



Diagnostic Accuracy of Doppler Ultrasound in the Diagnosis of Testicular Carcinoma by Taking Histopathology as Gold Standard

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To determine the diagnostic accuracy of doppler ultrasound in the diagnosis of testicular carcinoma, by taking histopathology as gold standard.

Methods: This cross-sectional study was carried out at Radiology department of Liaquat University of Medical and health Sciences (LUMHS), from November 2017 to October 2019. All the clinically diagnosed cases of testicular carcinoma, those who referred for doppler ultrasound and histopathology of testes, were included. After taking informed consent all the study participants underwent testicular histopathology after doppler ultrasound. All of the information was entered into a research proforma. SPSS version 20 was used to analyze the data.

Results: Overall, 70 patients of suspected testicular carcinoma were studied. The mean age of the cases was 38.38±4.55 years. Most of the cases 47(67.1%) were poor. As per Doppler ultrasound

(U/S) findings out of all 55.7% cases had diagnosed testicular carcinoma, while histopathologically it was observed in 45.7% of the cases. Diagnostic accuracy of Doppler U/S in testicular carcinoma diagnosis was observed to be 77%, followed by sensitivity (SE) 84%, specificity (SP) 71%, positive predictive value (PPV) 78% and negative predictive value (NPV) 84%.

Conclusion: Doppler ultrasound observed to be a non-invasive, uncomplicated, lack of pain, effective and easily available diagnostic tool for early diagnosis of testicular carcinoma.

Keywords: Testes; cancer; doppler ultrasound; histopathology.

1. INTRODUCTION

Scrotal lesions can manifest in a variety of ways, with patients frequently noticing a 'lump' or suffering non-localizing discomfort. [1]. Germ cell carcinomas, the most common kind of testicular carcinoma, are more common in white men as compared to black men, however recently growing trends have been noted in the black community from the United States. [2,3]. These tumors are most common in younger age groups, with the majority of individuals presenting at the age of 30 years. [2]. Testicular cancer significantly varies in terms of geography and ethnicity [4]. Testicular cancers have been cured with excellent rates, mainly because of vigilant staging of this cancer at the time of diagnosis along with adequate timely management [5].

The patients with testicular cancer can be studied using combined approach of radiological and clinical assessment [1]. Ultrasound (U/S) contributes significantly in testicular cancer detection. U/S is an ideal and noninvasive modality of imaging to evaluate scrotal abnormalities. U/S can differentiate the most significant etiological factors of acute scrotal swelling and pain, as well as testicular torsion and epididymitis. It is the preferred modality of imaging for acute scrotal traumas [6]. In scrotal swelling or palpable abnormality cases, U/S can distinguish, characterize, and locate both extra and intra testicular masses besides other abnormalities. Though, it is challenging to characterize testicular tumors reliably with U/S. Color Doppler U/S has become progressively vital in current years. Color Doppler U/S can better differentiate medically treatable scrotum from surgical emergency and can help avoiding preventable disastrous surgical consideration [7,8]. Now, U/S with a combined approach of color Doppler and high frequency transducers has become a superior imaging modality to evaluate acute scrotum [7], however accurate

contribution of ultrasonography in testicular tumors evaluation remains not settled [9].

2. MATERIALS AND METHODS

This cross-sectional study was carried out at Radiology department of Liaquat University of Medical and health Sciences (LUMHS). Study duration was two years from November 2017 to October 2019. All the clinically diagnosed cases of testicular carcinoma, those who referred for doppler ultrasound and histopathology of testes were included in the study. All the histopathological known cases of testicular carcinoma and those who did not want to participate in the study were excluded from the study. After doppler ultrasound of testes all the cases underwent testicular histopathology by senior general surgeon having minimum experience of 5 years. All of the information was entered into a research proforma. SPSS version 20 was used to analyze the data

3. RESULTS

Overall, 70 patients of suspected testicular carcinoma were studied. The mean age of the cases was 38.38 ± 4.55 years and mean duration of disease was 7.39 ± 1.33 months. Most of the cases 47(67.1%) were poor followed by 16(22.9%) had middle socioeconomic status and 07(10.0%) had upper socioeconomic status and residential status showed in Table 1.

As per doppler ultrasound findings out of all 55.7% cases had diagnosed testicular carcinoma, while histopathologically it was observed in 45.7% of the cases as showed in Table 2.

