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Original Article

Comparison of Ultrasound Results Performed by Emergency Medicine and Radiology Assistants in the Diagnosis of Testicular Diseases for Visitors in Emergency Departments in Kermanshah

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Abstract

Background: Scrotum pain is a common complaint in urology patients. Its diagnosis can be challenging, and a complete history and physical examination of the patient will be required for all acute and chronic scrotum pain. The present study was designed to compare the results of the performed ultrasound by emergency medicine and radiology assistants in the diagnosis of testicular disease for visitors who have been referred to the emergency department of Imam Reza hospital in Kermanshah.

Materials and Methods: In general, 100 patients with testicle injuries and acute scrotum pain who were referred to the emergency department of the hospital from September 2017 to September 2019 were evaluated in this analytical cross-sectional study. The kappa coefficient was used to assess the contingency between the diagnosis of performed ultrasound by the emergency medicine assistants and radiology assistants.

Results: The obtained value (82.5%) of this coefficient showed a high contingency between the diagnosis of testicle disease by radiology assistants and emergency medicine assistants, and this contingence was statistically significant ($P<0.001$).

Conclusion: Based on the kappa coefficient (82.5%) for evaluating the contingency diagnosis of performed ultrasound, a high level of contingency was found between the diagnosis of testicle disease by radiology assistants and emergency medicine assistants. A value higher than 75% of the kappa coefficient indicates that the desired contingency performing an ultrasound with an emergency medicine specialist causes a reduction in time wastage and costs for patients and provides quicker access to treatment and a chance of less complications for the patients.

Keywords: Acute testicular pain, Emergency medicine, Ultrasound

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Introduction

Scrotal pain is a medical emergency that requires immediate attention (1). Acute scrotal pain or so-called acute scrotum refers to sudden pain, swelling, and inflammation (2), which may be derived from the scrotum itself, including the testicle, epididymis, testicle, and epididymis appendages, spermatic cord, and scrotum sidewall tissue. In addition, it may be a sign of a lesion in another organ of the body, and pain will be released into the scrotum due to common innervation (3). The most important non-traumatic acute pain testicular conditions requiring emergency intervention are infectious epididymitis, ruptured aortic aneurysm, inguinal hernia, necrotic fasciitis (Fournier's gangrene), and testicle torsion (4) although, as mentioned earlier, the spectrum of diseases are wider with acute scrotum pain complaint. Many of these conditions may be less urgent, including testicular appendix torsion, testicle cancer, inguinal hernia, ureterolith with referral pain to the testicle, Henoch-Schonlein purpura, orchitis in the field of mumps or brucellosis or the coxsackie-virus, hydrocele, and varicocele (5).

Nearly 5% of all visits by emergency medicine specialists belong to patients with acute scrotum pain. Further, 25% of all acute testicle pain is related to testicle torsion (6). The emergency department is the most important unit of the hospital and emergency medicine specialists provide 24-hour weekly health services for emergency patients (7). This is an emergency medicine specialist's ability to consider all the points and extract real emergencies from a variety of diseases, especially in studies that must reject testicular torsion because of its ominous (including

sterile) implications (8).

Ultrasound has been an integral part of the care and treatment program of the emergency medicine faculty and the assistant group over the past two decades (9). Ultrasound performed by emergency medicine specialists in patients with testicular problems is also more accurate because these specialists are aware of the patient's history, pain location, and symptoms. As stated by Yagil et al, Doppler ultrasound performed by emergency medicine specialists for diagnosing testicle torsion included 94% sensitivity, 96% specificity, 95.5% accuracy, and 89.4% positive diagnostic values. Considering that radiologists are unavailable at all hours of operation, performing ultrasound is recommended by emergency medicine specialists for patients with testicle torsion in order to quickly diagnose the disease, manage patients, and prevent sterility (10). Therefore, given that no study has so far focused on the field of emergency medicine in our country, the current study aimed to compare the results of performed ultrasound by emergency medicine assistants and radiology assistants in the diagnosis of acute testicular disease.

Materials and Methods

This cross-sectional analytical study started after receiving approval from the Ethics Committee of Kermanshah University of Medical Sciences. The study population consisted of all patients with testicle injuries and acute scrotum pain who were referred to the emergency department of Imam Reza hospital from September 2017 to September 2018. The sample population in this study was 100 people. The data collection tool was a checklist designed based on the main purpose of the project and included demographic information, illness symptoms, and patient diagnosis.

