

## Anatomical Variation of Corona Mortis

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Corona mortis is the name of arterial or venous anastomosis between the external iliac (more commonly the inferior epigastric) and the obturator vessels. This structure, located on the posterior surface of the superior pubic ramus, is at risk during surgical approaches to the pelvis and acetabulum. The corona mortis ominous name, meaning "crown of death", reflects its significance in pelvic trauma, particularly pubic symphysis and superior pubic ramus fractures. The case reported was described after a routine dissection during anatomy class with students from the Department of Anatomy, Histology and Pathology at the Medical Faculty of the University of Sofia. The cadaver was a 82-year old woman and was fixed with the formaldehyde method. We encountered a variant obturator artery that originated from the external iliac artery. Each vascular variant in this area is important for description in order to confirm the classification of variations in order to prevent future errors in surgery.

*Key words:* corona mortis, pelvic fractures, inguinal hernioplasty, venous anastomosis

### Introduction

The obturator artery, usually a branch of the internal iliac artery, is a relatively small blood vessel, which passes through the obturator foramen and blood supplies the adductor group of thigh muscles. If the obturator artery originates from the inferior epigastric artery, which typically arise from the external iliac artery, it is called corona mortis (CM). CM is also the name of arterial or venous anastomosis between the external iliac (more commonly the inferior epigastric) and the obturator vessels [1]. CM runs along the posterior aspect of the superior pubic ramus in the retropubic space (of Retzius) at a variable distance from the pubic symphysis (range 40-96 mm) [2]. The laceration of CM, meaning "crown of death", can cause a life-threatening bleeding in trauma cases or in scheduled operations [3, 5, 6, 7, 9, 10].

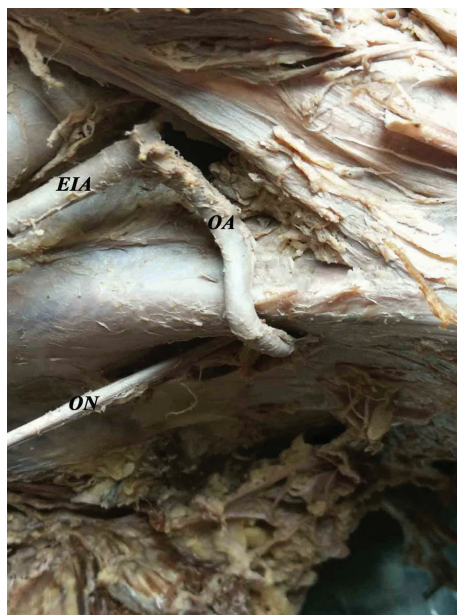
### Materials and Methods

In the past eight years 30 embalmed human bodies were assessed, that included 18 males and 12 females. During dissections of the cadavers in routine anatomy exercises

the pelvic vessels were carefully dissected in searching of anastomoses between the obturator and external iliac vessels.

## Results

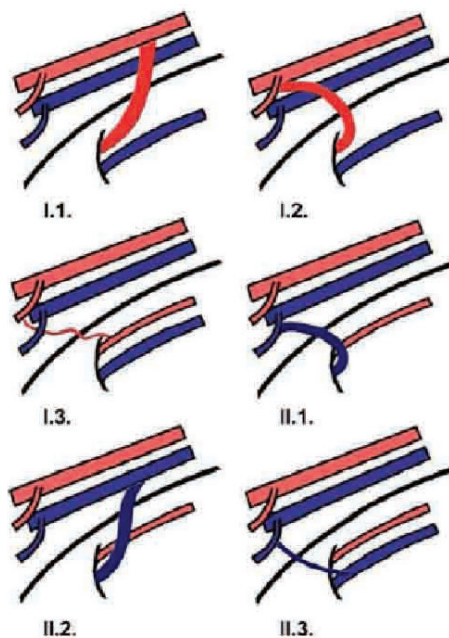
The case described here was found after a routine dissection during the anatomy class with students from the Department of Anatomy, Histology and Pathology at the Medical Faculty of the University of Sofia. The cadaver was a 82-year old woman and was fixed with the formaldehyde method. During our dissection we encountered a variant obturator artery that originated from the external iliac artery (Fig. 1). Averagely, the division occurred approximately at around 9.8 cm from the beginning of the external iliac artery. The diameter of the last mentioned vessel has been measured at 5.5 mm and the aberrant obturator artery's diameter at 3.6 mm.



**Fig. 1.** Anatomical variation of corona mortis. EIA – external iliac artery; OA – obturator artery; ON – obturator nerve

## Discussion

Although classic anatomical texts only describe arterial corona mortis, more recent studies described the presence of venous connections. Several terms have been linked to corona mortis, such as accessory obturator artery, accessory obturator vein, aberrant obturator artery and anomalous origin of obturator artery [9]. The term corona mortis is used exclusively to describe large anomalous connections, while small calibre anastomoses are believed to be anormal pattern [4]. The average reported diameter according to one series, which looked at both cadaveric, and patients specimen was of 2.6 mm (range 1.6 – 3.5 mm) [10]. Tornetta et al. [10] found vascular channels consistent with a corona mortis in 84%



**Fig. 2.** Anatomic classification of corona mortis (after Rusu et al. 2010). I.1. Obturator artery originating from the external iliac artery; I.2. Obturator artery emerging from the inferior epigastric artery; I.3. Anastomosis of the obturator artery and inferior epigastric artery; II.1. Obturator vein going into the external iliac vein; II.2. Obturator vein fuse into the inferior epigastric vein; II.3. Venous anastomosis of the obturator vein and inferior epigastric vein.

of 50 fresh cadaveric hemipelvises [10]. In a cadaveric study, the arterial connection between the internal and external iliac systems was found in 0% of 54 hemipelvises, in another to be 34% of 55 hemipelvises and in an angiographic study to be 28.5% out of 98 hemipelvises. Rusu et al. [8] classified corona mortis based on pattern and type of vessels involves. In their classification, there were three types of corona mortis: Type I-arterial; Type II-venous and Type III-a combined arteriovenous vascular network (Fig. 2). CM can be also located using computer tomography – a three-dimensional model of corona mortis can be constructed using contrasted enhanced CT scanning. This would be helpful in order to study the location and morphological patterns of the anastomosis and avoid further complications during surgical interventions.

During pelvic operation, corona mortis is accused to be a source of major bleeding in case of a surgical error. For instance, totally extraperitoneal inguinal hernioplasty can be associated with vascular complications especially during the fixation of the mesh [3, 5, 6, 7]. This structure is also at risk during surgical approaches to the pelvis and acetabulum [9, 10]. In addition, traumatic pelvic fractures are associated with a substantial mortality rate, with reported mortality rates up to 50%. In case of pelvic fracture, massive extraperitoneal hemorrhage may arise due to the presence of CM. So, endovascular specialists managing pelvic injury by coil embolization should keep CM in mind as a potential source of prolonged and dangerous hemorrhage [11]. In urinary surgery, when dealing with bladder suspension (stress incontinence), the use of tension-free vaginal tape (TVT-Secur method), may lead to severe bleeding in case of rupture of CM. Finally, the blood variations in the pelvic region are helpful in exercises for medical students during pelvic and lower limb dissections.

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