

Acute Scrotal Emergencies: Randomised Prospective Study

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Abstract: ***Background and Aim:** Patients presenting with acute scrotal pain to the emergency department require a timely diagnosis. Although the differential diagnosis can be extensive and varies with age, there are a few conditions that are considered true surgical emergencies. **Material and Methods:** This study consisted of 60 patients of acute scrotal emergencies who were admitted in Department of Surgery in MB Govt. Hospital attached to RNT Medical College, Udaipur from July 2015 to December 2016. **Results:** Epididymo-orchitis (48%) was the commonest acute scrotal emergency followed by torsion testis (17%), testicular abscess (13%), testicular trauma (13%), obstructed hernia (7%) and painful scrotal sinus. Maximum patients of acute scrotal emergency were present in age group 21-40 years (48%) followed by age group 41-60 years (32%). Maximum patients of epididymo-orchitis were present in age group 21-30 years. Torsion testis was more common in younger group (10-20) years. **Conclusions:** We found that Epididymo-orchitis (48%) was the commonest acute scrotal emergency followed by torsion testis (17%), testicular abscess (13%), testicular trauma (13%), obstructed hernia (7%) and painful scrotal sinus. Early diagnosis along with aggressive treatment better the final outcome. Further studies with larger sample size are warranted.*

Keywords: Epididymo-orchitis, Torsion Testis, Testicular abscess, Testicular trauma

1. Introduction

Acute scrotal emergencies are one of the more challenging clinical dilemmas in surgery. Acute scrotal emergencies can affect the entire life of the patient in the form of sterility. So needs careful examination, proper evaluation and aggressive treatment. Follow up is essential to find out the complications in the form of sterility so as to take the total care of the patient.

Acute scrotum is defined as "the acute onset of pain and swelling of the scrotum that requires either emergency surgical intervention or specific medical therapy." Patients presenting with acute scrotal pain to the emergency department require a timely diagnosis^[1]. Although the differential diagnosis can be extensive and varies with age, there are a few conditions that are considered true surgical emergencies. These include torsion of the spermatic cord, incarcerated hernia with strangulation, testicular trauma leading to rupture or organ-threatening hematomas, and Fournier's gangrene. These are conditions that need to be kept in mind by the physician when approaching such patients. Other causes such as epididymitis or orchitis need to be distinguished, and although not requiring emergency surgery, still require urgent diagnosis and treatment^[2].

Diagnostic ultrasound can accurately diagnose many acute conditions of the scrotum, and emergency physicians have come to utilize it to advance their diagnostic acumen. This educational review article discusses the current literature and the use of emergency ultrasound in patients presenting with scrotal pain as well as scanning approaches and common sonographic findings^[3]. Several acute scrotal conditions can present in similar way, testicular torsion is by far the most significant. Testicular torsion is a true surgical emergency because, the likelihood of testicular salvage decreases, as the duration of torsion increases. The

other conditions that present in similar way to testicular torsion includes torsion of appendix testis, epididymo-orchitis, Fournier's gangrene, trauma to testis, haematocele, pyocele and obstructed or strangulated inguino-scrotal hernia etc.

2. Methodology

Patient recruitment This randomized prospective comparative study was carried out at a tertiary referral center of north-west India. Prior approval was obtained from the institutional review board and institutional ethics committee. All patients presenting at the out-patient department between July 2015 and December 2016 with Acute scrotal emergencies irrespective of the etiology were included in the study and were entered into a prospectively maintained database.

The prospective database was extracted onto a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA) and patients were deidentified and assigned a unique identification number. Using a random number generator, 60 random patients from the pooled data were selected who formed the study cohort.

Informed consent (written and verbal) was obtained from each patient for inclusion into the study. Patients were made aware through the information sheets and preliminary interviews that the choice to consent or otherwise would have no bearing on the treatment offered. The patients were subjected to a detailed evaluation by the first author.

Data collection

Patient evaluation included demographic data, detailed history, general and systemic examinations followed by laboratory evaluation. Routine blood and urine examinations

were done along with radiographic screening of the ultrasound of the affected part.

Patient management

Patients were managed according to the standard hospital protocols. 58% cases of acute scrotal emergencies were managed conservatively and 42% patients were operated.

