

Lymphovenous Anastomosis for Treating Lymphedema in IgG4-Related Disease

Ying-Sheng Lin, MD, MPH*
Feng-Jung Yang, MD†

Summary: Immunoglobulin G4-related disease (IgG4RD) is a multi-organ immune-mediated condition, and lymphoplasmacytic infiltration is one of the main pathologic features.^{1,2} Lower extremity lymphedema is likely to occur if the infiltration involves multiple inguinal lymph nodes and thus disrupting lymphatic transport. Lymphovenous anastomosis (LVA) is a surgical procedure used to treat obstructive lymphedema in extremities^{3,4} or in the head and neck area.⁵ It basically reroutes the obstructed lymph flow into patent venous system by making microsurgical anastomosis between lymphatic duct and vein over the swollen area. Herein, we reported a patient with recalcitrant lower extremity lymphedema caused by IgG4RD, whose lymphedema subsided after being treated with LVA. (*Plast Reconstr Surg Glob Open* 2020;8:e3111; doi: 10.1097/GOX.0000000000003111; Published online 24 September 2020.)

CASE REPORT

A 65-year-old man presented with general malaise and bilateral lower extremity edema (Fig. 1). Chest x-ray revealed bilateral pleural effusion. Computed tomography showed congestive heart and bilateral inguinal lymphadenopathy. Biopsy of inguinal lymph nodes showed hyaline deposits. Serology test showed elevated IgG4 titer (345 mg/dL, normal range: 10–140 mg/dL). Congestive heart failure and IgG4RD were diagnosed. The patient's general malaise improved with diuretic treatment, but the edema over lower extremities persisted. Obstructive lymphedema caused by bilateral inguinal lymphadenopathy was confirmed by lymphoscintigraphy (Fig. 2). Compression garment was applied initially but lymphedema only subsided slightly after bed rest at night and still recurred during the day. He was referred to a lymphedema surgeon, and LVA was performed due to the obstructive nature of his lymphedema. The surgical procedure was performed for each leg separately due to long-hour operations. First, the right leg was operated on under general anesthesia, and the left leg was operated one month later under local anesthesia due to his uncomfortable recovery from previous general anesthesia. Intradermal indocyanine green (ICG) injection (0.2cc) over the 1st digital web space of

foot was performed intraoperatively. The intradermally injected ICG dye was transferred via a superficial lymphatic system. A near-infrared camera was used to identify the superficial lymphatic ducts over legs. For the right leg, two 2-cm-long incisions were made over the dorsal foot and medial aspect of thigh, respectively. For each incision, a lymphatic duct (0.5–0.8mm) and a nearby vein (0.8mm) were identified, and side-to-end lymphovenous anastomosis was made with 11-O nylon under surgical microscope. For the left leg, three 2-cm-long incisions were made over the dorsal foot, medial aspects of lower leg and thigh, respectively. For each incision, a lymphatic duct (0.3–0.6mm) and a nearby vein (0.3–0.6mm) were identified, and end-to-end lymphovenous anastomosis was made with 11-O nylon (Fig. 3). Compression garment was applied immediately postoperatively. The patient subjectively claimed lightness, softness, and no recurring swelling in the lower extremities during follow-up at clinic (Fig. 1). Lymphoscintigraphy performed at 6 months postoperatively revealed an improved lymphatic flow (Fig. 2). The patient no longer used the compression garment and his lymphedema did not recur at 1-year postoperative follow-up.

DISCUSSION

IgG4 is an antibody accounting for less than 5% of the total IgG in healthy individuals.⁶ IgG4RD is a fibroinflammatory condition characterized by tumefactive lesions, a dense lymphoplasmacytic infiltrate rich in IgG4-positive plasma cells, and elevated serum IgG4 concentrations.¹ Although IgG4RD affects predominantly extranodal sites such as the pancreas, salivary gland, and lacrimal gland, up to 80% of the patients with IgG4RD are found to have systemic lymphadenopathy.^{7,8} In our case, CT scan findings revealed bilateral inguinal lymphadenopathy, presumably causing obstructive lymphedema over lower extremities. Lymphoscintigraphy was used to confirm our diagnosis.⁹

From the *Division of Plastic and Reconstructive Surgery, National Taiwan University Hospital Yunlin Branch, Taiwan; and †Department of Internal Medicine, National Taiwan University Hospital Yunlin Branch, Taiwan.

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Fig. 1. Patient photographs. A, Preoperative and B, 1-year postoperative comparison.

