**Scholars Journal of Applied Medical Sciences (SJAMS)**
***Abbreviated Key Title: Sch. J. App. Med. Sci.***
**ISSN 2320-6691 (Online)**
**ISSN 2347-954X (Print)**

A Unit of Scholars Academic and Scientific Society, India
www.saspublisher.com

Surgery

# Role of Ultrasound in Male Infertility

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**Original Research Article**

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**Article History**
*Received: 11.04.2018*
*Accepted: 22.04.2018*
*Published: 30.04.2018*

**DOI:**
10.21276/sjams.2018.6.4.84

**Abstract:** The aims of our study is to evaluate the role of ultrasonography to identify any intra and extra testicular causes of male infertility and to correlate ultrasonographic findings with clinical and laboratory findings. This prospective study was carried out on 100 patients attending the outpatient department of Infertility clinic of Department of Surgery, detailed history and examination was done. The patients suspected to have scrotal pathology were subjected to colour Doppler sonography in the Department of Radiodiagnosis, AMU, and Aligarh. In our study clinically varicocoele was the most common anomaly found followed by atrophic testes, epididymal cyst and others. On colour Doppler sonography varicocoele was the most common sonographic abnormality that was present in 40 (35.08%) patients. Left sided varicocoele was more common than right sided varicocoele. Sonography had an overall sensitivity of 57% whereas clinical examination had an overall sensitivity of only 22% o. Testicular volume and mean sperm counts/ ejaculate have shown a proportionate relationship in our study. Ultrasound is a non-invasive method, easy to perform and is cost effective. It provides important information without any post- examination consequences. Due to the high incidence of abnormalities detected by color Doppler ultrasonography we advocate that it should be used as a routine investigation in all infertile male patients.
**Keywords:** male infertility, ultrasound, varicocele.

## INTRODUCTION

It has been estimated that almost 7% of men in their reproductive age are sub-fertile or infertile due to pre-testicular, testicular or post-testicular problems Krausz [1].

Despite many technical advances that have improved diagnostic skills the etiological factors for male infertility are still obscure and around 50% of them remain undiagnosed [2]. To fill this gap in infertility clinics the use of imaging of the male genital tract has been progressively expanded. This study evaluate prospectively the role of ultrasonography in indigenous population to identify various scrotal and extra-scrotal factors with the use of scrotal ultrasound and Trans rectal ultrasound causing male infertility and there correlation with clinical and radiological findings.

## MATERIALS AND METHODS

This prospective study was carried out on 100 patients attending the outpatient department of Infertility clinic of Department of Surgery, detailed history and examination was done. The patients suspected to have scrotal pathology were subjected to colour Doppler sonography in the Department of Radiodiagnosis, AMU, and Aligarh.

### Study subjects

Patients were selected only when two consecutive semen samples that were taken at least 5 days apart were found to be abnormal and/or if the patient had never attained fatherhood.

### Inclusion criteria

All male patients aged between 20-50 years, clinically diagnosed with infertility or sub- fertility having abnormal semen parameters as according to WHO 2010 guidelines and/or if patients had never attained fatherhood were taken for study.

**Table 1: WHO semen parameters**

| Parameter | WHO 2010 |
|---|---|
| Volume | 1.5ml |
| Concentration | 15 million/ml |
| Progressive motility | 32% |
| Normal forms | 4% |

**Exclusion criteria**

- Patients not giving consent to be a part of the study.
- Patients having any acute scrotal pathology.
- Patients having any associated serious systemic conditions.
- Patients having incomplete medical records.
- Patients having HBsAg and HIV status positive.
- Patients who were referred to other centre after clinical, laboratory and radiological investigation.

**Sample size**

A total of 100 patients were taken for study that were recruited through Infertility clinic of Department of Surgery over a period of 18 months. Age of patients ranged between 20- 50 years.

**History and Physical Examination**

A detailed history and physical examination was done with special attention to any history suggestive of mumps, trauma to the testes, any operation and similar illness in the past. Assessment of the genitals was done with reference to examination of the penis including the location of the urethral meatus, palpation of the testes and measurement of their size, presence and consistency of the vas and epididymis, presence of varicocoele, secondary sexual characteristics including body habitus, hair distribution and pattern of breast development and at last digital rectal examination.