All patients of epididymo-orchitis were managed conservatively and all cases of torsion testis, scrotal abscess, obstructed inguinal hernia and painful scrotal sinus were operated.

75% patients of testicular trauma were managed conservatively and 25% were operated.

42% cases of acute scrotal emergencies were operated. 92% of them were taken for emergency surgery and 8% were taken for elective surgery.

3. Results

Patient presentation

A total of 60 patients were included in the study according to the study protocol. The present study was undertaken in cases presenting with acute scrotal emergencies in MBG Hospital attached to RNT Medical College, Udaipur from July 2015 to December 2016.

All the patients were evaluated in detail by clinical examination and investigations. Epididymo-orchitis (48%) was the commonest acute scrotal emergency followed by torsion testis (17%), testicular abscess (13%), testicular trauma (13%), obstructed hernia (7%) and painful scrotal sinus.[Table 1]

Maximum patients of acute scrotal emergency were present in age group 21-40 years (48%) followed by age group 41-60 years (32%). Maximum patients of epididymo-orchitis were present in age group 21-30 years. Torsion testis was more common in younger group (10-20) years.[Table1]

Pain and scrotal swelling were the most common symptoms in cases of acute scrotal emergencies and were present in 100% cases.

Fever was present in all cases of scrotal abscess and 86% cases of epididymo-orchitis.

Burning micturition was present in 27% cases of epididymo-orchitis.

In cases of acute scrotal emergencies, maximum no. of patients presented with symptom duration between 2 to 5 days (52%) followed by duration 6 hrs. to 2 days (48%) and duration between 5 to 7 days (17%). 12% had symptom duration less than 6 hours with most of them having testicular torsion (40% of all torsion cases) and testicular trauma (37% of all cases of trauma). 7% patients had symptom duration of more than 7 days.[Table2]

Right sided scrotal involvement was present in 45% cases of acute scrotal emergencies and left side was involved in 42% cases. Bilateral involvement was present in 13% cases.

Total 4 patients of acute scrotal emergencies were suffering from other diseases. Two of them had associated hydrocele, one had inguinal hernia and one had fistula in ano.

Laboratory parameters

Total leucocyte count was raised in all cases of acute scrotal emergencies except in case of painful scrotal sinus.

Raised neutrophil count was present in 45% cases, raised lymphocyte count was present in 27% cases, raised monocyte count was present in 5% cases and raised eosinophil count was present in 2% cases.

In cases of acute scrotal emergencies, total 47 patients were investigated. 74% patients were investigated by USG. Color doppler was done in 20% cases. Both USG and color doppler were done in 14% cases. 13 patients were diagnosed clinically.

In our study, we found that doppler ultrasound was 100% specific and sensitive for testicular torsion. The common age group for torsion of testis was 14–18 years for epididymo-orchitis, it is quite a wide range between 30 and 45 years. We therefore conclude that doppler ultrasound of scrotum is most informative in a patient presenting in emergency department with acute scrotal pain. It can reliably rule out testicular torsion and helps in clearing clinical dilemma between torsion testis and epididymo-orchitis, and thus help in avoiding unnecessary surgical explorations. Hence, it can significantly improve outcome and decrease morbidity of patient. It is an accurate, rapid, nonexpensive, nonionizing, important adjunct to clinical assessment of scrotum.[Table3]

Urine culture and sensitivity was done in 20 patients of epididymo-orchitis. In 8 patients (40%), bacteria were present in the urine sample. [Table4]

Gram negative bacteria were found in 6 (75%) patient's urine sample. E. coli was the commonest organism found in 5 patient's urine sample. Gram positive bacteria were present in 2 (25%) patient's urine sample.

Urine examination for pus cells was done in 20 patients of epididymo-orchitis.

Pus cells were present in 75% cases and absent in 25% patients.

4. Discussion

The present study consisted of analysis of 60 patients who got admitted to MBGH, Udaipur during the period of 1/07/2015 to 31/12/2016.

Scrotal swelling is usually most common in 2nd-3rd decade of life. In the present study, there were 6(10%) patients in 0-20 age group. We found 29(48%) patients in age group 21-40 year. 41-60 years of age group had 19(32%) patients.

