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Editor: MITCHELLE TANNER

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Graphics: MARCIA KRUSE
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Editorial Committee: MARCIA BECK, RN, CS, CMLDT
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JANE ARMER, RN, PhD
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NATIONAL LYMPHEDEMA NETWORK
Latham Square

1611 Telegraph Avenue, Suite 1111
Oakland, CA 94612-2138
Telephone 510-208-3200
Website www.lymphnet.org
E-mail nlm@lymphnet.org

The NLN Mission Statement

The mission of the NLN is to create awareness of lymphedema through education and to promote and support the availability of quality medical treatment for all individuals at risk for or affected by lymphedema.

The NLN is dedicated to:

- ◆ promoting research into the causes, prevention and treatment of lymphedema;
- ◆ securing adequate insurance coverage for medically necessary, safe and effective treatment;
- ◆ expanding the number and geographical distribution of lymphedema treatment facilities and certified therapists.

To achieve these goals, the NLN disseminates information about lymphedema to health care professionals so they can appropriately counsel their patients on its avoidance, and prescribe safe, effective treatment for those affected by this condition. The NLN also provides this information to the general public.

Risk of Surgical Procedures In Limbs With Edema (Lymphedema)

By Waldemar L. Olszewski, MD, PhD

Etiology of Swelling

Lymphedema belongs to the clinically recognized swellings of limb soft tissues. There are, however, many causes of edema, not necessarily due to lymphatic obstruction. They should be properly diagnosed, as edema of tissues poses a serious problem for surgeons prompted to perform emergency or elective surgery of soft tissues, blood vessels, nerves or bones of the lower or upper extremity. Etiology of edema should be known to the surgeon before surgery, and its location, extent and duration have to be taken into consideration while planning the surgical procedure. Edemas of the extremity look, at first glance, very much alike, irrespective of the etiological factors responsible for their development. Edema is a clinical sign and not a disease, and its etiology should be accurately defined. Differential diagnosis should be made between obstructive or primary lymphedema and chronic venous insufficiency (varicose veins with valvular insufficiency, post-thrombophlebitic syndrome), post-traumatic edema (after injury of soft tissues, fracture or dislocation), cardiac and nephrotic edema, as well as rheumatoid arthritis. Physical and laboratory examinations are necessary for revealing the cause of edema.

The highest number of false diagnoses of lymphedema is seen in the group of patients with a history of venous thrombosis, in whom the lack of the ultrasonographically-detected changes in large veins suggests the presence of lymph stasis. It is often forgotten that venous thrombosis develops initially in the muscular venous sinuses. The dissolving power of the Doppler technique is still not sensitive enough to detect these subtle changes. The second highest number of misdiagnoses is observed in patients with post-traumatic edema of limbs after soft tissue or bone injuries. A long-lasting inflammatory-type swelling clinically manifests as lymphedema. Patients often complain of edema; but fail to report prior injuries sustained. Cardiac and nephrotic edema develops bilaterally, and although patients are aware of the fact that cardiac or renal insufficiency lead to formation of edema, they often take limb swelling for a separate entity. Rheumatoid arthritis affecting the foot may mimic primary lymphedema.

Thus, the establishment of proper diagnosis may be extremely difficult.

Surgery performed on limbs indiscriminately, without prior diagnosis of the cause of edema, may lead to unnecessary complications. These include: activation of the thrombotic process in veins and poor wound healing with secondary infections.

Diagnosis of Type of Swelling

Physical evaluation of swollen limbs, allowing differentiation between lymph and venous stasis, has been presented below.

PHYSICAL EXAMINATION (PE)

The PE should include the following (L-lymphedema, VS-venous stasis):

Level of edema

- dorsum of foot (L)
- foot, calf and thigh (L, VS)
- calf only (lipedema)

Skin changes

- Stemmer's sign, hyperkeratosis, fluid leakage (L)
- calf dermatoliposclerosis (VS)

Skin color

- pale (L)
- erythema (dermatitis, lymphangitis, dermatolymphangioadenitis/DLA)(L)
- bluish (dilated skin and superficial veins)(VS)

Skin compliance

- pitting (L,VS)
- hard (L)

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Risk of Surgical Procedures...

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LABORATORY EVALUATION

The laboratory diagnosis should include the following:

- Ultrasonography of veins (color Doppler) (to detect venous insufficiency and thrombosis)
- Soft tissue X-ray or computed tomography (CT) (to define whether swelling affects skin and subcutaneous tissue [L] or muscles [VS]. CT more accurately defines location of swelling compared with soft tissue X-rays)
- Lymphoscintigraphy (depicts lymphatics and nodes, allows evaluation of the speed of absorption of lymph from tissues, observation of the lymph flow and calculation of the time for filling of nodes.)

