Review of Diagnosis and Management of Scrotal Trauma with a Case Report

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ABSTRACT
Scrotal trauma is a rare surgical emergency. Blunt trauma scrotum is a common mode of scrotal injury which may result in testicular rupture, haematocele, testicular dislocation and hematoma. Testicular injuries are managed both conservatively as well as surgically. Surgical exploration becomes a must in case of testicular rupture and large haematoceles.

Keywords: Scrotum, Testis, Rupture, Haematoma, Trauma.

INTRODUCTION AND ETIOPATHOGENESIS
Scrotal trauma is a rare surgical emergency accounting for less than 1% of all traumatic injuries, largely because of its safe anatomical location and mobility. The injuries are predominantly more prevalent in 15–40 years of age group¹. However, 5% of trauma patients are less than 10 years old (Monga and Hellstrom 1996). There are various mechanisms of scrotal trauma, of which blunt trauma is the commonest form. Blunt trauma scrotum contributing to 80% scrotal injuries is usually caused by sports like road bicycling, horse-back riding, motorcycle riding, especially on bikes with a dominant gas tank (Leibovitch and Mor 2005). Blunt testicular trauma has been reported amongst in-line hockey skating and rugby players (Frauscher et al. 2001). Motor vehicle accidents and direct physical assault also contribute to scrotal injuries².

The right testis is more likely to get injured than the left one, because it is more likely to be trapped against the pubis bone and the inner thigh³.

Blunt trauma due to motor vehicle accident and physical assault has been reported to have a prevalence of 9–17%³. The blunt trauma injury caused by a blow forces the testicle against the thigh or pubis and results in intra-testicular bleeding. The tunica albuginea is believed to get ruptured only when the trauma force exceeds 50 kg⁴.

If the bleeding remains within the tunica vaginalis, haematocele results. But when the tunica vaginalis gets torn due to high intra-testicular pressure and bleeding, scrotal hematoma forms and presents as an enlargement of the scrotum. Penetrating trauma contributes to remaining 20% of scrotal injuries and is caused by firearm (commonest), stab, animal hit and self-inflicted injuries.

Thermal and degloving injuries- are the rarest cause of scrotal injuries. In degloving injury scrotal skin is sheared off, and it often requires skin grafting⁵.

SCROTAL ANATOMY
The scrotum having two compartments is separated by the midline septum, which is called median raphe. Each compartment of the scrotum contains a spermatic cord, testis, and epididymis. The wall of scrotum is formed of the several layers, namely: Skin, superficial fascia, Darts muscle, external spermatic fascia, cremasteric fascia and the Internal spermatic fascia (superficial to deep). The testes is covered by tunica vaginalis, which has two layers. The layer towards the scrotal wall is the parietal layer, and the layer overlying the testis and epididymis is the visceral layer. The tunica vaginalis covers the testis and epididymis except for a small region in the posterior view. A potential space between the visceral and parietal layers normally haves a few milliliters sterile fluid.

Tunica albuginea lies deep to the tunica vaginalis. Each testis is covered by the tunica albuginea, which helps to maintain its shape and integrity. A testis measured 5 cm × 3 cm × 2 cm and is homogeneously echogenic in ultrasound. The testicular parenchyma consists of multiple lobules, each of which is composed of several seminiferous tubules that lead via tubuli recti to the dilated spaces known as the rete testis. The epididymis, which overlies the superior and lateral aspects of the testis, is composed of a head, body, and tail. The body of the epididymis courses alongside the testicle inferiorly to become the tail, which continues as the vasa deferens in the spermatic cord

DIAGNOSIS
Initial provisional diagnosis can be formed on basis of patient history alone. Careful history and examination for:

Symptoms: Pain, nausea, vomiting, fainting, scrotal swelling.

Signs: Tenderness, redness, swelling, ecchymosis of the hemiscrotum.

