Case Report

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Traumatic Testicular Dislocation in Patients With Anterior Pelvic Injuries

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ABSTRACT Traumatic testicular dislocation can be easily missed, especially against the background of obvious severe injuries in a patient with multiple and concomitant trauma. Despite the fact that traumatic testicular dislocation is a rare condition and does not pose an immediate threat to patient safety, it can cause serious consequences leading to male infertility. To prevent complications, this pathology should be diagnosed and treated as soon as possible. For this purpose, it is necessary to exercise diagnostic vigilance and conduct an appropriate examination in patients with polytrauma, especially those received while riding a motorcycle. The diagnosis of the trauma can be made if, on physical examination, there is a dense elastic formation corresponding to a displaced testicle with simultaneous desolation of half of the scrotum. This will help speed up the diagnosis and initiation of treatment, as well as facilitate preoperative planning of interventions on the bones of the anterior pelvic ring. Therefore, diagnostic instrumental and physical examination with palpation of both testicles upon admission is highly recommended.

Keywords: traumatic testicular dislocation, traumatic testicular torsion, motor vehicle injuries, traffic accident, polytrauma, multiple and concomitant trauma, pelvic fractures

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TA – traffic accident
CT – computed tomography
MRI – magnetic resonance imaging
TDT – traumatic dislocation of the testis

INTRODUCTION

Traumatic dislocation of the testis (TDT) is a rare complication of direct traumatic impact on the anterior pelvis and scrotum leading to dislocation of the testicles, usually in the inguinal region. Early diagnosis and treatment of this pathology are recommended to preserve the organ, its sexual function and prevent malignant degeneration of the gonads and their appendages. Often, TDT is not diagnosed immediately after injury, but is detected incidentally at a later date. The main diagnostic tools for TDT are ultrasound, computed tomography and magnetic resonance imaging.

Late diagnosis can lead to the development of complications: testicular ischemia and atrophy, torsion of the spermatic cord, impaired spermatogenesis and infertility. This article presents a short literature review and three clinical observations of TDT in adults.

Aim

Demonstration of diagnostic possibilities and outcomes of treatment of patients with injuries of the anterior pelvis complicated by dislocation of the testicles.

MATERIALS AND METHODS

The clinical observation includes 3 patients admitted to the N.V. Sklifosovsky Research Institute for Emergency Medicine with injuries of the anterior pelvis complicated by dislocation of the testicles in 2019–2020.

Literature search was carried out in the databases PubMed, Elibrary.ru in English and Russian, using the keywords “testicular dislocation”, “traumatic testicular dislocation”.

DISCUSSION

There are not very many articles on traumatic dislocation of the testis (TDT), and they are mostly written by urologists. The first mention of TDT without a description of further treatment can be found in an article by E. Claubry dated 1818, which presents a case of bilateral dislocation of the testicles in a 20-year-old man due to a cartwheel collision [1]. Approximately 55 cases have been described in the literature by 2003 and about 20 more cases by 2008 [2].

N. Zavras et al. performed a search for English-language articles in PubMed and Google Scholar databases using the keywords “traumatic testicular dislocation” and “testicular dislocation” and found about 47 reports (101 patients in total) published from 1965 to 2014, of which two articles were retrospective studies, and the rest were clinical observations [3].

By 2010, S. Phuwapraisirisan et al. found just under 200 reports on testicular dislocation [4]. A search for Russian articles using the keywords “traumatic testicular dislocation” and “testicular dislocation” reveals isolated reports in Russian urological journals, where the authors refer to the statistics of the same foreign authors [5]. Scrotum injury is a rare pathology – only 1% of all injuries in men – and is not a life-threatening condition [6]. Underestimation of the importance of the initial examination for possible dislocation of the testicles can lead to late diagnosis with the subsequent development of male infertility [5].

In the literature, the following definition of traumatic dislocation of the testicle is found: A forcible displacement of one or both normally lowered and placed testicles outside the scrotum along the fascial planes through the anatomical holes [7]. In addition, some authors highlight an extremely rare phenomenon, first described by E.P. Alyea in 1929, the so-called complicated dislocation of the testicles, when a traumatic testicle is squeezed out through the skin of the scrotum [7, 8, 9].

