International Journal of Anatomy and Research,
Int J Anat Res 2020, Vol 8(3.2):7665-68. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2020.182

Case Report

MEANDERING LOOP OF INFERIOR EPIGASTRIC ARTERY IN INGUINAL CANAL

C.S. Ramesh Babu *[1], Vinay Sharma [2].

[*1] Associate Professor of Anatomy, Muzaffarnagar Medical College, Muzaffarnagar, (U.P), India.

[2] Professor of Anatomy, Muzaffarnagar Medical College, Muzaffarnagar, (U.P), India.

ABSTRACT

Inferior epigastric artery has gained lot of attention because of its injury while performing various percutaneous anterior abdominal wall interventional procedures. An anomalous meandering loop of inferior epigastric artery extending medially in the posterior wall of inguinal canal was observed bilaterally in a male cadaver. From its origin the artery turned horizontally medially in the extraperitoneal fat and then turned upwards after forming a loop. The loop was 38.42 mm away from the midline on right side and 41.02 mm on the left side. After entering the rectus sheath the artery ran vertically along the lateral border of rectus abdominis for a short distance before passing posterior to muscle. Looped course of inferior epigastric artery in the posterior wall of inguinal canal has not been reported in literature. Catastrophic consequences can occur if a surgeon is caught unaware of an anomalous vessel during laparoscopic inguinal hernia repair.

KEY WORDS: Deep Inferior Epigastric Artery, Inguinal canal, Variant course.

Corresponding Author: C.S. Ramesh Babu, M.Sc. (Anatomy), Associate Professor of Anatomy, Muzaffarnagar Medical College, Muzaffarnagar. -251203 (U.P), India.
Mobile: +91-9897249202 **E-Mail:** csrameshb@gmail.com

Access this Article online	Journal Information
Quick Response code	**International Journal of Anatomy and Research**
	RG Journal Impact: 0.21*
	ISSN (E) 2321-4287 | ISSN (P) 2321-8967
	https://www.ijmhr.org/ijar.htm
	DOI-Prefix: https://dx.doi.org/10.16965/ijar
DOI: 10.16965/ijar.2020.182	**Article Information**
	Received: 01 Jul 2020 — Accepted: 28 Jul 2020
	Peer Review: 01 Jul 2020 — Published (O): 10 Aug 2020
	Revised: None — Published (P): 10 Aug 2020

INTRODUCTION

Inferior epigastric artery (IEA) or deep inferior epigastric artery (DIEA) as clinicians prefer to call it, arises from external iliac artery just proximal to the level of inguinal ligament. The DIEA arising from the medial aspect of external iliac, proceeds caudally for a short distance and then making a loop turns superomedially in the extraperitoneal fat [1]. It ascends along the medial margin of the deep inguinal ring to pierce the fascia transversalis to enter the rectus sheath at the level of arcuate line midway between pubic symphysis and umbilicus. Its superomedial course from deep inguinal ring to lateral border of rectus, an important surgical landmark, is used to define the lateral border of inguinal triangle of Hesselbach. After entering the rectus sheath, the artery ascends between the rectus and posterior rectus sheath to anastomose with superior epigastric artery above the level of umbilicus.

Increased use of various percutaneous anterior abdominal wall interventional procedures, laparoscopic surgeries and tissue flaps from anterior abdominal wall, for example, deep inferior epigastric artery perforator (DIEAP) flap, has kindled interest to study the detailed anatomy of vasculature of anterior abdominal wall. One of the main puncture-related complications of such interventional procedures is injury to IEA with a reported incidence of 0.2% to 2.0% [2]. Observations based on combined

cadaveric and radiographic studies on 244 cases have indicated that DIEA existed consistently in all cases without anomalies [3,4]. Most of the anatomical, surgical and radiological studies have focused their attention on the site of origin, position in the rectus sheath and branching pattern of the DIEA with a relevance to assess a safe zone for entry of laparoscopic instruments and to raise various types of tissue flaps based on the perforators for reconstructive surgeries. The DIEA may arise from the external iliac at a higher level than usual, from femoral artery below the inguinal ligament, from profunda femoris or as a common trunk with deep circumflex iliac artery[5.6]. Very little attention has been paid to anomalous proximal course of the artery in the inguinal region. We report here bilateral presence of a meandering loop of DIEA in the inguinal canal running medially parallel to inguinal ligament and then making a loop to ascend to reach the rectus sheath.

