Case Report:

Variations in the cystic and iliolumbar arteries with Psoas minor muscle

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ABSTRACT

The knowledge of multiple variations in peripheral blood vessels and muscles is important as these structures can be injured during a surgical procedure or regional anaesthesia. Some unusual clinical symptoms may arise due to these variations. While doing the routine dissection for MBBS Students, in the Department of Anatomy, NRS Medical College, Kolkata, India, few variations were found in abdomen of two male cadavers in December, 2013. In one cadaver, the cystic artery arose from the gastroduodenal artery. In the second cadaver, iliolumbar artery originated from the left common iliac artery and the psoas minor muscle was present on both sides. This case report will enhance our knowledge in gross and clinical anatomy.

KEY WORDS: Hepatic artery, cystic artery, gastroduodenal artery, iliolumbar artery, psoas minor muscle

INTRODUCTION

According to normal anatomy, the hepatic artery, after its origin from the celiac axis, passes anterolaterally to the upper border of the first part of the duodenum. It may be subdivided into the common hepatic artery (from the coeliac trunk to the origin of the gastroduodenal artery), and the hepatic artery ‘proper’ (from the point of origin of gastroduodenal artery to its bifurcation into right and left hepatic arteries at the porta hepatitis)\(^1\). The cystic artery usually arises from the right hepatic artery and passes anterior to the cystic duct and reaches the superior aspect of the neck of gallbladder to divide into superficial and deep branches. The origin of the cystic artery often varies. The most common variant is an origin from the common hepatic artery, sometimes from the left hepatic or gastroduodenal artery\(^1\).

The abdominal aorta bifurcates into right and left common iliac arteries to the left side of the fourth lumbar vertebral body. In addition to external iliac and internal iliac arteries each common iliac artery also gives small branches to the peritoneum, psoas major, ureter, adjacent nerves and surrounding areolar tissue. Each internal iliac artery divides into one anterior and one posterior trunk, behind the superior margin of the greater sciatic foramen. Iliolumbar artery is usually the first branch of the
posterior trunk of the internal iliac artery. It ascends laterally anterior to the sacroiliac joint and lumbosacral trunk to reach the medial border of the psoas major muscle where it divides into lumbar and iliac branches. The common iliac artery occasionally gives rise to iliolumbar artery.

Psoas minor is a muscle of the posterior abdominal wall. It is often absent, but when present, lies anterior to the psoas major. It arises from the bodies of the 12th thoracic and 1st lumbar vertebrae and from the disc between them. It ends in a long flat tendon attached to the pectineal line and ileopectineal eminence of the hip bone and laterally to the iliac fascia.

**MATERIALS AND METHODS**

While doing the routine dissection for MBBS students in December, 2013, few variations were found in the abdomen of two male cadavers, in the Department of Anatomy, NRS Medical College of Kolkata, India. One subject was about sixty years old and the other was about seventy years. Dissection was done properly in abdomen of the two cadavers. All the structures were observed minutely and relevant photographs were taken.

**OBSERVATIONS**

In the first cadaver, the cystic artery arose from the gastroduodenal artery instead of the right hepatic artery, passed upwards and it inclined towards the gallbladder on right side. The hepatic artery proper divided into right and left hepatic branches below the porta hepatis, before running into the liver parenchyma as usual.

In the second cadaver, the left iliolumbar artery originated from the left sided common iliac artery (instead of the posterior division of the internal iliac artery). Then it divided into iliac and lumbar arteries reaching the medial border of the psoas major muscle. On right side, the iliolumbar artery arose from the posterior division of the internal iliac artery as usual.

Moreover, psoas minor muscle was present on both sides in the posterior abdominal wall of the second cadaver. Both the muscles ended into long tendons in the lower part.

**Figure – 1;** The cystic artery (D) arose from the gastroduodenal artery (C) instead of the right hepatic artery (E), passed upwards and it inclined towards the gallbladder (G) on right side.

