

Variant Accessory Obturator Nerve – A Case Report and Embryological Review

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ABSTRACT

Usually accessory obturator nerve arises from the ventral branches of the third and fourth lumbar ventral rami and passes deep to pectineus. It supplies pectineus and hip joint and then joins with the anterior division of the obturator nerve. Here, we report unilateral variation in an accessory obturator nerve on right side in an adult male cadaver. Accessory obturator nerve was found to be arising from the ventral rami of L 3 and 4. Then it entered in the femoral triangle crossing superficial to the pectinius. The accessory obturator nerve divided into three branches, one was supplying the pectineus from its superficial surface while another was supplying the hip joint. The third branch joined with the anterior division of the obturator nerve to form subsartorial plexus. On the right side, obturator nerve was found to be having its usual course except that its anterior division did not supply pectineus muscle. Clinicians should keep such variations in mind while performing hip surgeries, obturator nerve blockade and treating peripheral neuropathies.

INTRODUCTION

Variations exist in several structures of the lower limb. An accessory obturator nerve (AON) has a reported incidence of 10–30%^[1]. AON when present, is small and usually arises from the ventral branches of the third and fourth lumbar ventral rami between the roots of femoral and obturator nerve (ON)^[2]. It may also arise from L2, L3 and L4; or L2, L3 or it may arise from the ON^[2]. Usually AON courses with the ON to the level of pelvic brim. AON, instead of passing through the obturator foramen, descends along the medial border of the psoas major muscle, to cross the superior ramus of the pubis and behind the femoral vein. The nerve descends on the deep or dorsal aspect of the pectineus muscle and divides in the interval between this muscle and the capsule of the hip joint. It breaks up into three branches: one enters the front of the capsule of the hip joint; another one passes medially to anastomose with the anterior branch of the obturator nerve; and third one penetrates the dorsomedial aspect of the pectineus muscle to supply a portion of this muscle^[2].

Earlier some variations in the course, branches and termination of this nerve were described such as very small AON supplying only pectineus muscle or is lost in the capsule of the hip joint; terminal branches of AON replaced the femoral branch to the pectineus; it made a significant contribution to the innervation of the adductor muscles^[1,3]. Here, we reported a rare variant of AON and discussed it under the light of available literature.

During the routine dissection, the unilateral variation in AON on the right side was reported in an adult male cadaver. Skin and fascia was excised to get a view of the thigh contents. When traced proximally, AON was found to be emerging from medial side of psoas major muscle. Then it entered in the femoral triangle crossing the superior ramus of the pubis, deep to inguinal ligament and medial to the femoral sheath (Figure 1). Distally the nerve was found to be dividing into three branches; one was supplying the pectineus from its superficial surface while another was supplying the hip joint. The third branch of the AON joined with the anterior division of the ON and found to taking part in the formation of the subsartorial plexus (Figure 1 and 2). When traced upwards AON was found to be arising from the ventral rami of L 3 and 4. Right obturator nerve was found to be having its usual course except that it did not supply pectineus.

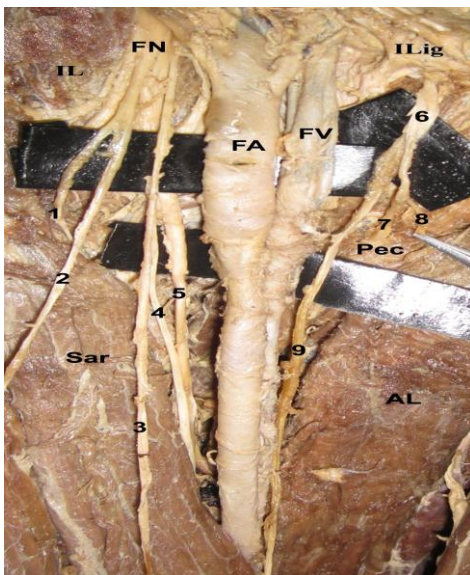


Fig 1: Accessory obturator nerve and its distribution. [AL: Adductor longus, IL: Iliacus, ILig: Inguinal ligament, FA: Femoral artery, FN: Femoral nerve, FV: Femoral vein, Pec: Pectinius, Sar: Sartorius, 1: 1 nv to Sar, 2: Intermediate cutaneous nerve of thigh, 3: Medial cutaneous nerve of thigh, 4: branch of 3 to subsartorial plexus, 5 Saphenous nerve, 6: Accessory obturator nerve, 7: Branch to Pec, 8: Branch of 6 to hip joint, 9: Branch of 6 joining with anterior division of obturator nerve]



