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Surgical lympho-venous shunts

E D I Z I O N I M I N E R V A M E D I C A

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In June 1966, at the meeting of our Society in Amsterdam,^{3,4} we presented a simple surgical treatment of lymphedema which consists in the creation of an anastomosis between a lymph node and the neighbouring vein. The rationale of this procedure is based on the fact that when a lymph node is cut and anastomosed to the vein the subcapsullary and medullary sinuses of the node remain patent and drain freely the lymph from the afferent vessels, thus decompressing lymph stasis. This paper reports the results obtained with this procedure in 31 patients which were followed up for a periods of up to 12 months.

MATERIALS AND METHOD

Between December 17, 1965 and June 1, 1967, 31 patients with lymphedema were operated on. A lympho-venous shunt was performed on 12 patients with secondary lymphedema, 17 patients with primary lymphedema and 2 patients with post-phlebitic syndrome (Table 1).

SECONDARY LYMPHEDEMA

All the patients were elderly women (Table 2) with a carcinoma of the uterus which had been treated by hysterectomy and X-ray therapy (Table 3). The lymphedema appeared from two to ten years after the operation or termination of the X-ray treatment.

The lymphatics of the calf and thigh were dilated and tortuous, dermal back-flow was usually present in the thigh as well as a very specific pattern of collateral circulation bypassing the inguinal and iliac regions. The iliac lymphatics were not numerous and 24 hours after

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TABLE 1.—Number of patients submitted to lympho-venous shunting (1965-1967).

| | | |
|------------------------|-------------|----|
| Lymphedema | { primary | 17 |
| | { secondary | 12 |
| Postphlebitic syndrome | | 2 |
| Total | | 31 |

TABLE 2.—Secondary lymphedema.

| | Age distribution | | | | |
|--------|------------------|-------|-------|-------|-------|
| | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 |
| Female | — | 1 | 5 | 3 | 3 |
| Male | — | — | — | — | — |
| Total | — | 1 | 5 | 3 | 3 |

TABLE 3.—Onset of secondary lymphedema after hysterectomy and/or X-ray therapy.

| | YEARS | | | |
|-----------------|---------|-----|------|----------|
| | up to 1 | 2-5 | 6-10 | above 10 |
| No. of patients | 3 | 6 | 2 | 1 |

Paper presented at the 8th Congress of the International Society of Cardiovascular Surgery, Vienna, September 7-9, 1967.

TABLE 4.—*Lymphography in secondary lymphedema.*

| |
|--|
| 1. Dilatation and tortuosity of thigh and calf lymphatics. |
| 2. Derinal backflow in the thigh. |
| 3. Collateral circulation around the inguinal and iliac regions. |
| 4. Scarcity of iliac lymphatics. |
| 5. Stagnant contrast medium in thigh lymphatics 24 hours after lymphography. |

TABLE 5.—*Phlebography in secondary lymphedema.*

| Site of thrombosis | No. of patients |
|---|-----------------|
| Femoral and iliac veins | 4 |
| Femoral and saphenous veins | 1 |
| Constriction of the iliac veins by the tumor | 2 |
| Total | 7 |
| Saphenous, femoral, iliac and inferior vena cava normal | 5 |

lymphography stasis of the contrast medium in the thigh was observed (Table 4). The femoral and iliac veins were normal only in 5 cases, in the others a more or less recanalized venous thrombosis was demonstrated or the veins were constricted by the tumor (Table 5).

PRIMARY LYMPHEDEMA

This group includes 15 women and 2 men. The onset of edema, as reported by the patients, occurred at the age between 10 and 40 years (Table 6). The lymphatics were hypoplastic in 9 cases, aplastic in 6 and hyperplastic in 2

TABLE 6.—*Onset of primary lymphedema.*

| | Age of patients | | | | |
|---------|-----------------|-------|-------|-------|-------|
| | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 |
| Females | 1 | 4 | 6 | 3 | 1 |
| Males | — | 2 | — | — | — |
| Total | 1 | 6 | 6 | 3 | 1 |

TABLE 7.—*Primary lymphedema.*

| Lymphatics as classified by the surgeons on lymphograms | Number of patients |
|---|--------------------|
| Hyperplastic | — |
| Normal | 9 |
| Hypoplastic | 6 |
| Aplastic | 2 |

(Table 7). A detailed study of the veins of the lower extremities was carried out in all cases of primary lymphedema and the tibial, popliteal, femoral, iliac and inferior vena cava looked normal and showed competent valves.

