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ANOMALOUS ARRANGEMENT OF CONTENTS OF LUMBOSACRAL TRIANGLE OF MARCILLE: A CLINICAL IMPLICATION

Pooja Singh*[1], Ritu Singh[2], Prasenjit Bose[1], Himani Singh[1], Vishakha Sontakke[1] and Richa Gurudiwan[1]

[1]Senior Resident, Department of Anatomy, All India Institute of Medical Sciences, Raipur, Chhattisgarh, 492009.
[2]Tutor, Department of Anatomy, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, 201308.

***Corresponding Author: Dr. Pooja Singh**
Senior Resident, Department of Anatomy, All India Institute of Medical Sciences, Raipur, Chhattisgarh, 492009.

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ABSTRACT
During routine dissection class, we encountered a variation of neurovascular structures of pelvis on 70 year old male cadaver. We observed bilateral variant pattern of structures that were deeply situated on lumbosacral triangle (LST), over ala of sacrum. The iliolumbar artery (ILA) arose directly from common iliac artery and lumbosacral trunk (LST) was formed at a lower level. So, the final arrangement on ala of sacrum from medial to lateral aspect were- sympathetic trunk, ventral ramus of L5, lateral sacral artery (LSA), lower division of ventral ramus of L4 nerve and obturator nerve. Better understanding of these variations will lead to greater success and helpful for clinicians, medical students and reasearchers.

KEYWORDS: Iliolumbar artery, Lumbosacral triangle, Ventral ramus, Ala of Sacrum.

INTRODUCTION
Lumbosacral triangle of Marcille is a triangular interval on each side of the body of 5th lumbar vertebra. It is bounded medially by 5th lumbar vert., laterally by medial border of psoas major muscle, apex is directed above and formed by the junction of psoas major and 5th lumbar vert., while base is formed by upper surface of ala of sacrum. Floor or posterior wall is formed by transverse process of 5th lumbar vert. and iliolumbar ligament.

Various important structures occupy this triangle and are arranged in three strata- deep, intermediate and superficial. Structures of deep stratum rest on the bony ala of sacrum and are named from medial to lateral side- ganglionated sympathetic trunk, lumbosacral trunk, iliolumbar artery and obturator nerve.[1] These structures emerged from the medial border of psoas major and run vertically over the ala of sacrum. Structures of intermediate stratum pass obliquely downwards and laterally, they include common iliac vessels. Structures of the superficial stratum crossed vertically in front of oblique structures- ureter crosses the common iliac vessels at the lateral angle of triangle, ovarian vessels cross the common iliac vessels lateral to the ureter, inferior mesenteric vessels traverse infront of the common iliac vessels at the medial angle of the left lumbosacral triangle and the nerve fibres from the hypogastric plexus on the medial side of inferior mesenteric vessels.

Here we reported a very rare case of anomalous arrangement of structures over the posterolateral wall of the pelvic inlet.

CASE REPORT
During routine dissection class of first year undergraduate medical students, we found bilateral variations of certain neurovascular structures in a 70 year old male cadaver. Focussing on the branches of posterior division of internal iliac artery, two branches arose - lateral sacral artery and the larger one was superior gluteal artery. The third branch of post. division i.e. IIiolumbar Artery (ILA) was absent on both side in the lumbosacral triangle, but it arose directly from the common iliac artery at L4 level and divided into iliac and lumbar branches beneath the psoas major [Fig 1a]. The largest branch of internal iliac artery i.e. Superior gluteal artery (SGA) and Lateral sacral artery (LSA) originated from common site of post. division of Internal Iliac Artery (IIA), just above the sacroiliac joint. SGA passed downward between ventral rami of L4 and L5 nerve and was directly resting on ala of sacrum. Now SGA goes downward and laterally, beneath the lumbosacral trunk (LST) and finally left the pelvis through greater sciatic foramen above the piriformis [Fig 1b]. We observed LSA originated much more medially, runs downward lateral to sympathetic trunk and enters into sacral foramina. Before entering the foramina LSA divided into two branches, upper one passed from 1st and 2nd ventral sacral foramina while lower branch entered from 3rd and

4th sacral foramina. Both LSA and SGA were the contents of lumbosacral triangle at deep strata [Fig 1b].

