Surgical Anatomy of a Novel Medial Gastrocnemius Recession versus the Proximal Medial Gastrocnemius Recession

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Introduction/Purpose: Isolated gastrocnemius contracture (IGC) is associated with various foot and ankle pathologies. To address the problem of IGC, a number of gastrocnemius lengthening procedures have been described. Decreased power and endurance with plantar flexion activities have been reported in patients after the Strayer procedure. Although proximal medial gastrocnemius recession (PMGR) has shown to be an effective surgical treatment for IGC, it poses risks to various anatomic structures around the knee joint and requires the patient to be positioned prone. The aim of this study was to describe an anatomic basis for a novel medial gastrocnemius recession (MGR) at the mid-level of the gastrocnemius muscle and to investigate the anatomical structures at risk in comparison to PMGR.

Methods: Ten fresh frozen cadaveric lower leg specimens were employed for the study. The standard PMGR and the novel MGR were performed on each specimen. For the MGR procedure, we made a 2 cm incision over the mid-level of the medial gastrocnemius muscle region and performed complete release of the medial gastrocnemius fascia. After completion of the two procedures, complete dissection was performed to investigate the distances between surgically released fascia margins and surrounding anatomic structures including the greater saphenous vein, small saphenous vein, saphenous nerve, medial sural cutaneous nerve, semimembranosus tendon, tibial nerve and popliteal artery. These distances were recorded and compared statistically.
Results: Proximities of anatomic structures to surgically released gastrocnemius fascia were significantly different between the two techniques. Major neurovascular structures were closer to the surgical margin than anticipated and at greater risk with the PMGR. In particular, popliteal artery (average distance 6.62 mm) and the tibial nerve (8.04 mm) were in close proximity with the PMGR margin, whereas these structures were deeply embedded and farther away from the MGR margin. For the PMGR, the semimembranosus tendon (average distance of 4.16 mm), small saphenous vein (6.71 mm), medial sural cutaneous nerve (3.66 mm), were also in close proximity to the surgical margin. For the MGR, the structures closer to the surgical margin and thus at greater risk of injury were the greater saphenous vein (12.22 mm) and saphenous nerve (11.87 mm).

Conclusion: Medial gastrocnemius recession (MGR) at the central level of the gastrocnemius muscle may be an attractive surgical option and method when addressing IGC associated with various foot and ankle disorders. It can easily be performed in either the supine or prone position and may allow for less risk of injury to major surrounding neurovascular structures than a more proximal release. The biomechanical and clinical efficacies of the proposed MGR warrant further investigation.