



ROLE OF SONOGRAPHY IMAGING IN MALE INFERTILITY

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Abstract:

Introduction: Infertility is known as major problem as life crisis for many couples. Investigation of male infertility is assuming greater importance with male factors implicated as it caused half of the infertile couples. Infertility is defined as infertility is a disease of reproductive system defined by failure to achieve the clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. It is also define as failure of couple to conceive after 12 months of regular intercourse without the use of contraception in women <35 years; and regular intercourse after 6 months without the use of contraception in women ≥ years. A recent report on the status of infertility in India, states that nearly 50% of infertility is related to the reproductive anomalies or disorders in the male. Male infertility include as pretesticular, testicular and post testicular causes. Common causes may be due to deficiencies in the semen and semen quality is used as a surrogate measure of male fecundity. Testicular causes are mainly cryptorchidism, varicocele exposure to gonadotoxins and post testicular causes which included disorders and obstruction of ejaculation and erectile dysfunction. There are many studies which found that sperm count of less than 10 million per milliliter is also suboptimal for fertility; however there is no cut off value of sperm count that is diagnostic of infertility. The common investigations done in evaluating fertility is Ultrasound examinations of scrotum and semen analysis. Ultrasound is a very useful modality for assessing the testicular size which is also related to condition like epididymo-orchitis, varicocele and undescended testis.

Aim: The main aim of this study is to deteremine the used of ultra sonography in the evaluation of male infertility and to compared with clinical and surgical findings.

Material and Methods: All the patients were referred to the Department of Radiology for transrectal and scrotal ultrasonography with high frequency transducer having a frequency of 7.5 MHz and Color Doppler wherever indicated. In this study all male patients with infertility and abnormal semen analysis and with the case of infertility with coincident scrotal findings on clinical examination were included. Transrectal ultrasound was done by positioned in left lateral decubitus position. On each side testis and epididymis was identified as completely as possible and compared for symmetry, size, texture and vascularity.

Result: In this study patients with abnormality were found in highest number on clinical palpation and ultrasound was varicocele. In 18 cases Varicocele was detected on clinical examination and 24 cases in ultrasound. In 9 cases Hydrocele was detected in clinical examination and Ultrasound. In 5 cases epididymal cysts were detected in clinical findings and 6 cases were found in Ultrasound Findings whereas 2 cases of epididymitis was found in ultrasound and only 1 case in clinical examination. Therefore the total number of abnormalities was found by ultrasound which was significantly greater as compared to physical examination. The p-value was 0.001 which shows statistically significant.

Conclusion: Transrectal ultrasound enables high resolution imaging of prostate, seminal vesicles and distal vas deferens and is implicated in diagnosing the cause of obstructive azoospermia. Therefore Imaging plays an important complementary role to clinical examination and laboratory analyses for the detection of precise anatomy and level of abnormality. Hence transrectal and scrotal ultrasound provides valuable information in the diagnostic evaluation of infertile men and pathological conditions can be detected on ultrasound compared to clinical palpation.

Keywords: Infertility, Sonography, Transrectal, Testicular

Introduction

Infertility is defined as a failure to achieve pregnancy during frequent, unprotected intercourseⁱ. Infertility is known as major problem as life crisis for many couples. Investigation of male infertility is assuming greater importance with male factors implicated as it caused half of the infertile couplesⁱⁱ. Infertility is a condition with economic, psychological, medical implications resulting in stress, trauma particularly in a social set-up like ours, with a strong emphasis on child-bearing.

According to World Health Organization (WHO), International Committee for Monitoring Assisted Reproductive Technology, infertility is a disease of reproductive system defined by failure to achieve the clinical pregnancy after 12 months or more of regular unprotected sexual intercourseⁱⁱⁱ. It is also defined as failure of couple to conceive after 12 months of regular intercourse without the use of contraception in women <35 years; and regular intercourse after 6 months without the use of contraception in women ≥ years^{iv}. It is the most common problem among couples though there was no any reliable figure for global prevalence of infertility; however it is estimated that nearly 72.4 million couples globally experience fertility problems^{v,vi}. According WHO currently about 60–80 million couples worldwide suffer from infertility^{vii}. As per sequel older couples frequently have difficulty conceiving. Infertility is classified as primary when there has never been pregnancy for couple. Secondary infertility refers to the situation prior pregnancy was possible involving at least one partner of the couple. Although it is assume that infertility is predominantly related to the woman who caused infertility with either the female or the male partner. A study showed that 50% of cases involved male factor and only 30% is the sole cause of infertility^{viii,ix,x&xi}. As per WHO overall about 3.9% to 16.8% were prevalence of primary infertility.

