

# Preservation of supraclavicular nerve while harvesting supraclavicular lymph node flap

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## Summary

Lymph node transfer has recently become one of the popular techniques for surgical treatment of lymphedema. We aimed to evaluate postoperative donor site numbness and other complications in patients who underwent supraclavicular lymph node flap transfer to treat lymphedema with preservation of the supraclavicular nerve. From 2004 to 2020, 44 cases of supraclavicular lymph node flap were reviewed retrospectively. In the donor area, sensorial evaluation was clinically done with the postoperative controls. Among them 26 had no numbness at all, 13 had short-term numbness, two had numbness for > 1 year and three had numbness for > 2 years. We suggest that careful preservation of the supraclavicular nerve branches can avoid the major complication of numbness around the clavicle.

## Key words

lymphedema – lymph node transfer – supraclavicular lymph node flap

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## Introduction

Lymph node flap transfer began in 1990 with an animal model that was created by Chen et al [1] with a clinical report in 1993. Vascularized lymph node flap transfer has recently become one of the popular techniques for surgical treatment of lymphedema [2]. Thus far, there are seven different donor sites for lymph node flaps: supraclavicular, lateral thoracic, groin, submental, gastroepiploic, appendicular, and ileocecal. Each has its advantages and disadvantages.

Supraclavicular vascularized lymph node (SC-VLN) transfer is a good option in case it does not increase the risk of secondary lymphedema as much as in the groin or axillary lymph node flaps; additionally, the donor site scar is well-hidden. However, the most significant disadvantage reported by some of our patients is numbness around the clavicle. Additionally, no published study has

shown numbness complications in patients with supraclavicular lymph node transfer.

In this study, we aimed to evaluate postoperative donor site numbness and other complications in patients who underwent vascularized supraclavicular lymph node transfer to treat lymphedema with the supraclavicular nerve preservation.

## Patients and methods

From 2004 to 2020, 44 cases of supraclavicular lymph node flap transfer were reviewed retrospectively. The ethics committee approval was received. We included the patients with upper and lower extremity lymphedema who underwent lymph node flap transfer. The supraclavicular lymph node flap on the left side was used in patients with right upper extremity lymphedema. In the postoperative period, patients were called for regular follow-up and the

donor sites were evaluated along with routine lymphedema examination. In the donor area, sensorial evaluation was clinically done with self-assessment of the patients at postoperative controls. The patients determined skin numbness using their fingertips. (Questionnaire: do you have any numbness in your shoulder and/or upper chest area after your lymph node transfer surgery?; Answer: yes/no). The patients noted numbness and tingling complaints. Other donor site complications such as infection, hematoma, chyle leakage, scarring and secondary lymphedema were searched retrospectively. The patients who did not come to controls during the follow-up period were excluded. The mean follow-up period was 29 months (19–36 months).

## Surgical technique

The SC-VLN is located in the triangular area where it forms the border of

sternocleidomastoid muscle, the external jugular vein and the clavicle and vessel [3].

The skin paddle and pedicle were taken into consideration; markings were made followed by the skin incision. After passing the platysma muscle, the first step to harvest the lymph node flap was to identify the external jugular vein followed by the supraclavicular nerve dissection lateral to the external jugular vein. The supraclavicular nerve originates from the C3 and C4, and it is a sensory nerve. This nerve provides sensation over the region of proximal chest, anteromedial side of the shoulder and clavicle. Since the nerve branching is variable, landmarks are unknown [4]. Consequently, if we definitely know the anatomic location and plane of the nerve, it could generally be possible to preserve the nerve by operation and prevent morbidity.

It may have two or three branches which should be preserved as far as possible (Fig. 1A, B). According to the variations of nerve anatomy, the supraclavicular nerve can pass through the supraclavicular lymph node to reach the skin. Under these conditions, the preservation of the nerve branches can be overlooked so that the flap is not damaged. If the preservation is not possible, nerve stump should be ligated and placed into the soft tissue to prevent neuroma. Subsequent procedures are dissection of soft tissue

containing lymph nodes and vascular pedicle, which are all located medially to the supraclavicular nerves.

### Statistical Analysis

Data analysis was performed by IBM SPSS Statistics version 21.0 (IBM© Corp., Armonk, NY, USA). The Mann-Whitney U test was performed for the statistical analysis. The P-values < 0.05 were considered significant.