First, senior assistants in emergency medicine were trained by an emergency medicine professor at the Iran University of Medical Sciences for one week, and then they had a practical test. Radiology assistants also participated in the process. Next, patients with acute testicle injuries who were referred to the emergency department of Imam Reza hospital in Kermanshah with ultrasound indications were included in the study. The exclusion criterion was a lack of informing their tendency in the consent form. These patients were assisted with ultrasound by emergency medicine assistants and then by junior or senior radiology assistants with similar ultrasound (Fujifilm SonoSite), Edge-2 model (Malaysia, 2016-9), triple transducer connect, and a surface prop with a frequency of 6-13 MHz. In the present study, the final urologic diagnosis was considered as the standard diagnosis and 18 patients were admitted accordingly. To confirm the diagnosis, intraoperative, postoperative, and pathological results were followed in patients who underwent surgery. Then, the findings were compared with the results of the ultrasound exams conducted by the assistants of two training classes and the clinical review performed by urologists.

The results were evaluated by the project assistant in the patient data collection form. Finally, the data were analyzed by SPSS software, version 20.

Charts, statistical tables, and sensitivity and specificity indices were used for descriptive data, and correlation tests and the kappa contingency coefficient were applied for data interpretation. All analyses were performed at a significant level of 0.05 using SPSS software, version 20.

Results

In this study, 115 patients were investigated although 15 cases were excluded due to the lack of access to them for follow-ups. The mean age of the patients was 31±17 years. The most common symptoms in patients were pain (100%), tenderness, and swelling (45%), respectively.

Moreover, 27% of patients had only one symptom while 35% and 38% of them had two and more than two symptoms, respectively. Epididymo-orchitis (32%), hydrocele (17%), and hematoma (10%) were the most common diagnoses for the patients by urologists. There were normal diagnoses for 19 cases in the urologist's report.

The kappa contingency coefficient was employed to evaluate the contingency between the diagnosis of performed ultrasound by radiology and urology assistants, and the coefficient was %91.4, indicating a highly significant level of contingency between the diagnosis of testicle disease by radiology assistants and urologists ($P<0.001$).

According to Table 1, in cases with a lack of contingency, the most common diagnostic error was the misdiagnosis of Epididymo-orchitis, which accounted for 64.2% of the diagnosis error.

The kappa contingency coefficient was used to evaluate the contingency between the diagnosis of performed ultrasound by emergency medicine assistants and urologists and the coefficient was 91.2%, representing a high level of contingency between the diagnosis of testicle disease by ultrasound and urologists ($P<0.001$). The cases with the lack of contingency are listed in Table 2.

Table 1. Cases With the Lack of Contingency Between the Diagnosis of Performed Ultrasound by Radiology Assistants and Urologists

Urology Diagnosis	Radiology Diagnosis	Number	Percent
Epididymo-orchitis	Hydrocele Cyst	2 1	42.8
Varicocele	Normal	1	14.2
Hematoma	Hydrocele	1	14.2
Hydrocele and inguinal hernia	Abscess and inguinal hernia	1	14.2
Fournier gangrene	Hydrocele	1	14.2
	Total	7	100

Moreover, the kappa contingency coefficient was applied to investigate the contingency between the diagnosis of performed ultrasound by emergency medicine and radiology assistants, and the coefficient was 82.5%, implying a high level of contingency between the diagnosis of testicle disease by radiology and emergency medicine assistants ($P<0.001$). A value higher than 75% of the kappa coefficient indicates the desired contingency.

Discussion

There are incidents in any part of the medical field requiring immediate intervention to save that organ. According to research, a specific time has been announced to save the organs; for example, a golden time for the preservation of testicles is 6 hours. Accordingly, physicians should act as soon as possible to save the patient (11). Today, bedside ultrasound is performed by many emergency physicians. On the one hand, the radiologist is unavailable on non-work shifts, and this test is rapidly performed under life-threatening circumstances; on the other hand, thus conducting it with emergency medicine assistants immediately present at the bed of the patient will lead to proper management and time, and triggers to save the life of the patient (12) (Table 3).