6(10%) patients were found in age group >60 years. Campbell found that the acute scrotal swelling is more common in 2nd-3rd decade of life i.e. incidence of acute scrotum is higher during the years of maximum sexual activity^[4]. In our study, we also found the maximum no. of patients in 21-40 years. It has been reported in the literature that the average age of a patient with acute epididymoorchitis is 49 years^[5].

In our study, out of 29 patients of epididymoorchitis, 13(45%) were in age group 21-40 years. 12(41%) patients were in age group 41-60 years. 4(14%) patients were above 60 years of age.

Testicular torsion is a true emergency and must be differentiated from other complaints of testicular pain because a delay in diagnosis and management can lead to loss of the testicle⁶. Testicular torsion accounts for as many as 26% of cases of acute scrotum⁷. Although testicular torsion can occur at any age, including the prenatal and perinatal periods, it is more common in men who are younger than 20 years of age^[8].

In a study on testicular trauma by Ryan Terelecki^[9] such injuries were typically seen in males aged 15-40 years. In the present study, it was found that maximum patients of testicular trauma were in age group 21-40 years.

In a study of 57 patients of obstructed inguinal hernia done by Devajit et al the most representative age group was 21-45 years^[10]. In the present study, 3(75%) patients of obstructed hernia were in age group 21-40 years and 1(25%) patient was in age group 41-60 year.

All patients of epididymoorchitis had pain and scrotal swelling. 25(86%) had fever and 8(27%) had burning micturation. All patients of testicular torsion had pain and scrotal swelling. 2(20%) patients had fever. None of them had burning micturation. All patients of testicular abscess had pain, scrotal swelling and fever. All patients of trauma had pain and scrotal swelling.

All patients of obstructed hernia had pain, inguino scrotal swelling and symptoms of intestinal obstruction. 2(50%) patients had fever.

One patient of painful scrotal sinus had scrotal pain and testicular swelling.

Nature of onset and duration of pain is another important factor. In epididymitis, the pain is usually insidious in onset with a longer duration of pain at presentation, in comparison to testicular torsion where the pain is of sudden onset with a short duration of pain at presentation^[11]. Torsion of testicular appendage may be distinguished from testicular torsion by its more insidious onset and slightly longer duration of pain at presentation, presumably because this condition is less painful^[12].

In the present study, 7(12%) patients of testicular torsion presented with symptom duration less than 6 hours. 29(48%) patients presented within 2 days. 15(52%) had symptom duration 2-5 days. 5(17%) had symptom duration 5-7 days. 4(7%) had symptom duration more than 7 days.

4(40%) patients of testicular torsion presented within six hours and 5(50%) patients presented more than six hours but less than 2 days.

Bortsch and colleagues^[13] found that most of the cases of testicular torsion presented as symptoms of duration less than two days. In the present study, we also found that 90% of the patients of torsion testis had symptoms of less than two days.

In the present study, 27 (45%) patients had involvement of right side of scrotum while 25 (42%) patients had involvement of left side of scrotum. 8 (13%) patients had bilateral disease.

11(38%) patients had right sided epididymoorchitis, 14(48%) patient had left sided epididymoorchitis and 4(14%) had bilateral disease.

8(80%) patients had torsion of right testis and 2(20%) had torsion of left testis. In 3(38%) cases of scrotal abscess, right testis was involved and in 4(50%) cases left testis was involved. 1(13%) patient had bilateral testicular abscess.[Figure1]

In cases of testicular trauma, 2(25%), patients had right sided testicular injury, 3(38%) patients had left sided testicular injury and 3(38%) patients had bilateral testicular injury.

2(50%) patients had right sided incarcerated hernia and 2(50%) patients had left sided obstructed hernia.

One patient of painful scrotal sinus had involvement of right scrotum. The present study shows that there is almost equal involvement of right or left testis in acute scrotal emergency.

In the present study, epididymo orchitis is the most common scrotal emergency. It was found in 47% of cases. Vinod et al^[14] reported 10% cases of epididymo orchitis in 120 cases. In the present study incidence of torsion is 17% while Vinod et al^[14] also found 17% incidence of torsion testis. Incidence of scrotal abscess was 13% in the present study. Obstructed hernia was found in 13% cases.

