Case Report:
Surgically Important Giant Obturator Artery, its Variant Distribution and Other Associated Vascular Variations in a Male Pelvis

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Abstract: Knowledge of variations of obturator artery is of importance during many surgical procedures of the pelvis both in male and females. Here, an extremely rare variation of obturator artery and other associated vascular variations of the pelvis are presented. These variations were noted in the right pelvic half of an adult male cadaver. The obturator artery was huge and it divided into two divisions. The lateral division accompanied the obturator nerve and vein and entered the medial compartment of the thigh by passing through the obturator foramen. The medial division gave two vesical branches, which divided and formed a tuft of arteries near the lateral side of the neck of the bladder. It also gave a slender branch, which entered the obturator foramen along with the main obturator neurovascular bundle. The medial division gave a prostatic and a penile branch. The penile branch entered the crus of the penis as the deep artery of the penis. Further the inferior gluteal and internal pudendal arteries arose through a common trunk, which divided into terminal branches in the gluteal region, below the piriformis muscle.

Key Words: Obturator hernia, Gluteal region, Iliac arteries

Introduction:
Obturator artery is branch of anterior division of internal iliac artery. It predominantly supplies the muscles of the medial compartment of the thigh. It shows many variations in its origin and distribution (1). Clinically, the most important being ‘corona mortis’ (2). Corona mortis or crown of death, as it is known is the pubic branch of inferior epigastric artery running down over the superior ramus of pubis to the obturator foramen. This artery can be damaged is various surgical procedures of the pelvis and hence called corona mortis.

Branches of obturator artery are known to supply prostate and penis in males. Usually, surgeons are aware of these variations and try to avoid injuries to these arteries during surgical procedures. This report presents a few rare, concurrent variations of pelvic vessels, which might increase the chances of iatrogenic bleeding during some of the surgical or radiological procedures.

Case Report:
During routine dissection classes for undergraduate medical student, the following vascular variations were noted in the right pelvic half of an adult male cadaver, aged approximately 60 years. The internal iliac artery divided into anterior and posterior divisions. The posterior division gave iliolumbar, lateral sacral and superior gluteal arteries. The anterior division gave superior vesical, inferior vesical, middle rectal, obturator and a common trunk which divided into internal pudendal and inferior gluteal arteries. The obturator artery was huge and it divided into two divisions. The lateral division accompanied the obturator nerve and vein and entered the medial compartment of the thigh by passing through the obturator foramen. The medial division gave two vesical branches, which divided and formed a tuft of arteries near the lateral side of the neck of the bladder. It also gave a slender branch, which entered the obturator foramen along with the main obturator neurovascular bundle. The medial division passed through the puboprostatic ligaments and divided into a prostatic and a penile branch. The penile branch entered the crus of the penis as the deep artery of the penis. The dorsal artery of the penis was a direct continuation of the artery of penis, which was derived from the pudendal artery. Further another unique feature of the case is that the common trunk of inferior gluteal and internal pudendal arteries divided into terminal branches in the gluteal region, below the piriformis muscle. The variations have been shown in figures 1-3.
Figure 1. Dissection of the right hemipelvis showing the giant obturator artery and its variant branches. (IIA – internal iliac artery; EIA – external iliac artery; EIV – external iliac vein; MUL – medial umbilical ligament; SVA – superior vesical artery; IVA – inferior vesical artery; ON – obturator nerve; OA – obturator artery; MD – medial division of obturator artery; LD – lateral division of obturator artery; VB – vesical branches; AOA – additional obturator artery)

Figure 2. Dissection of the right hemipelvis showing closer view of the giant obturator artery and its variant branches. (MUL – medial umbilical ligament; SVA – superior vesical artery; IVA – inferior vesical artery; ON – obturator nerve; OA – obturator artery; MD – medial division of obturator artery; LD – lateral division of obturator artery; TA – Tuft of vesical arteries; AOA – additional obturator artery; PRB – prostatic branch; PNB – penile branch)

Figure 3. Dissection of the right gluteal region showing common arterial trunk dividing into inferior gluteal and internal pudendal arteries. (PM – piriiformis; CT – common trunk; IPA – internal pudendal artery; IGA – inferior gluteal artery; SN – sciatic nerve)

Discussion:
The obturator artery shows great deal of variation in its origin. In about 79% of cases it arises from either one of the divisions of internal iliac artery and in the remaining 21% cases, it arises directly from external iliac artery or inferior epigastric artery (3). In the current case, it took origin from the anterior division of the internal iliac artery as in majority of earlier reported cases. But the unique feature was its bifurcation in to two divisions. The lateral division accompanied obturator nerve and continued further into obturator foramen as the main continuation of the obturator artery. The medial division gave two branches which formed an arterial tuft near the neck of the bladder. There are no report on this type of arterial tuft formed by branches of obturator artery. This tuft might bleed profusely during fixation of the bladder, radical prostatectomy or in pelvic lymph node clearance (4). The additional branch given off by the medial division entered the obturator foramen. This artery might rupture during low energy pubic ramus fracture (5) or during rotational acetabular osteotomy procedures (6). The artery might also result in iatrogenic bleeding during infectious groin bypass surgery (7). Because of the small size and rarity of its occurrence, the bleeding from this branch may go unnoticed till late stage. The possibility of presence of prostatic and penile branches of the medial division should be kept in mind during radical prostatectomy procedure. The rupture of penile branch, not only results in bleeding but, might result in postoperative erection problems. In some cases, a branch called accessory pudendal artery may arise from the obturator artery. This artery supplies the prostate and penis as seen in the current case (8). All attempts are made by surgeons to preserve this artery during prostate surgeries to avoid post-operative erectile dysfunction. Prostatic arteries arise from various sources. They may arise from obturator artery in 5–12% cases (9, 10). Therapeutic embolization of prostatic artery is performed as the treatment for benign prostate hyperplasia (11). Knowledge of the current variation could be very useful to prevent adverse effect of the embolization. Embolization of the medial division of the obturator artery in the current case might successfully treat the prostatic problem but it might result in erectile dysfunction. There are earlier reports on origin of artery of the penis through a common trunk, other branches of the common trunk being the inferior vesical and obturator artery (12). The current case is different compared to the earlier case because the inferior vesical artery came directly from anterior division of internal iliac artery as a separate branch in the current case. In the current case, the internal pudendal and inferior gluteal arteries also arose through a common trunk which divided below piriiformis into two terminal branches in the gluteal region. Ligation of the common trunk during inferior gluteal myocutaneous flap surgeries might result in erectile dysfunctions.

Conclusion:
Division of obturator artery into medial and lateral branches, additional obturator branch, vesical arterial tuft, prostatic and penile arterial supply by the medial division is unique and has not been reported hitherto. Iatrogenic injury to the medial trunk might result in vascular problems associated with bladder, prostate and penis. Knowledge of this variation could be important to orthopedic surgeons, radiologists and urologists.

Conflict of Interest: None.

References:
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