

A HUMAN CADAVERIC STUDY ON THE VARIATION IN FORMATION OF OBTURATOR NERVE AND STUDY THE PRESENCE OF ACCESSORY OBTURATOR NERVE

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Abstract:

Introduction-: The lumbar plexus is a network of nerves which comprises of the ventral primary rami of the first, second, third and fourth lumbar spinal nerves (L1 - L4). Awareness of the possibility of encountering multiple variations may prevent post-operative complications. This would also be useful information for Anatomists, Anaesthesiologists, Gynaecologists, Orthopedicians and Surgeons.

Aim-: The aim of this study was to evaluate the incidence and variation in the formation of femoral nerve.

Material and method-: The study was carried out on a total of 60 lumbar plexuses taken from 30 cadavers in the department of anatomy index medical college (MP), and govt medical college, toda (J&K). For the purpose of providing a more transparent depiction of the observed variation, each item has been photographed with a digital camera.

Result-: The normal origin of the FN is from the dorsal divisions of the L2, L3, and L4 roots. Atypical branching pattern of femoral nerve was found in 5 out of 60 (8.33%) plexuses.

Conclusion-: This study found distinctions that could aid anatomists, anaesthetists, gynaecologists, orthopaedicians, and surgeons perform nerve blocks, abdomino-pelvic surgeries, and caesarean sections. These changes can also assist clinicians treat psoas major muscular abscess, groin pain syndrome, testicular pain, psoas muscle infarct (specifically in diabetics), and other conditions that might cause lumbar plexopathies.

Key words – Obturator nerve (ON), Iliohypogastric nerve (IHN), Ilio- inguinal nerve (IIN), Genitofemoral nerve (GFN), Lateral femoral cutaneous nerve (LFCN), Femoral nerve (FN), Accessory obturator nerve (AON)

Introduction-

The lumbar plexus is a network of nerves which comprises of the ventral primary rami of the first, second, third and fourth lumbar spinal nerves (L1 - L4). The first lumbar nerve also receives a branch from the last thoracic nerve.

The Lumbar Plexus lies within the posterior part of the psoas major muscle in front of the transverse processes of the lumbar vertebrae.

The lumbar plexus formation as described in the standard treatise (Gray's Anatomy) is as follows:

The first lumbar nerve (L1), supplemented by a twig from the last thoracic, and splits into upper and lower branches. The upper larger branch divides into the iliohypogastric (IHN) and ilio- inguinal nerves (IIN). The lower, the smaller branch unite with second lumbar nerve (L2) to form the genitofemoral nerve (GFN). The remainder of the L2, L3, and the part of L4 joins the plexus, and divides into ventral and dorsal branches. The ventral branch of the L2 unites with the ventral branches of the L3 and L4 nerves to form the obturator nerve (ON). The dorsal branches of L2 and L3 nerves each divide into a smaller and a larger part; the smaller parts unite to form the lateral femoral cutaneous nerve (LFCN), and the larger parts join with the dorsal branch of the L4 to form the femoral nerve (FN). Sometimes, the accessory obturator nerve (AON) also present, when it exists, arises from the ventral branches of the L3 and L4 Spinal nerves.

FEMORAL NERVE (Dorsal division of L2,L3,L4)

Femoral nerve is the primary nerve which innervates the anterior aspect of thigh and largest of the peripheral branches from the lumbar plexus. It emerges through the psoas major muscle fibers and passes down between the psoas major and iliacus muscles, then passes underneath the inguinal ligament just lateral to the femoral artery as it enters the anterior compartment thigh. Within the thigh the femoral nerve gives off the muscular branches to the iliacus muscle. There are two large anterior cutaneous branches (intermediate and medial cutaneous nerves). The intermediate cutaneous branch descends along the anterior compartment of thigh to supply the skin then contribute to the patellar plexus. The medial cutaneous branch supplies the skin over the medial side of the thigh. The femoral nerve gives off several terminal branches including the nerve to pectinius, nerve to vastus medialis, nerve to sartorius, and the saphenous nerve.

Aim and Objectives- The aim of this study was to evaluate the incidence and variation in the formation of femoral nerve.

Material & Methods –

The research was carried out on a total of 60 lumbar plexuses taken from 30 adult human cadavers, with 30 taken from the right side and 30 taken from the left. The lumbar plexus was exposed bilaterally in respect to the psoas major muscle after it was dissected on both sides using an anterior approach.

The psoas major muscle was left intact and in its original position after all of the viscera that were located in front of the peritoneum were removed in order to expose the posterior abdominal cavity via the anterior approach. We looked into the connection between the psoas major

muscle and the lumbar plexus. After that, the muscle was meticulously dissected and cut into pieces so that the branching pattern of the nerves could be observed.

Results –

Table 1: Femoral Nerve (FN)

Origin	Rt		Lt		Absent		Unusual branching	
	N	%	N	%	N	%	N	%
T12,L1,L2,L3,L4	1	3.33	1	3.33	-		5	8.33
L2,L3,L4,L5	1	3.33	-	-				
L2,L3,L4	28	95	27	90				
L3,L4	-	-	1	3.33				
L3,L4,L5	-	-	1	3.33				

The normal origin of the FN is from the dorsal divisions of the L2, L3, and L4 roots (Figure 15). Atypical branching pattern of femoral nerve was found in 5 out of 60 (8.33%) plexuses. FN was not absent in any of the plexuses in the present study.