**Systemic Examination**

A detailed systemic examination was done. In central nervous system assessment higher function, any neurological disorder, all cranial nerve function, sensory and motor nervous system were assessed. In cardiovascular system any abnormal heart sounds if present were documented. In respiratory system examination any illness suggesting asthma, bronchitis and any abnormalities in breath sounds were noted. In abdominal examination all hernia sites and any lump and organomegaly if present was documented

**Semen collection and analysis**

After 3-5 days of ejaculatory abstinence, semen samples were collected in a sterile plastic container by the process of masturbation from the subjects. Semen samples were collected in the laboratory room in a clean, dry, biologically inert container. In case of oligozoospermic or azoospermic patients, three semen samples were collected on different days with at least four days abstinence. After that gross and microscopic analysis was done and findings were noted

**Transrectal ultrasound**

Transrectal ultrasonography in the infertile men was done to evaluate patency of the distal ductal system (vas deferens) and internal genital organs. Sonography of all patients were done using a real time endocavitory probe (GE, 3.5 MHz). Image documentation was done with multiformat camera.

**Preparation and positioning and technique**

The patients were asked to take a rectal enema one night before and in the morning and instructed to take 2 to 3 glasses of water and hold urine for 2 to 4 hours before the study. The procedure was fully explained to patient in details and consent was taken.

Subjects were asked to remove their inner garments. Left lateral position was the most comfortable position for subjects in our study and this was done. Two leggings were used to cover the legs for patient's and the examiner's convenience. To make the ultrasound room more comfortable for the patient, the room was kept semi dark during assessment. The patients were explained the technique of the scanning. For transrectal ultrasound, the ultrasound transmission gel was applied to the endorectal transducer and it was covered with a sterile probe cover or a sterile condom. Scanning begins in the axial plane and the base of the prostate and seminal vesicles were visualized first. Seminal vesicles were identified bilaterally, with the ampullae of the vas on either side of the midline. The seminal vesicles are convoluted cystic structures that are darkly anechoic. Measurements were taken. Length of the seminal vesicle was taken using dotted lines along the curvature of the organ in its midline. Width was taken at the midpoint. Volume was calculated using the in-built calculator in the scanning machine. Vas deferens was visualized and the diameter of the vas deferens was measured. Next, the base of the prostate was visualized. Volume assessment of the prostate is an important and integral part of this procedure. The length and breadth of the prostate were taken on the longitudinal axis of the prostate. Thickness was taken on the transverse axis. The ellipsoid volume formula was then applied, as follows: length × breadth × thickness × 0.52. This was available in the in-built calculator of volume in the software on the scanning machine prostatic scanning was done in various slices.

**Scrotal scanning**

**Equipment**

A logic-500 (GE WIPRO) ultrasound machine was used. The patient was scanned using linear colour Doppler multi-frequency probe**.**

**Preparations and positioning**

For scrotal ultrasound patient is instructed to shave the parts and come for scanning. An ultrasound examination of the scrotum was done percutaneously

to investigate the testis and cord structures. The examination was done in both supine and upright position