Various authors distinguish several variants of testicular dislocation that are different in terms of mechanism. Some researchers believe that the main cause is a direct blow to the perineal region, which pushes the testicle out of the scrotum with a rupture of the fascia and vessels of the spermatic cord [10].

Other researchers note a pronounced spasm of the cremaster muscles against the background of an enlarged external inguinal ring, the presence of an oblique inguinal hernia, and testicular hypotrophy as factors contributing to testicular dislocation [11, 12]. Before the advent of motorcycles with a front-mounted gas tank, traumatic dislocations of the testicles were mainly the result of hitting wheels from wagons and carts, and there is even a mention of mass self-mutilation among conscripts of the tsarist army of Russia who evaded military service during the First World War [13]. Currently, dislocations of the testicles most often occur during martial arts, contact sports [14], when hitting a saddle [2] or a motorcycle fuel tank [10].

F. Goulding subdivided testicular dislocations into two groups: 1) internal dislocation – the testicle is displaced through the external inguinal ring into the inguinal canal and further into the abdominal cavity; 2) surface dislocation – the testicle is displaced subcutaneously within a circle, the center of which is the external inguinal ring, and the radius is the length of the spermatic cord [13, 15]. Surface dislocation is much more common than internal one [4, 7, 8, 10, 15, 16]. Most often TDT was observed in the inguinal region (40–50% of all cases) [10]. This is followed by the pubic region (18%), penis (8%), perineum (4%), soft tissues near the hip joint (4%) and thigh (2%). In case of internal dislocation, the testicles were recorded in the inguinal canal (8%) and the abdominal cavity (6%) [11]. Similar data are presented in the work of other authors [8] (Fig. 1). In the literature, there is a description of testicular location in the cavity of the hip joint in a 25-year-old lumberjack after a blunt blow with a log [17]. In this clinical case, the testicle, absent in the scrotum, was found during the revision of the fracture of the right acetabulum – it was clamped between the bone fragments and the femoral head. Orchidectomy was performed due to severe damage to testicular tissues and blood vessels supplying it.

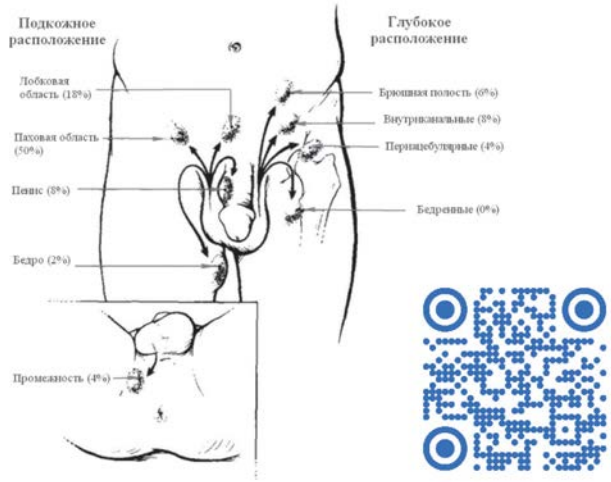

Fig. 1. Possible places of testicular dislocation and the frequency of their occurrence in the literature (until 1993). Figure published with permission from Gary J. Faerber* [8]. *Link and QR code to Yandex.Disk — https://disk.yandex.ru/i/RSSuUyItXd8QKg

During physical examination, one can palpate the testis as a mobile elastic rounded formation under the skin and the desolation of the corresponding half of the scrotum [16]. A history of orchidectomy and undiagnosed cryptorchidism should be excluded. In addition, it is important to differentiate traumatic testicular dystopia from cryptorchidism. In case of traumatic testicular dislocation, the scrotum is well developed compared to cryptorchidism, when it is underdeveloped (Bruckmann's sign) [15, 18].

In order to detect traumatic dislocation of the testicles, ultrasound is a first-line diagnostic method. Color Doppler sonography is useful for determining testicular blood flow [7, 19]. With TDT inside the abdominal cavity (6% of cases), the diagnostic value of ultrasound decreases, since in this case it has a low sensitivity of 45% and a specificity of 78% [7].

If the testicle is not palpable and not detected by ultrasound, magnetic resonance imaging (MRI) is indicated, since the study has a diagnostic sensitivity and specificity of up to 96% and 100%, respectively [5, 7, 20]. Computed tomography (CT) of the abdominal cavity and pelvis is informative in testicular dislocation with simultaneous trauma of the anterior pelvis and scrotal contusion [7, 21, 22].