CASE REPORT

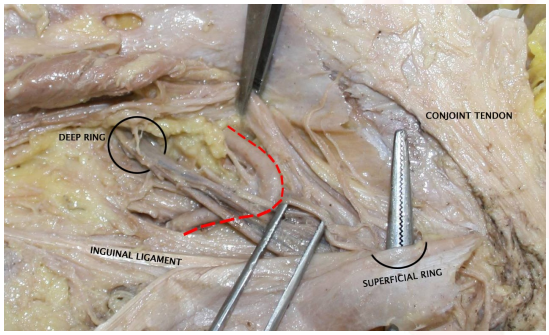

Fig. 1: Right inguinal canal dissection showing the loop of inferior epigastric artery in the inguinal canal midway between deep and superficial inguinal rings. The convexity of the loop is directed inferomedially.

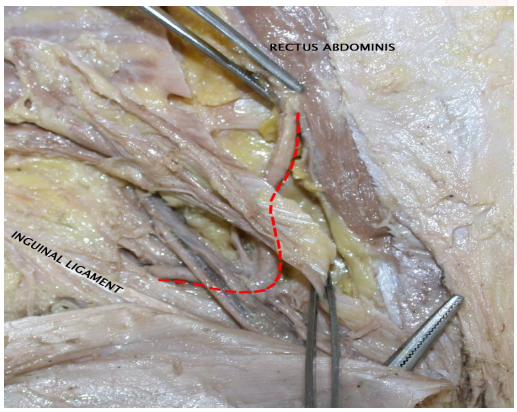

Fig. 2: Dissection of right inguinal region showing the loop of inferior epigastric artery in inguinal canal. Note the course of inferior epigastric artery along the lateral border of rectus abdominis after piercing the rectus sheath.

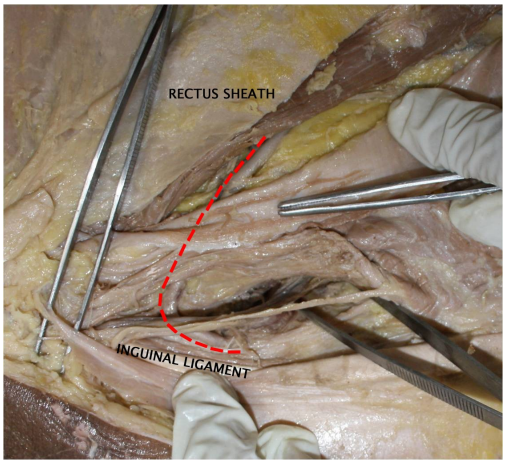

Fig. 3: Left inguinal canal dissection showing the loop of inferior epigastric artery. The artery after piercing the rectus sheath ascends for a short distance along the lateral border of rectus abdominis.

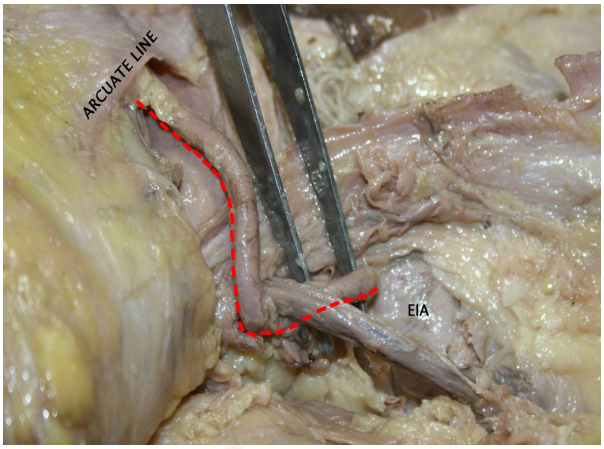

Fig. 4: L- shaped course of left inferior epigastric artery. Note the vertical course of the artery along the lateral border of rectus before passing deep to the muscle at the level of arcuate line.

