



A Rare Case of Associated Double Ilioinguinal Nerve and Double Iliohypogastric

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 20 Oct 2023	<i>Background: Anatomical variations represent an embryological and comparative background for medicine and biology in order to understand the morphological aspect of the human body and its related structures. The present report aimed to describe an unfamiliar variation in the intra-abdominal course of the left Ilioinguinal and Iliohypogastric nerves. Methodology: A 77 male cadavers with the age range between (24-69 years) which were involved during routine dissection in department of anatomy among several Sudanese faculties during the period from (2016 – 2018) after obtaining the ethical approvals. Results: An abnormal course of left Ilioinguinal and left Iliohypogastric nerves in the abdomen by emerging as two nerves from the lateral border of the left psoas major muscle was mostly noticed. Conclusion: Variations in the intra-abdominal course of Ilioinguinal and Iliohypogastric nerves should be known by the surgeons during various abdominal surgeries.</i>
CC License CC-BY-NC-SA 4.0	Keywords: Ilioinguina, Iliohypogastric, variation

1. Introduction

Anatomical variations may influence predisposition to diseases symptomatology, clinical examination, investigation and patient management including operative surgery. Accordingly, accurate knowledge of variability in human morphology is important to improve diagnostic and interventional performance as well as open and laparoscopic surgery. [1] Clinical diagnosis and surgical procedures require a thorough knowledge not only of the normal gross anatomy of the structures within a region but also of the common and less common anatomical variations of the structures located within it. Recent and continuing advances in surgical procedures have made the need for such detailed knowledge ever-more important. The history of the concept and contents of the human anatomical variations is the history of the anatomy itself, or, more accurately, the history of the search for the establishment of the canon of the normal structure and composition of the human body. Normal means “within the normal range of variation” the medical progress needs a more accurate knowledge of the variability of the human morphology to improve diagnosis and therapeutic performance. It is not surprising that anatomical variations not only have not disappeared from the medical and biological background but also have been enclosed among the main aims to be considered in medical curricula in some developed countries. Anatomical variations represent an embryological and comparative background for medicine and biology in order to understand the morphological aspect of the human body and its related structures. [2]

The posterior abdominal wall contains numerous structures, for example the abdominal aorta and its associated nerve plexuses, the inferior vena cava, the sympathetic trunks, and lymphatics. There are also structures that originate in this area that are critical to the normal function of other regions of the body such as the lumbar plexus of nerves. [3] The lumbar plexus of nerves is formed anterior to the lumbar transverse processes, within the proximal attachment of psoas major muscle, within the substance of psoas major muscle. The lumbar plexus originates from the ventral rami of the L1–L4 nerve roots and projects laterally and caudally from the intervertebral foramina, posterior to the psoas major muscle. A communicating branch from the T12, also known as the subcostal nerve, often joins the first lumbar nerve. The L2–L4 ventral rami first bifurcate into an anterior and posterior primary division. The T12 and L1 nerves and the L2–L4 anterior primary divisions supply muscular branches to the psoas major and quadratus lumborum. Both primary divisions then enter the lumbar plexus and give rise to six peripheral nerves. Within this plexus, the L1 nerve splits into a cranial and caudal branch. The cranial branch bifurcates into the iliohypogastric (IHN) and Ilioinguinal nerves (IIN), the former also formed by the subcostal nerve in people where this nerve contributes to the lumbar plexus. [4] The caudal branch of the L1 nerve unites with the anterior division of the L2 nerve to form the genitofemoral nerve. The anterior divisions of the L2–L4 roots form the obturator nerve. The lateral femoral cutaneous nerve arises from the posterior divisions of the L2 and L3 roots; the posterior divisions of L2, L3, and L4 join to create the femoral nerve (Figure 1 and 2). [5].



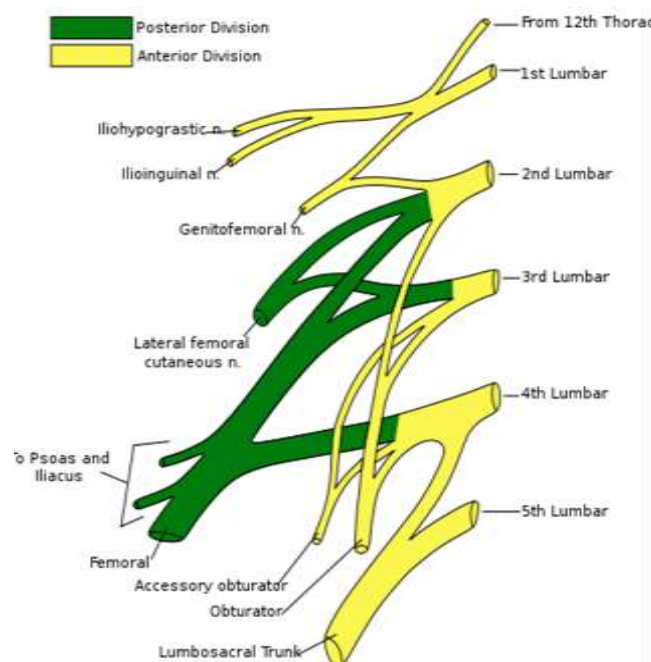


Figure 2: Schematic of Lumbar plexus ⁽⁴⁾

Anatomy of Iliohypogastric nerve (IHN)