Fig 2: Accessory obturator nerve and its distribution. [ABr: Adductor brevis, AL: Adductor longus (excised and reflected), FA & V: Femoral artery & vein, FN: Femoral nerve, Gr: Gracillis, Sar: Sartorius (reflected), 1: Accessory obturator nerve, 2: Branch of 1 joining with 3, 3: branch of anterior division of obturator nerve, 4,5,6: branches of anterior division of obturator nerve, 7: combination of 2 & 3, 8: branch of Medial cutaneous nerve of thigh, 9: Saphenous nerve, *: branch of 9, \$: branch to Vastus medialis, 7,8 & * forms subsartorial plexus]

DISCUSSION

There are a number of the puzzling circumstances related to the AON regarding its frequency of occurrence and pattern of its distribution. Eisler et al set the pattern for the current description of origin, course, and occurrence of the AON and reported a frequency of 25% (8 out of 32 cases)^[4]. De Sousa et al reported 19% occurrence while Kaiser et al found 8.3% frequency (2 out of 24 sides)^[5,6]. Woodburne RT found nerve in 48 specimens of 550 sides (8.7% incidence)^[7]. Bardeen CR found the AON to be present in 21 of 250 specimens, a frequency of 8.4% [8]. It is equally obvious these were too small to give reliable results^[4,5,6,7,8].

Compared to the described literature, in the present case report, it is notable that the AON is passing superficial to the pectineus muscle instead of passing deep to the muscle. The basis for the existence of the present variant can be explained by reviewing the embryological basis. Developmentally, it has been suggested that this small nerve may have been separated from the obturator nerve during the formation of the obturator foramen^[9]. Howell AB noted that the pubis develops first as a process, subsequently hooking around the ON and joining the ischium so as to enclose this nerve in the obturator foramen^[10]. The small AON arises from the lumbar plexus by roots from the third and fourth lumbar nerves and it emerges between the obturator and femoral nerves. Eisler P noted that the roots of the AON push out between those of the pre-axial obturator and the postaxial femoral nerves. At the same time he unequivocally classified the accessory nerve as parts of the ventral division of the lumbar plexus^[4].

The presence of AON is clinically important as it is also considered during ON blockade. The AON blockade can be indicated in superficial surgeries of thigh, treatment of pain due to thigh tourniquet, as a diagnostic aid for pain syndromes in the hip joint, inguinal areas or lumbar spine, and in relief of intractable hip pain due to osteoarthritis. The anatomical variations of peripheral nerves are also important to orthopedic surgeons, neurophysicians, physiotherapist and radiologists. Such comprehension is useful in nerve grafting, neurophysiological evaluation for diagnosing peripheral neuropathies.

REFERENCES

1. Akkaya T, Comert A, Kendir S, Acar HI, Gumus H, Tekdemir I, et al. Detailed anatomy of accessory obturator nerve blockade. *Minerva Anesthesiol.* 2008;74(4):119–22.
2. Standring S, Borley NR, Collins P, Crossman AR, Gatzoulis MA, Healy JC, et al., Editors. Posterior abdominal wall and retroperitoneum. In *Gray's Anatomy*. 40th Ed. London: Churchill Livingstone; 2008. P-1069–1081.
3. *Anatomy Atlases* [homepage on the Internet]. A digital library of anatomy information. Bergman RA, Afifi AK, Miyauchi R. *Illustrated Encyclopedia of Human Anatomic Variation: Opus III: Nervous System: Plexuses. Femoral Nerve*. [Cited 2012 Aug 28]. Available from: <http://www.anatomyatlases.org/>.
4. Eisler P. Der Plexus lumbosacralis des Menschen. *Anat Anz.* 1891;6:274–81.
5. De Sousa OM. Consideracoes anatomocirurgicas sobre 6 nervo obturator acessorio. *Rev Cir S Paulo.* 1942;7:399–402.
6. Kaiser RA. Obturator neurectomy for coxalgia. An anatomical study of the obturator and the accessory obturator nerve. *J Bone Joint Surg (Am).* 1949;31:815–19.
7. Woodburne RT. The Accessory Obturator Nerve And The Innervation of the Pectineus Muscle. 1959;367–9.
8. Bardeen CR. Development and vari 6 Development and variation of the nerves and the musculature of the inferior extremity and of the neighbouring regions of the trunk – In man. *Am J Anat.* 1906;6:259–390.
9. Bolk L. Beziehungen zwischen Skelett, Muskulatur and Nerven der Extremitaten. *Mowh Jb.* 1894;21:241–77.
10. Howell AB. The phylogenetic arrangement of the muscular system. *Anat Rec.* 1936;66:295–316.