

Modified Seki Method for the Treatment of Lymphedema

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Summary: Lymphedema is characterized by the abnormal accumulation of lymphatic fluid in the skin and subcutaneous tissue owing to impaired lymph flow. This condition may be primary or secondary to other diseases. Most lymphedema occurs in the lower extremities, which greatly interferes with the activities of the patients, especially walking. Further, it may affect the psychological condition of patients. In Indonesia, several patients with severe lymphedema have visited our clinic. In our center, lymphography is not available. However, as our center is a provincial referral hospital, many patients with lymphedema present with severe conditions. Nonoperative and operative treatment is available, including lymphovenous anastomosis. Herein, we present the rare case of a 33-year-old man with severe lymphedema in his left leg for the past 7 years. The patient was diagnosed with stage III secondary lymphedema of the left lower extremity and underwent lymphaticovenular anastomosis using a modification of the Seki method (Seki 2015). Five large lymphatic vessels were identified using methylene blue, and a transverse incision was made approximately 2–3 cm from the skin to the fatty tissue under the superficial fascia. Lymphaticovenular anastomosis was performed using a microscope. On postoperative day 1, the edema in the leg shrank significantly, and 6 months after surgery, the patient's foot size began normalizing. The patient could wear pants and became more confident. (*Plast Reconstr Surg Glob Open* 2023; 11:e5479; doi: [10.1097/GOX.0000000000005479](https://doi.org/10.1097/GOX.0000000000005479); Published online 18 December 2023.)

Lymphedema is a pathological condition of the progressive lymphatic system characterized by inflammation and an accumulation of protein fluid in the interstitial space, followed by fatty tissue hypertrophy and fibrosis.¹ Complications include disability, impaired mobility, and impaired function owing to swelling of the affected regions.

Congenital lymphedema is called primary lymphedema because there is little lymph tissue available, and the manifestation of swelling depends on the severity of the condition, which may occur at birth or develop later in life. Lymphedema after trauma, surgery, radiation, tumor invasion, or infection is considered secondary lymphedema.¹ Lymphedema is divided into a five-grade system according to the circumferential difference between the affected limb and the uninvolved contralateral limb.²

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Anamnesis, physical examinations, and supporting examinations are required to diagnose lymphedema. Patients experience various degrees of swelling, ranging from mild to severe, with a risk of life-threatening complications. Supporting examinations include bioelectric impedance analysis, tonometry, perometry, and lymphoscintigraphy. Bioelectric impedance analysis is used in body composition analysis and provides direct analysis of the differences in edema volume.³

In developing countries, many patients are unaware of lymphedema, especially in the early stages, and think that unilateral leg swelling is caused by obesity or heart disease; therefore, many patients presenting to our center are in a severe state. The lack of microsurgeons is another obstacle. Furthermore, limited supporting examinations hinder diagnosis. Many studies suggest a preoperative approach that classifies lymphedema based on indocyanine green (ICG) lymphangiographic findings.⁴ However, lymphography is unavailable in our center, and many patients with lymphedema who come to us are in serious condition.

In this case, we used the method developed by Seki et al, in which the incision site at the superior edge of the knee was defined as the intersection of a transverse line drawn at the superior edge of the patella and a longitudinal line drawn along the medial axis of the distal thigh with the

Disclosure statements are at the end of this article, following the correspondence information.

patient in the supine position. Additionally, we selected a subcutaneous vein or a second to the third branch of the greater saphenous vein in this region.⁵ However, one incision was insufficient; therefore, we made modifications by using several additional incisions located near the original Seki point.

CASE REPORT

A 33-year-old man with complaints of a swollen left leg for 7 years presented to our hospital (Fig. 1A). When the swelling increased, it interfered with his daily activities. His complaints included itching on the left leg and the appearance of spots filled with fluid, which broke at times and released a reddish-yellow liquid. The patient had no other comorbidities, and no additional nonoperative treatments, such as complex decongestive therapy or manual lymphatic drainage, had been performed.