The IHN is a branch of L1 that travels with the ilioinguinal nerve for a distance before branching off to a different destination and innervation. It emerges from the superior aspect of the lateral margin of the psoas major; enters the abdomen posterior to the medial arcuate ligaments and courses inferiolaterally along the anterior surface of the quadratus lumborum, then pierces and innervates the posterior fibers of the transverse abdominis near the iliac crest and pierces internal oblique muscle above the anterior superior iliac spine, then pierces aponeurosis of external oblique an inch above superficial ring. During traverses through the internal and external oblique abdominis muscles it supplies motor branches. Superficial innervation is supplied to the skin of the gluteal region posterior to the lateral cutaneous branch of T12 via a lateral cutaneous branch. The anterior cutaneous branch of the IHN nerve innervates the skin of the hypogastric region. ^[4]

Anatomy of Ilioinguinal nerve (IIN)

The Ilioinguinal nerve originates from L1 ventral ramus and emerges from the lateral aspect of upper part of psoas major muscle just below the iliohypogastric nerve, passes obliquely across quadratus lumborum and the upper part of iliacus and enters transverses abdominis muscle near the anterior end of the iliac crest. It pierces the internal oblique muscle and supplies it and then traverses the inguinal canal below the spermatic cord. It emerges with the spermatic cord from the superficial inguinal ring to supply the proximal medial skin of the thigh and the skin over the root of the penis and upper part of the scrotum in males, or the skin covering the mons pubis and the adjoining labium majors in females. The nerve may be injured predominantly during inguinal hernia surgery, appendicectomy and pfannensteil incision which produces paraesthesia over the skin of the genitalia. Entrapment of the nerve during surgery may cause troublesome recurrent pain in its cutaneous distribution area. ^[5]

2. Materials And Methods

This study involved the report of 77 male cadavers with the age range between (24-69 years) which were involved during routine dissection in department of anatomy among several Sudanese faculties. Most of these faculties were presented in Khartoum state and they involved: (Al-Zaiem Al-Azhari, International university of Africa, National university, University of Science and technology, Sudan International university, National Ribat University, Omdurman Islamic university, Al-Hayah college, and Al-Fajer college) The collection of reports was conducted during the period from (2016 – 2018). Ethical approvals were obtained from the administration of these colleges after explaining the objectives of the study.

3. Results and Discussion

Associated double iliohypogastric and ilioinguinal nerves were observed on the left side of two cadavers out of 77 cadavers which were dissected at several Departments of Anatomy of Medical Colleges in Sudan. In the first cadaver the two nerves originate from the first ventral lumbar spinal segment individually as two branches, one thick lateral branch which carry the motor component and thin medial branch which carry sensory component for both nerves (Figure 3).

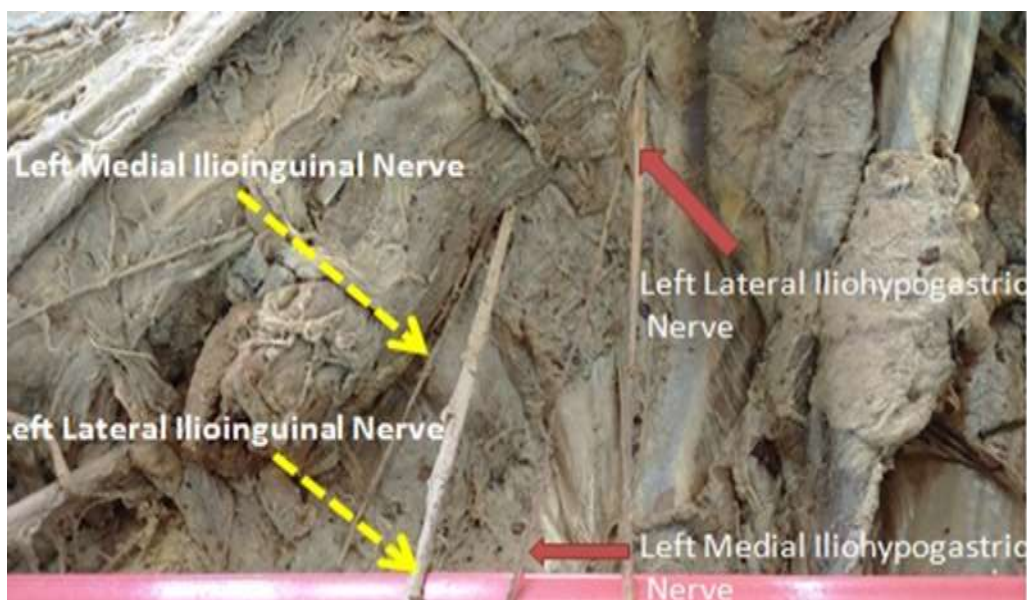


Figure 3: Left double iliohypogastric and ilioinguinal nerves originating individually from first lumbar spinal segment