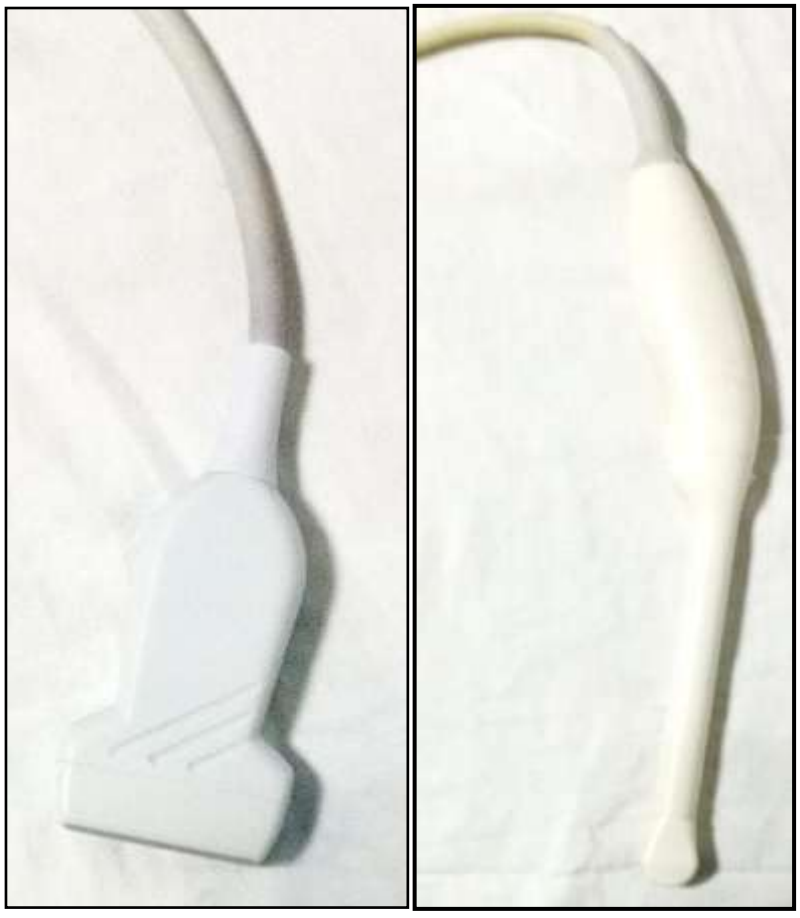
**Technique**

The transducer (7-9 MHZ) was prepared with a sonogel (coupling gel).The transducer was held in the right hand and direct contact scan was performed with gentle rotation and angulations of the transducer. Both sagittal and transverse images were obtained. A transverse scan demonstrating both testes for comparison was obtained. Additional views were also obtained in coronal and oblique planes, with the patient upright and performing valsalva manoeuvre. Enlargement of veins was assessed. Diameter of veins was measured both in resting posture as well as in valsalva manoeuvre. Presence of varicose veins if any was noted and gradations of varicosity were done.

Colour flow Doppler examination was performed to evaluate testicular and epididymal blood flow. The length and breadth of the testis was taken in the longitudinal axis of the testis. Thickness was taken on the transverse axis. Testicular volumes were calculated by using the empirical formula of Lambert: length ×breadth × thickness × 0.71. This was available in the in-built calculator of volume in the software on the scanning machine. Then, the testis andpara-testicular area, mediastinum testis, epididymal head, epididymal body and epididymal tail were examined sequentially. Spermatic cord and vasculature were also studied.

**STATISTICAL ANALYSIS**

The obtained data were subjected to statistical analysis using statistical software SPSS version 20.0. Data were expressed as mean± standard deviation and Statistical significance was analyzed by Chi-square test. Spearmen's correlation test was performed to assess the linear relationship between parameters.



**Scrotal probe** **Endorectal probe**

**Fig-1: Sonography probe**

**Fig-2: Sonography Apparatus**

**Fig-3: Colour Doppler sonogarphy of scrotum in supine position**

**Fig-4: Colour Doppler Sonography of scrotum in erect postiton**

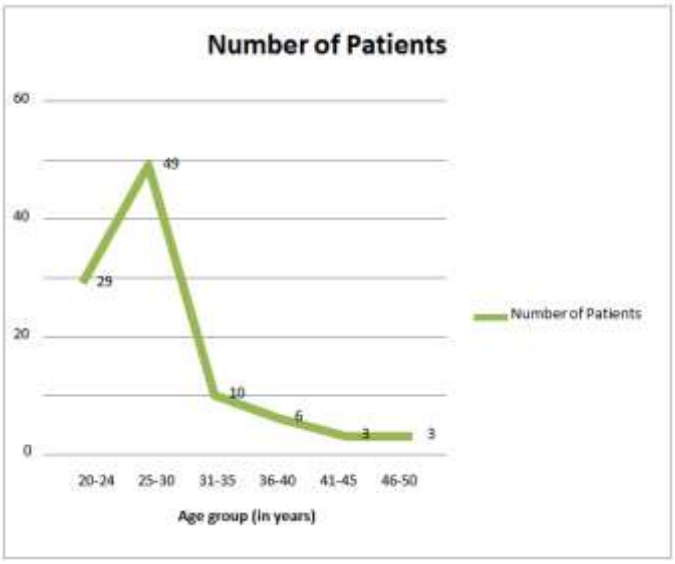
**Fig-5: Colour Doppler sonography of scrotum on erect position while performing valsalva manoeuvre**

