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CORR Insights®: Variations in the Innervation of the Long Head of the Triceps Brachii: A Cadaveric Investigation

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Where Are We Now?

Traditional teaching suggests that the long head of the triceps is consistently innervated by the radial nerve [7]. Nerve reconstruction techniques for plexus injury often use the nerve to the long head of triceps as a donor nerve [2]. However,

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in their study, Drs. Erhardt and Futterman have reminded us that the nerve supply to the long head of the triceps is inconsistent. At all times, the clinician should be cognizant of potential variable anatomy. This is especially relevant when assessing patients with plexus injuries and other proximal shoulder girdle nerve lesions.

We have known about nonradial nerve supply to the long head of the triceps since 2002 [6]. Since that time, most of our evidence consists of case studies [5], but there are some larger cadaveric anatomic studies on the subject [3, 6]. The current study includes 22 anatomic dissections, a reasonably large number, emphasizing the issue of nerve supply to the long head of triceps. The message, essentially, is that the long head of triceps can be supplied by either the radial nerve, the axillary nerve, by a branch from both the axillary or radial nerve,

or by a branch directly from the posterior cord of the brachial plexus.

This variability explains the clinical scenario of axillary nerve palsy affecting triceps function. Dual-innervated muscles may provide a potential donor in some cases of axillary nerve reconstruction. Also, this variable anatomy should be kept in mind when performing a surgical approach to the triceps muscle.

Where Do We Need To Go?

Anatomic studies, like the current paper, are always useful and certainly worth repeating. To further develop clinical relevance of this information, anatomic and electromyographical studies of patients with dually innervated nerve supply would be useful to determine exactly what level of triceps function is carried by each nerve branch. It would also be useful to determine the exact nature of these nerve branches—whether they are purely motor, sensory, or mixed in function. However, due to the low numbers of patients with dually

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innervated nerve supply this may be difficult to achieve. A study could potentially produce inconsistent results that may not really inform current techniques in plexus reconstruction. While our knowledge of the exact nature of the neuronal supply to the long head of the triceps may be lacking, and questions remain, the practical issue is that we know that the neuronal supply is variable. Also, this “variable” supply is, in fact, normal.

The current paper highlights quite clearly that pure radial nerve supply of the long head of the triceps occurs in only the minority of cases. This information should be better communicated in standard anatomical sources. There are anatomic textbooks that do highlight variations in anatomy [1], but no such references exist for the nerve supply of the long head of the triceps. Some texts are web-based and perhaps easier to access, such as the *Illustrated Encyclopedia of Human Anatomic Variation* [4]. However, standard anatomic texts should carry this relatively recently discovered information regarding the nerve supply to the long head of the triceps.

Further, and probably more importantly, plexus reconstruction instructional studies should highlight that the radial nerve offers inconsistent nerve supply to the long head of the triceps.

How Do We Get There?

In their study, Drs. Erhardt and Futerman make it clear that nerve reconstruction surgery can be enhanced by highlighting the variable nerve supply to the long head of the triceps. Though this information is not new, it does emphasize the need for flexibility in the difficult sphere of plexus reconstruction.

Checking a nerve transfer function at the time of surgery will remain key, and strengthening our knowledge of the nuances of neuronal supply is an aspiration worth considering in the future. Practically, this may be difficult. However, in the short-term, plexus reconstruction instruction should clearly outline the known variable nerve supply to the long head of the triceps.

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