POSTPHLEBITIC SYNDROME

Both patients were women operated on for swelling and edema which persisted 1 to 2 years after a Linton flap operation.

In all patients the diagnosis was established after a thorough clinical and radiological examination. Pre- and postoperatively the circumference of the lower limb was measured at the following levels: 15 cm above and 15 cm below the patella and 3 cm above the ankles. The measurements were always taken after night rest with the patient lying down and then after three hours walking without rest. The incidence and frequency of recurrent lymphangitis were especially considered (Tables 8, 9).

TABLE 8.—*Recurrent lymphangitis in patients with secondary lymphedema.*

| Number of patients | Lymphangitis |
|--------------------|--------------|
| 12 | 2 |

TABLE 9.—*Recurrent lymphangitis in patients with primary lymphedema.*

| Number of patients | Lymphangitis |
|--------------------|--------------|
| 17 | 12 |

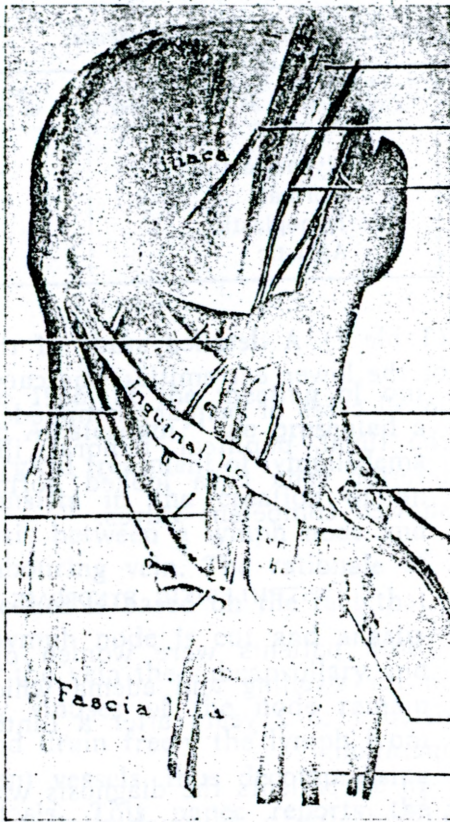


Fig. 1.—Lympho-venous shunts performed at various levels; (a) to the iliac vein, (b) to the femoral vein, (c) to the great saphenous vein. (Part of the figure is reproduced from Grant: «An Atlas of Anatomy», by courtesy of E. & S. Livingstone).

All patients were operated on with the same technique. After dissection the lymph nodes were transected with the vascular supply intact. The capsula of the node was sutured with a running 5-0 silk suture to the wall of the incised femoral, saphenous or iliac veins (Fig. 1). Double shunts were performed with the saphenous and femoral veins and with the femoral and iliac veins. Of the 12 patients with secondary lymphedema the inguinal lymph node was anastomosed to the saphenous vein in 4 and to the femoral vein in 6 cases. In 2 cases anastomosis was not feasible because of fibrosis of the nodes (Table 10). These cases were used as controls. Of the 17 patients with primary lymphedema the

TABLE 10.—Lympho-venous shunts in 12 patients with secondary lymphedema.

| Lymph node anastomosed to the vein | |
|--|---------|
| saphenous | femoral |
| 4 | 6 |
| Lymph nodes unsuitable for anastomosis | |
| 2 | |

TABLE 11.—Lympho-venous shunts in 17 patients with primary lymphedema.

| Lymph node anastomosed to the vein | | | | |
|------------------------------------|---------|-----------------------|-------|-------------------|
| saphenous | femoral | femoral and saphenous | iliac | iliac and femoral |
| 1 | 10 | 2 | 1 | 3 |

inguinal lymph node was anastomosed to the saphenous vein in 1, to the femoral vein in 10, to the femoral and saphenous vein in 2. The iliac lymph node was anastomosed to the external iliac vein in 1 and to the iliac and femoral vein in 3 cases (Table 11). A subcutaneous drain was left in the wound after simple closure in all cases. No stockings or any other supplementary treatment were used postoperatively. The patients were followed up for 1 to 12 months, control clinical examination and circumference measurements were carried out every 3 months in the same manner as preoperatively. Because of the risk of fat embolism connected with the oily lipiodol contrast medium no lymphographies were carried out postoperatively.

