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Case Report / Olgu Sunumu

Treatment of upper extremity lymphedema with minimally invasive supermicrosurgery technique

Minimal invaziv süpermikrocerrahi tekniği ile üst ekstremite lenfödem tedavisi

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ABSTRACT

A 51-year-old female patient was admitted to our clinic with numbness and anesthesia in the left upper extremity. There was widespread peripheral edema above and below the left elbow. Symptoms of the patient were associated with axillary lymphatic nodular dissection during previous the mastectomy operation. The patient was successfully treated using the supermicrosurgery technique via lymphaticovenular anastomosis.

Keywords: Lymphaticovenular anastomosis, lymphedema, minimal invasive, supermicrosurgery.

ÖZ

Elli bir yaşında kadın hasta, sol üst ekstremitede uyuşma ve his kaybı ile kliniğimize başvurdu. Sol dirseğin üzerinde ve altında yaygın periferik ödem izlendi. Hastanın semptomları, daha önce yapılan mastektomi ameliyatı sırasındaki aksiler lenfatik nodüler diseksiyon ile ilişkili idi. Hasta lenfatikovenüler anastomoz ile minimal invaziv süpermikrocerrahi tekniği kullanılarak başarılı bir şekilde tedavi edildi.

Anahtar sözcükler: Lenfotikovenüler anastomoz, lenfödem, minimal invaziv, süpermikrocerrahi.

Lymphatic node dissections result in extremity edema subsequent to oncological surgical procedures. Lymphoedema causes the movement restriction, dizziness, and restlessness in the affected extremity, leading to decreased quality of life and labor force, as well as cosmetical problems.[1] Currently, minimally invasive lymphaticovenular anastomosis (LVA) is a new technique for lymphoedema treatment. The novel approaches using microsurgery have enabled us to develop new medical devices and surgical materials with the improvements in medical technologies. Supermicrosurgery is a technique of dissection and anastomosis of the smaller vessels (<0.8 mm).[2] This technique requires the utilization of a high-resolution surgical microscope and 11/0 to 12/0 prolene sutures, and the skills for the use of surgical instruments finer than 0.2 mm.

In this article, we report a successful treatment of upper extremity lymphedema (UEL) with minimally invasive supermicrosurgery technique via LVA.

CASE REPORT

A 51-year-old female patient was admitted to our clinic with numbness and anesthesia in the left upper extremity and with the complaint of inability to do housework. Her medical history revealed mastectomy four years ago. On physical examination, there was widespread peripheral edema above and below the left elbow. However, there was no redness or itching. Doppler ultrasonography revealed no arterial or venous pathology. Her symptoms were considered to be associated with the axillary lymphatic nodular dissection during the previous mastectomy operation. The UEL indices were used for the volumetric

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evaluation of the affected extremity with severe edema. Accordingly, five parameters were measured from five different locations of the upper extremity.[3] A summation of squares of circumferences C1, C2, C3, C4, and C5 (cm) divided by the body mass index (BMI) is defined as the UEL index (Figure 1). The UEL index of the left arm was 137.85, compatible with moderate edema (Figure 2).

A written informed consent was obtained from the patient. The operation was performed under local anesthesia. Three incisions were performed: one of them was 3-cm distally from the left wrist placed in left forearm dorsal side and the other incision line was 5-cm proximally to the dorsum of the left forearm. Localization of the third incision was close to the fossa cubiti. The local anesthetic medication (lidocaine 2%) was injected. Then, the exploration of the skin tissue was accomplished using microsurgical equipment with a 1 to 2-cm skin incision (Figure 3). We used the Leica M320TM ×40 zoom (Leica Microsystems GmbH, Germany) surgery microscope. The superficial tissue vein vessels and lymphatic vessels were reached (Figure 4). The superficial lymphatic vessel was anastomosed to the appointed venous vessel via an end-to-end technique. An 11/0 polypropylene suture (Ethicon Inc., NJ, USA) was used for the anastomosis technique (Figures 5-8). The third incision was opened only exploratively, due to the severe sclerosis of the lymphatic vessels and no anastomosis was performed. The same closure technique was performed for all incisions. The

