

Role of Decongestive Therapy for Lymphedema in A Patient After Liver Transplantation: A Case Report

Karaciğer Nakli Sonrası Bir Hastada Lenfödem için Dekonjestif Tedavinin Rolü: Bir Olgu Sunumu

¹Merve Akdeniz Leblebicier, ¹Gülsüm Bakçepinar, ²Emine Cihan

¹Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Kutahya Health Sciences University, Kutahya, Turkey

²Department of Therapy and Rehabilitation, Physiotherapy Program, Vocational School of Health Sciences, Selcuk University, Konya, Turkey

Abstract

Lymphedema is defined as the abnormal accumulation of protein-rich fluid in the interstitial space as a result of deterioration in lymphatic system functions. In our case, we describe a patient that developed lymphedema symptoms in his right upper extremity following liver transplantation. After the lymphedema diagnosis, the patient underwent complex decongestive therapy, which included 30 sessions of manual lymphatic drainage (30 minutes a day) and 30 sessions of multilayer bandaging (five days a week). There was an improvement in both the shoulder joint range of motion and circumferences measurements of the hand and arm after treatment. Based on this case, we recommend manual lymph drainage as a preventative in the early period after organ transplants affecting the lymphatic system.

Keywords: Lymphedema, Transplantation, Liver lymph, Decongestive therapy

Özet

Lenfödem, lenfatik sistem fonksiyonlarındaki bozulma sonucu interstisyel boşlukta proteinden zengin sıvının anormal birikimi olarak tanımlanır. Olgumuzda karaciğer nakli sonrası sağ üst ekstremitede lenfödem semptomları gelişen bir hastayı tanımladık. Lenfödem tanısından sonra hastaya 30 seans manuel lenfatik drenaj (günde 30 dakika) ve 30 seans çok katmanlı bandaj (haftada beş gün) içeren dekonjestif tedavi uygulandı. Tedaviden sonra hem omuz eklemi hareket açıklığı hem de el ve kol çevre ölçümlerinde iyileşme oldu. Bu olgudan hareketle lenfatik sistemi etkileyen organ nakillerinden sonra erken dönemde koruyucu olarak manuel lenf drenajını öneriyoruz.

Anahtar Kelimeler: Lenfödem, Transplantasyon, Karaciğer lenfi, Dekonjestif tedavi

Correspondence:

Emine CİHAN
Department of Therapy and Rehabilitation, Physiotherapy Program, Vocational School of Health Sciences, Selcuk University, Konya, Turkey
e-mail: pteminecihan@gmail.com

Received 04.10.2022 Accepted 15.12.2022 Online published 16.12.2022

1. Introduction

Lymphedema is defined as the abnormal accumulation of protein-rich fluid in the interstitial space as a result of deterioration in lymphatic system functions for various reasons (1). Lymphedema cases are rarely observed after transplantation surgeries. The cause of lymphedema after liver transplantation can be shown as the share of the liver in the amount of lymph in the thoracic duct. The hepatic lymphatic system is a drainage system consisting of three parts: portal, sublobular and superficial (or capsular), which is claimed to produce 25-50% of the lymph in the thoracic duct. Most of the hepatic lymph drains into the portal lymphatics (2). It is known that the lymph vessels in the liver become dilated during transplantation in transplantation surgeries. The reason for this is thought to be lymphatic stasis caused by the interruption of lymph flow during surgery (3). It has been shown that in lymphedema, the lymph protein that mixes with the blood is more concentrated in the proximal part of the thoracic duct (4). In this case, our aim was to emphasize that a response to decongestive treatment can be obtained in the late period in the treatment of lymphedema and that it is important to follow-up in terms of lymphedema in post-transplant patients.

2. Material and Methods

Case-Presentation

Patient

A 67 year-old male patient with a body mass index of 25.46 visited our hospital with severe edema on his right arm and right hand. He had been diagnosed with cryptogenic cirrhosis seven years earlier and hepatocellular carcinoma three years after the cirrhosis diagnosis. Four years after the carcinoma diagnosis, the patient underwent liver transplantation. Liver transplantation was performed in 2018 and it was obtained from a brain-dead donor. Patient has been on everolimus therapy since transplantation. After this operation, swelling developed in the right arm of the patient, and his symptoms became severe in about two months. At four months after liver transplantation,

lymphoscintigraphy was performed, which showed mild dermal back flow at the right forearm and decreased uptake of the right axillary lymph nodes. Based on these findings, the patient was diagnosed with lymphedema caused by lymphatic obstruction. It was determined that lymphedema developed due to trauma to the lymphatic pathways. In addition, the arterial and venous Doppler ultrasonography of the patient revealed subcutaneous edema, which was more prominent in the distal right upper extremity.