The testicles may be displaced to the inguinal region or rarely in to the abdominal cavity⁶.².
INVESTIGATIONS

Standard ultrasound is a sufficient investigation for diagnosis of scrotal injury which is performed lying supine with the scrotum supported by a towel between the thighs. These are the various findings in different conditions:

Testicular Rupture

The normal tunica albuginea looks a re than 90% of ic compression of the testis. The discontinuity of the tunica albuginea suggests rupture of the testis. Sensitivity and specificity of USG for diagnosis of testicular rupture sequentially is 50% and 75%.8

Testicular Fracture

Testicular fracture in ultrasound shows a linear hypoechoic, avascular area within the testicular parenchyma that may or may not be associated with tunica albuginea rupture9.

Hematoma

Intra-testicular hematoma is common in blunt testicular trauma. This takes time to develop, therefore an acute hematoma is re-examined within 12–24 hours later the initial ultrasound examination to detect any changes in echogenicity10,11.

Haematocele

Accumulations of blood within the tunica vaginalis, are the commonest in the scrotum after blunt trauma10. Large haematocele may cause compression of blood vessels and bring down blood flow, mimicking complete or partial torsion. Thus, emergency surgical evacuation of the extra testicular hematoma is necessary to rejuvenate blood flow in a large haematocele. Ultrasound has limited success in diagnosing tunica albuginea rupture in the event of a large hematoma12.

Traumatic Epididymitis

Traumatic epididymitis is uncommon, but it can occur in patients who have sustained acute scrotal trauma.

Testicular Torsion

Trauma-induced testicular torsion is a well-known phenomenon and a surgical emergency. Traumatic torsion can be induced by stimulating forceful contraction of the Cremaster muscles.

Testicular Dislocation

Testicular dislocation is uncommon after trauma injury, and it is difficult to diagnose with ultrasound examination after acute trauma.

Color Doppler imaging of scrotum is required for assessing the testicular viability and perfusion. Sometimes testicular MRI or CT scan as second-line imaging modalities may be required when USG is not helpful1.

MANAGEMENT

Haematocoele

Haematocoele is commonest finding in scrotal trauma. It requires conservative as well as surgical management.

Conservative management is recommended for small haematoceles that are up to three times of the size of the contralateral testis13.

But conservative management in large haematoceles often needs delayed surgery (> 3 days). These patients with large haematoceles who fails conservative management have a higher chances of orchidectomy than patients who undergo early surgery.14–18

Early surgical exploration preserve testis in more than 90% of cases compared to delayed surgeries which result in orchidectomy in 45-55% of patients19.

Another drawback of conservative management is prolonged hospital stay and may result in infection and subsequent pus formation. Therefore, large haematoceles must be explored earlier irrespective of the presence of testicular contusion or rupture.

Testicular rupture

Testicular rupture accounts approximately 50% of blunt scrotal trauma18. It may happen due to traumatic compression of the testis against the inferior pubic ramus or symphysis and thigh. Approximately 50 kg force is needed to produce testicular rupture (Wasko and Goldstein 1996).19

Usually testicular rupture is unilateral, but 1.5% of cases may be bilateral20. In rare instances it is associated with epididymal rupture, which is difficult to detect with ultrasound.

Testicular rupture symptomatically presented with pain, nausea, vomiting, and sometimes fainting. Hemiscrotum would be tender, swollen, and ecchymotic.

<p>| AAST organ injury severity scale for the testis |</p>
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description of injury</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Contusion or hematoma</td>
</tr>
<tr>
<td>II</td>
<td>Subclinical laceration of tunica albuginea</td>
</tr>
<tr>
<td>III</td>
<td>Laceration of tunica albuginea with &lt;50% parenchymal loss</td>
</tr>
<tr>
<td>IV</td>
<td>Major laceration of tunica albuginea with &amp; 50% parenchymal loss</td>
</tr>
<tr>
<td>V</td>
<td>Total testicular destruction or avulsion</td>
</tr>
</tbody>
</table>

High-resolution, real-time USG use to diagnose of intra- and/or extra-testicular haematoma, testicular contusion, or rupture21–28. The colour Doppler study provides information about testicle viability. If scrotal USG is inconclusive, testicular CT or MRI may be helpful29.

