Rupture of Testicular Tunica Albuginea: A Urological Emergency

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Key Words
Testicular rupture • Tunica albuginea rupture • Acute scrotum • Blood-testis barrier • Urological emergency

Abstract
Background: Road traffic accident, commonly enunciated as “RTA”, is the leading cause of morbidity and mortality worldwide. However, for a urologist, an “RTA” could imply “Rupture of the testicular Tunica Albuginea”, with equivalent, if not higher psychosocial, anatomical and hormonal morbidity and/or mortality. Blunt or penetrating trauma, or degloving injuries, may lead to an RTA, with extrusion of the testicular seminiferous tubules, mandating an early diagnosis and prompt intervention, in order to prevent future complications.

Method: A thorough “pubmed” search was conducted with the terms “testicular rupture” and “tunica albuginea rupture”, and all English language articles with these terms in title or abstract, were included in this review.

Results/Conclusion: The following review highlights this urological emergency as an important differential for an “acute scrotum” and provides an insight into the currently available literature documenting testicular ruptures, as well as the various diagnostic modalities and management practices. Additional food for thought remains the need for long term follow up of these patients, in order to assess for hypogonadism or infertility as well as the need to understand the role of the “blood-testis barrier” and possible implications of its breach, with auto antibody production.

Testicular Rupture

Testicular rupture, by definition, is a breach or tear in the tunica albuginea, resulting in extrusion of the testicular contents, including the seminiferous tubules [1].

Types of Rupture

Based on their mode of trauma, testicular injuries have been classified into 3 types: blunt trauma injury; penetrating trauma injury; and degloving injury [2]. Any of these mechanisms may be responsible for testicular rupture and extrusion of intratesticular contents.

Mechanism of Injury

Blunt trauma usually involves a fierce blow to the testicle, forcing it against the thigh or pubic bone, with resultant intraparenchymal bleed, and rupture of tunica albuginea [3]. As per previous studies, a force of around 50 kg or more is needed to breach this “holy barrier” of tunica albuginea [3].

Penetrating testicular trauma and rupture, usually has a different mechanism of injury [4, 5]. Assaults on account of gunshots, stabbings, war injuries, straddle injuries and especially bomb blasts are most commonly implicated as the causative factors [5]. However, these are usually associated with concomitant multi-organ involvement [5].
Degloving injuries associated with testicular rupture are rare and usually associated with animal bites (mainly dogs), with multiple soft tissue and bony injuries alongside [6, 7].

Sports injuries and fisticuff injuries, where patients have been directly struck on the groin, account for nearly 50% of all testicular ruptures [8, 9].

**Clinical Presentation and Diagnosis**

Testicular rupture is, in itself, a urological emergency, and it is reported that more than 90% of ruptured testes can be salvaged if identified and explored early [4].

A thorough history and physical examination are the cornerstones in early diagnosis of testicular rupture injuries [9]. Symptomatically, there may be no difference from other causes of acute scrotum and only a history of trauma, prior to the development of symptoms, may act as a pointer towards the diagnosis [2].

Most patients would present with a history of trauma in the recent past with pain, redness and increasing scrotal size [10]. Clinical examination would reveal tenderness, ecchymosis and swelling of the affected hemiscrotum with the testis often not palpable due to extreme tenderness, or masked by expanding hematomas or complete traumatic dislocation [10].

More often than not, it is nearly impossible to conduct an adequate examination of the scrotum, in the presence of a hematoma as well as exquisite tenderness, and this may contribute to probably taking the adage of “conservative treatment” away from this entity.

**Investigations**

In such an acute scrotum, with severe scrotal edema, swelling and tenderness, it may not always be possible to examine the testis clinically. Herein lays the importance of a testicular ultrasound.

