

SCROTAL ULTRASONOGRAPHY IN THE ASSESSMENT OF SUBFERTILE MALES

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Abstract- *Subfertility is defined as a failure to conceive after one year of unprotected regular sexual intercourse. A prospective study was conducted to identify the role of ultrasonography in assessing the cause of male subfertility in a Sri Lankan population. The objective of the study was to identify the role of ultrasonography in assessing the cause of male subfertility in a Sri Lankan population.*

The sample consists of 86 patients referred for scrotal ultrasonography for the assessment of male subfertility. Ultrasound scan of the scrotum was done for the assessment of the testicular volume, testicular pathologies and extra testicular pathologies. The patients who were azoospermic or had seminal fluid volume less than 2.5ml were subjected to Trans Rectal Ultrasound Scan (TRUS) to exclude any obstruction to the seminal fluid pathway. As the results mean duration of subfertility was 4.47 (SD=2.63). 91.9% of the study population had primary subfertility while 8.1% had secondary subfertility. Testicular volume was calculated using three measurements and the formula of an ellipsoid. The mean ultrasonic testicular volume of the right testis was 7.66 cm³ (SD=4.24), and that of the left was 7.43 cm³ (SD=4.50). 44.2% of patients had some abnormality detected by ultrasound scan while 55.8% had normal ultrasonography. 26.8 % (n = 23) of the sample had varicocele and of which 73.91 % (n = 17) was on left side only, 17.39 % (n = 4) had only right sided varicocele and 8.69 % (n = 2) had bilateral disease. 4.7% of patients had epididymal cysts and 4.7% had testicular microlithiasis. When considering the echo pattern of the testis 77.9 % (n = 67) had normal echo pattern but 16.3% (n = 14) had heterogeneous echo pattern. As a conclusion the commonest abnormality detected in sub fertile men was a left sided varicocele. However there was a significant difference in the mean testicular size of Sri Lankan sub fertile men.

Index terms- *Subfertility, testicular volume, ultrasonography*

I. INTRODUCTION

Subfertility is defined as a failure to conceive after one year of unprotected regular sexual intercourse. Subfertility can be primary or secondary and there are multiple male and female factors responsible for subfertility. [Alison Taylor]

Male subfertility can be caused by congenital or acquired urogenital abnormalities, genetic and immunological factors, endocrine disturbances, genital tract infections and erectile dysfunction, which can be divided into pretesticular, testicular and post-testicular, causes. Initial screening for male subfertility involves semen analysis, repeated at 4–6 weeks if abnormal. Once male subfertility is established, urological referral is undertaken. Evaluation of the subfertile male includes detailed history and physical examination, followed by laboratory tests and imaging. (Ammar, Sidhu and Wilkins, 2012)

The three main imaging modalities used for investigation of the male reproductive system are ultrasound, MRI and invasive techniques such as venography and vasography. Ultrasound remains the mainstay as it is non-invasive, safe and widely available, and is able to define many of the abnormalities relevant to male subfertility. (Ammar, Sidhu and Wilkins, 2012)

Scrotal US is a first-line, basic imaging tool for all scrotal abnormalities, and it has also been demonstrated that testicular volume as measured by scrotal US is significantly correlated with testicular function. An increased resistive index and pulsatility index of the capsular branches of the testicular arteries on unenhanced color Doppler US examination may indicate impaired testicular microcirculation in patients with clinical varicocele. Doppler US is a promising method for assessing patients who are affected by azoospermia. (Gudelglu and Parekatil, 2013)

Trans-rectal ultrasound (TRUS) enables high-resolution imaging of the prostate, seminal vesicles and vas deferens and is the modality of choice in diagnosing congenital and acquired abnormalities implicated in the cause of obstructive azoospermia. (OA) (Ammar, Sidhu and Wilkins, 2012)

In a study done by Tijani et al in 2009 using 149 patients with diagnosis of male infertility and 100 healthy individuals, they performed scrotal ultrasound scans in all the subjects using a high frequency (7.5 MHz) linear transducer of an ultrasound scanner. Images in B-mode ultrasound scan and color Doppler were acquired in the supine and upright position. According to their results, the

prevalence of abnormal scrotal findings in the sub-fertile and fertile men was 65.1% and 23% respectively. Varicocele was the commonest and was found in 55% and 12% of the sub-fertile and fertile men respectively. Hydrocele and epididymal abnormalities were the next common with higher prevalence in the sub-fertile men and they concluded that except varicocele, there was no statistically significant difference in the prevalence of the other abnormalities between the sub-fertile and fertile groups (Tijani et al., 2014)