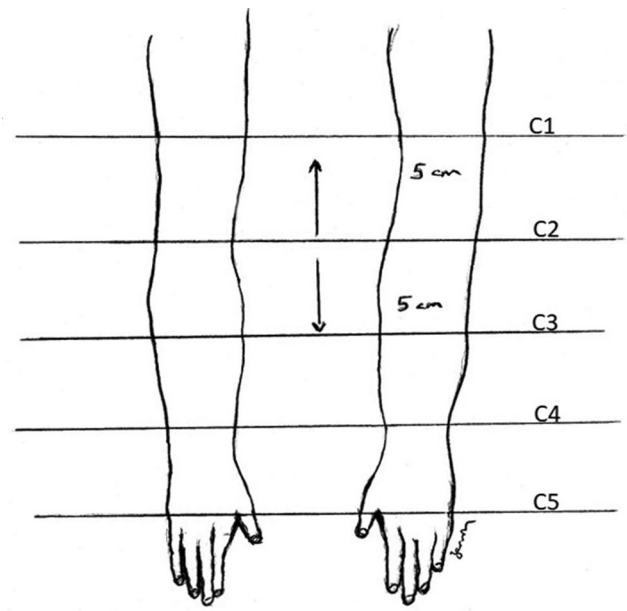

Figure 1. C1: Circumference at 5 cm above olecranon; C2: Circumference at olecranon; C3: Circumference at 5 cm below olecranon; C4: Circumference at wrist; C5: Circumference at dorsum of hand. UEL index: $(C1^2+C2^2+C3^2+C4^2+C5^2)$/body mass index; <130 mild edema; 130 to 150 moderate edema; >150 severe edema.

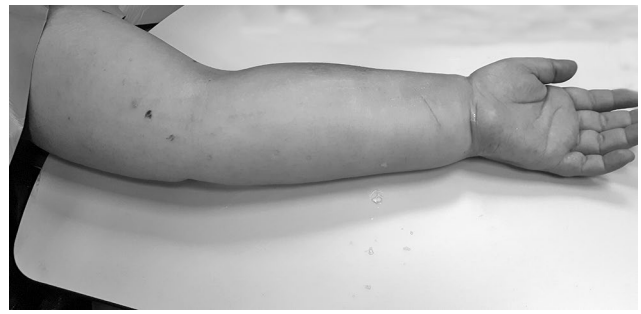

Figure 2. Before the operation. Moderate upper left extremity edema with an UEL index of 137.85. UEL: Upper extremity lymphedema.

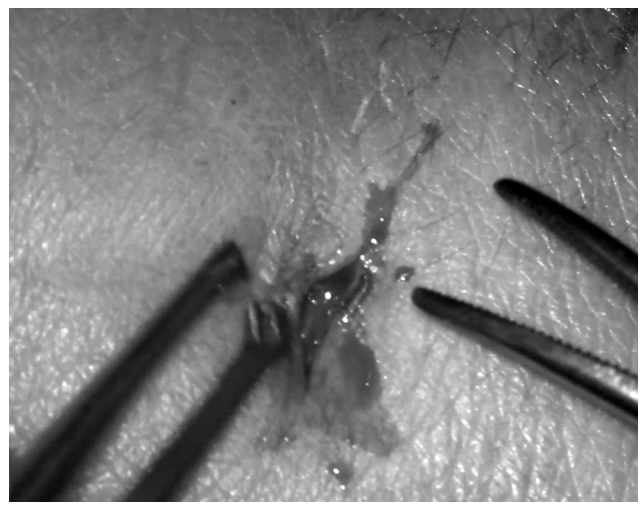

Figure 3. A minimally invasive incision was made.

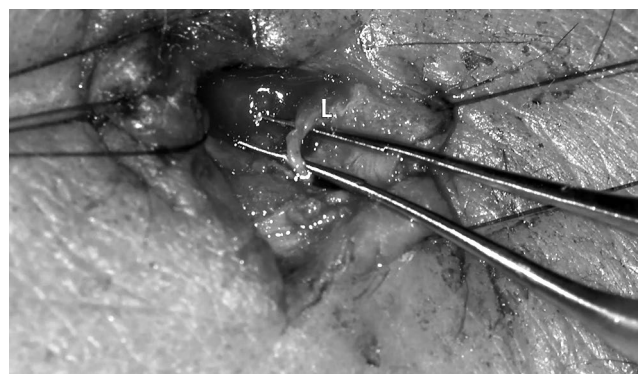

Figure 4. Lymphatic vessel close superficial facia (Leica M320 ×16 magnification).
L: Lymphatic vessel.

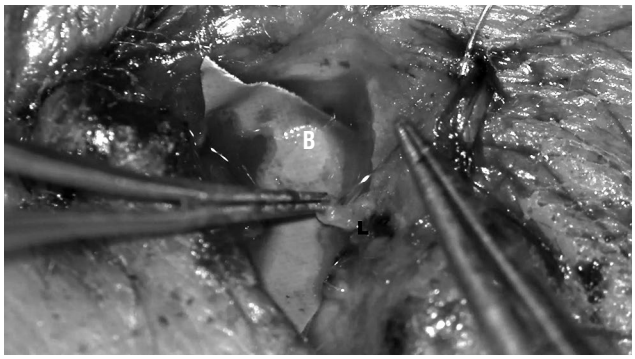

Figure 5. Picking up lymphatic vessel lumen (Leica M320 ×25 magnification).

L: Lymphatic vessel; B: Background material.

