



## Traumatic hemipelvectomy: case presentation

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Traumatic hemipelvectomy is a severe, life-threatening injury, mainly occurring due to machinery injury or traffic accident. Few cases have been published in the literature. Treatment requires a rapid, multidisciplinary team approach which will result in the saving of the patient's life. We present the outcome of a male patient with traumatic hemipelvectomy.

**Key words:** Pelvis; traumatic hemipelvectomy.

Traumatic hemipelvectomy, an unbalanced-unstable fracture of the pelvis, is one of the rarest injuries of the lower extremity. The number of articles published on this subject in the literature is limited.<sup>[1-13]</sup> Traumatic hemipelvectomy is usually caused by high-energy injuries resulting from traffic accidents, motorcycle accidents, in which the rider is not protected, and machinery accidents. The integrity of the blood vessels in the retroperitoneal area may be compromised and the extremity may become pulseless and take on a cadaveric look. Therefore, traumatic hemipelvectomy, as a definition, expresses open or closed, ligamentous or osseous instable hemipelvic injuries and the accompanying disruption of the pelvic neurovascular integrity. Because of this, caution is necessary in pelvic fractures in terms of traumatic hemipelvectomy. However, internal or external hemipelvectomy is also a method used for the surgical treatment of pelvic tumors or pelvic osteomyelitis.<sup>[14-16]</sup>

Traumatic hemipelvectomy comprises less than 2% of all pelvic fractures. Whereas mortality in open pelvic fractures is around 40%, this figure is 60 to 100% in traumatic hemipelvectomy.<sup>[4]</sup>

The aim of this case presentation was to review the stages related to the survival of a patient with mostly fatal traumatic hemipelvectomy.

### Case report

A 40-year-old male was admitted to our emergency room following a work accident by a fall into a stone breaker. In preliminary examination, the patient was in a state of conscious, sleepy and hypovolemic shock. Systolic blood pressure was 50 mmHg and cardiac pulse 140/min. The patient's Injury Severity Score (ISS) was 61.

Intravenous rehydration treatment was initialized immediately via the insertion of a subclavian catheter. The initial hematocrit level was 20% and hemoglobin 5 g/dL. Antibiotic treatment was begun with a combination of second generation cephalosporin, gentamycin and metronidazole and tetanus prophylaxis was applied. Suprapubic catheterization was not deemed necessary. Pelvic and chest radiographies were taken. In thorax examination, no respiratory problems were detected.

There was no active arterial bleeding although venous leakage was observed. Preliminary evaluation of

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the injury revealed that the left lower extremity had been amputated by total avulsion from the hemipelvis and a second time at the cruris (Fig. 1). The skin covered the proximal injury site as degloved areas. The wound reached the perineum around the scrotum and anus. Radiography showed that the left hemipelvis was totally separated from the sacroiliac joint in the posterior and from the symphysis pubis in the anterior (Fig. 2).

Surgical procedure showed that both branches of the iliac artery had been severed, presented thrombosis along a 10 cm segment and vasospasm. This seemed to have prevented high-pressured active bleeding and the likelihood of losing the patient due to possible development of hypovolemia.

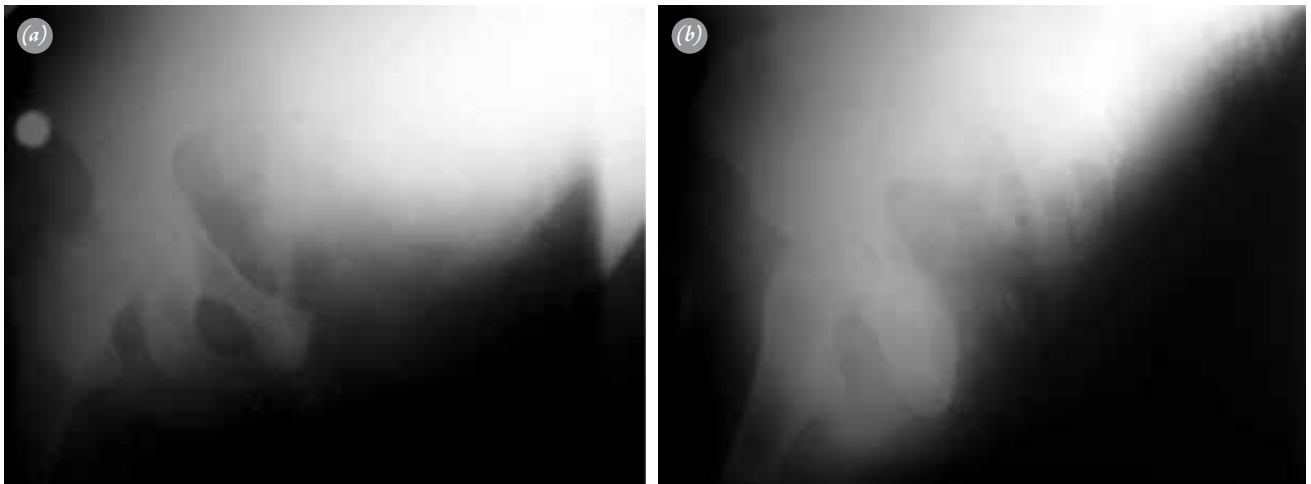
Ligation of the main artery and the veins coming from the sacral plexus was performed. Bone wax (Luken's™ Bone Wax) was applied to the innominate bone as result of bleeding in the sacroiliac joint. The wounded area reached around the anus (Fig. 1b). As a result of the evaluation of the general surgeon, it was observed