While on the right side of these cadavers the nerve originates by a common trunk which attaches to the first ventral lumbar spinal segment, then this trunk was divided at the lateral border of psoas major muscle into two branches superior iliohypogastric and inferior iliopinguinal nerves (Figure 4).

While in the second cadaver the origin of two nerves from the first ventral lumbar spinal segment was differs in iliohypogastric nerve from that of ilioinguinal nerve. The iliohypogastric nerve originates from the first ventral lumbar spinal segment as two branches, lateral and medial both of them have the same diameter. While the origin of the ilioinguinal nerve in the form of single trunk, then this trunk divided at the lateral border of psoas major muscle into lateral and medial branches (Figure 5).

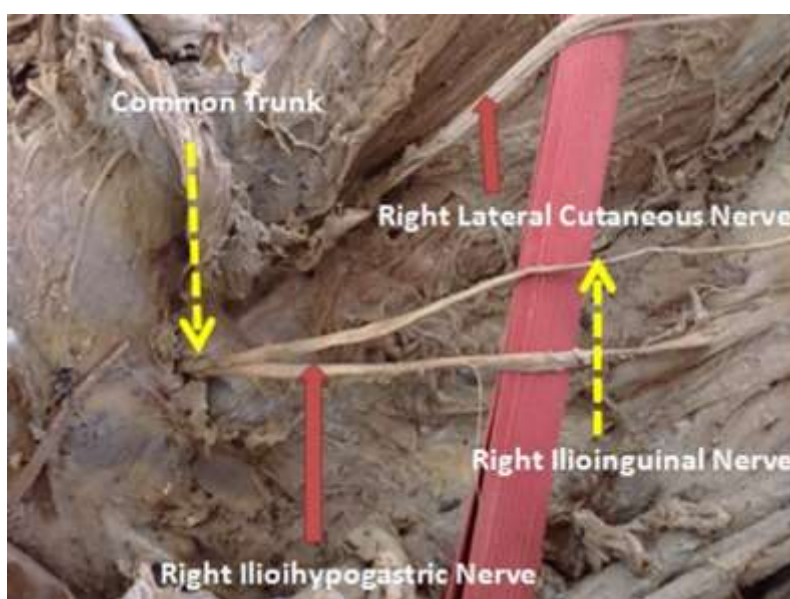


Figure 4: Right common Ilioinguinal and Iliohypogastric nerves from the first lumbar spinal segment

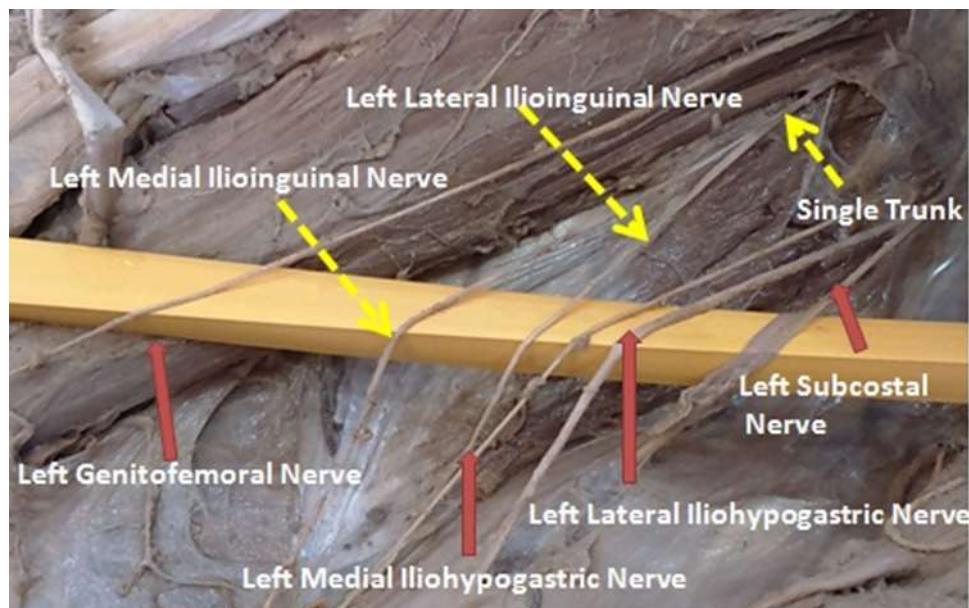


Figure 5: Left double Ilioinguinal nerves originating from first lumbar spinal segment as a single trunk