**Fig-6: Transcrectal sonography**

## OBSERVATIONS AND RESULTS

**Table-2: Age distribution of patients**

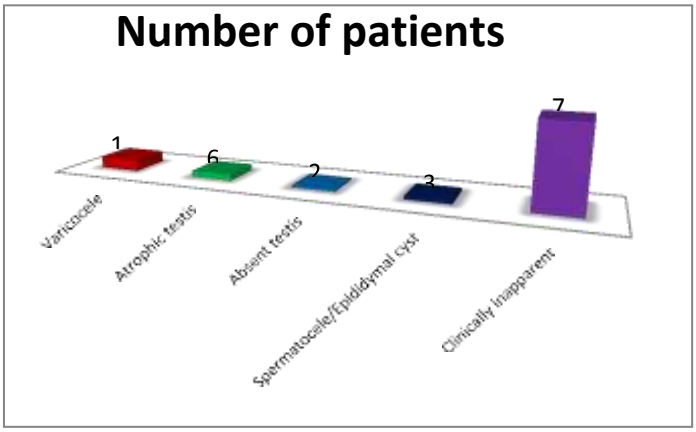
| Serial number | Age group (in years) | Number of Patients | Percentage |
|---|---|---|---|
| 1 | 20-24 | 29 | 29% |
| 2 | 25-30 | 49 | 49% |
| 3 | 31-35 | 10 | 10% |
| 4 | 36-40 | 6 | 6% |
| 5 | 41-45 | 3 | 3% |
| 6 | 46-50 | 3 | 3% |




**Graph-1: Number of patients in different age groups**

**Table-3: Clinical findings**

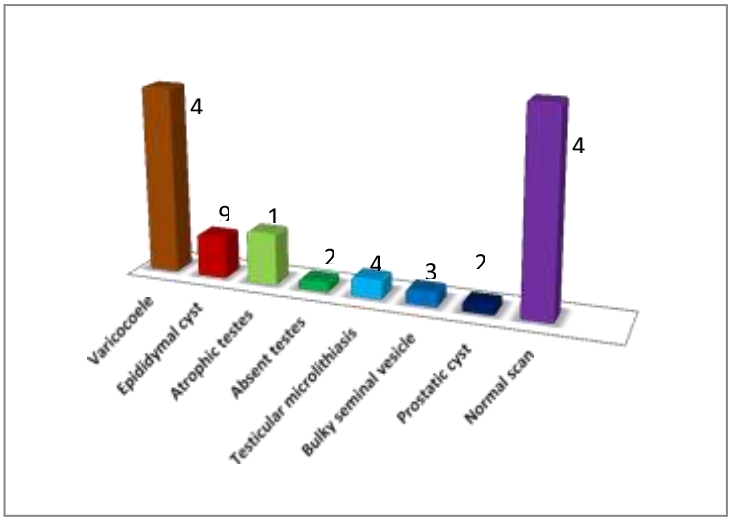
| Serial number | Clinical findings | Number of patients (n=100) | Percentage |
|---|---|---|---|
| 1 | Varicocele | 11 | 11% |
| 2 | Atrophic testis | 6 | 6% |
| 3 | Absent testis | 2 | 2% |
| 4 | Spermatocele/Epididymal cyst | 3 | 3% |
| 5 | Clinically inapparent | 78 | 78% |