that the pelvic integrity had been preserved and the anus and the rectum remained intact. The levator ani muscle had ruptured. After saline irrigation with an added 14 lt of gentamicin, an aspirative drain was placed and the wound was closed. The wound was covered by bringing the posterior femoral skin to the anterior like a flap (Fig. 1f). Compressive body dressing was applied.

During the surgery, 4 units of blood were transfused. Postoperatively, 7 units of blood in the first 12 hours and 20 units of blood and 2 units of fresh-frozen plasma in the first 48 hours were given. On the 2nd postoperative day, the subject presented subfebrile fever, respiratory distress, hypotension, hypoxia in blood gases and parenchymal infiltration shown in the posteroanterior lung radiograph, requiring differential diagnosis. Hypovolemia, lung edema and ARDS were eliminated. With the diagnosis of transfusion-related acute lung injury (TRALI), the patient was treated in another hospital for 15 days with mechanical ventilation support under the care of a pulmonologist. During this time, in order to prevent



**Fig. 1.** (a-d) Appearance of the patient with two-stage amputation and (e, f) after stump closure. [Color figure can be viewed in the online issue, which is available at [www.aott.org.tr](http://www.aott.org.tr)]



**Fig. 2.** Radiographs showing total disruption of the hemipelvis **(a)** from the sacrum and **(b)** symphysis pubis in amputation.

contamination of the wounded area, a sigmoid colostomy was opened. Approximately 40 days following surgery, the patient was discharged from the hospital. The colostomy was closed later on and micturition and defecation control were observed. Infection or skin-muscle necrosis in the injured area did not develop.

The patient's prosthetic procedures were completed in the 3rd postoperative month and walking exercises using the hemipelvectomy prosthesis were completed (Fig. 3). The 10th year follow-up could be conducted via telephone. The patient reported no problems related to the wound and had retired due to disability. However, the patient had been undergoing narcotic and non-opioid drug therapy due to phantom pain at a pain clinic and sometimes showed symptoms of depression. No urinal or fecal incontinence was reported.

## Discussion

In traumatic hemipelvectomy, survival is possible only if the patient undergoes fast treatment. The mechanism of this hindquarter extremity amputation is hyperabduc-

tion external rotation. Eighty percent of injuries occur as a result of motorcycle accidents.<sup>[10]</sup> According to Beal and Blaisdell, avulsion and hip level crushing injuries are other mechanisms.<sup>[17]</sup>

In spite of the high-energy nature of the injuries, the lower extremity remains connected to the torso in 50% of high-energy traumas.<sup>[7]</sup> In cases where total amputation does not occur, the completion of the hemipelvectomy is recommended to decrease complications.<sup>[5-9]</sup> Secondary damage can develop due to elongated ischemia and the patient goes into hypovolemic shock. In 2,002 patients, Pohleman et al. observed 11 cases, of which 4 patients survived.<sup>[5]</sup> While Lawless et al. gives the mortality rate of traumatic hip disarticulations as 60%, only 45 patients have been reported in the literature to have survived traumatic hemipelvectomy.<sup>[1]</sup> In Lasurt et al.'s study in 2010, this number was 52.<sup>[10]</sup>

As a genitourinary system injury is often present, the integrity of the ureter, urethra and rectum must be examined.<sup>[1,2,10,12]</sup> Colostomy and suprapubic catheter is often necessary. These types of precautions will prevent



**Fig. 3.** **(a, b)** Views of the patient after wound healing and closure of colostomy. **(c-f)** Mobilization of the patient with prosthesis in the late period. [Color figure can be viewed in the online issue, which is available at [www.aott.org.tr](http://www.aott.org.tr)]

contamination, pelvic abscess and sepsis. If the patient is hemodynamically stable, procedures such as angiography and urography may be planned.