Table 2. Cases With the Lack of Contingency Between the Diagnosis of Emergency Medicine Assistants and Urologists

Urology Diagnosis	Radiology Diagnosis	Number
Epididymo-orchitis and pyocele	Epididymo-orchitis	1
Pyocele and epididymal abscess	Epididymo-orchitis	1
Epididymo-orchitis and abscess	Epididymo-orchitis	1
Hydrocele	Epididymo-orchitis	3
Hematoma and penile fracture	Hematoma	1
	Total	7

Table 3. Cases With the Lack of Contingency Between the Diagnosis of Performed Ultrasound by Radiology Assistants and Emergency Medicine Assistants

Diagnosis of Emergency Medicine Assistants	Diagnosis of Radiology Assistants	Number	Percentage
Epididymo-orchitis	Hydrocele	5	64.2
	Cyst	1	
	Epididymo-orchitis and abscess	1	
	Pyocele and epididymal abscess	1	
	Epididymo-orchtis and pyocele	1	
Varicocele	Normal	1	
Hematoma	Hematoma and penile fracture	1	35.7
	Hydrocele	1	
Hydrocele and inguinal hernia	Abscess and inguinal hernia	1	
Fournier's gangrene	Hydrocele	1	
	Total	14	100

The purpose of this study was to compare the results of performed ultrasound by emergency medicine and radiology assistants in the diagnosis of testicular diseases for visitors in the emergency departments of Imam Reza hospital in Kermanshah. In the present study, the mean age of participants was 31 years with a standard deviation of 18 years old. Epididymo-orchitis (32%), hydrocele (17%), and hematoma (10%) were the most common diagnoses for the patients by urologists. There were normal diagnoses for 19 cases in the urologist's report. In a study conducted on referred patients to the emergency departments with acute testicle pain in 2011, it was found that the mean ± standard deviation of the study population was 44.44 ± 17.08 years old. Most patients were diagnosed with epididymo-orchitis, testicle torsion, hydrocele, and inguinal hernia while 15 patients had normal diagnoses.

In the present research, the main difference between the findings by emergency medicine assistants, radiology assistants, and urologists was related to the diagnosis of epididymo-orchitis, which is in line with the results of Blaivas et al (13). These results indicate that there is a high agreement between the diagnosis of testicle disease by radiology assistants and urologists, as well as emergency medicine assistants and urologists. This suggests that the diagnosis of emergency medicine physicians in testicle torsion and other etiologists by ultrasound in the emergency department is reliable, and they can identify cases that require emergency surgery so that to save time and money.

According to the present study, in the diagnosis of healthy individuals from patients with testicle disease, the performed ultrasound by emergency medicine assistants had 100% sensitivity and specificity in comparison with urology diagnosis while radiology assistant diagnosis had 99% sensitivity and 100% specificity compared with urology diagnosis.

Yagil et al indicated that Doppler ultrasound had 94% sensitivity and 96% specificity, 95.5% accuracy, and 89.4% positive diagnostic value for testicle torsion. The researchers in this study suggested that performing Doppler ultrasound by emergency medicine specialists should be routinely performed for the triage of patients who are referred with acute scrotal pain (10), which is inconsistent with the results of our study. Likewise, Whitson et al reported that performed ultrasound by emergency medicine physicians had 96%-100% sensitivity and 80-90% specificity for the diagnosis of testicle torsion, and had 80%-90% sensitivity and specificity for epididymo-orchitis (9), which corroborates with the findings of the current study.

In line with our results, Shekarchi et al found that ultrasound performed by emergency medicine physicians had 89%, 57 sensitivity while the one performed by radiology assistants represented 77%, 08 sensitivity (14). This difference can be due to several reasons

including the operator skill. Contradictory results have been reported regarding the accuracy of performing ultrasound by emergency medicine and radiology assistants. Tootian Tourghabe et al also concluded that assistants' screening radiology performance features in detecting cholecystolithiasis and increasing cholecyst wall thickness were substantially higher than those of emergency medicine assistants (15). Therefore, the results of the present study can be used to develop training programs for emergency medicine assistants to improve their performance in bedside ultrasound in the diagnosis of the acute testicle and scrotum diseases. The limitations of this study are the lack of the response of some patients to telephone calls and the lack of confidential clinical records that some patients were unable to obey, resulting in the removal of some patients being from the final study.