**Graph-2: Clinical findings**

**Table-4: Colour Doppler sonographic findings**

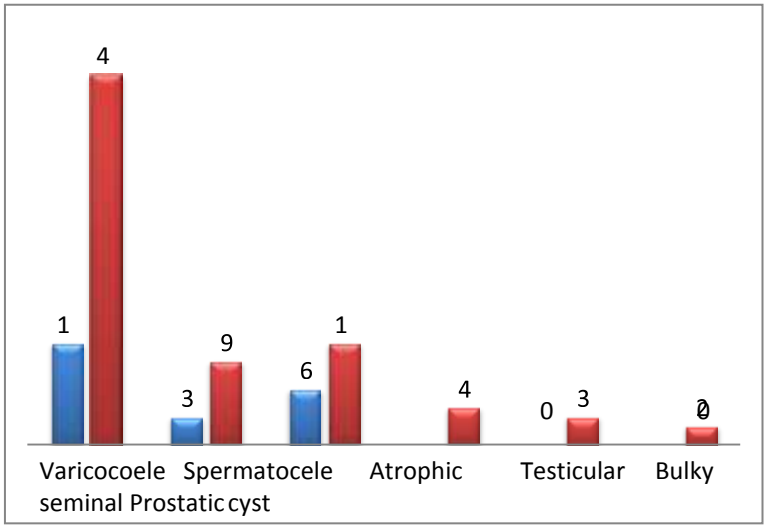
| Serial number | Sonographic findings | Number of documentations | Percentage |
|---|---|---|---|
| 1 | Varicocele | 40 | 35.08% |
| 2 | Epididymal cyst | 9 | 7.90% |
| 3 | Atrophic testis | 11 | 9.65% |
| 4 | Absent testis | 2 | 1.76% |
| 5 | Testicular microlithiasis | 4 | 3.50% |
| 6 | Bulky seminal vesicle | 3 | 2.64% |
| 7 | Normal scan | 43 | 37.71% |
| 8 | Prostatic cyst | 2 | 1.76% |



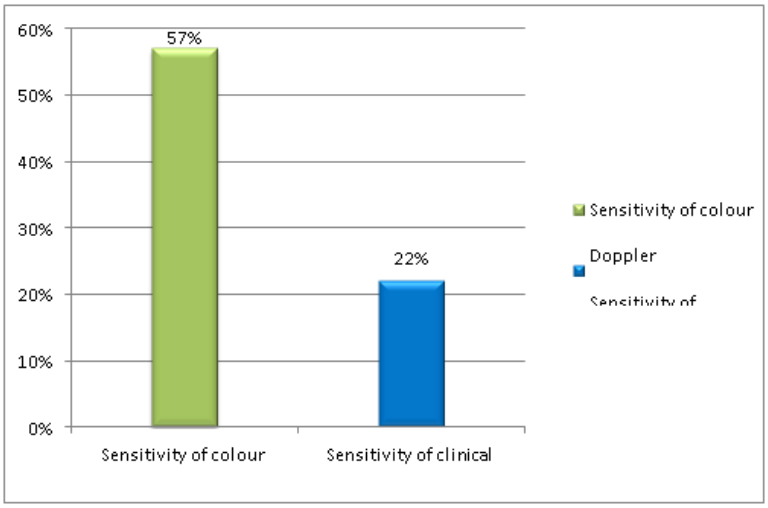

**Graph-3: Different colour Doppler sonographic findings**

**Table-5: Clinical versus color Doppler findings**

| Serial number | Different conditions | Clinical findings | Sonographic findings |
|---|---|---|---|
| 1 | Varicocele | 11 (11%) | 40 (35.08%) |
| 2 | Epididymal cyst/Spermatocele | 3 (3%) | 9 (7.90%) |
| 3 | Atrophic/micro testis | 6 (6%) | 11 (9.65%) |
| 4 | Absent testis | 2 (2%) | 2 (1.76%) |
| 5 | Testicular microlithiasis | 0 | 4 (3.50%) |
| 6 | Bulky seminal vesicle | 0 | 3 (2.64%) |
| 7 | Prostatic cyst | 0 | 2 (1.76%) |




