Corona Mortis Artery Avulsion Due to a Stable Pubic Ramus Fracture

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A 70-year-old woman with osteoporosis fell at home and presented to our emergency department with intense left hip pain. Radiographs revealed a left iliopubic rami fracture and nondisplaced right ischiopubic rami fracture. She was discharged after a 24-hour observation with no clinical changes. Seventy-two hours later, she was readmitted with a painful abdominal mass, progressive oliguria, tachycardia, hypotension, and profuse perspiration with generalized pallor. On physical examination, a painful mass in the hypogastrium and intense inflammation in the thigh and the proximal portion of left knee were found.

Emergent multiphase contrast computed tomography revealed a large nonhomogeneous hematoma neighboring the fractured left iliopubic rami, and contrast extravasation indicated arterial bleeding. Selective angiography showed an active hemorrhage from the distal portion of a small branch of the left obturator artery. After embolization of the arterial vessel, the patient was hemodynamically stable. The fracture was rotationally and vertically stable.

These fractures are common, especially among the elderly. This type of injury is usually treated conservatively and with active mobilization once the acute pain has subsided. Supraselective embolization after localization of the bleeding vessels by arteriography is recognized as a minimally invasive procedure with excellent outcomes in hemorrhagic complications of pelvic fractures. An apparently benign pubic rami fracture in the setting of hemodynamic instability should raise the suspicion of a corona mortis injury, especially in elderly and anticoagulated patients.
The inferior epigastric artery arises from the external iliac artery immediately above the inguinal ligament. It penetrates the transversalis fascia and travels anterior to the arcuate line, rising between the abdominis muscle and the posterior layer of its sheath. This artery gives off pubic branches that course along the inguinal ligament and descend to the internal surface of the pubis, where they sometimes anastomose with branches from the obturator artery. This connection between the external iliac system and the obturator system is known as the corona mortis (Figure 1).

Cadaveric studies have shown anastomoses between the external iliac and obturator system in approximately 84% of specimens, of which 34% had an arterial connection, 70% had a venous connection, and 20% had both an arterial and a venous connection. The most frequently reported variant is the connection between the external iliac artery and the obturator artery, which passes over the iliopubic rami. The name corona mortis (literally “crown of death”) is given because any fracture at this level could damage the pubic branches between obturator and iliac systems, which is associated with a high risk of massive bleeding.

This article presents a case of delayed hemorrhagic complication by a corona mortis lesion in an elderly patient with a stable isolated pelvic rami fracture.

**CASE REPORT**

A 70-year-old woman with osteoporosis fell at home and presented to our emergency department with intense pain in her left hip. On initial assessment, she was hemodynamically stable (blood pressure, 169/88 mm Hg; heart rate, 100 beats per minute), with pain on palpation of the iliopubic rami. Hemoglobin was 12 g/dL. Blood tests revealed no significant clotting or platelet abnormalities. Radiographs revealed a left iliopubic rami fracture and a nondisplaced right ischiopubic rami fracture (Figure 2). Abdominal trauma ultrasound was negative for free peritoneal fluid. After 24-hour observation with no clinical changes, the patient was discharged with the prescription of rest, analgesia, and low-molecular-weight heparin as prophylaxis against thromboembolic disease.

Seventy-two hours later, she was readmitted with a painful abdominal mass, progressive oliguria, tachycardia (140 beats per minute), hypotension (95/64 mm Hg), and profuse perspiration with generalized pallor. On physical examination, a painful mass in the hypogastrium and intense inflammation in the thigh and the proximal portion of left knee were found. The initial hemoglobin value was 4.5 g/dL, prothrombin activity was 62%, and activated partial thromboplastin time was 52 seconds.

Emergent multiphase contrast computed tomography revealed a 10×15×10-cm nonhomogeneous hematoma neighboring the left iliopubic rami fracture, and contrast extravasation indicated arterial bleeding and contralateral displacement of the bladder. Selective angiography showed an active hemorrhage from the distal portion of a pubic branch of the left obturator artery. The stable rami fracture (*) is seen below the area of bleeding.

Selective angiography confirms the source of active bleeding, showing extravasation of contrast medium to pelvis (arrow) from the distal portion of a pubic branch of the left obturator artery. The stable rami fracture (*) is seen below the area of bleeding.

After embolization of the arterial vessel, the patient was hemodynamically stable (heart rate, 100 beats per minute; blood pressure, 110/65 mm Hg), and hemoglobin values, which had reached 3 g/dL after transfusion of 6 units of packed red cells, had returned to normal. Emergency surgery confirmed the arteriovenous aneurysm caused by the corona mortis. The patient had an uneventful postoperative course.
red blood cells, increased to 9 g/dL. Repeat angiography confirmed the effectiveness of the embolization (Figure 4). A week later, the patient was discharged on enoxaparin sodium injection treatment.

**DISCUSSION**

The fracture sustained by our patient is classified as A2 according to the Tile system and is considered rotationally and vertically stable.\(^6\) Osteoporotic fractures of the pubic rami after a low-energy injury are common among the elderly. This type of injury is usually treated conservatively and with active mobilization once the acute pain has subsided.\(^\) Hill et al\(^8\) reported an annual mortality rate of 13.3% after pubic rami fracture, with a 5-year survival rate of 45.6%. The independent predictive factors of mortality are age and the presence of dementia; hemorrhagic shock is not regarded as a survivability factor, which indicates that isolated pubic rami fracture is rarely a cause of massive hemorrhagic shock.\(^8\)

Poole and Ward\(^9\) reported that deaths from primary pelvic injury are uncommon, accounting for 14% of patients who die with a pelvic fracture. The majority of deaths are due to associated injury, and all 14% had unstable pelvic ring fractures. Some deaths have been reported from severe hypovolemic shock due to rupture of the obturator or iliopubic artery, but these cases were in young patients with high-energy injuries.\(^1,3,10\) Four cases of hemorrhagic shock produced by isolated pubic rami fracture in elderly individuals with low-energy injuries have been reported.\(^1,4,5,7\) In these cases, bleeding occurred within the first 6 hours after the fracture, and most of the patients were receiving anticoagulant or antiplatelet treatments.

In the current case, the hemorrhagic complication appeared 72 hours after diagnosis of the fracture, and the patient was not receiving anticoagulant or antiplatelet treatment. All 4 cases in the literature had a nondisplaced or a minimally displaced rami fracture of the pelvis, and the hemorrhagic bleeding was diagnosed by angiography.\(^1,4,5,7\) Supraselective embolization after localization of the bleeding vessels by arteriography is recognized as a minimally invasive procedure with excellent outcomes in hemorrhagic complications of pelvic fractures, and this approach is preferable to open surgery in the emergency setting.\(^1,4,5,11,12\)

An apparently benign pubic rami fracture in the setting of hemodynamic instability should raise the suspicion of a corona mortis injury, especially in elderly and anticoagulated patients. We recommend the hospital admission of all elderly patients with a pelvic fracture for at least 24 hours to perform regular hemodynamic observations, especially if the patient is on anticoagulant or antiplatelet treatment.

**REFERENCES**