In the present study, 15(51%) patients of epididymoorchitis had raised neutrophil count while 10(35%) patients had raised lymphocyte count. 2(17%) patients had raised monocyte and 1(9%) patient had raised eosinophil count. 4(40%) patients of torsion had raised neutrophil count and 2(20%) patients had raised lymphocyte count. 5(62%) patients of scrotal abscess had raised neutrophil count and 2(25%) patients had raised lymphocyte count. 1(12%) patient of trauma had raised neutrophil count and 1(12%) patient had raised lymphocyte.

2(50%) patient of obstructed hernia had raised neutrophil and 1(25%) patient had raised lymphocyte count.

Leukocytosis and pyuria have been reported to occur in around two thirds of patients with epididymoorchitis¹⁵. De Jong and associates have reported that in cases of epididymo orchitis leucocyte count is high¹⁶. In our study, leucocyte

count was found to be high in cases of epididymo orchitis and torsion testis. Highest count was 23000/mm³.

In the present study, total 48 patients were investigated on the basis of USG and colour doppler. 36 (74%) patients were investigated on the basis of USG. 7 patients (20%) were investigated on the basis of colour doppler. In 5 (14%) patients both USG and color doppler were done.

In ultrasound examination, 3(5%) patients were diagnosed as case of torsion testis, 26 (43%) diagnosed as cases of epididymo orchitis or orchitis. 3 (5%) cases had scrotal abscess. In 2 patients (3%) ultrasound showed hematocele. 1(2%) patient had painful scrotal sinus. 1 patient had obstructed inguinoscrotal hernia.

Both USG and color doppler were done in 3(5%) patients of epididymo orchitis, 1(2%) patient of torsion testis and 1(2%) of hematocele. 13(22%) patients were diagnosed clinically.

On gray-scale sonography, in acute phase of torsion, within 1–6 hrs, testis appears enlarged, with normal echogenicity, and later it becomes heterogeneous and hypoechoic compared with the contralateral normal testis. A hypoechoic or heterogeneous echogenicity may indicate nonviability. Reactive hydrocele and scrotal skin thickening are often seen with torsion. The gray-scale findings of acute and subacute torsion are not specific and may be seen in testicular infarction caused by Sepididymitis, epididymo orchitis, and traumatic testicular rupture or infarction. Color Doppler sonography shows absent blood flow in the affected testicle or significantly less than in the normal, contralateral testicle. The spermatic cord, immediately cranial to the testis and epididymis is twisted and intrascrotal portion of the cord appears as edematous, round, ovoid or curled echogenic extra-testicular mass, [Figure2] with the epididymal head wrapped around it as causing a characteristic torsion knot or “whirlpool pattern” on color doppler^[17]. Torsion of at least 540° is necessary for complete arterial occlusion. With partial torsion of 360°, or less, [Figure3] arterial flow may still occur, but venous outflow is often obstructed, causing diminished diastolic arterial flow on spectral Doppler examination^[6]. If spontaneous detorsion occurs, flow within the affected testis may be normal, or it may be increased and mimic orchitis^[19].

In our study, we diagnosed 26 cases as epididymo-orchitis by ultrasonography who had findings with a straight spermatic cord, a swollen epididymis and testis, an absent focal lesion in the testis, and increased flow on color Doppler studies (in 3cases color doppler was also done).

Baker and associates found that colour doppler had a diagnostic sensitivity of 89% and specificity of 98% in cases of torsion^[20]. Paltin and colleagues found 100% efficacy of colour doppler in torsion testis^[21].

Reports in the literature have suggested that ultrasonography for testicular torsion has the sensitivity varies from 50 to 100%. Although in our study, sonography was 100% accurate in cases of torsion, it is suggested that sonographic interpretation must be in conjunction with the clinical diagnosis, and patients in whom torsion testis is strongly

suspected clinically should be subjected to exploration even if the Doppler flow is good^[22]. The experience of the clinician seems to be a very important factor in accurate diagnosis. Corbett and Simpson^[23] reported that in their series the correct diagnosis of testicular torsion was made in 39% of patients by casualty doctors, in 53% by urology registrars and in 76% by specialists. In the present study, 13 patients were diagnosed clinically.

In this study, *E. coli* was detected in the urethra of 14% of the patients diagnosed with acute epididymo orchitis. Such epididymo orchitis occurs when the bacterial infection starts in the lower urinary tract and ascends to the epididymis. In such cases antibiotic treatment was administered.

