

Research Article

Can Ultrasound Reduce the Rate of Negative Testicular Exploration in Suspicious Acute Scrotum; A 5-Year Experience in A District Hospital

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Abstract

Objective: To retrospectively outline findings of testicular exploration in patients with suspicious acute scrotum and to compare the outcomes between exploration with and without US as a preoperative diagnostic tool.

Methods: A retrospective analysis of patients underwent scrotal exploration from Jan2014 till Dec 2018 in our hospital was conducted. The data were divided into exploration with preoperative ultrasound (US group) and exploration without preoperative US (non-US group).

Results: 47 patients (mean age 14-years) were explored during the 5-year period. The most common finding was torsion Cyst of Morgagni (34%, 16/47). True torsion was found in 27.6% (13/47) with 3 unsalvageable testes. Torsion rates were higher in patients who underwent US (7/14, 50%) than exploration without US (6/33, 18.1%). Time delay between two groups showed no statistical difference (p-value >.05). Also, US showed 70% sensitivity and 100% Specificity regarding torsion testis.

Conclusion: Based on our numbers, negative exploration can be reduced with the help of US as a diagnostic tool for

torsion. However, until further studies with larger populations and definitive pathway regarding ultrasound are commenced, we recommend urgent exploration as the standard intervention in dealing with suspicious acute scrotum.

Keywords: Torsion testis; Testicular torsion; Testicular exploration; Ultrasound; Doppler

1. Introduction

Testicular torsion is a relatively common cause of acute scrotal pain which accounts for approximately up to 15% of acute scrotal disease in children [1] and up to 25% in early adolescents [2]. It remains a difficult differential which require proper management, as delay in intervention can comprise organ preservation and cosmetic outcome [3]. More dramatically, it can lead to impairment in hormonal and fertility functions [4, 5], with nearly 80% and 100% infarction of torsted testes after 10 h and 24 h since the onset of pain respectively [3]. Urgent Testicular exploration remains the definitive management of scrotal pain with suspicion of torsion, as the primary objective of surgery is to avoid testicular loss [6]. However, it's debatable that with the advances in Doppler US studies, unnecessary interventions can be avoided [8]. The purpose of this study is to report the outcomes of scrotal exploration in a district hospital setting, and to outline our experience in utilization of Ultrasound imaging as a pre-operative investigation.

2. Methods and Materials

Cavan General hospital is a regional hospital in county Cavan, Ireland. No urology service is available in the hospital. However, Acute scrotal pain is managed by on-call general surgeons. Testicular Ultrasound is utilized only in working hours (9 am till 5 pm). All acute scrotal pain presented before 5 pm were urgently imaged utilizing a special pathway to avoid any delay. But after 5 pm, the

decision of acute scrotal management is only dependent on clinical findings. All patients underwent scrotal exploration for acute scrotum from January 2014 to December 2018 were included in this study. The hospital database and the operative theatre log books were screened for included data. Patient with abscess, trauma, elective settings and non-acute causes were excluded. Patients records were retrospectively reviewed and audited by AG and YT. Data collected included; Age, presenting time, time to US and intervention, whether preoperative ultrasound was performed or not and intraoperative findings. The data were analysed and categorized into 2 groups, US group and Non-US group. Follow up wasn't included in this study.

Due to the limitation of sample size in both groups, Z test couldn't be applied regarding the positive and negative exploration results. However, comparison between the time needed to operate between US and Non-US group was done by T test using hypothesis testing with significance level $0.05(\alpha)$.

3. Results

In the 5-year period, 47 patients underwent urgent scrotal exploration for acute scrotal pain, mean age was 14 years (5-35 years) with 43% of patients in the age group (11-15 years) (Figure 1). The most common finding was torsion cyst of Morgagni (16/47, 34%) and testicular torsion (13/47, 27.6%). Three patients of the 13 with torsion required orchidectomy for gangrenous testes. Normal findings and epididymitis/orchitis presented 17% (8/47) and 11% (5/47) respectively, 3 cases of epididymal cyst and 2 cases were small hydrocele (Table 1).