Manual reduction and surgical procedures are the preferred treatment methods for TDT [6, 7, 10]. Some authors recommend an attempt at manual closed reduction in the first 3–4 days, when soft tissue edema is already beginning to subside, but adhesions have not yet formed [10, 23]. The first mention of the manual reduction of a traumatically displaced testicle was made by P.S. Conner in 1861 [24, 25]. However, there is an opinion that manual reduction is effective only in 15% of cases [10]. In cases where manual reduction is not possible or there are signs of testicular injury and (or) torsion of the spermatic cord, surgical intervention is indicated - open reduction and orchidopexy. The first mention of a surgical operation to move the testicle was made by M. Nicolas in 1899 [25].

There is an opinion that surgical treatment has an advantage over manual reduction of the testicle, since it allows surgeons to visually assess the degree of damage to the testicle and its appendages, eliminate torsion of the cords, evacuate hematomas, and restore the integrity of the membranes [5, 26, 27].

In patients with pelvic injury and undiagnosed testicular dislocation, there is a risk of iatrogenic damage to the testicles during surgical access, for example, when performing operations on the bones of the anterior pelvis.

Difficulties in diagnosing TDT are especially typical in patients with multiple and concomitant trauma, damage to the anterior pelvis, since this pathology is easily overlooked due to the presence of severe concomitant injuries [15, 28]. As a rule, dislocation of the testis is an immediate consequence of trauma, however, there are reports in the literature of delayed dislocation for up to 4 hours, and the displacement can progress over several days or even weeks and rarely disappears spontaneously [8, 12]. Formulating the diagnosis a few weeks after the injury is considered late.

There are reports in the literature of the correct diagnosis even after 10 years [19]. Late diagnosis may lead to loss of spermatogenic function, malignancy of testicular tissues, which may require orchidectomy [20, 27].

Histological changes usually appear 4 months after dislocation. They include hyalinization and atrophy of the seminiferous tubules, the absence of spermatozoa or reduced spermatid production, a decrease in the number of spermatogonia, and a relative increase in Sertoli cells which are part of the blood-testicular barrier around maturing male gametes [15, 23].

However, H. Sakamoto et al. described a case of restoration of spermatogenesis in a patient with bilateral testicular dystopia in the inguinal region and azoospermia for 15 years [29]. After 40 months from the surgical bringing down of the testicles, the conception happened naturally.

Clinical observation 1

A 29-year-old patient was injured in a traffic accident (TA) (a motorcycle driver). Complaints of pain in the right upper limb, right thigh, and the scrotum. Upon admission, the patient was diagnosed with a severe concomitant injury: (ISS 34) open GA-IIIc fracture-dislocation of the right humerus with damage to the artery and brachial plexus. Open rupture of the right acromioclavicular joint. Extensive torn-bruised wound of the right shoulder. Open GA-IIIb comminuted intra-articular fracture of the distal part of the right femur with displacement of fragments. Extensive torn-bruised wound of the right knee joint. Bruises, abrasions of the soft tissues of the face, trunk, limbs. III degree traumatic shock.

Taking into account the characteristic mechanism of the injury (motor trauma), we examined the perineum and revealed dislocation of the right testicle with the latter localized in the right inguinal region (Fig. 2).)

Fig. 2. Appearance of a patient with multiple trauma after a traffic accident (motorcycle driver) (A); dislocation of the right testicle in the inguinal region (B)

The testicle was defined as a mobile subcutaneous mass with a dense elastic consistency measuring approximately 3 × 1.5 cm (Fig. 3).

Closed manual reduction of the dislocated testicle into the scrotal cavity was urgently performed (Fig. 4). The absence of desolation of the corresponding half of the scrotum and palpation of the testicle in it is a sign of successful manipulation.

