

Variations In Origin Of Iliohypogastric Nerve And Its Clinical Implications - A Cross Sectional Observational Study

Research Article

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Abstract

Introduction: Iliohypogastric nerve, one of the branches of lumbar plexus supplies the anterior abdominal wall muscles. It is prone to injury during surgeries like hysterectomy and appendectomy. Hence a sound knowledge of the variations in origin of iliohypogastric nerve is important for surgeons to prevent iatrogenic injury.

Aim: The present study aims at documenting the variations in origin of iliohypogastric nerve from lumbar nerve roots and its clinical significance.

Material and Methods: A cross-sectional study was conducted on fifty (50) specimens by dissecting twenty five (25) embalmed adult human cadavers of South Indian population out of which 20 were male & 5 were female cadavers. The study was conducted by dissection method in the Department of Anatomy in Sri Siddhartha Medical College, Tumkur and Sri Siddhartha Institute of Medical Sciences and Research Centre, T Begur, Bangalore Rural.

Results: Out of the 50 specimens, variations in iliohypogastric nerve were observed in 13 specimens. The variations encountered were absence of Iliohypogastric nerve in 2 specimens and origin of Iliohypogastric nerve from ventral ramus of T12 spinal nerve in 11 specimens.

Conclusions: Knowledge of relevant regional anatomy is essential in localising neurological lesions of nerves, preventing surgical injuries and iatrogenic anaesthetic complications.

Keywords: Conjoint Tendon; Inguinal Hernia; Herniorrhaphy; Transversus Abdominis Muscle.

Introduction

The Iliohypogastric nerve (IHN) originates from the ventral ramus of first lumbar nerve. It emerges from the upper lateral border of psoas major, crosses obliquely behind the lower pole of kidney and in front of quadratus lumborum. It enters the posterior part of transversus abdominis by passing above the iliac crest. Between transversus abdominis and internal oblique, it divides into lateral and anterior cutaneous branches. The lateral cutaneous branch runs through internal and external oblique above the iliac crest, a little behind the iliac branch of the twelfth thoracic nerve, and is distributed to the posterolateral gluteal skin. The anterior cutaneous branch runs between and supplies internal

oblique and transversus abdominis, including the conjoint tendon. It runs through internal oblique 2 cm medial to the anterior superior iliac spine, and through the external oblique aponeurosis 3 cm above the superficial inguinal ring, and is then distributed to the suprapubic skin. The iliohypogastric nerve connects with the subcostal and ilioinguinal nerves [1].

IHN is occasionally injured during an oblique surgical approach to the appendix. Division of the iliohypogastric nerve above the anterior superior iliac spine may weaken the posterior wall of the inguinal canal and predispose to formation of a direct hernia [2]. The iliohypogastric nerve passes forward around the abdominal wall and pierces the external oblique aponeurosis above the superficial inguinal ring. The IHN can be blocked by inserting the

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anesthetic needle 2.5 cm above the anterior superior iliac spine on the spinoumbilical line [3].

Hence a thorough knowledge of the regional anatomy shall aid surgeons in avoiding any iatrogenic injury and prevent untoward post-operative complications.

Materials and Methods

A cross-sectional study was conducted on fifty (50) specimens by dissecting twenty five (25) embalmed adult human cadavers of South Indian population, out of which 20 were male & 5 were female cadavers.

This study was conducted by dissection method in the Department of Anatomy in Sri Siddhartha Medical College, Tumkur (19 cadavers) and Sri Siddhartha Institute of Medical Sciences and Research Centre (6 cadavers) T Begur, Bangalore Rural.

The standard procedure was followed for dissection [4].

Selection of specimen and methodology

- Inclusion criteria - Cadavers in which anterior abdominal wall and abdominal viscera had been studied and removed with undisturbed posterior abdominal wall structures were selected for the study.
- Cadavers with intact twelfth thoracic, 5 lumbar vertebrae, sacrum, psoas major, quadratus lumborum, transversus abdominis, and iliacus muscle were included in the study.
- Exclusion criteria -Specimens with any abnormality or pathology in this region disturbing the nerve anatomy were excluded from the study.
- The posterior abdominal wall was visualised and the structures namely 12th rib, Psoas Major, Quadratus Lumborum, Transversus Abdominis, Iliacus muscles and their covering fascia were identified. The muscles were exposed by removing their fascial covering. Injury to the nerves related to the muscles was avoided.

The Psoas Major muscle was traced through its whole length in the abdomen.

