

Corona Mortis and Ilioinguinal Approach to Acetabular Fracture: A Case Report

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ABSTRACT

The corona mortis, or crown of death, is described as an abnormal vascular connection between the obturator and external iliac or inferior epigastric veins or arteries located at the back of the superior pubic ramus in the space of Retzius. The corona mortis has been said to cause massive uncontrolled or profuse bleeding and even life-threatening hemorrhage. Detailed anatomical knowledge of its prevalence, variable anastomotic connections, and morphological characteristics is therefore crucial to reduce the risks of possible iatrogenic errors in surgical procedures in the pubic region, especially the ilio-inguinal approach to the acetabulum. Every surgeon dealing with superior pubic ramus fractures and acetabulum fractures needs to be aware of these anastomoses and avoid undue hemorrhage.

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Introduction

The corona mortis, or crown of death, is described as an abnormal vascular connection between the obturator and external iliac or inferior epigastric veins or arteries located at the back of the superior pubic ramus in the space of Retzius [1]. The corona mortis has been said to cause massive uncontrolled or profuse bleeding and even life-threatening hemorrhage. Detailed anatomical knowledge of its prevalence, variable anastomotic connections, and morphological characteristics is therefore crucial to reduce the risks of possible iatrogenic errors in surgical procedures in the pubic region, especially the ilio-inguinal approach to the acetabulum. This study was carried out to find whether the corona mortis actually is a threat in the anterior approach to the pelvic fractures or not.

Case Report

A 36-year-old truck-driver had a road accident (rollover) with pelvic trauma.

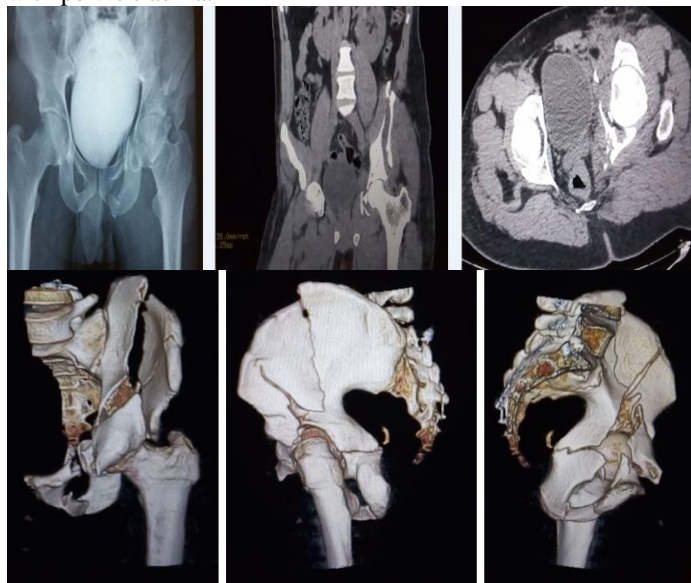


Figure 1. Rx and CT findings: Fracture of the left acetabulum (anterior with posterior hemi transverse).

The patient was initially hemodynamically stable; radiological investigations (X-rays + CT) showed a fracture of the left acetabulum (anterior with posterior hemi transverse). Surgical treatment is envisaged; osteosynthesis (screwed plate) is performed by ilioinguinal approach. During fracture reduction, lightning bleeding is observed (branches of the external iliac vein). Hemorrhage was controlled (ligature) with transfusion of red blood cells. Patient is stabilized with placement of screwed plate for his acetabular fracture.

