External or Internal Jugular Vein? Recipient Vein Selection in Head and Neck Free Tissue Transfer: An Evidence-Based Systematic Analysis

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Brief/Running Title: Systematic review of recipient vein selection in head and neck microsurgery

Key Words: Head and neck, free flap, jugular vein

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INTRODUCTION

Microvascular free tissue transfer has become the choice of reconstruction for complex head and neck defects. There are more free flap failure events as a result of venous thrombosis than arterial thrombosis. The selection of a recipient vein that is suitable for microvascular anastomosis in the head and neck region is one of the several essential components for successful free tissue transfer. Debates exist about venous thrombosis when anastomosed to the external jugular vein (EJV) versus internal jugular venous (IJV) system.[1] Although the EJV has a long segment and offers more degree of freedom upon anastomosis, it has a relatively low flow and is subjected to considerable manipulation during neck dissection which could lead to serious intimal damage. On the other hand, IJV with its multiple branches, a negative pressure with respiration, and the possibility of directly end-to-side anastomosis demonstrates its logical superiority in preventing venous thrombosis.[2] However, there is no consensus on recipient vein selection in head and neck free tissue transfer.[3]

MATERIALS and METHODS

We performed a systematic literature review by searching the PubMed database from January 2000 to December 2010. We used the following key words: head and neck, free flap reconstruction or free tissue transfer, and venous anastomosis. This search was supplemented by a review of reference lists of potentially eligible studies. We excluded the non-English articles, those with flap number less than 100, and venous anastomosis to two veins or two different venous systems. Two reviewers independently extracted data in two steps: titles and abstracts, and then full text articles. Numerical distribution of recipient veins with their number of venous thrombosis were recorded (Table 1.). The primary outcome was the venous thrombosis rate. Relevant studies were assigned a level of evidence according to the American Society of Plastic Surgeons Evidence Rating Scale for Therapy. Statistical analysis was performed using the chi-square two-by-two contingency with Yates correction. Values of $p < 0.05$ were considered as significant.

RESULTS:

Through our electronic and reference search, we identified five retrospective comparative studies (Level III Evidence). We pooled 1409 free flaps for further survey. A total of 704 flaps (50.0 %) were anastomosed to the IJV system and 705 flaps (50.0 %) to the EJV. Venous thrombosis rate were 4.83 % and 5.25 %, respectively ($p > 0.05$).

CONCLUSIONS:

In this systematic review, we found no statistical significant difference in venous thrombosis rates based on recipient vein selection. Thus this is a level II evidence-based systematic analysis. Recipient vein selection between EJV and IJV system has no impact on the outcome of head and neck free tissue transfer.

Reference:

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3. Ross GL, Ang ES, Golger A, et al. Which venous system to choose for anastomosis in head and neck reconstructions? *Ann Plast Surg*. 2008;61:396-398.

4. Fukuiwa T, Nishimoto K, Hayashi T, et al. Venous thrombosis after microvascular free-tissue transfer in head and neck cancer reconstruction. *Auris Nasus Larynx*. 2008; 35:390-396.

5. Francis DO, Stern RE, Zeitler D, et al. Analysis of free flap viability based on recipient vein selection. *Head Neck.* 2009;31:1354-1359.

Table: The five retrospective comparative studies

Author, Year	Total Flap No.	IJV system		EJV	
		Total No.	Thrombosed No. (%)	Total No.	Thrombosed No. (%)
Chalian, 2001[1]	151	86	0 (0)	65	5 (7.7)
Nahabedian, 2004[2]	100	80	6 (7.5)	20	2 (10)
Ross, 2008[3]	352	251	13 (5.2)	101	8 (7.9)
Fukuiwa, 2008[4]	102	72	2 (2.8)	30	4 (13.3)
Francis, 2009[5]	704	215	13 (6.0)	489	18 (3.7)

Abbreviations: IJV, internal jugular vein; EJV, external jugular vein.