The meandering loop of DIEA was observed bilaterally in a male cadaver during routine dissection. The DIEA had a normal origin from the external iliac artery just proximal to inguinal ligament with an external diameter of 3.16 mm on the right side and 3.56 mm on the left side. On the right side from its origin, the artery ran horizontally medially for about 24.86 mm and then made a loop, lying 38.42 mm from midline, with the convexity directed inferomedially (Figure-1). The artery turned upwards to pierce the rectus sheath to ascend along the lateral border of rectus and passed deep to the rectus at a point 68.56 mm above the pubic tubercle (Figure-2). On the left side the artery ran horizontally for about 23.92 mm and then making a loop to ascend to pass deep to the rectus 69.46 mm above pubic tubercle (Figures 3, 4). On the left side the loop lies 41.02 mm from midline.

DISCUSSION

Anatomical knowledge of origin, course, branching pattern of DIEA and its variations are most crucial to avoid complications during inguinal hernia surgery, application of various percutaneous procedures such as paracentesis, tru-cut or fine needle biopsies, peritoneal dialysis, insertion of laparoscopic instruments, laparoscopic tubal sterilization, abscess drainage and planning of skin flaps for reconstructive surgeries [7] Trocar injury to DIEA during laparoscopic hernia repair though rare, is well recognized and occurs during transabdominal pre-peritoneal (TAPP) repair [8,9].

Because of the occurrence of puncture related injury to the DIEA during various transabdominal percutaneous interventional procedures much attention has been paid to the assessment of a "safety zone" for entry to prevent iatrogenic injuries [10-13]. Though DIEA was more notorious in its course, it is generally agreed upon that the artery is usually located in the area between 4 and 8 cm from the midline and the safety zone of entry is staying away from this area. Presence of branches of DIEA crossing the lateral and medial borders of rectus muscle has led to the suggestion that the medial safer zone lies within 1 cm on either side of midline and lateral safer zone lies 8 cm from the midline [14]. The point where the DIEA crosses the lateral border of rectus abdominis as measured from pubic symphysis was found to range from as little as 0 cm to as much as 10 cm as revealed by cadaveric studies [10].

Vascular injuries due to trocar insertion have been reported to occur during laparoscopic inguinal hernia repair. Few cases of non-trocar vascular injury due to sharp dissection were also reported [8]. Recently Wani (2019) described a rare case of anomalous superficial course of DIEA at midpoint of the inguinal canal in a male presenting with double direct hernia, one on either side of the DIEA. The DIEA of normal origin from external iliac was observed passing superficially on posterior wall midway between the superficial and deep inguinal rings. The anomalous DIEA was found separating the two direct types of hernia [15]. We have presented here bilateral presence of a loop of DIEA traversing more than half the length of inguinal canal before turning upwards. The DIEA was having a "L" shaped course as it meanders through the extraperitoneal fat in the posterior wall of inguinal canal. A surgeon unaware of such rare anomalous course might cause iatrogenic injury to DIEA during laparoscopic inguinal hernia repair. To the best of our knowledge such a loop of DIEA in the inguinal canal has not been described in the literature.

CONCLUSION

Inferior epigastric artery being the most commonly injured vessel during laparoscopic entry through anterior abdominal wall, is widely studied for its position with respect to certain anatomical landmarks to identify a 'safe zone' for instrument entry. But very little attention has been paid to study its variant course, if any, in inguinal canal. The present case report has highlighted such an anomalous looped course in the inguinal canal which has not been reported in the literature. Catastrophic consequences can occur if a surgeon is caught unaware of an anomalous vessel during laparoscopic inguinal hernia repair

Conflicts of Interests: **None**

REFERENCES

[1]. Myung Y, Choi B, Yim SJ, Yun BL, Kwon H, Pak CS, et al. The originating pattern of deep inferior epigastric artery: anatomical study and surgical considerations. Surg Radiol Anat. 2018; 40 (8): 873-879. https://doi.org/10.1007/s00276-018-2055-8 PMid:29926133

[2]. Rao MP, Swamy V, Arole V, Mishra P. Study of the course of inferior epigastric artery with reference to laparoscopic portal. J Minim Access Surg. 2013; 9 (4): 154-158. https://doi.org/10.4103/0972-9941.118826 PMid:24250060 PMCid:PMC3830133