Normally, lumbosacral trunk is formed at upper margin of sacroiliac joint. But in this case, we noticed ventral rami of L4 and L5 joined to form lumbosacral trunk; about 4 cm below from the upper margin of sacroiliac joint [Fig 2b]. So, instead of lumbosacral trunk, ventral rami of L4 and L5 were the contents of LST [Fig 2b]. The other contents of LST were normal in their origin and course.

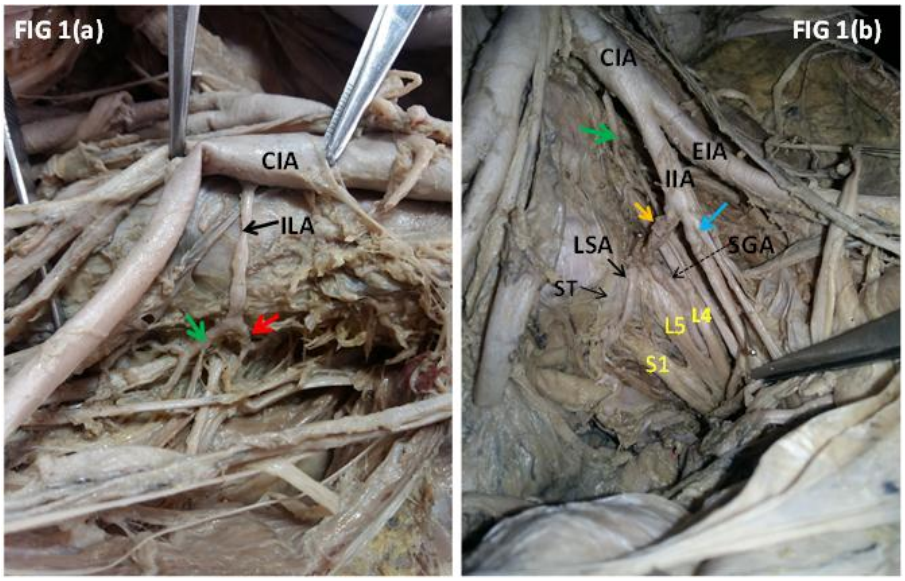

FIG. 1(a) Photograph of lower abdomen: showing Iliolumbar artery (ILA) originated from Common Iliac Artery (CIA) with its Iliac (green arrow) and lumbar (red arrow) branches.
FIG. 1(b) Photograph of lower abdomen and pelvis: showing External Iliac Artery (EIA), Ant. Division (blue arrow) and Post. Division (orange arrow) of Internal Iliac Artery (IIA), Lat.Sacral Artery (LSA), Sup. Gluteal Artery (SGA), Sympathetic trunk (ST) and ventral rami of L4, L5 and S1 nerves.