RESULTS

There were no serious complications. The discharge from the wound amounted to 5-50 ml per day, disappearing usually on the third to fifth day after operation. Primary healing occurred in 14 cases and the patients were usually discharged on the 10th postoperative day. Special attention was paid to the possibility of throm-

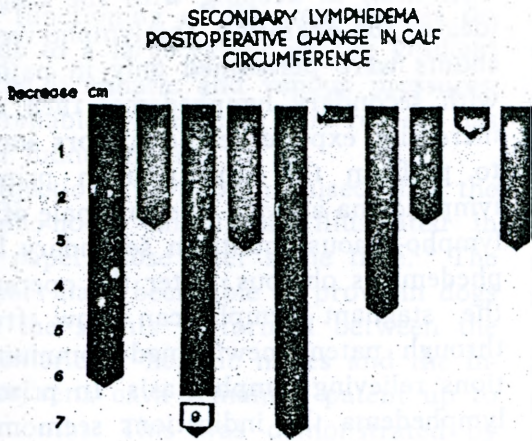


Fig. 2.—Change in calf circumference in 10 patient 3 to 9 months after lympho-venous shunting.

boembolic complications, but they did not occur in any of the operated cases.

On the fourth postoperative day the patients felt usually a definite subjective improvement. The movements in the ankle and knee joints were much easier and the feeling of bursting and tension, which the patient usually experienced before the operation, subsided or diminished considerably.

The circumference of the extremity did not change much in the first three days, but from the fourth day onwards the decrease of edema became usually progressive. In some patients the edema reappeared around the ankles after walking for three hours, but in contrast with the preoperative state it disappeared after rest.

The long term results were much better in secondary than in primary lymphedema. In secondary lymphedema the average reduction of edema, as shown by the difference in calf circumference, 3-9 month after the operation was 3.8 cm (0.9 cm) (Fig. 2). In primary lymphedema, 6-12 months after the operation, the average reduction of edema was 1 cm (0.4-5 cm) with the exception of 2 cases which showed an increase of 0.5 cm two and six months after operation (Fig. 3). In the two controls, where only a dissection of the groin was carried out, and in patients with postphlebotic syndrome, the edema increased postoperatively (Figs. 4, 5).

**PRIMARY LYMPHEDEMA
POSTOPERATIVE CHANGE IN CALF
CIRCUMFERENCE**

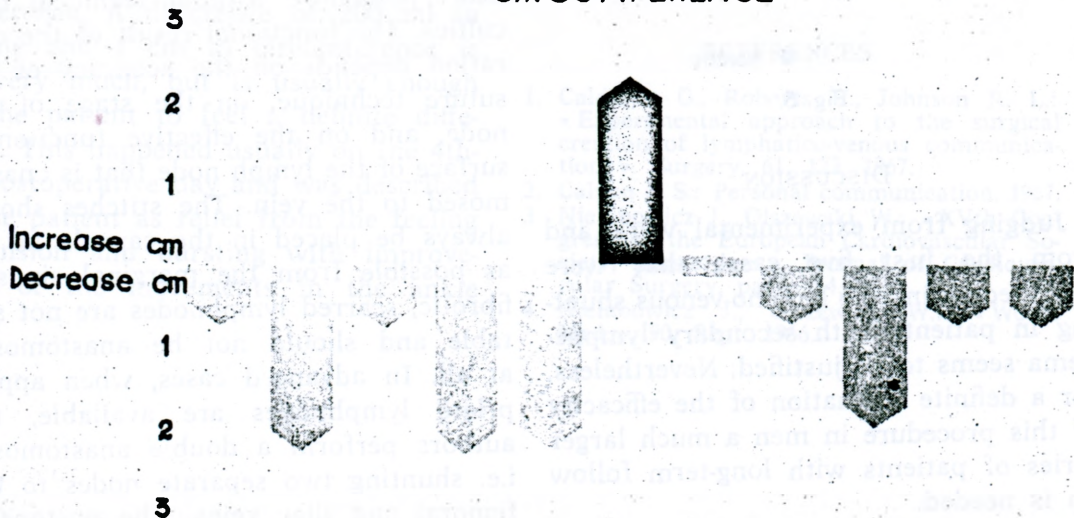


Fig. 3.

IN 2 PATIENTS NO LYMPH NODE
SUITABLE FOR ANASTOMOSIS
FOLLOW-UP AFTER DISSECTION
POSTOPERATIVE CHANGE IN CALF
CIRCUMFERENCE

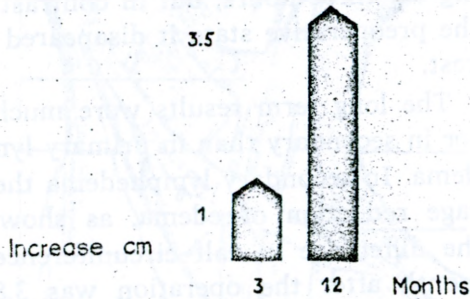


Fig. 4.—Change in calf circumference in 11 patients 6 to 12 months after lympho-venous shunting.