[3]. Ogawa K, Hanamure Y, Sameshima A, Nishimoto K, Sasaki K. Anatomy of deep inferior epigastric vessels. Otolaryngol Head Neck Surg. 1999; 121 (4): 499-501. https://doi.org/10.1016/S0194-5998(99)70245-7

[4]. Boyd JB, Taylor GI, Corlett R. The vascular territories of the superior epigastric and the deep inferior epigastric systems. Plast Reconstr Surg. 1984; 73 (1): 1-16. https://doi.org/10.1097/00006534-198401000-00002 https://doi.org/10.1097/00006534-19840 1000-00001 PMid:6197716

[5]. Ercamak B, Firat A, Gunenc Beser C, Bilgrin S, Sargon MF, Basar R. A combined anatomical variation of inferior epigastric vessels. Folia Morphol. 2012; 71 (4): 267-268.

[6]. Nayak BS, Mishra S, Geroge BM, Cherian SB, Shetty SD. Unusual branches of femoral artery in the femoral triangle - A case report. Int J Morphol. 2013; 31 (3): 819-821. https://doi.org/10.4067/S0717-95022013000300006

[7]. Genchellac H, Dursun M, Tenizoz O, Cagli B, Demir MK. Two detector computed tomography map of the inferior epigastric vessels for percutaneous transabdominal interventional procedures. Balkan Med J. 2014; 31: 72-76. https://doi.org/10.5152/balkanmedj.2014.13002 PMid:25207172 PMCid:PMC4115991

[8]. Raje D, Saunders M, Mukhtar H, Oshowo A. Second reported case of non-trocar injury of inferior epigastric artery during laparoscopic TAPP repair of inguinal hernia. Internet Journal of Surgery. 2006; 9 (2). https://doi.org/10.5580/253f

[9]. Lodha M, Bairwa B, Puranik A, Meena SP, Bulchandani H. Accidental inferior epigastric artery injury in laparoscopic inguinal hernia repair. A case report. J Clin Diagn Res. 2018; 12 (7): PD01-PD02 https://doi.org/10.7860/JCDR/2018/33997.11717

[10]. Andrade D, Abranches D, Souza N, Pereira R, Sand A, Prinz R, Pereira-Correia J. An analysis of the anatomical trajectory of the inferior epigastric arteries in the era of videolaparoscopic surgery: Is there in fact a “safety zone” for the prevention of iatrogenic lesions? Eur J Anat. 2012; 16 (1): 43-48.

[11]. Joy P, Simon B, Pritishkumar IJ, Isaac B. Topography of inferior epigastric artery relevant to laparoscopy: a CT angiographic study. Surg Radiol Anat. 2015. Published online 19 July, 2015. https://doi.org/10.1007/s00276-015-1513-9 PMid:26188502

[12]. Epstein J, Arora A, Ellis H. Surface anatomy of the inferior epigastric artery in relation to laparoscopic injury. Clin Anat. 2004; 17 (5): 400-408 https://doi.org/10.1002/ca.10192 PMid:15176037

[13]. Saber AA, Meslemani AM, Davis R, Pimentel R. Safety zone for anterior abdominal wall entry during laparoscopy. A CT scan mapping of epigastric vessels. Ann Surg. 2004; 239 (2): 182-185. https://doi.org/10.1097/01.sla.0000109151.53296.07 PMid:14745325 PMCid:PMC1356210

[14]. Wong C, Merkur H. Inferior epigastric artery: Surface anatomy, prevention and management of injury. ANZJOG, 2015. https://doi.org/10.1111/ajo.12426 PMid:26627186

[15]. Wani I. Double direct hernia, triple indirect hernia, double pantaloons hernia (Jammu, Kashmir and Ladakh Hernia) with anomalous inferior epigastric artery: a case report. International Journal of Surgery Case Reports. 2019;60:42-45. https://doi.org/10.1016/j.ijscr.2019.05.035 PMid:31200214 PMCid:PMC6563333

How to cite this article:

C.S. Ramesh Babu, Vinay Sharma. MEANDERING LOOP OF INFERIOR EPIGASTRIC ARTERY IN INGUINAL CANAL: A CASE REPORT. Int J Anat Res 2020;8(3.2):7665-7668. **DOI:** 10.16965/ijar.2020.182