**Graph-4: Comparison between colour Doppler and clinical examination**



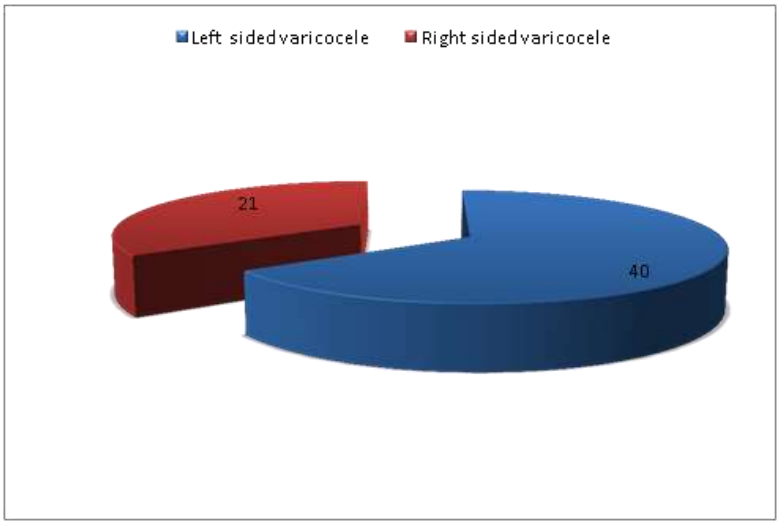

**Graph-5: Comparison of sensitivity of colour Doppler sonography and clinical examination**

**Table-6: Relationship between Varicocele and mean sperm count/ejaculate**

| Serial number | Grades of varicocoele | Number of patients | Mean sperm count/ejaculate (in millions) |
|---|---|---|---|
| 1 | Grade 1 | 13 | 33.15±18.7 |
| 2 | Grade 2 | 10 | 34.2±28.14 |
| 3 | Grade 3 | 19 | 25.37±14.9 |
| 4 | Grade 4 | 11 | 15.9±8.3 |

**Table-7: Number of patients with different sides affected in Varicocele**

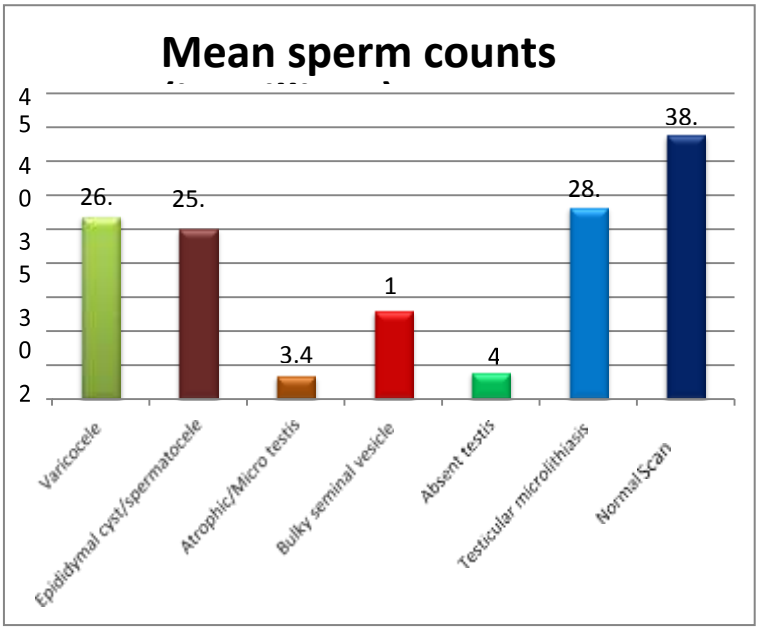
| Serial number | Total number of patients | Number of patients with left sided varicocoele | Number of patients with right sided varicocoele |
|---|---|---|---|
| 1 | 40 | 40 (40%) | 21 (21%) |