### Results

The mean age of the 44 patients (3 male, 41 female) included in the study was 51.6 years (range 28–75). Among them, 26 had no numbness at all, 13 had short-term numbness, two patients had numbness for > 1 year, and three patients had numbness for > 2 years. During the flap harvesting, supraclavicular nerves could not be preserved in five patients. In 39 patients, the supraclavicular nerve branches were completely dissected and preserved. Thus, the patients were evaluated as two groups according to nerve preservation. The medical records from the five patients who had numbness over the donor sites for > 1 or 2 years showed that the nerves were not able to be preserved. In the group whose nerves could not be preserved, numbness complaint was significantly higher and prolonged ( $P < 0.0001$ ).

However, in these patients, the nerve was ligated to prevent neuroma formation. None had real pain that

affected their daily life. The left sides were used in three patients who had right arm lymphedema to avoid thoracic duct injury. The right sides were used in the others. Infection, hematoma, chyle leakage and secondary lymphedema were not seen in the patients, and there was no hypertrophic scar in any patient. The healing of all scars was observed and met aesthetic expectations of the patients.

### Discussion

In cases where free tissue transfer is needed for the plastic surgery practice, donor site complications are always taken into consideration in the planning stage by comparing the advantages and disadvantages. Donor site morbidity is an important point to consider among the options for vascularized lymph node transfer. Therefore, SC-VLN lymph node transfer is our second option after gastro-epiploic lymph node transfer, which has advantages such as an inconspicuous scar and low donor site morbidity. An example of the donor site 1 year after the SC-VLN is in Fig. 2. However, having a good knowledge on neck anatomy is essential to harvest the flap carefully. SC-VLN flap includes the lymph nodes of cervical Vb level. This flap is supplied from transverse cervical artery, and is located around the branches of transverse cervical vessels and external jugular vein. The supraclavicular lymph nodes drain vital

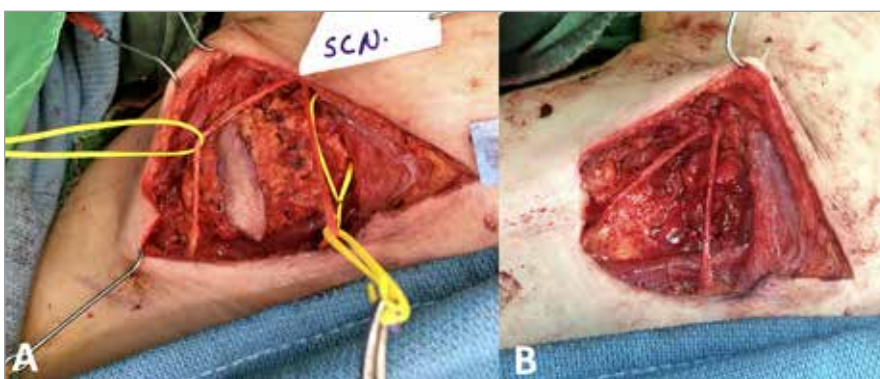


Fig. 1. (A) Preservation of the branches of the supraclavicular nerve during the flap dissection. (B) The view of the preserved nerves after harvesting the flap.



Fig. 2. An example for inconspicuous scar, postoperative 1-year view.

organs such as esophagus, thyroid gland and lung. However, the removal of these nodes is not consequential, and we know that from routine lymph node dissection in oncological surgeries [5].

In addition, since there are important structures in the region, possible risks of donor site and surgical technique should be carefully considered.

Various valuable studies have been published about the complications of vascularized lymph node transfer. The secondary donor site lymphedema is most significant complication of groin and axilla-based lymph node flaps [6,7]. Some studies found that up to 38% of patients who underwent groin vascular lymph node transfer had complications. Iatrogenic ipsilateral limb lymphedema was observed as the most frequent complication [8–10]. Additionally, Cheng et al reported that submental vascularized lymph node flap transfer causes a visible scar on the submental region, and there is a risk of marginal mandibular nerve injury [11]. Ciudad et al [12] reported that two cases of lymphatic leakage after Groin-VLN (in one of 13 patients) and SC-VLN (in one of 25 patients) harvest were noted.

However, no long-term studies reporting numbness as a complication of the supraclavicular lymph node donor area have been published. In this study, five patients (11.3%) who underwent SC-VLNT were found to have numbness at the donor site at more than one or two years postoperatively. The supraclavicular nerve was not able to be preserved in these patients, as noted in the patients' medical records. It was observed that this nerve was preserved in all patients (88.7%) who had short term numbness or no numbness at all.

## Conclusion

We found that the numbness complication may disappear or decrease during the long-term follow-up period in patients with nerve preservation. Thus, we believe that knowing the neck anatomy well, careful nerve dissection during the surgery and preservation of this nerve as much as possible will ensure a more comfortable postoperative period for the patients.

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## Roles of authors

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