There are many studies which showed the prevalence of infertility as infertility vary widely among Indian states in which 3.7% in Uttar Pradesh, Himachal Pradesh, and Maharashtra, 5% in Andhra Pradesh and 15% in Kashmir^{xii,xiii,xiv,xv}. One of the study showed that 40% of infertility cases were related to men, 40% of women and 20% of both sexes^{xvi}. A recent report on the status of infertility in India, states that nearly 50% of infertility is related to the reproductive anomalies or disorders in the male^{xvii}.

Male infertility include as pretesticular, testicular and post testicular causes. Common causes may be due to deficiencies in the semen and semen quality is used as a surrogate measure of male fecundity. Testicular causes are mainly cryptorchidism, varicocele exposure to gonadotoxins and post testicular causes which included disorders and obstruction of ejaculation and erectile dysfunction^{xviii}. There is variation in sperm count which may vary from 20 to 150 million sperms per milliliter. At least 60% of the sperms should have normal shape and should show normal forward movement for optimal fertility^{xix}.

There are many studies which found that sperm count of less than 10 million per milliliter is also suboptimal for fertility; however there is no cut off value of sperm count that is diagnostic of infertility^{xx}. The common investigations done in evaluating fertility is Ultrasound examinations of scrotum and semen analysis. Ultrasound is a very useful modality for assessing the testicular size which is also related to condition like epididymo-orchitis, varicocele and undescended testis^{xxi,xxii&xxiii}. By using ultrasonography testicular volume can be calculated in which average volume of normal adult testis being 18 cm³ ± 4 cm³^{xxiv,xxv}. The main aim of this study is to determine the used of ultra sonography in the evaluation of male infertility and to compared with clinical and surgical findings.

Materials and Methods:

This is the prospective cross- section study which is carried out on 50 male patients visiting the ultrasound section of K.M. Medical College and Hospital, Mathura (UP) of Radiology in a period of one year with complaint of infertility. All the patients were referred to the Department of Radiology for transrectal and scrotal ultrasonography with high frequency transducer having a frequency of 7.5 MHz and Color Doppler wherever indicated. In this study all male patients with infertility and abnormal semen analysis and with the case of infertility with coincident scrotal findings on clinical examination were included whereas cases of infertility due to known female causes, impotence and known pre-testicular causes were excluded. Transrectal ultrasound was done by positioned in left lateral decubitus position. All scrotal ultrasound scans were done using a Mindray DC-8 diagnostic ultrasound system with a 7.5MHz transducer in the presence of a male chaperone. Patients were explaining before examination that was then placed in a supine

position. Underwear and trousers were placed at the mid-thigh level. The scrotums were support via a folded towel positioned between the patient's legs. The penis was then placed over the patient's suprapubic region and covered with another towel. Over both scrotal sacs coupling gel was applied and examination was done in both longitudinal and transverse planes. on each side testis and epididymis was identified as completely as possible and compared for symmetry, size, texture and vascularity. The complete history of patients was taken and physical examination, laboratory investigations finding were recorded and results obtained from ultra sonography was also recorded.

RESULT:

In this study maximum no of patients were between the age 27 and 40 years of age. Maximum cases had sperm count between 5 and 10 M/ml i.e. 18 no of cases and other 15 cases were suffering from Azoospermia. On the physical examination of the patients abnormality was detected in infertile men out of 50 cases, 18 cases were varicocele, 9 cases were hydrocele, 5 cases were epididymal cyst, 3 cases were cryptorchidism, 1 case was epididymis and 1 case having nonpalpable vas deferens were diagnosed as shown in table below.

