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Surgical Anatomy of Vascularized Submental Lymph Node Flap. Shared Vascular Contribution of Submental Artery with Facial Artery and Topographic Relationship with Anterior Belly of Digastric Muscles

Parkpoom Piyaman1*, **Nutcha Yodrabum**2, Krittayot Patchanee1, Thanaphorn Oonjitti1, Rosarin Ratanalekha1

1 Department of Anatomy, Faculty of Medicine Siriraj Hospital, Mahidol University

2 Division of Plastic and Reconstructive Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University

n.yodrabum@gmail.com

Background: Vascularized submental lymph node transfer is becoming a popular surgical treatment for chronic lymphedema. Conventional flap area includes Ia and IIb sublevel of the neck and highlights submental artery as major arterial supply. However, level of arterial contribution by facial arteries over lymph nodes is neglected and topographic relationship of anterior belly of digastric muscle (ABDM) is still elusive. **Methods and Materials:** Forty vascularized submental lymph node flaps were harvest from 23 fresh cadavers. Colored polymer was injected into external carotid arteries prior to the harvest for visualization of the arterial supply. The harvest also included part of submandibular salivary glands and whole ABDMs to preserve topographic relationship.

Lymph nodes and related structures were studied macroscopically and by tracing under light microscope.

Results: Average number of lymph nodes was 4.4 ±1.8 nodes; 3.1 ±1.5 nodes supplied by submental artery (submental nodes) and 1.3 ±1.1 nodes by facial artery (submandibular nodes). Most of the nodes (92.5%) were located in posterior three-quarter of the flap but submandibular nodes were concentrated in posterior quarter. Each submental artery branched off 4.1 branches by average; ranged 2 – 8, whereas distal ones were located beyond posterior border of ABDM. Submental arteries were classified by relationship with ABDM into deep (80.0%) and superficial artery (20.0%). Likewise, submental nodes were classified into superficial nodes (42.5%), deep nodes (15.0%) whereas 42.5% were unrelatable to ABDM. The nodes of superficial artery also lied superficial to ABDM. Whereas 30% of lymph node of deep artery lied on opposite side; superficial to ABDM.

These nodes were supplied by perforators piercing from the deep side of ABDM.

Conclusion: Flap could be reduced to posterior three-quarter of conventional area due to concentration of lymph node. The study encourages to harvest a segment of facial artery from origin to crossing point over mandible to secure lymph nodes supplied by facial arteries. Patients who cannot afford to sacrifice facial artery should avoid

posterior quarter area due to high proportion of submandibular nodes. ADBM should be sacrificed to secure arterial supply of submental nodes due to intimate relationship between the nodes, perforators and the ABDM.
Keywords: vascularized submental lymph node flap, lymphedema, submental artery, facial artery, submental lymph node, submandibular lymph node, anterior belly of digastric muscle

* Corresponding author: Parkpoom Piyaman
Department of Anatomy, Faculty of Medicine Siriraj Hospital, Mahidol University 2, Wanglang Road, Bangkok Noi District, Bangkok, Thailand, 10700, 66 2 419 7035
Email: ppiyaman@gmail.com