The Recurrent Motor Nerve

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A possible cause of denervation following hamstring injury and repair: a cadaveric case

Introduction

Severe hamstring injuries warranting surgical repair are rare and mainly affect athletes, young and middle-aged people (2). A minority of these patients report postoperative complications of denervation. Symptoms of denervation include; weakness, sensory deficit, re-rupture and sciatic nerve palsy (5)

Recent anatomical observations have suggested the innervation to the proximal hamstrings, supplied by the recurrent motor nerve, may have an important role in this pathology (5). This nerve is at risk of damage, during injury or surgery to the proximal hamstrings.

We aimed to locate and investigate the recurrent motor nerve, using cadaveric dissection, to look for an anatomical cause of postoperative symptoms of denervation. Due to its course, the recurrent motor nerve's name is also a source of discussion.

Anatomy

The hamstring muscle complex consists of three muscles: the biceps femoris (long head - lhBF and short head - shBF), semitendinosus (ST) and semimembranosus (SM) (Figures 1 and 2).

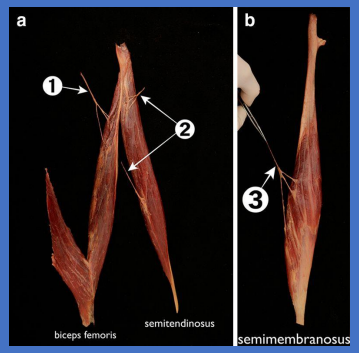

Figure 1: *Dissection of hamstring muscles. Demonstrating sciatic nerve motor entry points.*

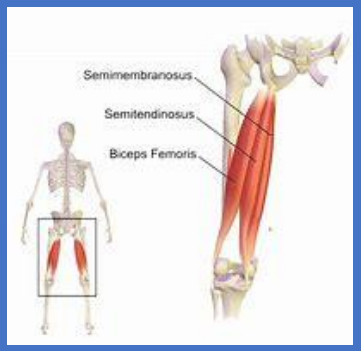

Figure 2: *Schematic of the hamstring muscles*

Background

Anatomical studies have investigated the distance from the ischial tuberosity to motor entry points of the sciatic nerve to the hamstring muscles (Table 1).

Table 1: Insertion points of sciatic nerve motor branches to the hamstring muscles, established by measuring a distance from the ischial tuberosity.

	Rab et al (3)	An et al (1)	Woodley et al (6)	Seidel et al (4)
No. of lower limbs	30	50	6	30
lhBF (cm)	**15.1 ± 3 .4**	**14.1 ± 3.3**	**No information**	**6.9 - 19.7**
shBF (cm)	No information	19.1 ± 2.3	20 - 34.2	No information
Superior ST (cm)	**4.75 ± 1.4**	**7.0 ± 2.2**	**4.2 - 12.2**	**7.1 - 9.2**
Inferior ST (cm)	14.47 ± 2.6	20.3 ± 2.9	7.5 - 19	14.3 - 20.2
SM (cm)	No information	21.1 ± 3.3	14.6 - 34.5	13.1 - 31.2

Recurrent Motor Nerve

The recurrent motor nerve was found by the author, in a cadaver fixed in formaldehyde, to insert into the proximal hamstrings by a distance of 1.5cm from the ischial tuberosity (Figures 3 and 4). The recurrent motor nerve inserted into the conjoined tendon of the hamstring muscle complex, formed from the tendons of the lhBF and ST, respectively.

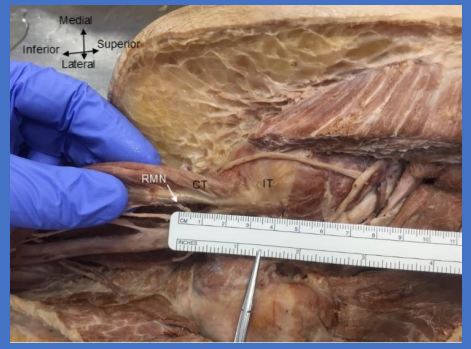

Figure 3: *Right gluteal and superior posterior thigh dissection. Lateral view. Demonstrating the distance between the attachment of the conjoined tendon and the recurrent motor nerve. PP12/18*
Key: RMN = recurrent motor nerve, CT = conjoined tendon of lhBF and ST, IT = ischial tuberosity

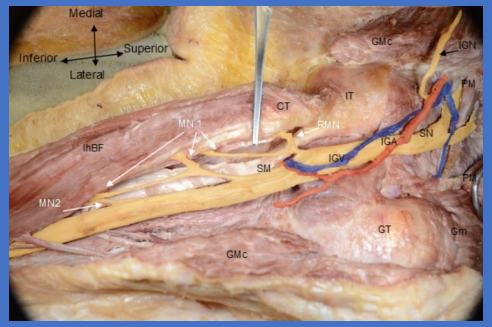

Figure 4: *Right gluteal and posterior superior thigh dissection, demonstrating the attachments and motor supply of the proximal hamstrings. Lateral view. PP12/18.*

Key: MN1 = motor nerves to lhBF, MN2 = motor nerve to ST, RMN = recurrent motor nerve to CT, lhBF = long head of biceps femoris, IT = ischial tuberosity, CT = conjoined tendon of lhBF and ST, SM = semimembranosus, GMc = gluteus maximus cut, PM = piriformis, Gm = gluteus medius, SN = sciatic nerve, IGN = inferior gluteal nerve, IGA = inferior gluteal artery, IGV = inferior gluteal vein, GT = greater trochanter, Yellow = nerves, Red = arteries, Blue = veins.

Discussion

This finding, built upon the work of Stępień et al's anatomical study of the hamstrings in 2018, who noted the presence of a proximal nerve and named it the recurrent motor nerve, however, did not provide a measurement of its motor entry point (5).

The recurrent motor nerve, or the nerve to the conjoined tendon, does not appear in literature describing the surgical technique for hamstring repair. Nor does it appear in anatomical literature. Further studies into the innervation of the proximal hamstrings are warranted. This would confirm the variability seen in the innervation to this region and in particular determine the recurrent motor nerves distance from motor entry to the ischial tuberosity. This would be of use to surgeons and may provide further considerations in surgical technique when repairing hamstring injuries.

References

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Figures

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