The study population consisted of all patients with testicle injuries and acute scrotum pain who were referred to the emergency department of Imam Reza hospital from September 2017 to September 2018. Thus, the results cannot be generalized to other populations, and future studies can be conducted with a larger sample size.

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This article was conducted based on the approval from the Ethics Committee (with the ethics code of ir.kums.rec.1396.625) of Kermanshah University of Medical Sciences.

Author's Contributions

Authors should be equally involved in submitting the proposal. Study design and analysis and analysis and interpretations.In addition, they co-authored draft articles and critiques Review it for an important thought, along with approval The final version of the study to send

Conflict of Interests

The authors declare that they have no conflict of interests in this work.

Ethical Statement

This study was approved by the ethics committee of Kermanshah University of Medical Sciences. Code of ethics; ir.kums.rec.1396.625

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Informed Consent

The informed consent form was obtained from all patients.

References

1. McAndrew HF, Pemberton R, Kikiros CS, Gollow I. The incidence and investigation of acute scrotal problems in children. Pediatr Surg Int. 2002;18(5-6):435-7. doi: 10.1007/s00383-002-0806-3.
2. Günther P, Rübben I. The acute scrotum in childhood and adolescence. Dtsch Arztebl Int. 2012;109(25):449-57; quiz 58. doi: 10.3238/arztebl.2012.0449.
3. Farshid B, Hamedanchi S, Mohammadi Bookani H. Acute scrotum secondary to tick-bite. J Urmia Univ Med Sci. 2010;21(4):368-72. [Persian].
4. Ringdahl E, Teague L. Testicular torsion. Am Fam Physician. 2006;74(10):1739-43.
5. Hemmati H, Yousefzadeh Chabok S, Dehnadimoghadam A, Mohammadi Melksari H, Ahmadi Dafchahi M, Shabani S. Trauma in Guilan (North of Iran): an epidemiologic study. Acta Med Iran. 2009;47(5):403-8.
6. Cass AS, Cass BP, Veeraraghavan K. Immediate exploration of the unilateral acute scrotum in young male subjects. J Urol. 1980;124(6):829-32. doi: 10.1016/s0022-5347(17)55687-6.
7. Akıncı H. Analyses of urological emergencies in Karabük State Hospital. Uludağ Üniversitesi Tıp Fakültesi Dergisi. 2009;35:17-20.
8. Ayati E, Ghadiriyan F, Ahadi MR. Estimation of the cost of damage to vehicles in rural road accidents in Iran. J Transp Res. 2008;5(1):1-3. [Persian].
9. Whitson MR, Mayo PH. Ultrasonography in the emergency department. Crit Care. 2016;20(1):227. doi: 10.1186/s13054-016-1399-x.
10. Yagil Y, Naroditsky I, Milhem J, Leiba R, Leiderman M, Badaan S, et al. Role of Doppler ultrasonography in the triage of acute scrotum in the emergency department. J Ultrasound Med. 2010;29(1):11-21. doi: 10.7863/jum.2010.29.1.11.
11. Agamir Mk, Tavakoli H, Asgari A, Fahimi A. Emergency in lower genitourinary tract. Teb va Tazkiyeh J. 2002;25:156-74. [Persian].
12. Mohamadi M.2013,Sonographic detection of Abdominal Free Fluid:Emergency Residents Vs Radiology Residents.trauma Mon.2013;17(4):377-9.
13. Blaivas M, Sierzenski P, Lambert M. Emergency evaluation of patients presenting with acute scrotum using bedside ultrasonography. Acad Emerg Med. 2001;8(1):90-3. doi: 10.1111/j.1553-2712.2001.tb00563.x.
14. Shekarchi B, Hejripour Rafsanjani SZ, Shekar Riz Fomani N, Chahardoli M. Emergency department bedside ultrasonography for diagnosis of acute cholecystitis; a diagnostic accuracy study. Emerg (Tehran). 2018;6(1):e11.
15. Tootian Tourghabe J, Arabikhan HR, Alamdaran A, Zamani Moghadam H. Emergency medicine resident versus radiologist in detecting the ultrasonographic signs of acute cholecystitis; a diagnostic accuracy study. Emerg (Tehran). 2018;6(1):e19.