In a retrospective study done by Hillelsohn et al in 2013 using 99 patients with non-obstructive male subfertility they concluded that an intratesticular RI greater than 0.6 is associated with impaired spermatogenesis, and it supports the use of testicular spectral Doppler sonography as a noninvasive tool for evaluation of testicular function.(Hillelsohn et al., 2013)

In a study done by Qublan et al in 2007 using 234 infertile men, subjects were evaluated for the presence of intra- and extra-testicular abnormalities using high-frequency transducers and color Doppler imaging. They found out that there is a statistically significant increase in the prevalence of abnormal scrotal findings detected with sonography in the study group compared to controls. These included varicocele in 35.5% versus 16%, hydrocele in 16.7% versus 8.7%, testicular microlithiasis in 9.8% versus 2%), epididymal enlargement in 9% versus 2.6% ($p < 0.05$), and epididymal cyst in 7.7% versus 2 %.(Qublan et al., 2007)

Sakamoto et al have done a study on Color Doppler ultrasonography as a routine clinical examination in male infertility in 2006. They performed color doppler ultrasonography in 545 infertile men and they found out that Intra-scrotal abnormalities were detected by ultrasonography in 65.3% of patients. Of them, 58.3% were undetected by physical examination. Left varicocele was found in 57.4%; testicular microlithiasis in 5.5% epididymal cyst in 3.9%; right varicocele in 0.8%; and testicular cysts in 3 0.6%. (Sakamoto et al., 2006). The objective of the study was to identify the role of ultrasonography in assessing the cause of male subfertility in a Sri Lankan population.

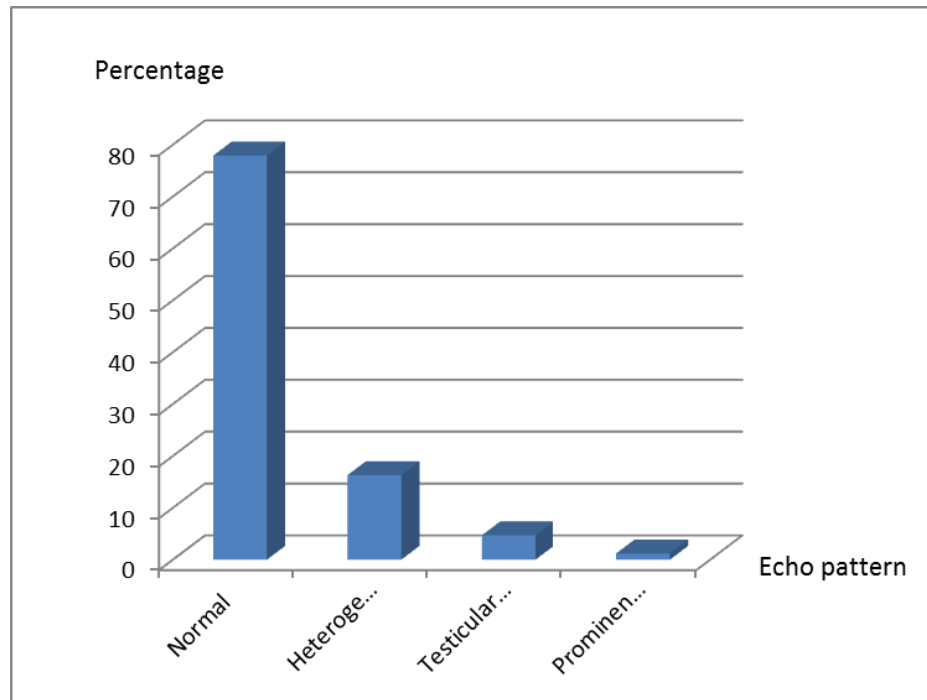
II. METHODOLOGY

This is a prospective study conducted during a period of 3 years at the Teaching Hospital Peradeniya, Sri Lanka. The sample consists of 86 patients referred for scrotal ultrasonography for the assessment of male subfertility. All the patients were scanned using a 7.5 to 10 MHz linear transducer of Sonoline G 50 ultrasound scanning machine by a single consultant radiologist. Ultrasound scan of the scrotum was done for the assessment of the testicular volume, testicular pathologies and extra testicular pathologies. The patients who were azoospermic or had seminal fluid volume less than 2.5ml were undergone Trans Rectal Ultrasound Scan (TRUS) to exclude any obstruction to the seminal fluid pathway. The findings were recorded and the patients were followed up.