When imaging studies are inconclusive then surgical exploration is ideal to exclude testicular rupture and other injury. Scrotal exploration includes evacuation of blood clots and haematoma, excision of any necrotic testicular tubules and closure of the tunica albuginea with running absorbable sutures likely 3/0 Vicryl.

More than 80% of ruptured testes can be salvaged if surgical repair is performed within 72 hours of testicular injury20.

Testicular dislocation

Traumatic testicular dislocation is rare. It is common in road traffic accidents31–33. Usually it is unilateral but may be bilateral in 25% of cases30.

Dislocation can be a subcutaneous, in the superficial external inguinal ring, inguinal canal or abdominal cavity. Traumatic dislocation of the testis is treated by manual replacement and secondary orchidopexy. If primary manual reposition cannot be performed, immediate orchidopexy is indicated.

Penetrating scrotal trauma

Penetrating injuries are rare to the scrotum require surgical exploration with conservative debridement of non-viable tissue. Primary repair of the testis and scrotum usually performed and also depends on the extent of injury.34
CASE REPORT

A 32 year male patient came to the emergency surgery ward with an alleged history of blunt trauma scrotum as a result of hit by a cricket ball one day back. He complained of pain, swelling & enlargement of right scrotum. He gave no history of any other medical comorbidity.

On clinical examination patient had stable vitals and systemic examination was with in normal limits.

Local examination: right hemiscrotum enlarged in size, skin erythematous, warm, indurated and tender. Testis could not be palpated separately from the swelling, there was no dislocation of testis, cough impulse was negative and getting above swelling was present.

Extensive injury of the tunica albuginea is repaired by mobilisation of a free tunica vaginalis flap for testicular closure. But in unstable patients, orchietomy is indicated.

In the case of extensive loss of genital tissue, e.g. IED blast injury, orchiectomy is indicated. When the injury is less severe, conservative management is recommended when the affected testis is enlarged >3 times the normal scrotum and both testes had normal vascularity without any testicular rupture.

Conservative management was planned and patient kept on nonsteroidal analgesic drugs and scrotal support. Patient discharged was on day five post admission, and follow-up USGs performed on 21 days and 6 weeks post injury that showed healthy and viable bilateral testes.

DISCUSSION

Blunt scrotal trauma may cause testicular rupture, haematoma, dislocation, and haematoma formation with rupture in approx. 45% of cases.36

Acute scrotal trauma is an uncommon injury because of the scrotal mobility and also testis being protected by tunica albuginea, despite its exposed and hanging location.37 Various studies demonstrated that testicular rupture is usually caused by more 50 kg force against the inferior pubic ramus or the pubic symphysis after blunt scrotal trauma.38 USG inguinoscrotal is sufficient investigation for diagnosis of testicular rupture, and if ruptured testis is having more than 30% intra-testicular haematoma or necrotic tissue then its prognosis is very poor to be salvaged.39 European Association of Urology (EAU) recommended that surgical exploration with excision of necrotic tissue and closure of the tunica albuginea is mandatory in each event of testicular rupture.39

Testicular dislocation is rarer than rupture and it is to be repositioned urgently with orchidopexy.39 At last haematoma or haematocele can be managed conservatively but urgent surgical exploration with extraction of haematoma is recommended when the affected testis is enlarged >3 times the contralateral testis.39

We have managed our case conservatively without any complication.

CONCLUSION

Scrotal trauma though is a rare clinical entity but the incidence is growing with industrialisation, advent of adventure sports and increase in motor vehicles. Scrotal and testicular trauma has seen a lot of standardisation through the works of urological and trauma associations, across the globe. We emphasise upon the early detection and management as per set protocols. Use of sonography has also been brought out in our study.

REFERENCES


Fig 1: Showing enlarged right scrotum

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Right</th>
<th>Left</th>
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<tbody>
<tr>
<td>Length</td>
<td>9 cm</td>
<td>6 cm</td>
</tr>
<tr>
<td>Width</td>
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<td>3.5 cm</td>
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<tr>
<td>Thickness</td>
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