The management for extremity lymphedema mainly consists of conservative physical treatment and surgical treatment.¹⁰ The former is based on manual lymphatic drainage and compression bandage-centered decongestive therapy.¹¹ The latter includes excision, liposuction, lymphovenous anastomosis (LVA), and vascularized lymph node transfer (VLNT).¹² Among those surgical procedures, LVA is considered the least invasive method, mainly used for fluid dominant lymphedema.¹³ Our patient's lymphedema is considered fluid dominant based on the characteristics that physical exam showed pitting edema, and his lymphedema could subside after bed rest. On the contrary, the fat-dominant lymphedema would show non-pitting edema and not

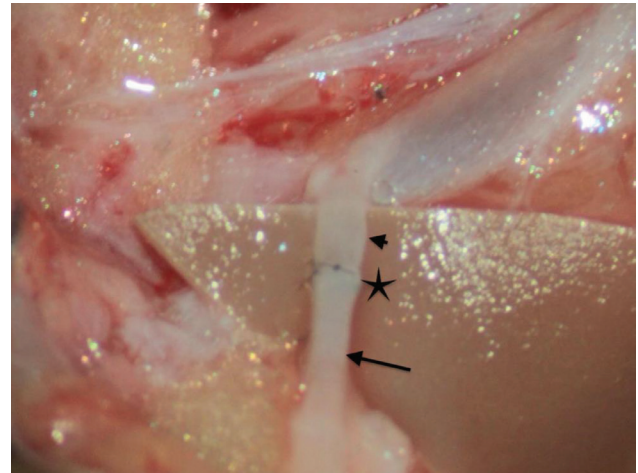


Fig. 3. End-to-end lymphovenous anastomosis. Arrow: lymphatic duct. Arrowhead: vein. Star: anastomosis site.

relieve after bed rest. The reasons why performing anastomosis between the side wall of lymphatic duct and the proximal end of vein, despite being more technically demanding, are the capability of rerouting bidirectional lymphatic flows and the maintenance of the original lymphatic duct. Immediate limb compression following LVA procedure could convert nonfunctioning LVAs with retrograde flow to functioning one with antegrade flow, and therefore facilitate lymphatic drainage and increase the surgical efficacy.¹⁴ LVA provided a therapeutic effect in this patient based on the improvement of patient's subjective assessments and the follow-up lymphoscintigraphy 6 months postoperatively. Additional objective modalities of evaluation such as perometry¹⁵ or bioimpedance spectroscopy¹⁶ could be used to detect the change of limb edematous status in a more accurate and reliable manner, other than tape measurement used in this study.¹⁷ Further application of LVA for upper extremity lymphedema related to IgG4RD is also reasonable because its efficacy for treating obstructive upper extremity lymphedema has also been proved.³

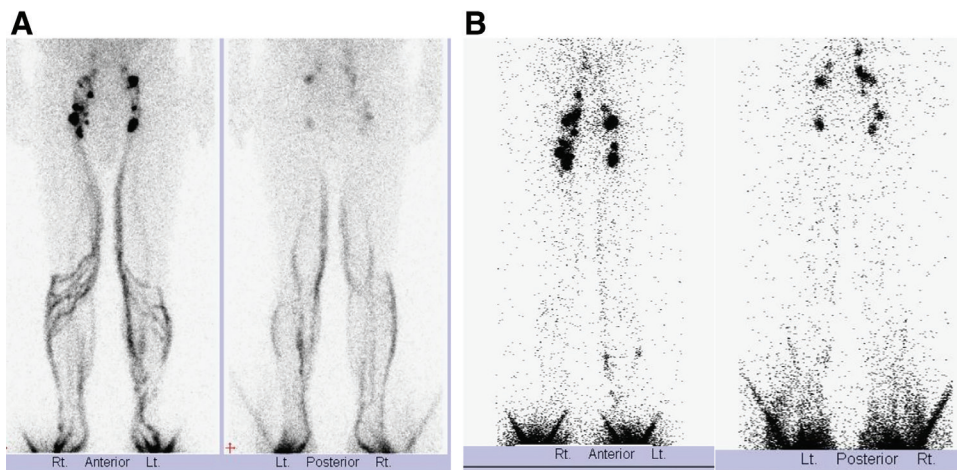


Fig. 2. Improved lymphatic drainage was noted. A, Preoperative and B, postoperative lymphoscintigraphy (0.5 hour after injection). RT, right; Lt, left.

CONCLUSION

In IgG4RD patients with obstructive lower extremity lymphedema due to inguinal lymphadenopathy, LVA could be a surgical option.

Feng Jung Yang, MD

Department of Internal Medicine
National Taiwan University Hospital Yunlin Branch
No. 579, Section 2, Yunlin Road
Douliu City
Yunlin County 640
Taiwan
E-mail: fongrong@ntu.edu.tw

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