Clinical Evaluation

When the patient was first diagnosed, stage 2 lymphedema was present in the right upper extremity. The clinical stage of the patient was determined according to the 2020 diagnostic criteria in the literature (5).

In the musculoskeletal examination of the patient, there was swelling in the right arm (Figure 1a), and limited range of motion (ROM) of the right shoulder joint. Shoulder range of motion for flexion, extension, abduction, external rotation and internal rotation were measured using goniometer. Right shoulder range of motion was limited in all directions. The measurements of the right shoulder range of motion before and after the treatment are given in Table 1. The skin was hard on palpation, and non-pitting edema was present. His laboratory tests were normal. The upper extremity volumes were calculated using the truncated cone method before and after treatment. The right and left arm circumferences were measured using a inflexible plastic tape at 4-cm intervals, starting from the carpometacarpal joint, and the volume of each limb was calculated from the circumference using the frustum model (6). The patient's quality of life and upper extremity functionality were evaluated with the Lymphedema Quality of Life Questionnaire-Arm (LYMQOL-Arm)(7). LYMQOL is a scale developed to evaluate the effect of lymphedema on patients' quality of life and consists of four 28 items. Symptom, appearance, function, and mood are evaluated. Responses were evaluated on a four-point Likert scale (1= not at all, 2= a little, 3= a lot,

4= a lot). Each item received a score between 1 and 4, with higher scores indicating a worse QoL(8). The measurements were taken before and after therapy.

Treatment

The treatment was completed in a total of 6 weeks, 5 days a week. After the lymphedema diagnosis, the patient underwent Complex Decongestive Therapy (CDT), which included 30 sessions of manual lymphatic drainage (MLD)(30 minutes a day), 30 sessions of multilayer bandaging (five days a week) and exercise. CDT is acknowledged as the primary treatment of lymphedema(9). CDT is carried out in two phases (intensive and maintenance) and consists of MLD, multilayer bandaging, compression garment, exercise (with compression bandage or compression garment), and skin care. The objective of CDT include limb volume reduction with stimulating lymphatic transport and prevention of complications and recurrence (10). MLD was performed from proximal to distal lymphatic direction with light skin massage by a trained physiotherapist. Non-elastic compression bandages were applied and changed daily.

The patient was also asked to follow an exercise program consisting of 30 sessions of shoulder muscle strengthening and shoulder joint range of motion exercises with theraband. Extremity elevation and skin care, such as skin hygiene were also recommended. In skin care, proper cleaning and moisturizing of the skin was ensured. The extremities were kept dry and clean, and the skin was evaluated daily in terms of scratches, infection, rash, and redness. The patient was followed up for nail care. No interventional procedure that could cause trauma to the skin was performed(11).

3. Results

After the treatment, the measurements of the shoulder joint range of motion and arm circumferences and LYMQOL- Arm were repeated. The initial LYMQOL-Arm score was 7.91, which decreased to 5.98 after treatment. The initial main extremity volume of the lymphedema side was 3.190 ml. which decreased to 2.990 ml after therapy. Shoulder mobility increased in all directions (Table 1). There was also a decrease in swelling and color change in the right upper extremity after treatment (Figure 1b).

Table 1. Degree of right shoulder range of motion before and after treatment

Shoulder range of motion (°)	Before Treatment	After treatment
Flexion	120	170
Extension	45	45
Abduction	90	160
External rotation	40	65
Internal rotation	30	50



Figure 1. (a) Upper extremities before treatment (b) Upper extremities after treatment

4. Discussions

In this case report, we described the sudden onset of edema in a previously healthy arm of a liver transplant patient, who was systematically diagnosed with secondary lymphedema. After this diagnosis, the patient was successfully treated with CDT. Although the literature contains many cases of secondary lymphedema, only a few patients developed this condition after liver transplantation. The first case of lymphedema after liver transplantation was reported by Saab et al. in 2006. In this case, it was considered that the continuation of chylous ascites accumulation after liver transplantation might be a reason for the abnormalities in the lymphatic system (12). In another case report, Seong et al. described lymphedema due to lymphatic obstruction in the lower extremity after liver transplantation, similar to our case. The patient was treated with lymphaticovenular anastomosis. Lastly, Motse et al. reported a case of lymphedema associated with the use of immunosuppressant sirolimus after liver transplantation (13).

The mammalian target of rapamycin inhibitors (everolimus and sirolimus) potently inhibits vascular endothelial growth factor-C-driven proliferation and migration of lymphatic endothelial cells, which may cause damage to lymphatic vessels and ultimately lymphedema (14). In our case, lymphedema was considered to be due to trauma to the lymphatic pathways. The rapid development of lymphedema after liver transplantation may also be an indication for this. In our case, while the patient was receiving immunosuppressive therapy, everolimus was also added to his treatment, but the development of lymphedema occurred before the start of everolimus therapy. Therefore, although everolimus causes lymphedema, we were not able to establish a relationship between the treatment applied and

lymphedema development. Ersoy et al. reported a patient that developed lymphedema due to everolimus after kidney transplantation and recovered when the treatment was terminated (15).