Fig. 3. Palpation of the right testicle after traumatic testicular torsion. Link and QR code to the video (by N.N. Zadneprovsky) of palpation to determine traumatic dislocation of the right testicle: 1) on YouTubeRU - https://youtu.be/KRJWvNit64c; 2) on Yandex.Disk - https://disk.yandex.ru/i/oTO1ILncuniPkA

1 2

Fig. 4. Manual closed reduction of the dislocated testicle into the scrotum. Link and QR code to the video (by N.N. Zadneprovsky) of closed reduction of the right testicle: 1) on YouTubeRU — https://youtu.be/q_Fr7jOLrAo; 2) on Yandex.Disk — https://disk.yandex.ru/i/3N974TRZ3IVncg

Ultrasound of the testicular vessels after reduction helps to assess the blood supply to the tissues and further prognosis. In this clinical example, the blood supply to the testicle was preserved after reduction (Fig. 5).

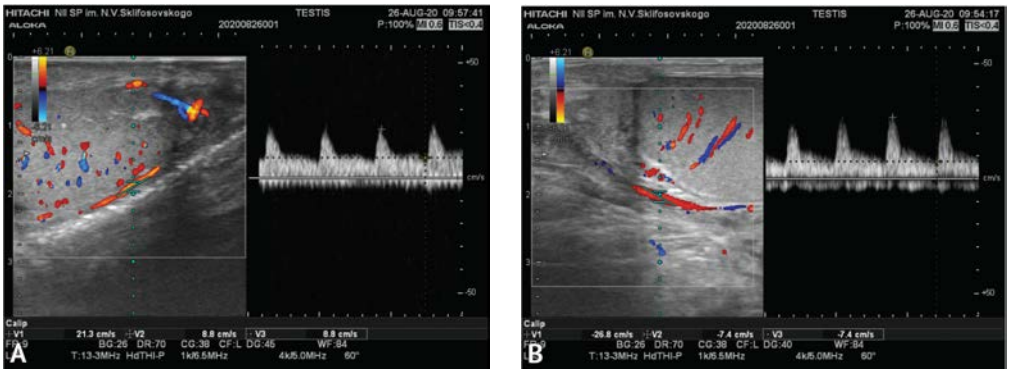

Fig. 5. Triplex ultrasound evaluation of testicular vessels: right testicle after reduction (A); intact left testicle (B)

Ultrasound of the vessels of the spermatic cord revealed the preservation of arterial and venous blood flow in the reduced testicle, which may indicate a favorable long-term outcome (Fig. 6).

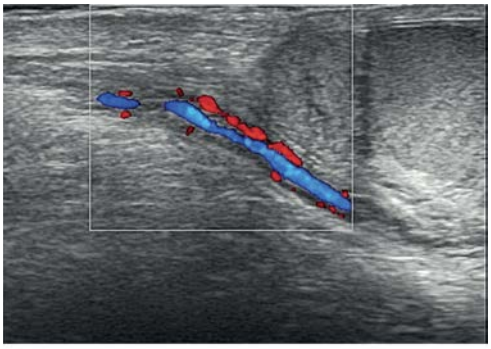

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Fig. 6. Echo view of spermatic cord vessels after testicular reduction. Link and QR codes to the video (by N.N. Zadneprovsky) of Doppler ultrasound examination of the spermatic cord vessels of the right testicle: 1) on YouTubeRU — https://youtu.be/a50IoEu8wxE; 2) on Yandex.Disk — https://disk.yandex.ru/i/4b1nfR3wXVu28A

Clinical observation 2

A 47-year-old patient suffered as a result of a fall from a height of 4 meters (at a construction site), hit his crotch on a hard object. Complaints of pain in the lumbar region on the right and right hip joint during movements and rotation of the body, loss of support on the right lower limb. On admission, an isolated AO/OTA 61B2.3b pelvic fracture (Nakatani II on the right, Nakatani II on the left), floating pubic symphysis, rupture of the sacroiliac joint on the right were diagnosed (Fig. 7).

Fig. 7. 3D reconstruction from a pelvic CT scan

The patient had no complaints about pain in the perineum, so the condition of the perineal soft tissues was assessed only visually and no serious pathology was detected. For the purpose of preoperative preparation, CT of the pelvis was performed on the 3rd day after the injury. Only after this examination, dystopia of both testicles was diagnosed at the level of rectus abdominis attachment in the pubic zone. The diagnosis was confirmed clinically by palpation of the anterior abdominal wall (Fig. 8).