Acute epididymo orchitis caused by *E. coli* tended to advance to severe disease, and that these patients complained of more severe pain than in cases of epididymo orchitis caused by more general urinary tract infective agents^[24]. Hoosen et al^[25] also reported that epididymo orchitis accompanying infections with *E. coli* was more severe than that caused by gram positive bacteria, and such cases were characterized by periductal and intraepithelial inflammation. Here we found that of 8 patients with identification of causative microorganisms, five had urinary tract infections caused by *E. coli* and they had a greater diameter of the epididymal head identified from ultrasonography. Moreover, their complaints of pain or tenderness were significantly more severe compared with the patients in whom causative microorganisms were not identified.

De Jong and associates^[16] have reported that gram negative bacteria were the common organism causing epididymo orchitis in the patient group over 35 years. Urine culture sensitivity was done in 12 patients. They found out that out of 12 patients, 10 (84%) had gram negative infection. In the present study urine culture and sensitivity was done in 20 patients. 8 patients (40%) had positive results. 6 (75%) patients out of the 8 patients had gram negative infection and 2 (25%) had gram positive infection.

Sexually transmitted organisms e.g. Chlamydia account for most cases in men who are younger than 35 years of age while coliform bacteria are more likely to be causative agents in elderly. In the present study coliform bacteria was most common organism^[26,27].

Sexually active men younger than 35 years are usually infected with *Chlamydia trachomatis* and *Neisseria gonorrhoea*^[28] whereas older patients, patients who have undergone recent genitourinary surgery, and patients with anatomical abnormalities often have infection with gram-negative enterococci associated with urinary tract infections^[27]. Fungal agents such as *Candida* species, very rarely, can also cause epididymitis^[28].

In a review of 543 surgical explorations for acute scrotal pain in boys, Van Glabeke et al^[29] found a 16.6% incidence of testicular torsion and a 46% incidence of appendage torsion. The authors recommended surgical intervention in all male children complaining of acute scrotal pain. If

immediate operative intervention is not possible, manual derotation may be attempted.

Bortsch and colleagues^[13] demonstrated that testes operated in less than 6 hours after the onset of symptoms of torsion remains normal. So emergency operation is must in cases of torsion.

5. Conclusion

The present study was undertaken and 60 cases presenting with acute scrotum in MBG Hospital, Udaipur from July 2015 to December 2016 were studied.

- Acute scrotum was found to be more common in younger age group.
- Epididymoorchitis was found to be commonest scrotal emergency followed by testicular torsion, scrotal abscess, scrotal trauma and obstructed hernia.
- Pain and fever were commonest presenting features in epididymoorchitis and testicular torsion.
- Burning micturation was present in some cases of epididymoorchitis but none in cases of testicular torsion.
- Presentation within six hours was more common in testicular torsion and testicular trauma.
- Nearly half of the cases of epididymoorchitis had symptoms on left side while 80% cases of testicular torsion were right sided.
- USG was found to be useful to diagnose epididymoorchitis while colour Doppler was more effective in diagnosing torsion testis. In some cases, both investigations were found to be complimentary.
- Gram negative bacteria were more common than Gram positive in cases of epididymoorchitis.
- All cases of epididymoorchitis were managed by conservative means while all cases of torsion testis required urgent surgical intervention.
- Emergency surgery was required in all cases of testicular torsion, scrotal abscess, and obstructed hernia while in testicular trauma, one out of two required emergency surgery.

It may be concluded that early diagnosis of acute scrotal emergencies is very important by clinical examination and investigations so that appropriate measures i.e. conservative or operative may be undertaken for the optimum benefit of the patient.

Compliance with Ethical Standards: This study was conducted in ethical compliance and with prior approval from institutional ethical committee and review board.

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Table 1: Age in cases of acute scrotal emergencies.

Table 2: Duration of symptoms in cases of acute scrotal emergencies.

Table 3: Patients investigated in cases of acute scrotal emergencies .

Table 4: Urine culture/ sensitivity in epididymoorchitis patients.

Figure 1: Intra-operative finding of left testicular abscess.

Figure 2: Pre-operative operative left gangrenous scrotum.

Figure 3: Intra-operative finding of right testicular torsion.

Figure 4: Intra-operative finding of incision and drainage of right scrotal abscess.

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