



ELSEVIER



# The anatomical basis for improving the reliability of the supraclavicular flap

Richard J. Ross<sup>a,\*,f</sup>, Charles E. Baillieu<sup>b,c,f</sup>, Ramin Shayan<sup>a,d,e</sup>,  
Michael Leung<sup>b,c</sup>, Mark W. Ashton<sup>a,e</sup>

<sup>a</sup> Taylor Laboratory, Department of Anatomy and Neurosciences, University of Melbourne, Parkville, Victoria, Australia

<sup>b</sup> Department of Plastic and Reconstructive Surgery, Southern Health, Dandenong, Victoria, Australia

<sup>c</sup> Department of Plastic and Reconstructive Surgery, Alfred Health, Prahran, Victoria, Australia

<sup>d</sup> AORTEC Unit, Faculty of Health Science, Australian Catholic University, O'Brien Institute, Fitzroy, Victoria 3065, Australia

<sup>e</sup> Department of Plastic and Reconstructive Surgery, Royal Melbourne Hospital, Parkville, Victoria, Australia

Received 26 February 2013; accepted 6 October 2013

## KEYWORDS

Supraclavicular flap;  
Head and neck reconstruction;  
Regional flap;  
Supraclavicular artery

**Summary** *Introduction:* The supraclavicular flap has re-emerged as a feasible option for head and neck reconstruction where a thin, pliable donor tissue is required or where free flap techniques may impose too great a surgical risk in frail patients. Whilst our understanding of the vasculature of this flap has improved immensely, the microvasculature and in particular the venous drainage of the distal half of the supraclavicular flap remain relatively unclear. The present study aims to detail the arterial supply and venous drainage of the supraclavicular flap, particularly relating to the interperforator anastomoses.

*Methods:* The arterial and venous systems of the supraclavicular flap were injected with a radiopaque medium in eighteen fresh cadavers (twenty three and twelve flaps, respectively). Dissected supraclavicular flaps were subjected to plain X-ray imaging plus CT angiography to visualise the arterial and venous systems and relations to surrounding muscle and fascia. Further, the nature of any true or choke anastomoses was described.

*Results:* The arterial supply of the supraclavicular flap is a combination of axial pattern proximally and random pattern distally, demarcated by the origin of deltoid muscle. The venous system must undergo significant shunting into high pressure vessels once the preferred natural venous pathways are ligated whilst the flap is raised. A vast number of anastomoses, both arterial and venous exist over the body of deltoid and are critical to distal flap tissue survival.

*Conclusion:* The vascularity of the supraclavicular flap is complex and relies upon relatively small, superficial vessels. This technique is a prototypical example of the angiosome concept at work and thus relies heavily on our understanding of the location and nature of the

\* Corresponding author. c/o Taylor Laboratory, Room E534, Level 5, Medical Building, Grattan Street, Parkville, Victoria 3010, Australia. E-mail address: richard.ross@health.sa.gov.au (R.J. Ross).

<sup>f</sup> Authors Richard J. Ross and Charles E. Baillieu contributed equally.

anastomoses along its course. We conclude that the supraclavicular flap remains a reliable method for reconstructing head and neck defects so long as the constraints of a complicated suprafascial vascular system are respected.

© 2013 British Association of Plastic, Reconstructive and Aesthetic Surgeons. Published by Elsevier Ltd. All rights reserved.

## Introduction

Optimal reconstruction of head and neck defects requires a delicate balance between form and function. While numerous techniques exist, the overarching premise to 'replace like with like' favours the use of locoregional tissues, such as the anterior thorax, neck, shoulders or upper back to achieve improved colour and texture match.<sup>1</sup> However, using locoregional tissues may present a compromise, as donor sites may be more visible in these highly aesthetically sensitive areas.

The supraclavicular flap has been explored sporadically as an option for reconstructing soft tissue defects of the head and neck since the 1800's.<sup>2</sup> This flap provides the benefits of a thin fasciocutaneous tissue, amenable to folding or contouring to the recesses of the oral cavity, lateral face and cervicomandibular region. Further, it is possible to achieve direct closure of the donor defect, the linear scar of which is easily concealed beneath clothing.