Lymphoscintigraphy is considered today to be an indispensable diagnostic procedure in each case of protracted edema of limbs. It allows visualization of the lymphatics and lymph nodes draining lymph from the site of injection of the tracer; it shows tissues with the lymph dermal backflow; it helps to semiquantitatively evaluate lymph flow and depict areas of inflammation (the tracer bound to aggregated albumin is taken up by tissue macrophages). Thus, lymphoscintigraphy is useful for detection of lymph stasis (lymphedema) as well as inflammatory foci in limb soft tissues (inflammation, post-traumatic local reaction).

All Circulatory and Inflammatory Processes Affect the Limb(s)' Lymphatic System

It should be pointed out that all of the listed factors causing edema also affect, to a higher or lesser degree, the lymph transport system. Chronic venous insufficiency brings about initial overloading of lymphatics with excess lymph. In the later inflammatory stages, partial obliteration of lymphatics and fibrosis of lymph nodes will develop. Protracted local reaction to trauma of soft tissues or bone fracture causes dilatation of lymphatics with lymph stagnation and enlargement of lymph nodes. Dermatitis is followed by perilymphatic fibrosis and subsequent obliteration of lymphatic trunks. Cardiac and renal insufficiency, as well as rheumatoid arthritis, are accompanied by increased lymph formation in the extremities and lymph overload.

The pathomechanism of various forms of edema of the legs and arms, including lymphedema, should be well known to the surgeon who plans surgery on the swollen tissues.

Type of Surgery Performed on Limbs

The most frequently performed surgical procedures on limbs are:

- Fracture fixation
- Venous surgery in chronic venous insufficiency with all known complications such as:
 - infections, ulcers and skin fibrosis
 - arterial reconstructive surgery
 - correction of hallux valgus
 - correction of foot bone architecture in diabetic foot
 - carpal tunnel syndrome
 - excision of nevi

Planning any type of surgery, as listed above, should be preceded by consulting an experienced Lymphologist or certified lymphedema therapist.

Surgical Problems Connected with Presence of Edema

What are the expected problems after surgery on the swollen limbs?

In all types of edema there will be possible complications in wound healing due to:

- (i) mechanical forces pulling wound edges apart and
- (ii) infection. There might also be stimulation of the thrombotic process in cases with the post-thrombophlebitic syndrome, and keloid formation in limbs with lymph stasis. The mechanism of keloid formation (fibroblast proliferation and excessive deposition of collagen) is not clear. The transforming growth factor beta seems to be responsible for the process.

Contraindication for Surgery on Swollen Limbs

The contraindications for surgery on the swollen limbs are recent

- (i) dermatolymphangioadenitis, and
- (ii) venous thrombosis.

Preoperative Measures

Preoperative preventive measures include:

- (i) decrease of edema by one week elevation of the extremity, with bandaging or compression sleeve/stocking (operating on swollen and hard tissues poses large problems

- with wound closure);
- (ii) administration of long-term penicillin with one shot seven days prior, and another one day prior to surgery, in order to saturate with antibiotic the swollen tissues with impaired lymphatic transport;
- (iii) avoiding pre-operative disinfection of skin with iodine containing lotions and shaving until the last moment before surgery, in order to prevent skin irritation and infection with the patient's own skin-resident bacterial flora.

Perioperative Treatment

This includes: one dose of wide spectrum antibiotic routinely given for prevention of infection by hospital bacterial flora, and in cases with thrombotic history, administration of low-molecular heparin.

Postoperative Care of Limbs

The postoperative care of limbs includes:

- (i) elevation;
- (ii) bandaging before resuming upright position (wound dehiscence is not infrequent);
- (iii) diuretics in patients with tendency for water retention;
- (iv) administration of long-term penicillin for a period of one to three months at one week intervals; and
- (v) wearing of compression garments and or bandages for months after surgery (the wound healing process in lymphedematous tissues lasts for many months in terms of remodeling of the healing tissue and persistence of the inflammatory process).

Conclusions

The surgeon performing an operation of swollen limbs should be aware of the etiology of the edema. This will allow him/her to apply specific measures protecting against wound dehiscence, infection and thrombosis of veins. Preoperative reduction of edema is necessary to facilitate wound closure without tension. There is no evidence of risk of development of healing complications after surgery on swollen (lymphedematous) limbs if the precautionary measures are taken. □

Waldemar L. Olszewski is a surgeon, Head of the Dept. of Surgical Research & Transplantology, Medical Research Center, Polish Academy of Sciences, and University Hospitals consultant, Warsaw, Poland. He can be reached via email at wlo@cmdik.pan.pl