**Graph-6: Distribution of patients of varicocoele the basis of side affection**

**Table-8: Mean sperm counts in different sonographic conditions**

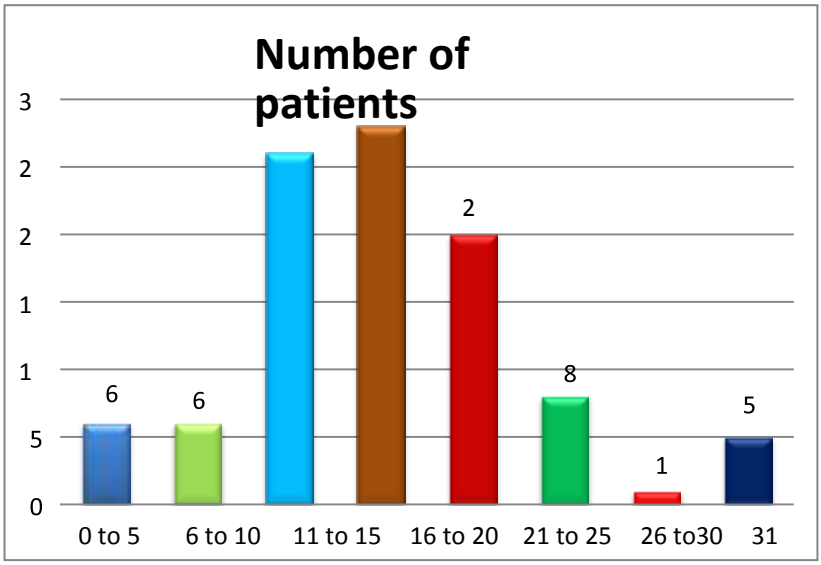
| Serial number | Sonographic findings | Number of documentations | Mean sperm counts/ejaculate (in millions) |
|---|---|---|---|
| 1 | Varicocoele | 40 | 26.98±19.10 |
| 2 | Epididymal cyst/spermatocele | 9 | 25.11±23.87 |
| 3 | Atrophic/Micro testis | 11 | 3.45±4.845 |
| 4 | Bulky seminal vesicle | 3 | 13.0±12.12 |
| 5 | Absent testis | 2 | 4.0±5.675 |
| 6 | Testicular microlithiasis | 4 | 28.25±38.57 |
| 7 | Normal scan | 43 | 38.93±29.048 |




**Graph-7: Mean sperm counts among different sonographic conditions**

**Table-9: Testicular volume among infertile patients**

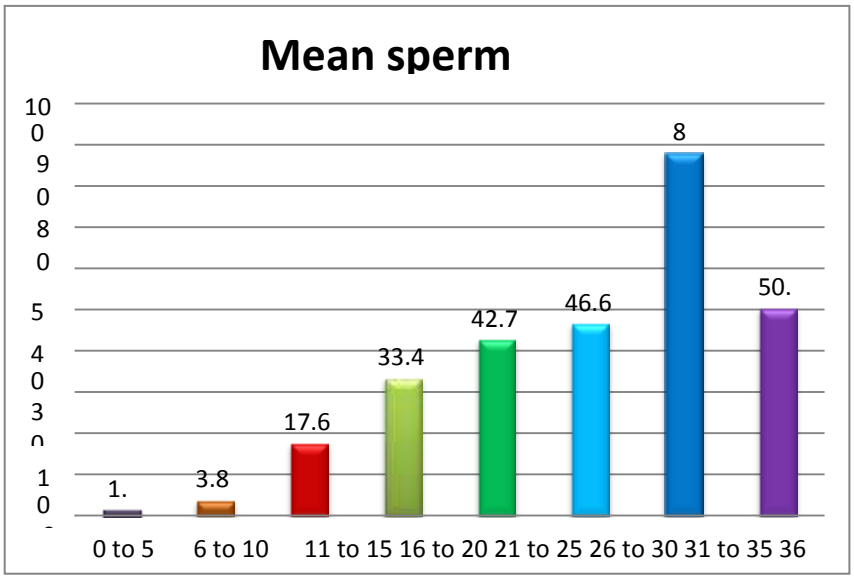
| Serial number | Testicular volume (cc) | Number of patients (n=100) |
|---|---|---|
| 1 | 0-5 | 6 |
| 2 | 6-10 | 6 |
| 3 | 11-15 | 26 |
| 4 | 16-20 | 28 |
| 5 | 21-25 | 20 |
| 6 | 26-30 | 8 |
| 7 | 31-35 | 1 |
| 8 | 36-40 | 5 |
| Total | 100 | |