The patient had a history of left leg trauma 7 years previously, for which massage was performed, but no further examination was done. In our clinic, the patient had previously been examined for filariasis, and no formations resembling filarial parasites were found. The ultrasound Doppler vascular examination of the left inferior extremity revealed soft tissue swelling (lymphedema) in the left femur, cruris, and pedis regions; multiple nonspecific lymphadenopathies in the left inguinal region; and no thrombus in the femoral artery or common, superficial, or popliteal veins.

The patient was diagnosed with stage III secondary lymphedema and multiple pustules in the left lower extremity.⁶ After obtaining informed consent, surgery was performed under general anesthesia. The patient underwent lymphaticovenular anastomosis using a modified Seki method. Intradermal and subcutaneous injections of methylene blue were used 1–2 cm distal to the skin incision line.

Five large lymphatic vessels were identified, and a transverse incision was made approximately 2–3 cm from the skin to the fatty tissue under the superficial fascia. Subsequently, the lymphatic vessels were cut with micro scissors, and lymphaticovenular anastomosis was performed with Prolene 12.0 under a microscope. The patient's leg was wrapped using a bandage as a complex decongestive therapy.

On postsurgery day 1 (Fig. 1B), the patient's edema and leg circumference appeared to have shrunk considerably. Complex decongestive therapy had been continued after the surgery, and 6 months postoperatively, his foot size began to normalize (Fig. 1C, D). The patient could wear pants and gained confidence. The patient has been planned to have another surgery with indication to further reduce the size of the foot.

DISCUSSION

Treatment of lymphedema includes nonoperative techniques, such as complex decongestive therapy in combination with manual lymphatic drainage, bandaging, physical exercises, skin care, and elastic stockings. Surgical



Fig. 1. Preoperative condition and postoperative results over time. A, Preoperative picture of a 33-year-old man with a 7-year history of a swollen left leg due to trauma. His complaints included itching on the left leg and the appearance of spots filled with fluid, which broke at times and released a reddish-yellow liquid. B, On postoperative day 1, the leg edema is significantly decreased. C, Ten days postoperative, leg circumference appeared to have shrunk, and the patient had returned to normal activities. D, Six months postoperatively, the patient's foot size is beginning to normalize. The patient can wear pants and is more confident.

treatment options include lymphovenous anastomosis, lymphovenous-lymphatic transplantation, and various forms of lymph vessel transplantation. However, lymphovenous anastomosis is the most frequently performed type of operation.⁷

Therapy techniques used in developed countries are not ubiquitously recognized due to financial constraints.⁸ In developing countries, many supporting examination tools, such as lymphoscintigraphy, are not available, and the number of patients continues to increase every day.

In the past, reduction excision was usually performed for patients with lymphedema, but many patients complained of ugly scars. Our consideration for managing these patients is how to provide maximum results despite minimal diagnostic tools. Therefore, we decided to continue performing lymphovenous anastomosis with limited supporting examinations, using the modified Seki point incision method. We have performed several procedures using this method. Generally, the patients have satisfactory results.

Our patient had lymphedema for several years without treatment. Before coming to our center, the patient consulted with other surgeons and was offered several surgical options such as reduction excision using the Charles procedure. However, the patient had uncertainties and finally arrived at our center in search of minimally invasive options.

Anatomically, the location of the lymphatic vessels is different in each patient; therefore, this surgery is challenging for microsurgeons. However, the presence of a fixed incision site characterizing the superior edge of the knee fully resolves the problem of lymphatic vessel detection in the thigh region. With this method, the stiffness and knee circumference may decrease over time.⁷ The advantage of this technique is that we can perform it without any additional examination with excellent results; however, the disadvantage is that we need to make random incisions around the Seki point.

CONCLUSIONS

As supporting examinations at our center were limited, we used a modified method by making several incisions from the original SEKI point using a subcutaneous

methylene blue injection. Under a microscope, we anastomosed a few veins and lymphatic vessels for better drainage. Reconstruction corrects the discordant form of the lower extremity and also boosts self-confidence and improves the quality of life of the patient.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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