Table 1: showing the findings on Local Examination

Findings	No. of cases	% age	
Varicocele	Left	12	24
	Right	2	4
	Bilateral	4	8
	Total	18	36
Hydrocele	Left	3	6
	Right	2	4
	Bilateral	4	8
	Total	9	18
Others	Epididymitis	1	2
	Non-Palpable Vas Deferens	1	2
	Single Left Testis	1	2
	Single Right Testis	1	2
	Epididymal Cyst	5	10
	Total	9	18

In this study in the Ultrasonographic scrotum reveals out of 50 cases, 24 cases were varicocele, 6 cases were epididymal cysts, 9 cases were hydrocele, 3 cases of epididymitis, 2 cases of cryptorchidism, 3 cases were testicular microlithiasis and 1 case was bilateral testicular cyst. Patients with cryptorchidism,

in all the patients' testis were normal in size, site and shape and echo pattern as shown in table below.

Table 2: showing the findings on Scrotal Ultrasound

Findings	No. of cases	% age	
Varicocele	Left	13	26
	Right	2	4
	Bilateral	9	18
	Total	24	48
Hydrocele	Left	1	2
	Right	1	2
	Bilateral	7	14
	Total	9	18
Epididymal Cyst	Left	1	2
	Right	0	0
	Bilateral	5	10
	Total	6	12
Epididymitis	Left	1	2
	Right	1	2
	Bilateral	1	2
	Total	3	6
Others	Bilateral Testicular Cyst	1	2
	Left Undescended	1	2
	Right Undescended	1	2
	Testicular Microlithiasis	3	6
	Total	6	12

In this study patients with abnormality were found in highest number on clinical palpation and ultrasound was varicocele. In 18 cases Varicocele was detected on clinical examination and 24 cases in ultrasound. In 9 cases Hydrocele was detected in clinical examination and Ultrasound. In 5 cases epididymal cysts were detected in clinical findings and 6 cases were found in Ultrasound Findings whereas 2 cases of epididymitis was found in ultrasound and only 1 case in clinical examination. Therefore the total number of abnormalities was found by ultrasound which was significantly greater as compared to physical examination. The p-value was 0.001 which shows statistically significant as shown in table below.

Table 3: showing the comparison of findings between clinical and ultrasound significant in infertile males

Findings	Clinical Findings		Ultrasound Findings	
	No. of Cases	%age	No. of Cases	%age
Varicocele	18	36	24	48
Hydrocele	9	18	9	18
Epididymal Cyst	5	10	6	12
Epididymitis	1	2	3	6
Total	33	66	42	84
χ^2	25.76			
p-value	0.001			

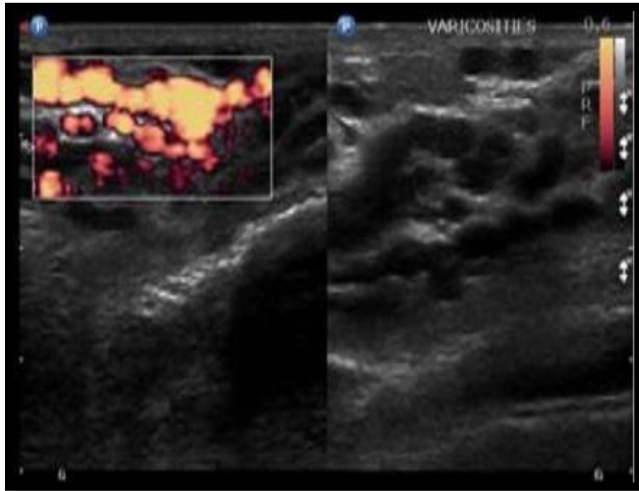


Figure 1: Multiple dilated tortuous anechoic tubular channels are seen posterior to both testis. Flow seen in dilated vessels which increases on Valsalva indicating bilateral varicocele.

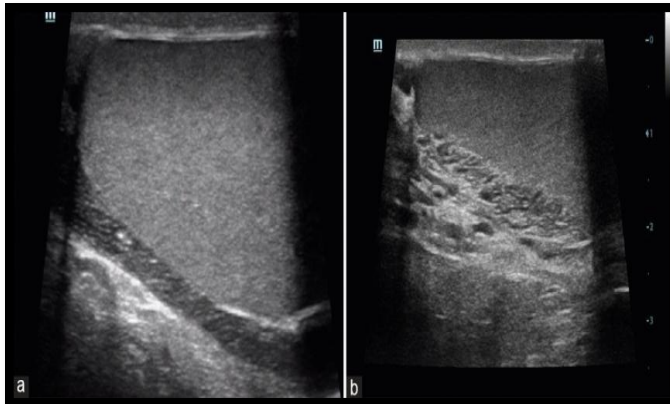


Figure 2: Tubular ectasia of epididymis in a 40 year-old male, underwent vasectomy, asymptomatic at present. Longitudinal (a) and short axis (b) scan of the left scrotum shows epididymal enlargement with speckled appearance