Other intra-abdominal injuries have been reported in 10% of cases.<sup>[1,8]</sup> However, the rate of urogenital and gastrointestinal injuries is higher.<sup>[1,4,8,10]</sup> Klasen and ten Duis reported genitouriner injuries in 82.6% of cases.<sup>[8]</sup> Pell et al. suggested that, especially in injuries close to the anus, the fecal route must be changed to reduce contamination of the wound and subsequent loss of life.<sup>[18]</sup>

In a case presentation, Wand stated that the tear in the levator ani muscle was caused by deep injury reaching from the perineum to the posterior and attributed the absence of rectal injury to the injury of the levator ani at the pelvic insertion site.<sup>[3]</sup>

Therefore, the surgical team must include a urologist and a general surgeon following volume replacement by the anesthesiologists.<sup>[19]</sup> The procedure must be rapid as the most common reason for fatality is hypovolemic shock. There must also be caution regarding blood reactions and disseminated intravascular coagulation that might occur following the extreme use of blood and blood products.

In a review of 224 complicated pelvic fractures, Carillo et al. reported accompanying common iliac artery and external iliac arterial injuries in 4% of cases.<sup>[20]</sup> Invasive radiological procedures and embolization have been reported to be used for the control of active bleeding.<sup>[1,20]</sup> Lawless et al. reported that an intimal flap interrupted the blood flow in the angiography of a patient, thus decreasing hemorrhage and saving the patient's life.<sup>[1]</sup> According to Lasurt and Combalia-Aleu,<sup>[10]</sup> survival possibility of patients with complete hemipelvectomy is greater than those with partial hemipelvectomy. Complete severing of the veins makes muscular contraction and retraction easier. The observation in this case presentation is similar.

Traumatic hemipelvectomy patients must be taken into surgery as soon as possible. Laparotomy and use of aortic clamp is recommended when necessary.<sup>[1,10]</sup> Bleeding is the main cause of mortality and methods such as packing, ligation and embolization can be used to cease blood loss.<sup>[10]</sup>

In this type of injury, extremity saving approaches are not preferred as such procedures could lead to mortality.<sup>[7,12]</sup> This kind of hemipelvic amputation may be seen as an anteroposterior compression (Young-Burgess Type B, Stage 3) pelvic injury. In a study by Whitbeck et al.,<sup>[19]</sup> this type of fracture has been reported to require an average of 18.3 units of erythrocyte suspension in the first 24 hours. The need of transfusion in patients with an-

teroposterior compression fractures has been found to be 10 units/24 hours above those with vertical scissoring type fractures. In our case, 7 units of blood in the first 12 hours and a total of 20 units of blood and 2 units of fresh-frozen plasma in the first 48 hours was used for replacement. Although Osti et al. reported a successful replantation case after a traumatic hemipelvectomy, the usual tendency in these types of injuries is to perform a life-saving procedure.<sup>[1,6]</sup> The trial of an extremity saving approach brings about more risk to the patient, and makes them prone to complications, such as reperfusion injuries, organ failures, ARDS and sepsis.<sup>[8]</sup>

If intact, the gluteus maximus muscle can be used to cover the wound. These muscles, as in free muscle flaps, are important for delivering an immune response to the area in terms of possible infections. Nevertheless, the use of the patient's cruris skin as a fasciocutaneous fillet flap to close femoral and abdominal defects in hemipelvic injuries has also been reported.<sup>[21]</sup>

Whitney et al. reported a patient who had been injured by being run over by a train and applied himself for help.<sup>[12]</sup> In this case, the completion of the amputation was necessary at the scene to free the patient from where he had been stuck. In similar cases, bleeding control and fluid replacement at the scene are important.

In conclusion, traumatic hemipelvectomy is a rarely seen, often fatal injury which requires immediate life support and surgery. Through a multiple team approach, including an orthopedist, vascular surgeon, general surgeon, urologist and anesthesiologist, hemipelvectomy must be surgically completed. Orthopedists that treat pelvic traumas must keep in mind the fact that rapid completion of the amputation is essential in saving the patient's life.

**Conflicts of Interest:** No conflicts declared.

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