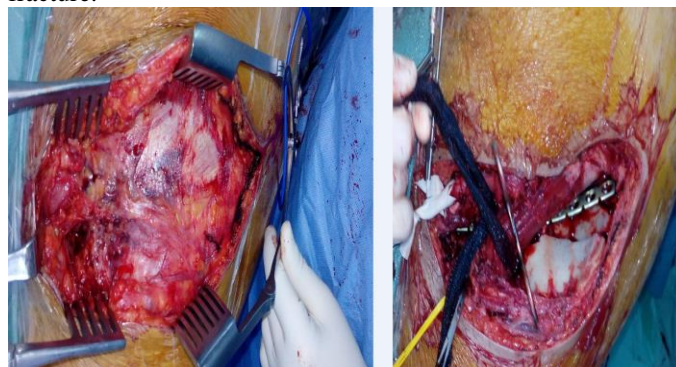


Figure 2. Intraoperative findings : Ilioinguinal approach for acetabular fracture.

Discussion

Accidental transection of the corona mortis in pubic surgical procedures can result in a potentially life-threatening hemorrhage. The high incidence of this vascular connection in the population makes it particularly clinically significant. Detailed anatomical knowledge of its prevalence, variable anastomotic connections, and morphological characteristics is therefore vital to reduce the risks of possible iatrogenic errors in surgical procedures in the pubic region.

During the embryonic development vascular formation consists of the appearance of anastomoses that may not or may persist during ontogenesis. Through the dorsal root of the umbilical artery two arterial plexuses are formed: the pelvic plexus and the abdominal plexus. During the fifth week of development, the umbilical arteries form a new

connection to the fifth pair of lumbar segmental arteries (which form the pelvic plexus), and then form the External Iliac Artery (EIA), the Internal Iliac Artery (IIA) and consequently the common iliac artery. The Obturator Artery (OA) is formed through the IIA, whereas all other arteries of the lower limbs develop like branches from the EIA, for example, the Inferior Epigastric Artery (IEA). Due to the large number of anastomoses during this period, such arteries are susceptible to originate from neighboring vessels. Therefore, a random selection of arterial canals would imply differences in the caliber of the OA and the IEA, causing the variation known as CM. [2].

Although the anatomy books describe the usual presence of the anastomosis between the OA and IEA anastomotic branches, they do not use the term Corona Mortis, and few books cite its clinical and surgical importance. The presence of corona mortis is a risk factor for complications in pubic rami fractures and in several surgical procedures and especially in acetabular surgery using the ilioinguinal approach.

The prevalence of arterial CM (with or without venous CM) has been reported in numerous studies, ranging from 12 to 65% [3-16]. Reports of the arterial CM's length vary: 52mm according to Hong [12], 52.4mm according to Stavropoulou-Deli [14], 62mm according to Tornetta [9] and 68mm according to Darmanis [1]. These numbers should draw the attention of surgeons because the number of studies reporting prevalence greater than 30% is higher indicating that this variation is not so unusual and those calibers should alarm as this vessel can cause significant bleeding.

The ilioinguinal approach used for fractures of the anterior acetabular column is related to a high risk of hemorrhage and additional damage to adjacent structures, such neurovascular structures. The difficulty in repairing these fractures is in identifying a safe place to position the implant, especially in quadrilateral and just-articular fractures [17]. A recent meta-analysis revealed that the corona mortis was found to be present in nearly half of the general population, that a venous corona mortis is 2-3 x more prevalent than an arterial corona mortis, and that the corona mortis is more common in Asia than in Europe and North America [18]. If corona mortis presents, it should be ligated to prevent bleeding, which is difficult to control if it retracts into the pelvis. To avoid iatrogenic errors in the surgical procedures, radiologists should alert surgeons regarding the anatomical data of the corona mortis and illustrate the appropriate operation approach, reducing the risk of lacerating corona mortis vessels [16,19].

Conclusion

The ilioinguinal approach is appropriate for all fractures including the anterior wall, anterior column, and anterior column with posterior hemitransverse extension. These vessels that form the corona mortis may be disrupted as a result of superior pubic ramus fracture, and during ilioinguinal approach for acetabulum fractures. Corona mortis causes life-threatening emergency only if it is neglected and appropriate precautions are not taken. So every surgeon dealing with superior pubic ramus fractures and acetabulum fractures needs to be aware of these anastomoses (arterial, venous, or both) and avoid undue hemorrhage.

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