

VARIATIONS AND MORPHOMETRY OF ILIOLUMBAR ARTERY AND ITS RELATION WITH SURGICAL LANDMARKS

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ABSTRACT

The location and the variations of the iliolumbar artery are very important for surgeons, since it is used as a feeding pedicle in bone flaps and as it has an injury risk after a pelvic trauma or regional operations. The present study was carried on 25 sagittal sections of male and female pelvises. The variations in the origin of ILA were noted. The length of ILA was measured from its origin up to its branching point. The distances from its point of branching to the midpoint of sacral promontory and the bifurcation of CIA were measured. The relation of obturator nerve with the ILA was also observed. Statistical analysis was carried out using SPSS version 16. The ILA originated from the posterior division of IIA in 22 specimens whereas in 3 cases it originated directly from the trunk of IIA. The length of ILA ranged from 0.8 to 2.5cm in males and 0.5 to 2.1cm in females. Unpaired t test showed significant difference in the means between males and females ($p < 0.05$). The obturator nerve was found to be posterior to the ILA in all the specimens. Knowledge of the variations and morphometry of the ILA in relation to various anatomical landmarks may help the surgeons to minimize the postoperative complications.

INTRODUCTION

The iliolumbar artery (ILA) arises from the posterior division of the internal iliac artery (IIA) and it extends in an oblique course, in front of the sacroiliac joint and the lumbosacral trunk. It crosses the obturator nerve (ON) and the external iliac vessels. Subsequently, it reaches the medial edge of the psoas major and divides into lumbar and the iliac arteries, and supplies the iliac bone, iliopsoas, quadratus lumborum, and the cauda equina [1]. The lumbar branch of ILA is related to psoas and quadratus lumborum, the spinal branch passing between the first sacral and fifth lumbar vertebrae enters the vertebral canal to supply the spinal nerve, and the iliac

branch passing to iliacus muscle in the iliac fossa [2, 3, 4]. Along its course, the iliac branch anastomoses with the gluteal, circumflex iliac, external circumflex and external branch of the epigastric arteries [5, 6, 7]. ILA also contributes to the vascular supply collateral branches to the sciatic nerve [8].

The IIA and its branches can be damaged during the anterior and the anterolateral spinal approaches, lumbosacral spinal endoscopic procedures, and especially during far-lateral disc excisions. Additionally, during anterior approaches to the sacroiliac joint for arthrodesis or internal fixation, posterior pelvic fractures these vessels can be injured [9, 10]. The location and the variations of the iliolumbar artery are very important for surgeons, since it is used as a feeding pedicle in bone flaps and as it has an injury risk after a pelvic trauma or regional operations [11, 12].

Variability of the origin of the ILA has been reported previously in the literature. In the present study

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the variations of ILA were observed and its morphometry in relation to various anatomical landmarks was also studied.

MATERIALS AND METHODS

The present study was carried on 25 sagittal sections of male and female pelvises of embalmed cadavers from the Department of Anatomy Kasturba Medical College, Manipal. The specimens were dissected for the branches of IIA and the ILA was noted. Distances were measured using digital callipers.

The variations in the origin of ILA were noted. The length of ILA was measured from its origin up to its branching point. The distances from its point of branching to the midpoint of sacral promontory and the bifurcation of

common iliac artery (CIA) were measured (figure 1). The relation of obturator nerve with the ILA was also observed. Statistical analysis was carried out using SPSS version 16. The gender difference in the parameters was analysed using unpaired t test.

RESULTS

Out of 25 sagittal sections, 17 were males and 8 were females. The ILA originated from the posterior division of IIA in 22 specimens whereas in 3 cases it originated directly from the trunk of IIA (Figure 2). The length of ILA ranged from 0.8 to 2.5cm in males and 0.5 to 2.1cm in females. The mean and standard deviations of the measured parameters are shown in table 1.