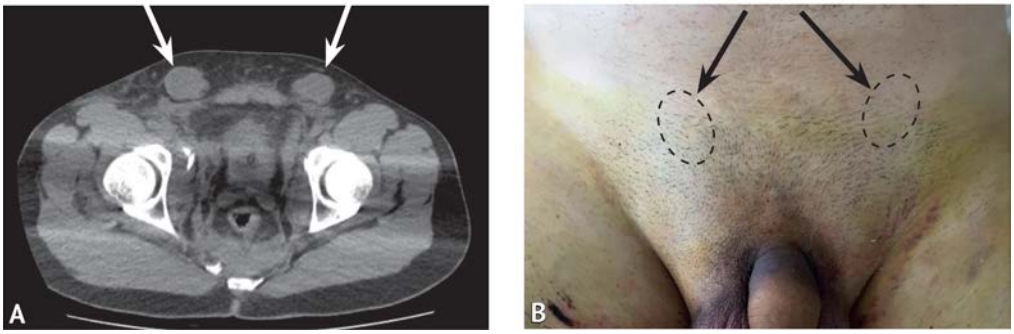

Fig. 8. Computed tomography image of bilateral testicular dislocation in the pubic region at the level of rectus abdominis attachment (A); localization of the testicles in the same patient during palpation (B)

On the 5th day after admission, an urologist performed closed reduction of the testicles to the root of the scrotum, since further reduction was difficult due to inflammation of the tissues. Then the patient underwent closed osteosynthesis of both pubic bones with interlocking nails and of the right sacroiliac joint with a cannulated screw (Fig. 9).

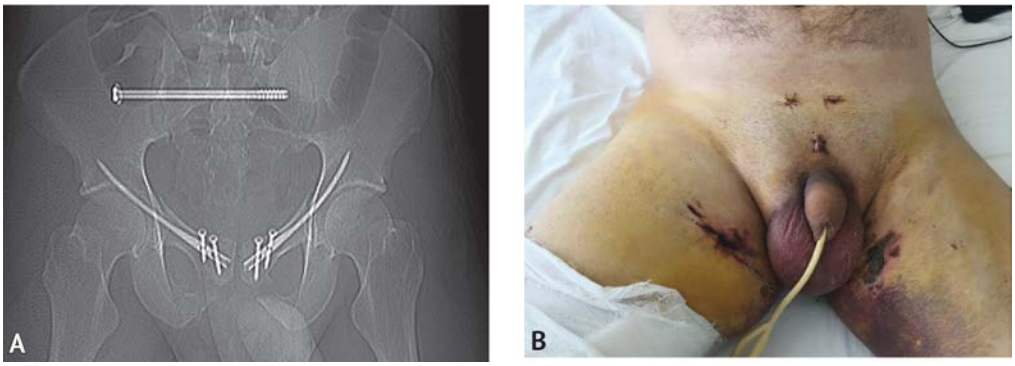

Fig. 9. Radiograph after pelvic osteosynthesis with pins and screws (A); local status of the perineal soft tissues after surgery (B)

In the postoperative period, the urologist recommended expectant management. Within 5 days, further displacement of both testicles into the region of the upper part of the scrotum was noted, which was confirmed by MRI results (Fig. 10).

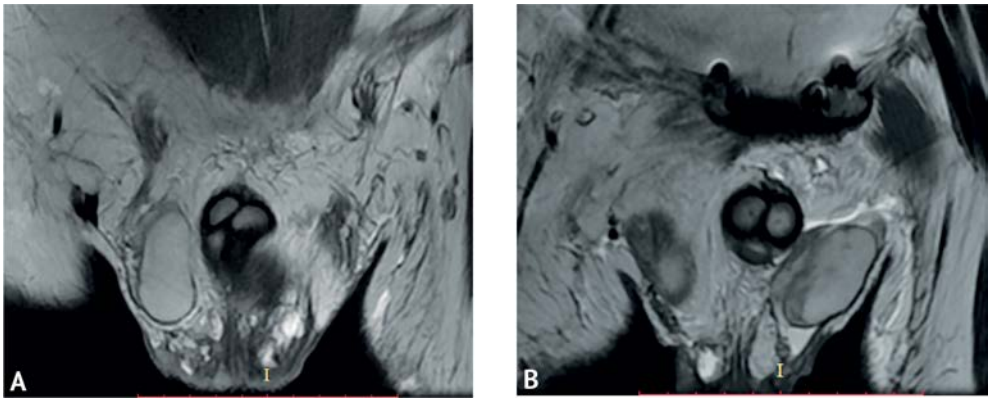

Fig. 10. Magnetic resonance imaging of the scrotum by frontal (coronal) section with visualization of the right testicle (A); with visualization of the left testicle (B)

During control ultrasound, a picture of depleted blood flow of the testicles and incomplete reduction of the testicles were noted, most likely due to a mechanical obstacle in the form of a dense hematoma in the scrotal cavity (Fig. 11).