Diagnostic accuracy of doppler ultrasound in the diagnosis of testicular carcinoma was observed to be 77%, followed by sensitivity 84%, specificity 71%, positive predictive value 78% and negative predictive value 84% as showed in Table 3.

Table 1. Demographic characteristics of the patients n=70

| Variables | | Statistics |
|----------------------------|--------|------------------|
| Age (Mean ± SD) | | 38.38±4.55 years |
| Duration of disease (Mean) | | 7.39±1.33 months |
| Residence | Rural | 28(40.0%) |
| | Urban | 42(60.0%) |
| Socioeconomic status | Poor | 47(67.1%) |
| | Middle | 16(22.9%) |
| | Upper | 07(10.0%) |

Table 2. Frequency of testicular carcinoma as per doppler and histopathological findings n=70

| Variables | | Frequency | % |
|----------------------------|----------|-----------|-------|
| Doppler U/S findings | Positive | 38 | 55.7% |
| | Negative | 32 | 44.3% |
| Histopathological findings | Positive | 32 | 44.3% |
| | Negative | 38 | 55.7% |

Table 3. Diagnostic accuracy of doppler ultrasound by taking histopathology as gold standard n=70

| Doppler ultrasound findings | Histopathology | | Total |
|-----------------------------|----------------|----------|-------|
| | Positive | Negative | |
| Positive | 27 | 11 | 38 |
| Negative | 05 | 27 | 32 |
| Total | 32 | 38 | 70 |

Sensitivity: 84%, Specificity: 71%, PPV: 78%, NPV: 84%

4. DISCUSSION

Management of testicular cancer, with its outstanding treatment and diagnosis, is regarded a masterpiece of modern science. In both adult and paediatric patients, testicular ultrasonography is a helpful noninvasive technique. It's a useful screening and diagnostic tool, and it aids in determining how to proceed in the right therapeutic environment. [10]. Testicular cancer is the most frequent malignancy in young adolescent and adult boys. However, the average age of the patients in this research was 38.38±4.55 years. Likewise, Necas M et al. [11] found that the patients were on average 39 years old. On the other hand, The average age of the patients was 30.95 years, according to Hamdan A et al. [10]. Assi T et al. [12] found that testicular tumor patients were on average 32 years old. The age discrepancy between this study and others might be due to the patients' selection criteria and age range.

In this study, the majority of the patients (47.1%) were socioeconomically disadvantaged. On the contrary, Richardson LC et al. [13] disclosed that the most of the studies reported a raised risk of

developments with high socio - economic status, but while recent research papers have demonstrated increased likelihood in populations with low-socioeconomic status, and that lower socioeconomic status and education levels are the risk factors for later-stage TC diagnosis and thus higher TC mortality. [13]. In this study the diagnostic accuracy of doppler ultrasound in the diagnosis of testicular carcinoma was observed to be 77%, followed by sensitivity 84% and specificity 71%. Correspondingly, other research studies reported that In the proper clinical situation, ultrasonography (U/S) has been demonstrated to have higher than 90% specificity and sensitivity for identifying testicular cancer [14,15]. Reginelli A, et al. [16] found that combining gray-scale U/S, RTE, and Color-Doppler resulted in a sensitivity of 100 percent, a specificity of 83 percent, a NPV of 100%, PPV of 91 percent, and accuracy of 90%. Doppler ultrasonography (US) is a commonly accessible imaging modality that shows comprehensive scrotal anatomy without the danger of ionizing radiation, at a cheap cost, with ease of mobility, and without the requirement for anesthesia. On color-Doppler, intratesticular tumor nodules exhibit nonspecific appearance differentiated by

hypervascularity with chaotic irregular branching patterns [17]. As a result, ultrasound is an excellent imaging technique for the scrotum. The radiologist must, however, be conversant with the standard findings in individuals, the proper methodology, and the US/ findings of testicular abnormalities.

5. CONCLUSION

Doppler ultrasound in the diagnosis of testicular carcinoma found to be a non-invasive, uncomplicated, lack of pain, effective and easily available diagnostic tool for early diagnosis of testicular carcinoma. However, it is dependent on sonologist experience, knowledge and handling. Further large-scale studies are suggested on this subjects.

CONSENT

Informed consent was taken from all the cases.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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