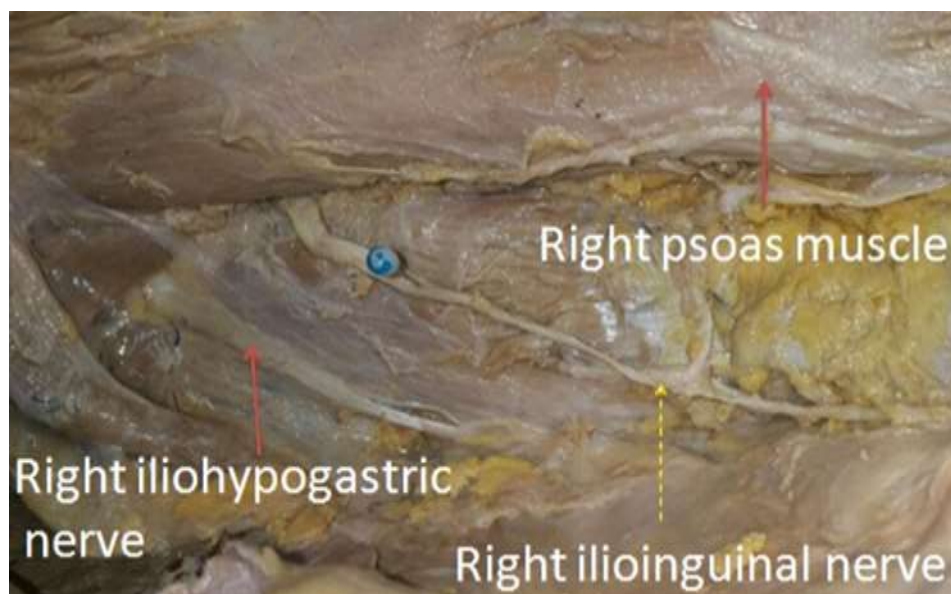


Figure 6: Separate origin of the right ilioinguinal and iliohypogastric nerves from the first lumbar spinal segment

In the right side of this cadaver the two nerves originate individually from the first ventral lumbar spinal segment passing obliquely downward from the lateral border of psoas muscle anterior to quadrates lumborum muscle (Figure 6).

The incidence of double IIN was seen in 8.44% cadavers, and it was more in the left side. This was higher than the finding reported in earlier similar studies when the incidence of double IIN was 2-5.9%, as explained in (Table 1).⁽⁶⁻⁹⁾ Incidence of double iliohypogastric nerve was not reported according to the internet search, and also the association of double iliohypogastric and double ilioinguinal nerve was not reported.

Table 1: Reported incidence of double IIN in literature

Study	Year	Regions	No.	%
Uzmansel et al., ⁽⁹⁾	2006	Case report	1	–
Assane et al., ⁽⁶⁾	2010	100	1	1
Selda et al., ⁽⁸⁾	2012	34	2	5.9
Sushma et al., ⁽⁷⁾	2015	50	1	2
Current study	2017	154	13	8.4

4. Conclusion

Cadaveric dissection of the nerve topography delineates variations not commonly cited in anatomical textbooks. The variations in the emergence and distribution of the Iliohypogastric and Ilioinguinal nerves are the cause of the failures of these nerves block and the difficulties at interpreting the iliohypogastric ilioinguinal nerves during the groin surgeries leading to postoperative and perioperative morbidity. A better knowledge of the regional anatomy and its variations is essential for preventing from the injury to the branches of the lumbar plexus and thereby avoiding postoperative complications. The variations in the lumbar plexus have clinical implications in Lumbar Plexus Blockade (LPB) during procedures like hip and knee arthroplasties, inguinal hernioraphy, obstetric surgeries, appendectomy, femoral artery angiography and pelvic surgeries.

Recommendations

Knowledge of various atypical innervation patterns will allow surgeons to properly identify vital nerves and reduce the risk of postoperative complications.

Also it enables the anesthetist to propose techniques for ilioinguinal and iliohypogastric block performance using more accurate anatomical landmarks formed by the inguinal ligament and the ventral cranial iliac spine, and a better diagnostic approach of ilioinguinal and iliohypogastric neuropathies. The nerves are related to the lower pole of the kidney posteriorly on their respective sides, so it should be also avoided during any surgical treatment related to the kidney, especially the lower pole.

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Conflict of interest

The author declared no conflicts of interest with respect to research, authorship, and publication of this article.

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