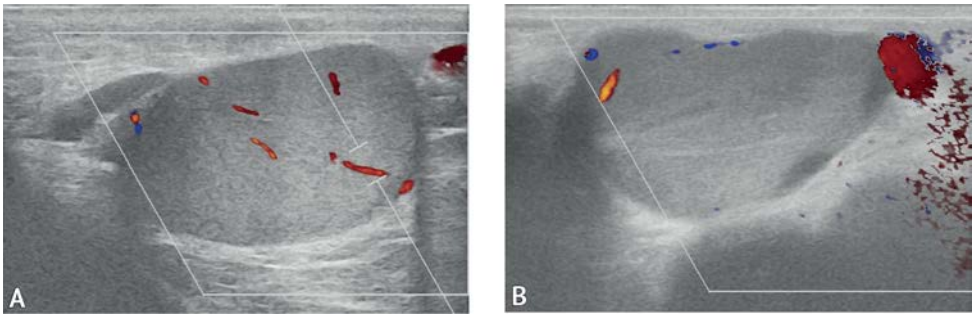

Fig. 11. Echo view of the left (A) and right (B) testis after closed reduction

Due to compromised soft tissues of the scrotum, orchiopexy was regarded as unjustified; a planned ultrasound of the scrotum in 1–1.5 months and (in case severe testicular dystopia would be detected) uni- or bilateral orchidopexy were recommended.

Clinical observation 3

A 42-year-old patient, injured in a TA (a motorcycle driver), hit his crotch on the fuel tank as a result of a sudden stop (Fig. 12).

Fig. 12. Yamaha SR 400 Cafe Racer gas tank

Complaints of pain in the pelvic region during movements and rotation of the body, loss of support on the left lower limb. On admission, the patient was diagnosed with isolated AO/OTA 61B2.1b pelvic fracture (Nakatani III on the right, Nakatani II on the left), uncomplicated fracture of the left lateral mass of the sacrum (Denis I) (Fig. 13).

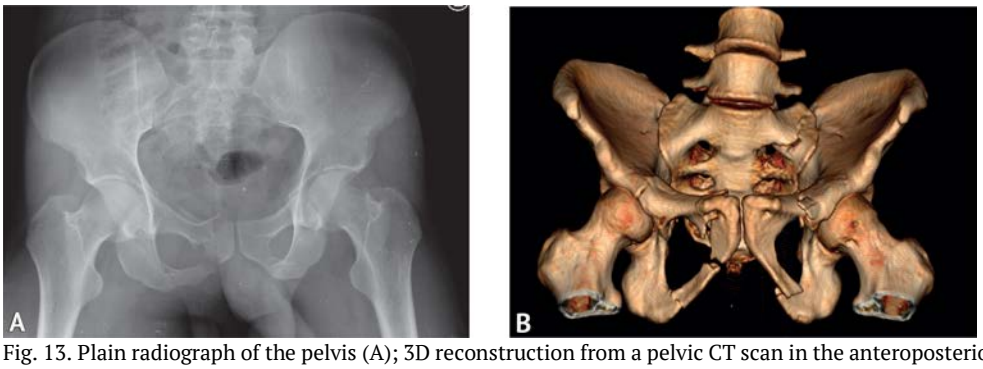

Fig. 13. Plain radiograph of the pelvis (A); 3D reconstruction from a pelvic CT scan in the anteroposterior view (B)

Due to the absence of any complaints in the genital area, no traumatic changes in the scrotum were detected upon admission. After 4 days, during an additional examination directly on the operating table, dystopia of the left testicle was diagnosed. Clinically, the testis was palpated subcutaneously in the area of the left external inguinal ring, in addition, the desolation of the left half of the scrotum was determined. Closed manual reduction of the testis into the scrotum was performed without additional orchidopexy (Fig. 14).