Table 1. Mean and standard deviations of the measured parameters

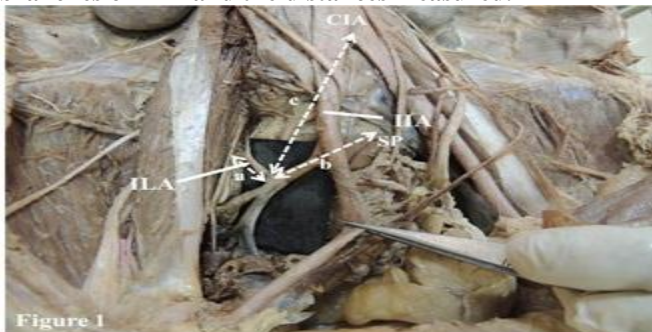
Parameters measured (in cm)	Male (N=17)	Female (N=8)
Length of ILA	1.6±0.4	1.2±0.1
ILA- SP	3.6±0.8	3.5±0.7
ILA- CIA	6.9±1.6	4.4±1.6

ILA- Iliolumbar artery, SP- Sacral promontory, CIA- Common iliac artery

Unpaired t test showed significant difference in the means between males and females ($p < 0.05$). The measurements between the right and left sides were not compared because the sagittal sections belonged to different cadavers.

The obturator nerve was found to be posterior to the ILA in all the specimens.

Figure 1. The sagittal section of pelvis showing the branches of ILA and the distances measured.



IIA- Internal iliac artery, ILA- Iliolumbar artery, SP- Sacral promontory, CIA- Common iliac artery
Length of ILA, b- ILA to SP, c- ILA to CIA

Figure 2. The sagittal section of pelvis showing the origin of ILA directly from the trunk of IIA.



IIA- Internal iliac artery, ILA- Iliolumbar artery, AD and PD- Anterior and posterior divisions of internal iliac artery

DISCUSSION AND CONCLUSION

The vascular anatomy of the pelvis and the sacrum is also very important in orthopaedic surgeries and in some spinal fixations. ILA can be injured during shearing fractures because it has very close relation with the sacroiliac joint. Therefore if a patient has a pelvic posterior arcus fracture and bleeding symptoms, the risk of injury of the ILA should be considered [13].

The literature reveals numerous cadaveric studies in which the variations of ILA were noted. The ILA originated from the posterior division of the IIA in 80% and from the trunk of IIA in 20% of studies specimens

[14]. ILA originated from CIA in 4.8%, from the trunk of IIA in 71.4% from posterior trunk of IIA in 19% and from two different points from internal iliac artery in 4.8% of cases [8]. Reports are available that the ILA arises 96.3% from the IIA and 3.7% from the CIA [4]. Few studies have also mentioned that the ILA arises from the IIA in all specimens studied [13]. In the present study the ILA originated from the posterior division of IIA in 22(88%) specimens whereas in 3 cases (12%) it originated directly from the trunk of IIA.

ILA and its branch supplying ilium have a risk of injury during anterior approaches to sacroiliac joint for



arthrodesis and an internal fixation. Thus, the anatomic location of this artery must be well known [15].

The morphometry of ILA is been reported in the literature by many authors. The mean distance between the origin of the ILA to the bifurcation point were 12.2±5.5 mm, 13.2±5.5 mm and 12.2±5.5 mm In the present study length of ILA from its origin to bifurcation point was 1.6±0.4 and 1.2±0.1cm in males and females respectively.

The authors have also measured the distances using important surgical landmarks. The distance between the origin of the ILA and the lower edge of the fifth lumbar vertebra was 43.2±11.6 mm, 43.2±12.6 mm, and 43.2±12.0 mm [8, 14, 16]. In the present study sacral promontory was taken as the reference point and the ILA was located at a distance of 3.6±0.8 and 3.5±0.7 cm from it.

The distance between the origin of the ILA and the bifurcation point of the CIA was 38.7±10.6 mm and 28.7±12.6 mm [8, 14]. In the present study the distance was 6.9±1.6 and 4.4±1.6 cm.

The ILA passed anterior to the obturator nerve in 70 % cadavers (28 cases) and posteriorly in 30 % cadavers (12 cases) [14]. In the present study the ON was found to be posterior to the ILA in all the specimens.

ILA can be injured during an L5-S1 far-lateral disc excision and he emphasized the importance of its variations at this level. An injury to it during surgery may lead to acute haemorrhage or a postoperative haematoma [16]. The anatomical variations of the ILA can also be important for harvesting the vascular iliac bone graft. The surgeons should consider that the anatomical variations of the ILA may complicate the lumbosacral junction and the posterior sacroiliac fixations [17].

The present morphometric study provides information about the location and variability in the origin of ILA, the knowledge of which would be essential for careful surgical approaches.

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