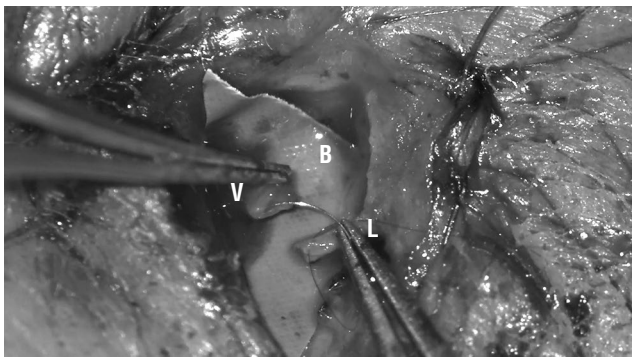

Figure 6. Insertion of needle into vein (Leica M320 ×25 magnification).

L: Lymphatic vessel; V: Venous vessel (close to superficial facia); B: Background material.

Figure 7. The first stitch was inserted and vessels were approached (Leica M320 ×25 magnification).

L: Lymphatic vessel; V: Venous vessel (close to superficial facia); B: Background material.

lymphatic vessels diameter was 0.45 mm (Figure 9). The left upper extremity was covered with a tight elastic bandage to increase the lymphaticovenous drainage subsequent to the operation. The patient was discharged 3 h later.

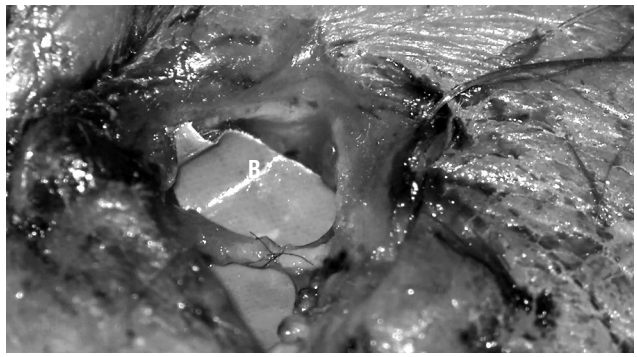

Figure 8. Anastomosis was completed (Leica M320 ×25 magnification).

L: Lymphatic vessel; V: Venous vessel (close to superficial facia); B: Background material.

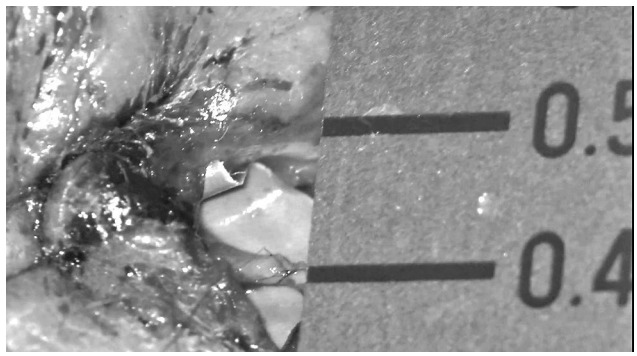

Figure 9. Lymphatic vessel diameter was measured. Ruler showed 0.45 mm in diameter (Leica M320 ×25 magnification).

Figure 10. One week after operation. UEL index was measured as 127.44, showing significant differences between upper part and lower part of left arm.

UEL: Upper extremity lymphedema.

At one week of follow-up, edema under the elbow line was apparently subsided. The patient was able to do her home activities easily and there was a

pronounced relief on the movements of the extremity. In addition, there was no numbness in the extremity and the UEL index was 127.44 (Figure 10).

DISCUSSION

Lymphedema is an important disease which has substantial effects on the quality of life.[4] It has primary and secondary types. Compression treatment is an alternative; however, complaints, particularly edema, recur after daily living activities in the majority of patients.[5] Surgical treatment is a favorable alternative for this patient population. It includes lymphaticovenular anastomosis, lymph node transfer, and drainage via silicon lymphatic canaliculi.[6] If the grade of lymphatic edema is high with prolonged duration, sclerosis and fibrosis may occur which potentially reduce the patency of the anastomosis and success rate. Secondary lymphedema has a fair chance, as the onset of the symptoms is earlier than the primary lymphedema. In primary lymphedema, post-LVA success rates vary between 30 and 50%, while this rate can increase up to 80% in secondary lymphedema.[7] For both types, the basic principal is early intervention. The patency rate can decrease due to the presence of fibrosis and sclerosis in Grade 3 and 4 patients.[8] For lymphedema classification and grades, indociyanin green (ICG) is used. The vessels can be scanned with near-infrared cameras during the diffusion of the injected ICG into the subcutaneous tissue.[9] However, we did not use this technology in our case due to the secondary etiology of lymphedema and possible obstruction in the axillary area, which may preclude finding the exact locations of the lymphatic vessels before the operation. The ICG and near-infrared camera can visualize the obstruction level in a more detailed and accurate way with increased patency rates in the near future. Instead, we used only 1-cm incision under local anesthesia to reduce the length of hospital stay.

In conclusion, with the developing technology, 40-times enlargement of the vessels using new microscopes can provide an opportunity to use the microsurgical equipment, and manufacturing 11/0 to 12/0-size suture materials enables the LVA and minimally invasive supermicrosurgery techniques as novel and favorable alternatives for lymphedema treatment.

Declaration of conflicting interests

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