The 47 cases were further categorised to Non-US group (33/47) and US group (14/47) (Figure 2) according to preoperative application of ultrasound doppler; In Non-US group (33), mean time between primary assessment and

exploration was 4 hours, the most common finding was tortored cyst of Morgagni (15/33, 45.5%). Six patients (18%) in this group had a finding of torsion testes; 5 viable torsion and 1 gangrenous. Unremarkable finding was found in 6 cases (18%) while 4 had epididymitis/orchitis, one epididymal cyst and one hydrocele.

On the other hand, the most common finding in the US group was testicular torsion (7/14, 50%), 2 of them were

unviable and required orchidotomy. US conformed the torsion in all 7 cases. 3 cases underwent exploration with suspicious blood flow in colour doppler, but the results were negative (2 normal and 1 hydrocele). Another 4 negative explorations, with Ultrasound proved normal vascularity and other finding, showed 2 epididymal cysts, 1 epididymitis, and 1 tortored Morgagni. Average time needed to operate on this groups was 5 hours from presenting to the emergency department.

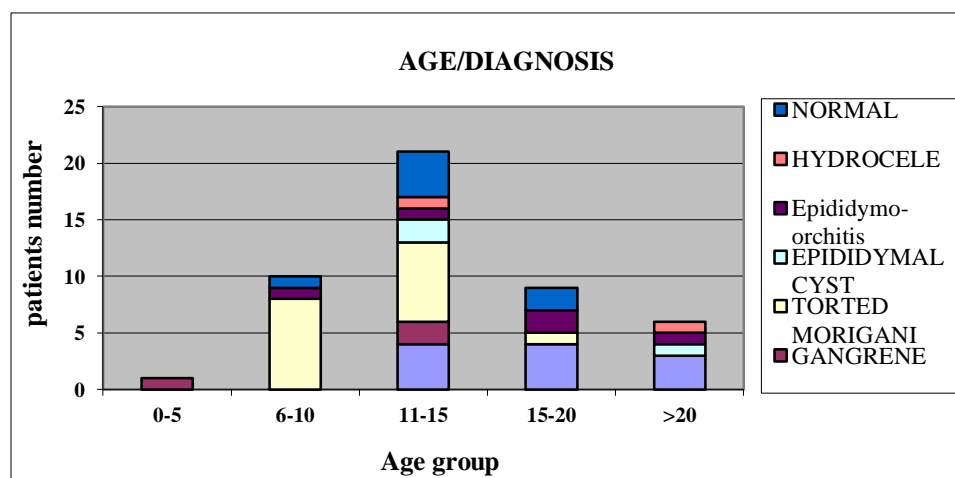


Figure 1: Showing age group and diagnosis.

Finding		US group (n=14)		Non-US group (n=33)		Total	
		n	%	n	%	n	%
Positive Result	Torsion	5	35.7%	5	15.1%	10	21.2%
	Gangrene	2	14.3%	1	3%	3	6.4%
	+ve Total	7	50%	6	18.1%	13	27.6%
Negative Results	Tortored morgagni	1	7%	15	45.5%	16	34%
	Normal	2	14.3%	6	18.2%	8	17%
	Epididymitis/orchitis	1	7%	4	12.1%	5	10.6%
	Epididymal Cyst	2	14.3%	1	3%	3	6.4%
	Hydrocele	1	7%	1	3%	2	4.2%
	-ve Total	7	50%	28	81.8%	37	78.7%
Total		14		33		47	

Table 1: Overall, Non-US and US group outcomes.