Following the first published description of the 'supraclavicular random patterned flap' by Mutter in 1842, several reports emerged of success in resurfacing cervicofacial burn contractures.<sup>2-4</sup> However, widespread utilisation of the supraclavicular flap has been restricted, due to concerns of reliability, first detailed by Blevins and Luce.<sup>5</sup> Much of this conjecture can be explained by the fact that until relatively recently, the vascular anatomy and flow mechanics of this region was incompletely understood. Further, confusion over vessel nomenclature and differences in technique only compounded the scepticism.<sup>6</sup>

The present study aimed to describe the arterial supply of the supraclavicular flap in relation to the interperforator anastomoses with direct implications for the reliability of the distal tip. In addition, we aimed to describe the venous drainage in a truly dynamic, anterograde system. Both of these primary end points have a direct impact on both flap safety and potential application for microvascular free tissue transfer.

## Materials and methods

### Anatomical studies

Anatomical dissection studies procured a total of eighteen fresh donor cadavers (eleven female, seven male, aged 36-94 years) from the Donor Body Program at the University of Melbourne and were conducted following institutional ethics board approval. All specimens were free from trauma and scars over the upper limbs and neck.

### Arterial studies

The arterial supply to the supraclavicular flap was studied in twenty-three flaps in seventeen fresh cadavers. The

supraclavicular artery was located similar to previous descriptions.<sup>7,8</sup> An incision was made over the surface marking of the omohyoid muscle as it emerges laterally to sternocleidomastoid, before exploring the plane deep to the deep investing fascia. Here, the transverse cervical vein was first identified, followed by the underlying transverse cervical artery (TCA). The supraclavicular artery emerged from the TCA in all cases, and was cannulated using a 24-gauge cannula (BD Insite, Becton Dickinson, Madrid, Spain). The TCA was ligated distally, as was the thyrocervical trunk and axillary artery proximal to the circumflex humeral arteries. This method isolated the supraclavicular artery from its main connections whilst maintaining the vascular relationship between the flap and surrounding soft tissue. Specimens were perfused with warm normal saline (40 °C) until a clear effluent emerged from small skin incisions made outside the distal extent of the flap. Coloured ink was then injected until the skin became discoloured and leaks were identified and ligated with silk suture or cautious use of electrocautery. Lead oxide was injected as per the method of Rees and Taylor and the flap dissected under 4× magnification surgical loupes following overnight incubation at 4 °C.<sup>9</sup>

To fully investigate the relationship between the fasciocutaneous tissue of the supraclavicular flap and the musculocutaneous perforators from the underlying deltoid muscle, the flap was raised with inclusion of the entire deltoid belly in seventeen flaps. The remaining six specimens were purely fasciocutaneous flaps. Importantly, to fully evaluate the distal extent of supraclavicular arterial territory, all dissections continued to a distance of 5 cm distal to the insertion of deltoid muscle and 2 cm anterior and posterior to the widest point of the muscle (Figure 1).

After flap dissection, specimens were assessed radiographically by both plain film and static computer tomographic angiography (CT) as previously described.

### Venous studies

Twelve flaps from six fresh cadavers were dissected after antegrade perfusion of the venous system. A five centimetre incision was made at the distal most extent of the flap in the mid coronal line, extending only to the subdermal plexus and one to three subdermal veins cannulated and perfused with normal saline then ink as above. Initial studies maintained a patent cephalic vein whilst later studies ligated the cephalic vein at the elbow and deltopectoral groove. The venae comitantes of the brachial artery were ligated proximally using 3-0 silk ligatures. A more dilute solution of lead oxide was injected similar to the method of Crock and Taylor, until dermal capillaries were filled beyond the most proximal extent of the flap.<sup>10</sup> The flap was then incubated and dissected as above.

Download English Version:

<https://daneshyari.com/en/article/4118139>

Download Persian Version:

<https://daneshyari.com/article/4118139>

[Daneshyari.com](https://daneshyari.com)