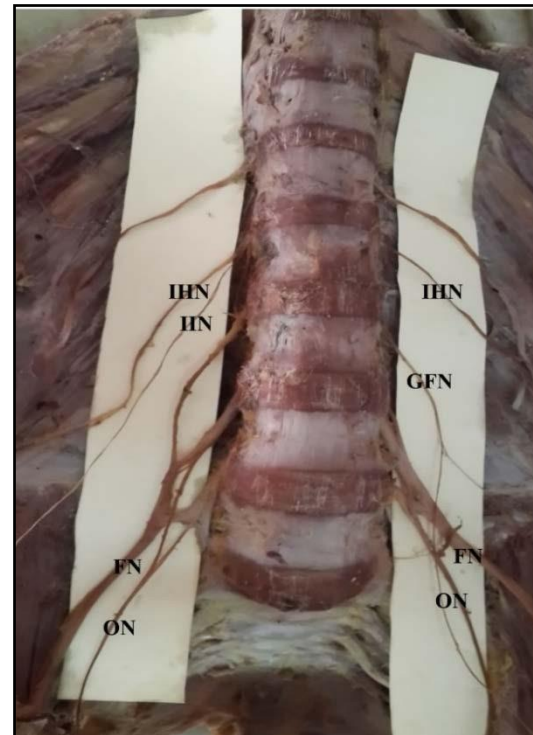


Figure 1: Showing origin of FN from dorsal division of L2, L3, L4 roots

Discussion –

Table 2: Comparison of Femoral Nerve (FN)

Author	Total No. of lumbar plexuses	Nerve Derived from (origin)	N	%	Unusual branching	
					N	%
Erbil et al. (1999)	2	L1, L2, L3, L4	1	50	-	-
		L2, L3, L4, L5	1	50	-	-
Yusuf et al. (2005)	20	-	-	-	-	-

Das and Vasudeva (2007)	2	-	-	-	2	100
Astik and Dave (2011)	64	-	-	-	-	-
Arora et al. (2014)	60	T12, L1, L2, L3	1	1.67	-	-
		L2, L3, L4	18	30		
Gindha et al. (2015)	60	T12, L1, L2, L3, L4	2	3.33	-	-
		L1, L2, L3, L4	30	50		
		L1, L2, L3	6	10		
		L2, L3	1	1.67		
		L2, L3, L4	21	35		
P. Nontasaen et al. (2016)	131	L2, L3, L4	131	100	-	-
Arora et al. (2016)	60	T12, L1, L2, L3	2	3.33	-	-
		L1, L2, L3, L4	18	30		
		L1, L2, L3	5	8.33		
		L2, L3	1	1.67		
		L2, L3, L4	34	56.67		
Present study (2016)	60	T12, L1, L2, L3, L4	2	3.33	(5 early division, 4 thin branch)	8.33
		L2, L3, L4, L5	1	1.67		
		L2, L3, L4	55	91.6		
		L3, L4	1	1.67		
		L3, L4, L5	1	1.67		

N: Number of plexuses showing variant origins / absent nerve / unusual branching

- ✧ Gindha et al. (2015) revealed that the origin of FN from T12, L1, L2, L3, or L4 in 3.3% of instances, which was comparable to the finding in our investigation.
- ✧ According to Arora et al. (2014, 2016), the origin of FN from T12, L1, L2, or L3 was reported in fewer than 5% of instances. Our research did not uncover any evidence of such an origin.
- ✧ Gindha et al. (2015) and Arora et al. (2016) reported that the origin was from the L1-L2-L3 level, between 8 and 10% of all instances. In this particular investigation, such a source was not found.
- ✧ Gindha et al. (2015), Erbil et al. (1999), and Arora et al. (2016) revealed that the genesis of FN can be traced back to L1-L2-L3-L4 in up to fifty percent of instances. In this particular investigation, such a source was not found.
- ✧ Gindha et al. (2015) and Arora et al. (2016) describe comparable findings, which indicate that the origin from L2-L3 accounts for less than 5% of all cases. Our research did not uncover any evidence of such an origin.
- ✧ 'The origin of FN from dorsal division of L2, L3, L4 was reported the present study report in similar 91.6% of cases by P. Nontasaen et al.,' the authors of the study said (2016).
- ✧ "Erbil et al. (1999) report that the origin from L2, L3, L4, L5 in 50% of instances, which is contradictory to the finding of the present study which found 1.67% of the cases."
- ✧ "In the present investigation, FN also took origin from L3, L4 in (1.67%) of instances, and from L3-L4-L5 in (1.67%) of cases." Such a diverse beginning has not been described in the available literature as of yet.

Conclusion –

90% of the FN had normal origin and Atypical branching pattern was found in 8.33% plexuses. This study found distinctions that could aid anatomists, anaesthetists, gynaecologists, orthopaedicians, and surgeons perform nerve blocks, abdomino-pelvic surgeries, and caesarean sections.

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