- The iliohypogastric nerve emerging from upper lateral border of the muscle was exposed, identified and cleaned.
- Variations if any in the emergence of the nerve from borders and surfaces of the Psoas muscle were noted. The specimen was numbered and photographed documenting the emergence of nerve from the Psoas muscle.
- The Psoas muscle was then removed by piecemeal from the transverse processes of the lumbar vertebrae and intervertebral discs, disentangling the ventral rami of the lumbar nerves from its substance thus exposing the plexus and its branches.
- The vertebrae were identified by articulation of 12th rib with 12th thoracic vertebra and also by identification of lumbosacral joint between 5th lumbar vertebra and sacrum. Roots were identified emerging from corresponding intervertebral foramina.
- Formation of iliohypogastric nerve was observed. Variations were taken note of.
- Each specimen was photographed individually after dissection.

Results

IHN was observed to be formed by the ventral ramus of L1 spinal nerve. (Table 1) In the present study, variations in IHN were observed in 13 specimens. (Graph 1).

The variations encountered were:

- a) Absence of IHN in 2 specimens. (Fig.No.1)
- b) Origin of IHN from ventral ramus of T12 spinal nerve in 11specimens. (Fig.No.2)

Discussion

Ilioypogastric nerve is one of the branches of lumbar plexus located in the posterior abdominal wall. It arises from the ventral rami of first lumbar nerve [1]. Variations in the origin of iliohy-

Table 1. Variations In Iliohypogastric Nerve.

TYPE	TOTAL N = 50	%
NORMAL Originating from L1	37	74
ABSENT	2	4
ORIGINATING FROM T12	11	22

Graph 1. Variations In Iliohypogastric Nerve.

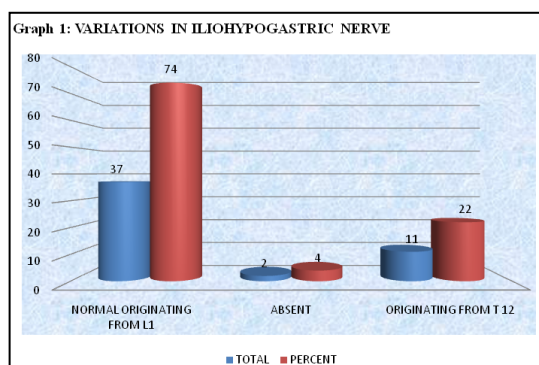


Figure 1. Specimen no 38 showing absence of Iliohypogastric nerve.

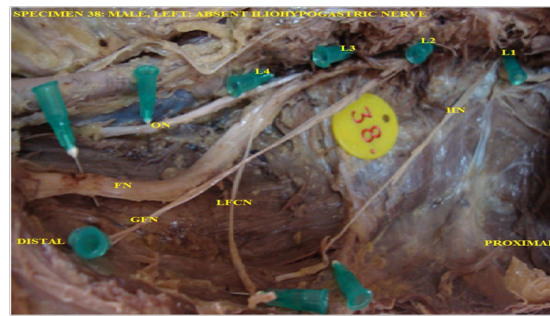


Figure 2. Specimen no 36 showing origin of iliohypogastric nerve from T12.

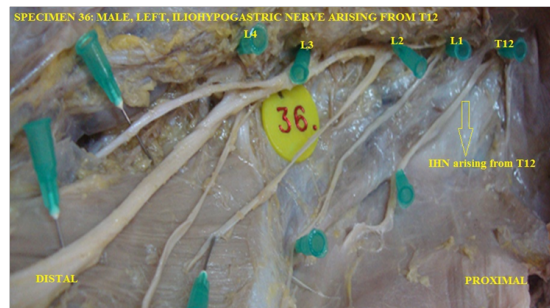
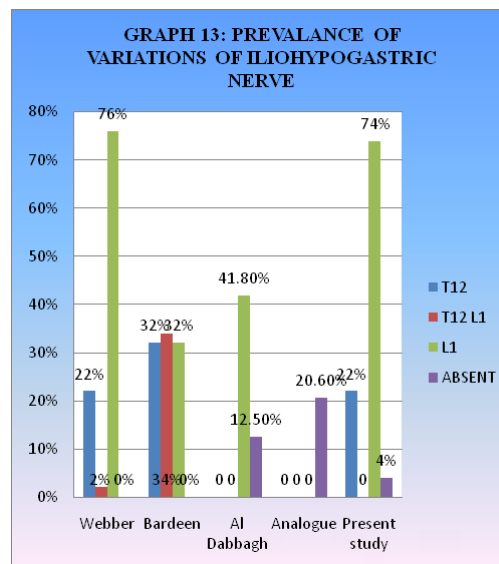


Table 2. Prevalence Of Variations In Iliohypogastric Nerve.

