

Male Infertility After Transpelvic Gunshot Wound Injury

A Case of Clinical and Forensic Relevance

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INTRODUCTION

According to the standardized definitions of the World Health Organization, infertility is defined as the failure to achieve pregnancy within one year in a sexually active and non-contracepting couple. Currently, about 15% of couples suffer from infertility. Around 50% of cases of infertility are male factors.⁽¹⁾

Infertility causes are increasingly being identified. Genetic disorders causing infertility include chromosomal abnormalities, such as Klinefelter syndrome, autosomal karyotype abnormality, sperm chromosomal abnormalities and translocations, genetic defects, such as X-linked abnormalities, Kallmann syndrome, Reifenshtein syndrome (androgen insensitivity), Y microdeletions, unilateral or bilateral absence or abnormality of the vas and renal anomalies, cystic fibrosis mutations, and less common inherited disorders.⁽¹⁾

In this study, we present a case of potential misdiagnosis involving a significant clinical condition subtended to infertility picture, with possible sequelae on inheritors whenever unrecognized in urological daily practice.

CASE REPORT

A 35-year-old Caucasian man presented to our facility for infertility. His past medical and surgical history revealed only a prior transpelvic gunshot wound injury due to a high-power military weapon during the Balkan conflict and a subsequent emergency exploration lapa-

rotomy on the battlefield, without further technical details. On physical examination, surgical scars were visible on the anterior abdominal wall on an umbilical-pubic and a right inguinocrural route (Figure 1). A bullet entrance wound was detectable on the lateral surface of the upper right thigh at the highness of the trochanteric region, while the exit wound was recognizable a little bit higher on the lateral surface of the upper left thigh (Figure 1). The external genitalia appeared normal and vas deferens was bilaterally palpable. Semen analysis showed a normal pH (7.5) and volume of ejaculated sperm (3.0 mL). Scrotal ultrasonography revealed a normal appearance of the epididymis, vas deferens, and testicular parenchyma. Fine-needle biopsy recognized a bilateral normal spermatogenesis, leading to the diagnosis of obstructive azoospermia. Therefore, the patient resolutely was asked for a vasa deferens recanalization by bilateral vaso-vasostomy.

To evaluate the possible outcome of such a surgical reconstruction, we performed a retrograde and micturitional urethrocytography demonstrating a regular morphology of the urethral segments with an adequate vesical neck opening in the absence of deforming outcomes due to previous surgery (Figure 2). To establish the vas deferens length into the pelvis, we performed a simultaneous transperineal ultrasound-guided vesiculography demonstrating the bilateral presence of normal seminal vesicles (Figure 3), and an antegrade

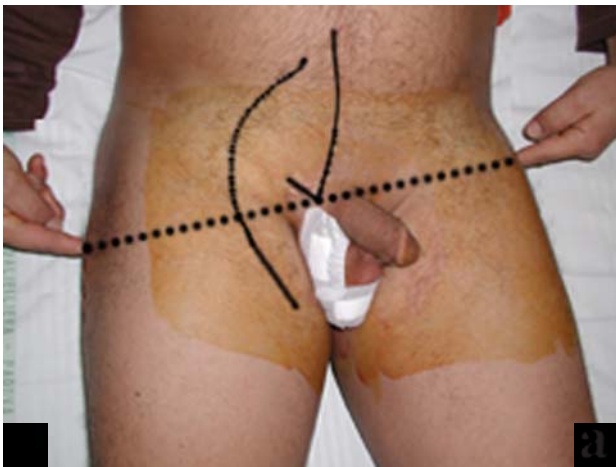


Figure 1. Appearance of patient on physical examination. The entrance and exit sites of bullet are shown (route of bullet signed with the broken line).

scrotal vasography surprisingly revealing the vas deferens truncated at the upper level of the scrotum (Figure 4), without a pathogenetic correlation with patient's past clinical history.

On this basis, hormonal and genetic evaluation investigated the etiology of what seemed to be a congenital (and not post-traumatic) malformation, especially focusing on cystic fibrosis (CF), a disease often presenting with bilateral absence of the vas deferens. While we found no abnormal findings about luteinizing hormone, follicle-stimulating hormone, prolactin, 17- β -estradiol, and testosterone, screening for CF transmembrane conductance regulator (CFTR) gene mutations revealed a heterozygosis for delta F508 mutation on a background of a poly-T genotype of 7T/9T. Therefore, the diagnosis was congenital bilateral absence of the vas deferens (CBAVD) associated with CFTR mutation and poly-T genotype of 7T/9T.