POSTTHROMBOPHLEBITIC SYNDROME
(2 PATIENTS)
POSTOPERATIVE CHANGE IN CALF
CIRCUMFERENCE

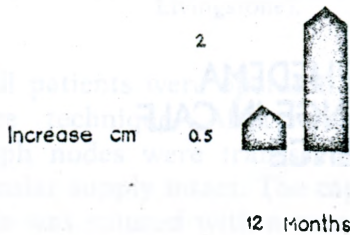


Fig. 5.

DISCUSSION

Judging from experimental work and from the first five cases that were operated on in 1966 lympho-venous shunting in patients with secondary lymphedema seems to be justified. Nevertheless, for a definite evaluation of the efficacy of this procedure in men a much larger series of patients with long-term follow up is needed.

At first, in keeping with the original idea of the operation, the lympho-venous shunts were performed only in patients with secondary lymphedema, then with increasing experience the authors started to perform this operation in primary lymphedema as well. The rationale of the lympho-venous shunts in secondary lymphedema is obvious: after the operation the stagnant lymph can flow freely through patent newformed communications relieving lymph stasis. In primary lymphedema the indications seem more controversial. Nevertheless, it seems that in selected cases the operation might be indicated for the following reasons:

(a) in some cases of primary lymphedema stasis in the thigh was evident; 24 hours after lymphography the contrast medium was still present in dilated lymphatics;

(b) when lymphographies were performed injecting the contrast medium at the groin spectacular difference in filling of the lymphatics were sometimes present; there was evident lymph stasis below the inguinal ligament while the lymphatics looked normal above;

(c) in some cases of lymphedema there was hyperplasia of the lymphatics.

Lympho-venous shunts are a simple, short procedure without technical difficulties. The functional result of the operation depends on the accuracy of the suture technique, on the stage of the node, and on the effective functioning surface of the lymph node that is anastomosed to the vein. The stitches should always be placed in the capsula as far as possible from the marginal sinuses; fibrotic, scarred lymphnodes are not suitable and should not be anastomosed at all. In advanced cases, when appropriate lymphnodes are available, the authors perform a double anastomosis, i.e. shunting two separate nodes to the femoral and iliac veins. The postopera-

tive functioning of the anastomosis depends to a large extent on the gradient of the lymphatic and venous pressures. No reliable evidence in this respect has been found in men.

Objections have been raised that the lympho-nodes shunts as illustrated in this paper, close after some time.^{1,2} The authors have been able to prove in dogs that the shunts performed between the mesenteric or hepatic nodes and the inferior vena cava remained patent up to 24 months. This was demonstrated by histologic preparations, by lymphography and by especially prepared coloured film. Nevertheless, so far no control lymphograms of a functioning surgical lympho-venous shunt in men have been obtained.

Trying to estimate the postoperative results in terms of some objective figures the authors very soon became aware of the difficulties. The simple measurement of the circumference of the extremity varies with the time of day, the temperature of the air and the exertion of the patient. The same is true for volume measurements with the water displacement technique.

After prolonged testing it was calculated that a 200 ml volume diminution of the lower extremity corresponds roughly to a 1 cm decrease of the circumference. A difference of 200 ml in volume and 1 cm in circumference is not very much, but is usually enough for the patient to feel a definite difference. This happened usually on the 4th-5th postoperative day and was described by the patient as relief from the feeling of tension and bursting with improvement of the movements in the ankle joint.

The comparison of long term results obtained in different groups demonstrate that the best effect of the lympho-venous shunts is to be expected in secondary lymphedema. In this group evident diminution of the circumference of the calf (up to 9 cm), relief of pain and easy movements in the ankle joints were found in almost all cases.

In primary lymphedema success may be obtained only in very carefully selected cases. At the present moment it is very difficult to make a definite evaluation of the efficiency of the lympho-venous shunts. Although it seems unwise to be dogmatic, the results obtained so far appear to be encouraging, especially in secondary lymphedema.

SUMMARY

The authors report on 31 lympho-venous shunts performed in patients with primary and secondary lymphedema. The patients were followed up postoperatively for 1 to 12 months. The best results were obtained in secondary lymphedema and in several patients the circumference of the calf diminished postoperatively as much as 9 cm. A detailed study of the postoperative results is presented.

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