III. RESULTS

Ultrasound scanning of the testis was performed in 86 sub fertile men and their mean age was 35.15 years ($SD=5.065$) ranging from 25 years to 48 years. Mean duration of subfertility was 4.47 ($SD=2.63$) 91.9% of the study population had primary subfertility while 8.1% had secondary subfertility. Testicular volume was calculated using three measurements and the formula of an ellipsoid. The mean ultrasonic testicular volume of the right testis was 7.66 cm^3 ($SD=4.24$), and that of the left was 7.43 cm^3 ($SD=4.50$).

44.2% of patients had some abnormality detected by ultrasound scan while 55.8% had normal ultrasonography. 26.8 % ($n = 23$) of the sample had varicocele and of which 73.91 % ($n = 17$) was on left side only, 17.39 % ($n = 4$) had only right sided varicocele and 8.69 % ($n = 2$) had bilateral disease. 4.7% of patients had epididymal cysts and 4.7% had testicular microlithiasis. When considering the echo pattern of the testis 77.9 % ($n = 67$) had normal echo pattern but 16.3% ($n = 14$) had heterogeneous echo pattern. (Graph 1)



Graph1. Testicular echo pattern

Of the 28 patients who underwent TRUS and from them only 2 patients found to be having obstruction of the ejaculatory ducts (7.14%).

IV. DISCUSSION

Scrotal ultrasonography plays an important role in the assessment of male subfertility. And it is almost always the initial imaging investigation in male subfertility. (Ammar, Sidhu and Wilkins, 2012)

In our study group the mean testicular volume of the right testis was 7.66 cm³ and in the left it was 7.43 cm³. In contrast in a study done by J.D. Schiff et al using 159 subfertile men the mean ultrasonic right testicular volume was 18.3 ml and that of left was 16.9 ml. (Schiff, Li and Goldstein, 2004) In a study done by Adrian Kristo and Evin Dani using 500 male subjects presenting for male infertility they found out that the testicular volume has a direct correlation with semen parameters and the critical mean testicular volume indicating normal testicular function is 13.3 ml. (Kristo and Dani, 2014) But there are no literature available regarding the ultrasonographically measured normal testicular volume in Sri Lankan men. In a study conducted by E. Wikramanayake, in 1995 using 200 Sinhalese men. The mean right testicular size was 17.2 + 4.1 ml and that of the left was 16.1 + 3.9 ml as measured by the orchidometer. The reason for this discrepancy may be due to smaller testicular size in Sri Lankan men compared to world population. But further studies are required to establish the normal testicular size in Sri Lankan men.

44.2 % of our study subjects had some abnormality detected by scrotal ultrasonography. In a study done by Hideo Sakamoto et al using 545 infertile men, Intra-scrotal abnormalities were detected by ultrasonography in 65.3% of patients. (Sakamoto et al., 2006) Similarly in a study done by K.H. Tijani et al using 149 subfertile patients and 100 healthy individuals in West Africa They found out that the prevalence of abnormal scrotal findings in the sub-fertile men was 65.1% and in fertile men it was 23%. (Tijani et al., 2014)

In the current study the commonest abnormality detected by ultrasonography was varicocele which was detected in 26.8 % of study subjects. It was followed by epididymal cyst (4.7%) and testicular microlithiasis (4.7%) In the study done by K.H. Tijani et al the commonest scrotal abnormality detected by ultrasound was varicocele and it was found in 55% subfertile men, epididymal cyst was found in 5.3%. Most studies have reported varicoceles to be more common on the Left in both sub-fertile men and normal population. In their study Left side varicocele was found in 66.7% and in Right side it was 3.7%. Similarly in our study Left side varicoceles were responsible for 73.91 %. (Tijani et al., 2014)

In the study done by Hideo Sakamoto et al Left varicocele was found in 57.4% of patients and testicular microlithiasis in 5.5%. Epididymal cyst was seen in 3.9%. Right varicocele was seen only in 0.8%. (Sakamoto et al., 2006)

In a study done by Qublan et al using 234 subfertile men including 176 oligospermic 58 azoospermic, and 150 normospermic men they found a statistically significant increase in the prevalence of abnormal scrotal findings detected with sonography in the subfertile group compared with normospermic group. The abnormalities detected in the subfertile group included varicocele in 35.5%, hydrocele in 16.7%, testicular microlithiasis in 9.8% and epididymal cyst in 7.7% versus.(Qublan et al., 2007)

V. CONCLUSION

Commonest abnormality detected in sub fertile men was a left sided varicose. This tally with the international literature and however there was a significant difference in the mean testicular size of Sri Lankan sub fertile men.

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12. Sensitivity and Specificity of Ultrasonography in Predicting Etiology of Azoospermia

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