads were conducted in the manner described to a point close to the anterior superior spine. With the aid of a long probe they were then thrust beneath the outer end of Poupart's ligament some way downward into the subcutaneous tissues of the thigh. The abdominal wound was now closed in such a way that the sutures used proved additional permanent channels for the escape of fluid from the peritoneal cavity. A number of thick silk ligatures were employed, taking up the peritoneum and the muscular layers of the abdomen but leaving out the skin. These were tied and the skin was then closed over them with a continuous superficial suture."

The study of the above cases of ascites treated by means of silk thread drainage shows thus far that of the ten cases in which it was employed successes and partial successes or failures are about evenly divided. In two of the more or less successful cases lymphangioplasty was used in conjunction with other operative procedures. In the fifth edition of Binnie's ²¹ work on Operative Surgery will be found an excellent treatise on this subject.

In summing up our findings of reported cases of the application of lymphangioplasty in various conditions, we see that the results have been as follows:

Brawny arm, 20 cases, with 9 successes and 9 failures, and 2 cases with no report as to swelling.

Elephantiasis, 17 cases, with practically 17 failures.

Chronic œdema of the leg (not elephantiasis), 3 cases, with 3 successes.

Chronic œdema of the face and eyelids, 3 cases, with 3 successes.

Ascites, 10 cases with success in 5 and with partial success or failure in 5.

In considering the results in brawny arm and in studying the reports of cases, we must give due consideration to the

more or less indefiniteness of the condition. I have classed as successes those cases in which there was marked diminution in the swelling and in which there was satisfactory relief of pain and disability. I do not believe that the operation has been a complete success in any of the cases thus far reported, nor do I believe that it has been claimed that the operation produces a restoration amounting to the normal condition. However, I think it is fair to concede that the operation has been a success in any case in which it has produced a marked reduction of the swelling with a consequent improvement in the subjective symptoms.

The scientific investigation made by Ibrahim, Madden and Ferguson is of the utmost importance. It would seemingly demonstrate the fact that the method may be useless; certainly it has proven so in cases of elephantiasis. My own feeling is that the operation is a very ingenious one, and is well worthy of further trial. In a limited number of cases it has met with success in the treatment of chronic œdema of the face and of the leg (not due to elephantiasis). I must confess that I feel sceptical as to its success when employed for the relief of brawny arm, though I shall certainly give it a further test. I have a feeling that we may find its greatest usefulness in cases of ascites due to cirrhosis of the liver. In cases of ascites I believe lymphangioplasty should be combined with the best form of omentopexy. In my opinion Narath's method of omentopexy is the best one which has yet been proposed. It may be that these patients can be relieved by the establishment of a collateral circulation through the omentum. On the other hand, the explanation of the relief which has been obtained may be found in Binnie's ²¹ suggestion that in the performance of omentopexy there has been established some incidental process of internal drainage. In the case reported by me I believe there was a drainage of the ascitic fluid to the subcutaneous tissues along the line of the omentopexy.

If the above report may act as an aid to the profession in throwing light on this interesting subject, I shall feel well paid for my humble efforts in that direction.

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