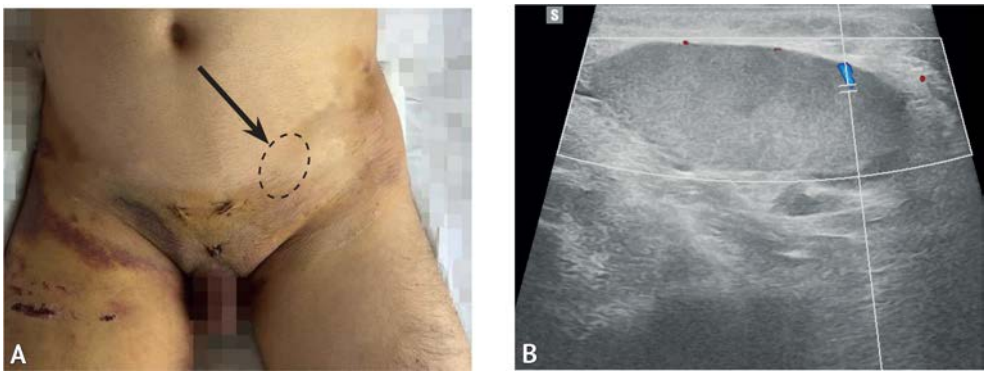

Fig. 14. Schematic representation of the left testicular localization in the left inguinal region (A) and its echogram before reduction (B). A depletion of the vascular pattern of the testis is noted

After that, osteosynthesis of the upper branches of the pubic bones with interlocking nails on both sides and closed osteosynthesis of the sacrum fracture with a cannulated screw on the left were performed. Postoperative period elapsed without complications. The pain has been relieved. The patient was allowed full weight bearing on both lower limbs on the 2nd postoperative day (Fig. 15).

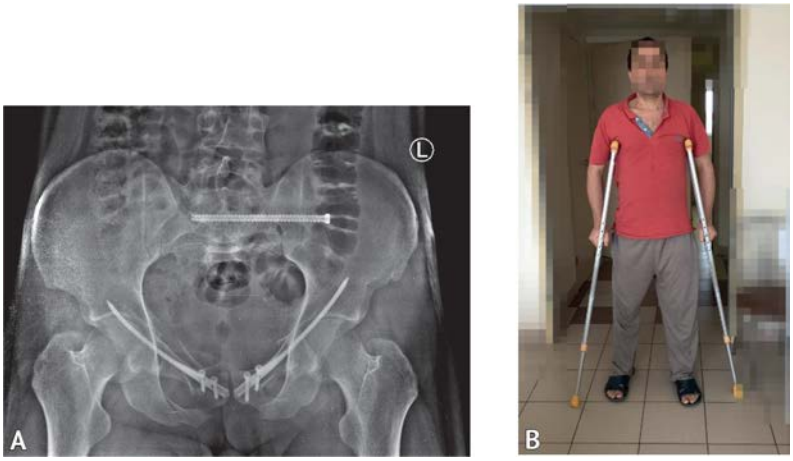

Fig. 15. X-ray of the pelvis in direct projection after surgery (A); photo showing the patient's ability to move with full support on the lower limbs on the 2nd day after surgery (B)

Due to the fact that orchidopexy was not performed, the patient was recommended outpatient follow-up by an urologist and a planned ultrasound of the scrotum in 1–1.5 months with the assessment of the dynamics of blood flow restoration and the viability of testicular tissues.

CONCLUSIONS

1. Traumatic testicular dislocation is a rare complication of damage to the anterior pelvis and scrotum, more common in motorcyclists - when the perineum hits the tank - and often combined with fractures of the pubic bones;

2. Against the background of severe damage to vital organs and systems, traumatic testicular dislocation can be recognized late or completely missed, which increases the risk of testicular injury during reconstructive bone surgeries and the development of gonadal atrophy;

3. Doppler ultrasound, computed tomography, and magnetic resonance imaging are reliable diagnostic methods for detecting traumatic testicular dislocation;

4. An attempt to bring the testicle down should be carried out as early as possible, before the formation of a dense hematoma in the scrotum. Preference is given to manual reduction, if it is ineffective - orchidopexy, the performance of which, in case of pronounced local changes in the soft tissues of the scrotum, can be delayed by 1–1.5 months.

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