Ultrasound of the scrotum is now considered the first line investigation for suspected testicular rupture, with specificity and sensitivity rates equivocal to physical examination [4, 10]. Heterogeneous testicular echotexture and discontinuity in the tunica albuginea are the parameters on ultrasound that are markers for rupture (fig. 1, fig. 2) (sensitivity: 100%; specificity: 93.5%) [4, 10]. In addition to diagnosis, ultrasound also aids in decision making. Buckley et al. [4] have reported that they depend on the initial size (clinical or sonographical) as well as hematoma dynamics, in order to consider surgical intervention or opt for conservative measures. In their retrospective review of 65 patients, 32 patients had a scrotal ultrasound suggestive of a testicular rupture (heterogeneous echotexture) and all of these underwent an immediate surgical exploration, with 30/32 having an actual rupture [4].

Color flow and duplex doppler help assess testicular vascularity and viability as an adjunct to routine ultrasound [10]. These too may help in decision making of conservative versus surgical management.

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**Fig. 1.** Testicular ultrasound showing the breach in the tunica albuginea.

**Fig. 2.** Testicular ultrasound demonstrating the collection after albuginea rupture.
Testicular MRI or CT scans do not provide too much of additional information, however, if doubt persists despite an adequate ultrasound, these would be the second line imaging modalities to resort to [4, 10–13].

Management

Management of testicular rupture depends on the history, duration of injury, pre-operative imaging and intra-operative appearance of the affected testis, as well as the condition of the opposite testis [4].

Conservative management, with non steroidal analgesics, local ice-packs and testicular elevation, is recommended in insignificant testicular injuries without any signs of a hematocoele, as well as in cases where the hematocoele may be present, but smaller than three times the size of the contralateral testis [10, 14, 15]. Whether one can rely only on the clinical findings though, remains less understood.

In a documented testicular rupture, immediate surgical exploration, debridement and excision of the devitalized testicular tissue with closure of the tunica albuginea, preserving as much of the viable testicular tissue as possible, forms the mainstay of treatment (fig. 3–5) [16]. Where approximation of the tunica albuginea is not possible due to extensive tissue loss, tunica vaginalis flaps can be used to bridge the gap and preserve as much of the testicular parenchyma as possible [17].

If the testis, on exploration, is found to be non-viable, with no possibility of tissue preservation, or if there is extensive necrotic tissue, an orchidectomy may be mandated, irrespective of the status of the contralateral testis [10].

A delay in presentation or surgical exploration has its own hazards, including chronic pain, superadded infection, testicular atrophy, impairment of hormonal status as well as increase in long term orchidectomy rates [4, 10]. Successful repair has been documented to occur in 90% of cases, when they present within 72 hours of injury, which drops to 45%, once this duration has lapsed [1].

There have been proponents of surgical exploration in all cases as well as those opting for conservative management initially, and then reverting to surgery in the...
absence of significant clinical improvement. What is the optimal strategy though, is still not known, and the path to be tread has to be self-chosen by the surgeon, keeping in mind the possible pros and cons of his decision.

As long as the contralateral testis remains functional, there is no need for hormone replacement (testosterone supplementation).

Infertility, if seen, is only in cases of bilateral testicular injuries, warranting bilateral orchidectomies and in such patients, a lifelong testosterone supplementation is necessary [10, 18].

For the Future

Follow up of patients with testicular rupture may be mandated to assess the extent to which late onset hypogonadism may actually occur, following such an injury.

The blood-testis barrier, also known as the Sertoli cell-semi
eriferous epithelium barrier [19, 20], provides a specialized micro-environment for meiosis I and II, as well as spermiogenesis and spermiation to take place [21]. In addition, it also has an important immunological function that cannot be even transiently compromised, so as to avoid the production of auto-antibodies against the germ cells [21]. Francavilla et al. [22] have even stated that these anti-sperm antibodies may lead to male infertility in future. Whether this barrier gets damaged by testicular rupture, leading to auto-antibody formation and is a likely cause of this late onset hypogonadism needs to be explored in future.

The implications could be in terms of ensuring long term follow up of such patients, as well as, keeping this entity in mind, in subsequent cases of idiopathic infertility.

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