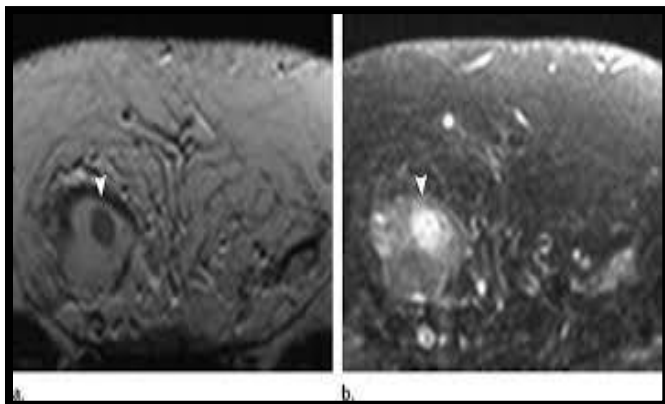


Figure 3: hyperplasia in a 45 year-old man (a) demonstrates hyperenhancement (relative to the testis) on the contrast-enhanced fat-suppressed 3D

T1-weighted FSPGR image (b) The right testis is undescended and located in the inguinal canal.

Discussion:

Past decade there is rapid development of novel management approaches for male factor infertility has enabled many of these men, previously believed to be infertile, the ability to become fathers. Male infertility contributes to 50% of cases. For early diagnosis and management of infertile male ultrasound of Scrotal and transrectal is an important investigation. However in some cases male fertility can be restored with correction of etiology which is occluding the part of ductal system. In this study the mean age of patients was 27.82+4.63 years with the range of 20-40 years which was comparable to the study of Brunereau *et al*^{xxvi} and Pethiyagoda *et al*^{xxvii}. These may be due to environmental changes as socioeconomic trends of the society in the developed countries which has led to delayed marriage and procreation.

In this study showed 18 no of cases with a sperm count between 5 and 10 M/ml whereas other 15 cases were suffering from Azoospermia which showed similar to the study of Goulet *et al*^{xxviii} and Moon *et al*^{xxix}. According to the study of Eskew *et al*^{xxx} 34% patients had clinically palpable varicocele and 64% on ultrasound examination which are comparable to this study. In the studied of Preuthippan and Nicholas *et al*^{xxxi} showed that out of 110 patients, 32 had left sided varicocele, 2 had right sided and 6 patients had bilateral varicocele on clinical palpation which are comparable to this study. In the another study of Gordon *et al*^{xxxii} showed 34% with varicoceles, 8% with bilateral small testes 8% with unilateral small testis 8% with epididymal cysts 4% with testicular microlithiasis 2% with testicular tumor and thickened epididymis in one and another study of Jequier *et al*^{xxxiii} also showed varicocele in 52% cases, epididymal cyst in 22% cases, testicular microlithiasis in 6% cases, hydrocele in 4% and testicular cancer in 0.4% cases which were comparable to this study. In the study of Ho *et al*^{xxxiv} showed on 387 patients found congenital absence of vas deferens in 8% of patients which is similar to this study and also similar to the studied of Abdul wahed *et al*^{xxxv}.

Conclusion:

For the evaluation of infertility of men scrotal ultrasound is useful which can detect abnormalities in

mediastinum testis, epididymis and proximal vas deferens. Transrectal ultrasound enables high resolution imaging of prostate, seminal vesicles and distal vas deferens and is implicated in diagnosing the cause of obstructive azoospermia. Therefore Imaging plays an important complementary role to clinical examination and laboratory analyses for the detection of precise anatomy and level of abnormality. Hence transrectal and scrotal ultrasound provides valuable information in the diagnostic evaluation of infertile men and pathological conditions can be detected on ultrasound compared to clinical palpation.

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