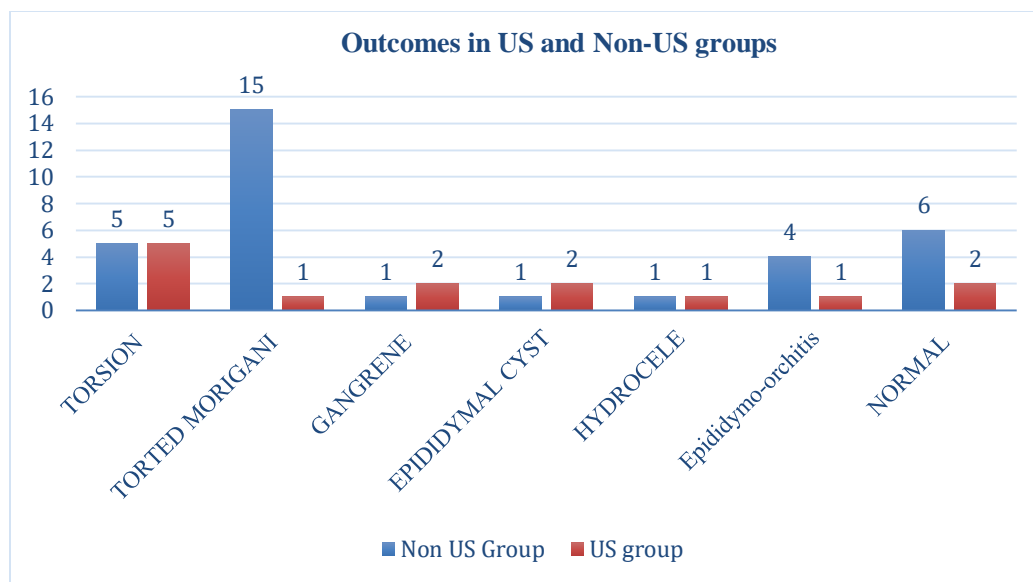


Figure 2: Outcomes in US and Non-Us groups.

4. Discussion

Testicular torsion results from twisting of spermatic cord and its content which leads to inadequate blood supply to testis, annual incidence of this surgical problem is 3.8 per in 100,000 males younger than 18 [9]. It has a bimodal peak, in neonates and around puberty [1]. Torsion pain is usually acute and severe and may lead to vomiting; and rarely presents with acute abdomen rather than scrotal pain [10]. The duration of the torsion can influence the clinical features, and may include swelling and induration of the surrounding skin. The testis is usually tender and may be high riding, the cord can be thickened and twisted or anteriorly located epididymis [6]. Also, cremasteric reflex is usually absent in patients with torsion which can help in distinguish it from other causes of acute scrotal pain [11].

The first line of imaging to testicular vascularity is colour Doppler sonography (CDS) [8, 12]. It can outline size, shape, echogenicity and perfusion of both testes. Also, it helps to evaluates the relative absence or decrease of blood flow in the affected testis in compared with the healthy one

[12]. However, the time needed to perform imaging can increase testicular ischemia and thereby decrease testicular salvage [13]. Additionally, Radionuclide studies can be used to evaluate acute scrotum, it can differentiate epididymitis “hot spots” from torsion testis “cold spots” [14]. However, availability, time, and radiation made Ultrasound the investigation of choice.

Urgent surgical intervention is recommended for acute pain with suspicion of torsion without the delay of ultrasound [6, 15, 16]. The critical time to needed to salvage the organ was reported at about 4-6 hours for 360 degree torsion [17]. The affected testis should be untwisted, warmed and fixed, contralateral orchiopexy should be performed regardless of the viability of the affected testicle due to increase the risk of contralateral torsion especially with bell clapper testis [18]. Orchiectomy is performed if the testis is unsalvageable [6, 18].

The acute scrotum in our hospital has two different pathways due to the limitation of availability of imaging. If the patient presented within working hours (9 am to 5 pm)

testicular US would be performed. Moreover, if presentation time is after 5 pm history and clinical examination would be the main indicator for exploration. In our study, torsion of testicular appendage was the most common overall cause of acute scrotum leading to exploration with 16 (34%) out of 47 patients. It was also reported to be the most common cause for scrotal pain in paediatrics with 50-70% of cases [19, 20]. In Addition, our study showed a significant difference between the 2 groups regarding the true torsion numbers. True torsions in the patient who underwent ultrasound and exploration was 50% and only 18 % in patients who underwent exploration without US. Also, numbers from our study showed that US had Sensitivity 70% Specificity 100% which is nearly similar to reported ones [7].