CDT is an effective and safe treatment. According to the circumferences measurements and quality of life evaluation of our patient, his treatment was effective. Although we applied CDT to the patient at two years after the development of lymphedema, there was an improvement in both the shoulder joint range of motion and circumferences measurements of the hand and arm. In the literature, several studies have revealed the positive effects of CDT on lymphedema volume and health-related quality of life in breast cancer-related lymphedema (16, 17). Kim et al. showed that after CDT, the quality of life significantly improved, and this was correlated with the reduction in the limb volume (16). In another study, Mondry et al. showed the reduction of the limb volume after a four-week CDT program (17). To our knowledge, this is the first case report to show that CDT is effective in post-transplant lymphedema. The treatment applied not only decreased the lymphedema volume but also increased the quality of life and functionality.

In this rare case, we improved the patient's quality of life with our treatment method. We observed an increase in shoulder mobility. Based on this case, we recommend manual lymph drainage as a preventative in the early period after organ transplants affecting the lymphatic system. CDT is required in cases where lymphedema develops.

REFERENCES

1. Johnson KC, Kennedy AG and Henry SM. Clinical measurements of lymphedema. *Lymphat. Res. Biol.* 2014; 12: 216-21.
2. Ohtani O and Ohtani Y. Lymph circulation in the liver. *Anat. Rec.* 2008; 291: 643-52.
3. Koslin D, Stanley R, Berland L, et al. Hepatic perivascular lymphedema: CT appearance. *AJR* 1988; 150: 111-3.
4. Stamp GFW and Peters AM. Peripheral lymphovenous communication in lymphoedema. *Nucl. Med. Commun.* 2012; 33: 701-7.

5. Executive Committee of the International Society of Lymphology. The diagnosis and treatment of peripheral lymphedema: 2020 Consensus Document of the International Society of Lymphology. *Lymphology*. 2020;53:3-19.
6. Deltombe T, Jamart J , Recloux S, et al. Reliability and limits of agreement of circumferential, water displacement, and optoelectronic volumetry in the measurement of upper limb lymphedema. *Lymphology*. 2007; 40: 26-34.
7. Borman P, Yaman A, Denizli M, et al. The reliability and validity of Lymphedema Quality of Life Questionnaire-Arm in Turkish patients with upper limb lymphedema related with breast cancer. *Turk J Physiother Rehabil*. 2018; 64: 205-212.
8. Keeley V, Crooks S, Locke J, Veigas D, Riches K, Hilliam R. A quality of life measure for limb lymphoedema (LYMQOL). *Journal of Lymphoedema*. 2010;5:26-37.
9. Sezgin Ozcan D, Dalyan M, Unsal Delialioglu S, et al. Complex decongestive therapy enhances upper limb functions in patients with breast cancer-related lymphedema. *Lymphat. Res. Biol*. 2018; 16: 446-52.
10. Lasinski BB. Complete decongestive therapy for treatment of lymphedema. *Semin. Oncol. Nurs*. 2013; 29: 20-27.
11. Harris SR, Hugi MR, Olivotto IA, et al. Clinical practice guidelines for the care and treatment of breast cancer: 11. *Lymphedema. Cmaj*. 2001;164:191-9.
12. Saab S, Nguyen S, Collins J, et al. Lymphedema tarda after liver transplantation: a case report and review of the literature. *ECT2006*; 4: 567-570.
13. Motse KG and Mashabane MJ. Sirolimus-induced lymphoedema. *S. Afr. Med. J*. 2016; 106: 886-7.
14. Ardalan M-R. Lymphedema attributed to sirolimus. *J. Nephro pharmacology* 2013; 2: 35-36.
15. Ersoy A and Koca N. Everolimus-induced lymphedema in a renal transplant recipient: a case report. *Exp Clin Transplant*. 2012; 10: 296-98.
16. Kim S, Yi CH and Kwon O. Effect of complex decongestive therapy on edema and the quality of life in breast cancer patients with unilateral lymphedema. *Lymphology*. 2007; 40 : 143-51.
17. Mondry TE, Riffenburgh RH and Johnstone PA. Prospective trial of complete decongestive therapy for upper extremity lymphedema after breast cancer therapy. *Cancer J*. 2004; 10: 42-48.

Ethics

Informed Consent: The authors declared that informed consent form was signed by the patient.

Copyright Transfer Form: Copyright Transfer Form was signed by the authors.

Peer-review: Internally peer-reviewed.

Authorship Contributions: Medical Practices: MAL, GB Design: MAL, EC Data Collection or Processing: GB Analysis or Interpretation: EC Literature Search: MAL, EC Writing: MAL, EC

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.