IHN	T12	T12 L1	L1	ABSENT
Webber	22%	2%	76%	0
Bardeen	32%	34%	32%	0
Al Dabbagh	-	-	41.80%	12.50%
Analogue				20.60%
Present	22%	-	74%	4%

Graph 2. Prevalence Of Variations Of Iliohypogastric Nerve.



pogastric nerve are quite common and a sound knowledge of the relevant regional anatomy is of significant clinical importance.

Bergman RA, Affi AK, Miyauchi R have stated that the iliohypogastric nerve is sometimes derived from the 12th thoracic nerve and may also receive a root from the 11th thoracic nerve [5]. The iliac branch of iliohypogastric nerve may be absent, replaced by the lateral cutaneous branch of the 12th thoracic nerve. The hy-

pogastric branch may supply the pyramidalis muscle and may be joined with the 12th thoracic nerve [5].

Various studies have reported variations in origin of iliohypogastric nerve (Table 2, Graph 2).

Webber in 1961 reported that the IHN was a branch from 12th thoracic nerve in 22%, and it was from both 12th thoracic and

1st lumbar in 2% but in 76% it arose as a branch of L1 nerve [6]. Bardeen in 1906 reported that IHN arose in 2% of cases from T11& T12 spinal nerves, in 32% from T12, 34% from T12 & L1 and in 32% from L1 [7].

Mallikarjun in 1997 reported IHN arising from L1 in 74% cases and from T12 L1 in 26% cases [8]. Lonkas M in 2011 conducted a study on 200 IHN and IIN specimens. He reported that IHN originated from T12 on 14 sides (7%), T12 L1 on 28 sides (14%), L1 on 20 sides (10%), T11 T12 on 12 sides (6%) [9].

Anloague AP, Huijbregts P reported 20.58% variations in IHN out of 34 cases studied, with absence of IHN in 7 cases (20.6%) [10]. Griffin M conducted a study on 50 cases and reported 2 cases of absent IHN [11]. Al Dabbagh (2002) in his study on 110 cases to identify anatomical variations in inguinal course of IIN and IHN reported the following variations. i) absence of one or both the nerves in 8 of 64 cases. ii) accessory IIN or IHN in 3 of 64 cases. iii) aberrant origin of IIN from GFN in 2 of 64 cases. iv) single stem for both nerves over spermatic cord in 24 of 64 cases [12].

In the present study, IHN was seen arising from L1 in 37 cases (74%), arising from T12 in 11 cases (22%), absent in 2 cases (4%). In the present study IHN arising from L1 in 74% and arising from T12 in 22% is similar to study of Webber.

Anatomical variations in the inguinal course of the iliohypogastric nerves are extremely common. Their early identification and preservation is likely to abolish, or considerably decrease, the incidence of postoperative sensory changes and or neuralgia pain [12].

Mandelkow H and Loeweneck H conducted a study on courses of IHN 44 adult human cadavers to clarify their relations to incisions in the abdominal wall in appendectomy, inguinal hernia repair, caesarean section and lumbar nephrectomy. The following observations were made i) to avoid cutting the anterior branch of IHN and IIN in appendectomy, incisions should be placed at a distance of not less than 3 cm from anterior superior iliac spine ii) in performing a lower paramedical incision (Lennander) and Pfannenstiel's suprapubic incision, the IHN will be spared if the incision passes at least 5cm cranial to the inguinal ligament. iv) during oblique lumbar incision for nephrectomy (Bergman - Israel) the IHN can be easily found in middle 1/3rd of lateral margin of quadratus lumborum muscle, where it should be displaced carefully downwards [13].

The iliohypogastric nerve is usually injured in conjunction with other nerves like ilioinguinal nerve. The most common causes of injury are surgical procedures requiring transverse lower abdominal incisions like hysterectomies, inguinal herniorrhaphy and appendectomies. A suture around the nerve incorporating it into the fascial repair, or postoperative entrapment in scar tissue or neuroma formation is common. Trauma or muscle tears of the lower

abdominal muscles may also result in injury to the nerve. Rapidly expanding abdomen as in pregnancy, ascites may also injure the nerve. This is called the idiopathic iliohypogastric syndrome and is rare [14].

IHN blocks can be used for inguinal or genital operations, such as inguinal herniorrhaphy or orchipexy, or for postoperative pain relief [15].

Conclusion

Ilioypogastric nerve, one of the branches of lumbar plexus exhibits several variations in its formation. The knowledge of such deviations from the normal anatomy gains clinical importance as it is likely to be injured during certain surgical procedures like appendectomy. Hence a thorough knowledge of regional anatomy is important to prevent iatrogenic injury and postoperative complications.

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