A recent meta-analyses on 2116 patient , which outlined the role of ultrasound in investigating testicular torsion in adult patients , showed that ultrasound can be an effective investigation testicular torsion and acute scrotal pain in adults with Overall diagnostic sensitivity was 0.86 [95% confidence interval (CI) 0.79–0.91] and specificity was 0.95 (95% CI: 0.92–0.97) [7]. However, none of the study included were randomized [7]. The meta-analysis results were significantly higher than those reported paediatric patients due to the presumption that adult patients are more cooperative during the exam. Ultrasound has been reported to fail to identify intratesticular flow in approximately half of paediatric patients [21]. False-negative US results can also occur during incomplete torsion and spontaneous detorsion. In these situations, repeating of ultrasound should be considered. However, a time delay could jeopardise organ salvage [22].

Timing of exploration plays a critical role in testicular salvage, in our series, the exact time of pain onset wasn't recorded. However, average time between presenting to our

hospital and exploration in both groups showed no significant difference ($p>.05$) with 4 hours in Non-US group and 5 hours US group. Additionally, only 3 patients had unviable testes out of 10 torsions, those 3 presented late to hospital, and it was mostly related to the children embarrassment to express their complains to their parents.

In a study of 209 scrotal explorations, the overall rate of testicular salvage was 75%. This rate dramatically decreases to 25% after 16 hours of torsion [23]. Another study outlined the significant impact of duration of presenting testicular pain and organ savage; It showed that Delay in exploration of beyond 12 h from onset of pain resulted in preserving only (33%) 5 out 15 patients with torsion [3].

Another limitation of our study is follow up, In our practice follow up is usually done by family doctor, however none of our patient reported postoperative complication which needed review or admission by our surgical team. In literature, the clear outcome of long-term effect of testicular torsion is not reported on adequate population. A study on 23 patients with detorsion and fixation reported no pain or discomfort during follow up. Also, analysis of 6 sperm samples of those patients showed; one normal, 3 pathological and 2 doubtful [24]. Another study 53 cases with torsion showed a significant association of loss of testicular tissue with increase of preoperative time. Also, sex hormones were significantly higher with a longer time of torsion [25]. On the other hand, study on 63 cases, with follow up period ranged from 6 months to 4 years, reported no significant difference in semen quality or hormones levels when compared with the normal individual of same age [26].

Mandatory scrotal exploration remains the recommended pathway for acute scrotum without the delay needed for US

study. However, this pathway leads to a large number of negative results. Hence, increase morbidity and operative risks, expenses and loads on hospitals [27]. Negative exploration was reported in two retrospective studies on 119 and 73 patients who underwent exploration for acute scrotum, showed 65% and 70% negative results respectively and authors in both studies recommended urgent exploration when dealing with suspicious acute scrotum [28, 29]. In our study overall negative exploration was 72% and 50% in patients underwent ultrasound preoperatively. These negative results showed that the dilemma of whether we should continue on immediate surgical intervention for acute scrotum with the suspicion of torsion, or should we rely on US for definite diagnosis. More studies are required to outline the role of ultrasound as a definite diagnostic tool in the management of acute suspicious scrotal pain.

5. Conclusion

Acute scrotum is an urgent surgical emergency that requires proper management. Also, scrotal exploration remains the recommended intervention to avoid testicular loss. However, with the advances of US doppler scan, unnecessary exploration can be avoided. More studies should be conducted to test the role of ultrasound in future planning of surgery. Also follow up studies are advised so we can have a better understanding of the outcome of torsion on fertility.

Statement of Ethics

Ethical approval was exempted by the national ethical committee as it was approved by local ethical committee for auditing by Cavan hospital. Waiver of consents was applied in this study as the nature of the retrospective study.

Disclosure

There were No Conflicts of interests between authors.

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Author Contributions

Ahmed Gendia; main data collection and analysis, writing of the manuscript; S. Tariq Cheema; Supervision of the research; Yousaf Tanveer; co-data collection and analysis.

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