As a result, there were no chances for a surgical reconstruction of a spermatic route to regain a natural fertility. Nevertheless, it would be possible to obtain pregnancy using the intracytoplasmic sperm injection; hence, we advised endocrinologic and genetic counseling.

DISCUSSION

Male side routine investigations for infertility include semen analysis, hormonal determinations, and eventually ad-



Figure 2. Retrograde and micturitional urethrocytography demonstrating normal bladder and urethra.

ditional procedures, such as fine needle testicular biopsy.⁽¹⁾ Initially, an obstructive azoospermia diagnosis was made in our patient. The hypothesized bilateral lesion that occurred to the vas deferens was anatomically compatible with both the primary bilateral transection of the spermatic routes due to the gunshot wound and the outcome of an emergent surgical intervention on the battlefield.⁽²⁾

In literature, iatrogenic injury to the vas deferens during the inguinal, pelvic, and scrotal surgery are described as acquired factors of male infertility, and are probably underestimated.^(3,4) Furthermore, a bilateral transection of the vas deferens in a patient with a cross stab injury to the root of scrotum has been previously reported.⁽⁵⁾

The finding of a truncation involving bilaterally the vas deferens at the upper level of the scrotum was not compatible with our previous suppositions, raising up the suspicion of a CBAVD due to a genetic disorder, as typically occurs in CF. The clinical diagnosis of the absent vas deferens can be missed easily, and all men with azoospermia should undergo careful examination to exclude CBAVD, particularly those with a low semen volume and pH.⁽⁶⁾

Cystic fibrosis is an autosomal-recessive disorder involving CFTR gene. It is the most common genetic disease of Caucasians, as 4% of the general population is carrier of gene mutations. This gene is located on the short arm of chromosome 7, and encodes for a membrane protein functioning

as a chloride ion channel, basic for the formation correct development of the ejaculatory duct, seminal vesicle, vas deferens, and distal part of the epididymis.

Congenital bilateral absence of the vas deferens is associated with CFTR mutations. Approximately, 1500 mutations are known and may be found in one or both copies of the CFTR gene, sometimes presenting only mild clinical stigmata, especially in heterozygosis. A mild allele associated with CBAVD is the RNA splice variant named 'the 5T allele'. This is characterized by a variable number of thymidine residues at the splice acceptor site of intron eight.⁽⁷⁾ The 5T allele is associated with the lowest amounts of functional CFTR protein, and in patients affected by CBAVD is frequently associated with a severe mutation on the other allele, such as the DF508 mutation, with an incomplete penetrance.⁽⁷⁻⁹⁾

In a man with CBAVD, it is important to examine the couple for CF mutations, determining both the genotypes and the consequent risk to transmit CF by assisted reproduction. Indeed, when the female partner is found to be a carrier of CFTR, the chance of having a baby with CF will be 25% if the man is heterozygous and 50% if the man is homozygous. Even in the case of negative female partner for known mutations, her chance of harboring an unknown mutation is about 0.4%.



Figure 3. Transperineal ultrasound-guided vesiculography demonstrating the bilateral presence of the normal seminal vesicles, without visualization of the vas deferens (arrows).

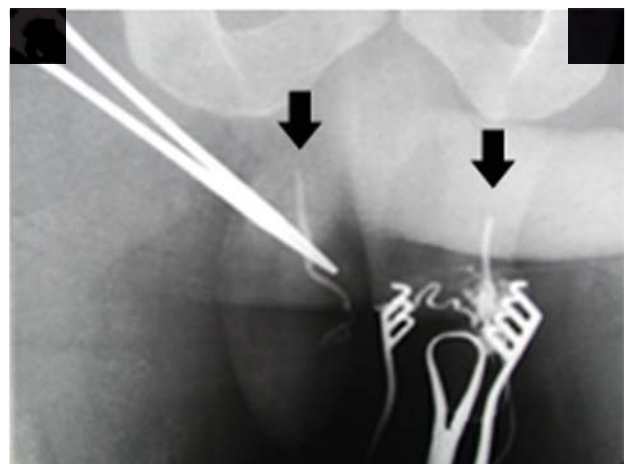


Figure 4. Antegrade scrotal vasography revealing the vas deferens truncated at the upper level of the scrotum (arrows).

CONFLICT OF INTEREST

None declared.

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