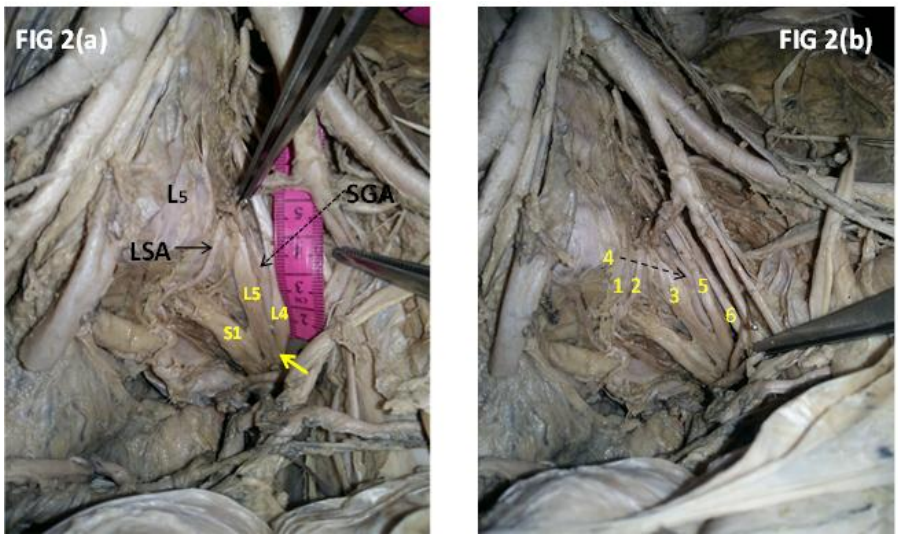

FIG. 2 Photograph at the ala of sacrum showing-
2(a) Formation of Lumbosacral trunk (yellow arrow) by joining of L4 and L5 nerves, 4 cm from the upper margin of pelvic brim (L5 vert. body)
2(b) Structures from medial to lateral are- 1. Ganglionated Sympathetic Trunk, 2. Lateral Sacral Artery, 3. ventral rami of L5, 4. Superior Gluteal Artery, 5. Lower division of ventral rami of L4, 6. Obturator nerve.

DISCUSSION

As regards the contents of lumbosacral triangle of Marcille, variation of branching pattern of IIA (Hypogastric Artery) is maximally studied previously. It is hypothesized that less or no data is available that explains the difference of structural arrangement in lumbosacral triangle of Marcille.

Jastschinski was the first person who classified the variations of parietal branches of the IIA into four types on Polish population. Adachi et al. categorized it into five types on Japanese population. Till now, so many researchers and clinicians have given their classification system. Knowledge of variations of neurovascular structures is important for surgeons, physicians and researchers.

In our study ILA was directly arising from common iliac artery at L4 vertebral level [Fig 1a]. Lipshutz observed that in 38% cases it was a branch of SGA and in 52% cases it was a separate branch of IIA. Lipshutz also stated that in 51% cases two lateral sacral arteries arose as a common trunk from posterior division of IIA, then superior branch gave origin to 1st spinal branch and entered through 1st ventral sacral foramen whereas inferior branch gave spinal branches for 2nd, 3rd and 4th ventral sacral foramina. In our study, we reported single lateral sacral artery arose from posterior division of IIA then it ran downwards and divided into two, upper one entered from 1st and 2nd ventral sacral foramina while lower one entered from 3rd and 4th ventral sacral foramen.

We observed that posterior division of IIA continued as SGA which passes between ventral rami of L4 and L5 nerve on ala of sacrum, now it ran deep to lumbosacral with a lateral orientation [Fig 2]. Finally SGA enter into greater sciatic foramen, above the pyriformis. Cruveilhier and Thiele also stated this vessel as a continuation of IIA. In 80% of their subjects it passed outwards between lumbosacral trunk and first sacral nerve.

Analyzing the embryological basis of variations of arterial system, it might be due to changes of hemodynamic and genetic factors. These vessels grow by budding and proliferation of endothelial cells and their anastomosing networks, due to those factors certain branches and tributaries become enlarged while some portion disappeared. Finally definitive vascular system is formed.

The lumbosacral trunk is form by the union of ventral rami of part of L4 and ventral rami of L5 [Fig 2]. It serves as a bridge between lumbar and sacral plexus. We reported the lower union of L4 and L5 nerves. It was about 4 cm below from upper margin of sacroiliac joint on both side. Waikakul et al. observed the union of L4 and L5 nerve was above (35.5%) and below (38.7%) from upper margin of sacroiliac joint. Atlihan et al. dissected 60 cadavers and reported an average distance of 11.49± 2.71 mm between superior aspect of the sacroiliac joint and the beginning of LST.

Due to presence of variations of above mentioned structures, the arrangement was also different from normal, on the pelvic brim (ala of sacrum) [Fig 2b].

Knowledge of these variations is very significant during pelvic surgeries, like- arterial ligations in case of hemorrhage, arterial embolization and monitoring of nerves during lateral vertebral body surgery. These structures are also important for rehabilitation of post operative patients.

CONCLUSION

It is important to provide accurate information about anatomy of human body. Variations of neurovascular structures of pelvis can potentially enhance the learning experience as well as clinical outcomes.

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CONFLICTS OF INTEREST

None

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