**Index:**

- A – Common hepatic artery,
- B – Hepatic artery proper,
- C – Gastroduodenal artery,
- D - Cystic artery,
- E – Right hepatic artery,
- F – Left hepatic artery,
- G – Gallbladder,
- H – Liver,
- I – Common bile duct,
- J– 1st part of the duodenum.
DISCUSSION

The cystic arteries vary markedly in regard to the arterial stem from which they arise. A cystic artery arise from a source other than the right hepatic artery in about 10% of the bodies\(^2,3\). Daseler et al (1947) found in their study that in 85-90% cases cystic artery arose from the right branch of the hepatic artery and in 2.5% cases from the gastroduodenal artery\(^3\). According to Hollinshead (1971), this artery may arise from the aberrant right hepatic artery, the left hepatic artery (in about 5% cases or more), branches of the coeliac trunk, or even from the superior mesenteric artery\(^4\). Bergman et al stated that the cystic artery may arise from the downward-directed vessel, the gastroduodenal artery, or its branch, the superior pancreaticoduodenal artery. Origin from the more distant source is far less common (0.3%) than the nearer (2.6%) \(^5\).

Pushpalatha et al (2010) found in their study that the cystic artery arose from the right hepatic artery in 54% cases, from the hepatic artery proper in 22% cases, from the common hepatic artery in 12% cases, from the gastroduodenal artery in 8% cases, from the superior mesenteric artery in 2% cases and from the accessory hepatic artery in 2% cases\(^6\). In another study, among 150 cases, cystic artery arose from the right branch of the hepatic artery proper in 147 (98%) cases and from the gastroduodenal artery in 3 (2%) cases (including a case of double gallbladder) \(^7\). According to another recent study most common source of origin of the cystic artery was the right hepatic artery in 92% cases, followed by aberrant right hepatic artery in 4% cases, the left

**Index:** A - Left psoas major muscle, B - Left kidney, C – Left ureter, D - Abdominal Aorta, E - Left common iliac artery, F - Left lateral femoral cutaneous nerve.

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**Figure – 2:** In the second cadaver, the left iliolumbar artery (A) originated from left the sided common iliac artery (B) and it divided into two branches reaching the medial border of psoas major (C).

**Figure – 3:** Right sided psoas minor muscle (lying on the belly of psoas major muscle) was held with forceps.

**Index:** A – Right psoas major muscle, B – Right kidney, C – Right lateral femoral cutaneous nerve, D – Right ureter, E – Abdominal Aorta, F – Right common iliac artery.

**Figure – 4:** Left sided psoas minor tendon (lying on the belly of psoas major muscle) was held with forceps.
hepatic artery in 1% case and the gastroduodenal artery in 1% case.

Knowledge of cystic artery variability, as revealed from different studies, facilitates intraoperative identification of vessels in both classical and laparoscopic cholecystectomy or surgery of bile ducts. Uncontrolled bleeding from cystic artery and its branches may increase the risk of lesions to vital vascular and other structures during hepatobiliary surgery and also during other upper abdominal surgeries like resection of pancreas.

The Iliolumbar artery, though it is usually the first branch of the posterior division of the internal iliac artery, may be absent, reduced in size, or partially replaced by one of the lumbar arteries. It occasionally gives rise to a lateral superior sacral artery. It has been occasionally seen as a branch of the common iliac, one lumbar, middle sacral and the lateral sacral arteries.

Psoas minor muscle is not constant in humans. In a report of 182 subjects it was present on both sides in 70 subjects, on the right side in 12, on the left side in 8, and absent on both sides in 92 subjects. Various sources report that the muscle is present in about 56% of bodies. When present, the muscle varies considerably in its site of origin. It may be connected only with the first lumbar vertebra, or with the second lumbar and intervertebral disc (above it) or it may arise from two heads. At its insertion it may end on the iliac fascia, inguinal ligament, neck of the femur or lesser trochanter with psoas major. According to Macalister this muscle may be doubled, the second part lying deep to the first. A subdivision or splitting of its tendon may occur with one part going to the fifth lumbar and the first sacral vertebrae, and the second going to the iliopectineal line. This was also observed that this muscle had been replaced by a tendon or its insertion lost in the pelvic fascia. The psoas minor muscle has been clinically ignored as a functional hip flexor. Patient complaints of pain in the anterior inguinal area during psoas minor strain which will interfere with their ability to run, jump or rotate on hip joint.

CONCLUSION
This case report with variant anatomy of the cystic artery may be of help for the surgeons to minimize the risk of haemorrhage and injury to vital structures including biliary apparatus during upper abdominal surgeries like cholecystectomy. The variation in the iliolumbar artery and the presence of psoas minor muscle are also important for surgery in the posterior abdominal wall. Psoas minor strain has importance in Sports Medicine.

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REFERENCES