**Graph-8: Number of patients in different testicular volume range**

**Table-10: Relationship between testicular volume and sperm counts**

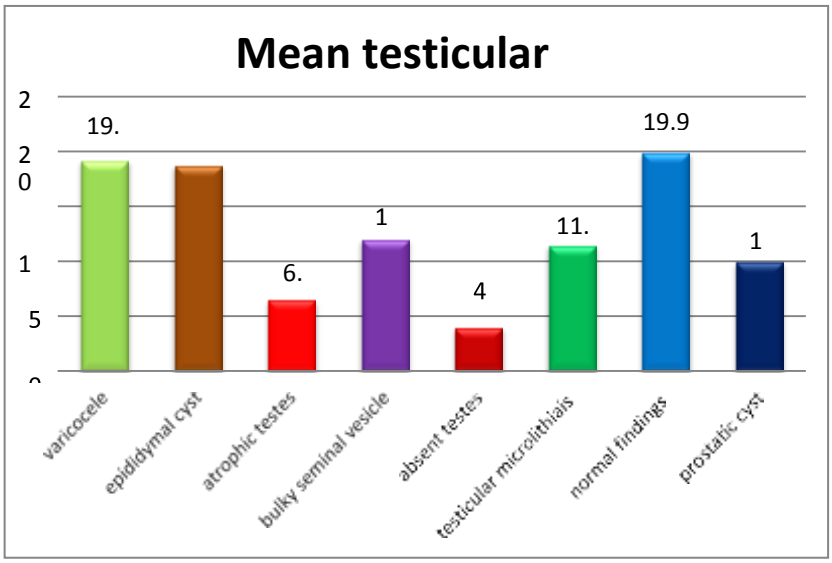
| Serial number | Testicular volume (in cc) | Mean sperm counts/ejaculate (in millions) |
|---|---|---|
| 1 | 0-5 | 1.50±3.20 |
| 2 | 6-10 | 3.83±3.746 |
| 3 | 11-15 | 17.63±12.92 |
| 4 | 16-20 | 33.43±24.951 |
| 5 | 21-25 | 42.74±25.510 |
| 6 | 26-30 | 46.63±31.55 |
| 7 | 31-35 | 88.0 |
| 8 | 36-40 | 50.4±25.245 |




**Graph-9: Mean sperm counts in different testicular volume range**

**Table-11: Relationship between Sonographic findings and testicular volume**

| Serial number | Sonographic findings | Mean testicular volume (in cc) |
|---|---|---|
| 1 | Varicocele | 19.20±6.58 |
| 2 | Epididymal cyst/spermatocele | 18.78±6.37 |
| 3 | Atrophic/Micro testis | 6.55±3.830 |
| 4 | Bulky seminal vesicle | 12±5.292 |
| 5 | absent testis | 4.0±2.82 |
| 6 | Testicular microlithiasis | 11.5±5.972 |
| 7 | Normal scan | 19.95±7.191 |
| 8 | Prostatic cyst | 10.0±7.071 |




**Graph-10: Mean testicular volume in different sonographic conditions**

## DISCUSSION

### Age distribution

In our study the total number of patients that were affected in the age group of 25- 30 years were 49 (49%) followed by 29 (29%) in 20-25 years, in 31-35 year there were 10 patients. Total numbers of patients in other age groups were 12 (12%) only.

In the Study conducted by Manna D, Pandit D *et al.*[3] depicted similar results in which they had showed that male infertility problems were highest in the age group of 25-34 years. In the study conducted by S. Samal, K. Dhadwe *et al.* [4] found that the maximum male infertility problems were in the age group of 31-40 years followed by other age groups. In the study conducted by Ford WC, North *K et al.* [5] concluded increased male infertility problems over the age of 40 years as compared to younger age groups, results of their study indicated that conception rate was 30 % lower in men over 40 years of age during a 12 months follow up period as compared to younger age groups. In the Study conducted by Harris I D, Randall BM *et al.* [6] stated that fertility rate in men younger than age 30 years has decreased by 15% after 1980 and also ageing of male partner has a significant adverse effect on fertility potential.

### Various sonographic conditions affecting infertile males

In our study most common clinical finding that was noted was varicocoele in 11 (11%) patients followed by atrophic testes in 6 (6%) patients, epididymal cyst in 3 (3%) patients. In the study done by Sandro C Esteves, Ricardo Miyaoka *et al.*[7] revealed similar results and showed varicocoele as the most common clinical anomaly in infertile patients followed by any infectious and hormonal causes In our study on colour Doppler sonography varicocoele was present in 40 (35.08%) patients, epididymal cyst in 9 (7.90%) patients, atrophic testis in11 (9.65%) patients, absent testis in 2 (1.76%) patients, testicular microlithiasis in 4 (3.50%) patients, bulky seminal vesicle in 3 (2.64%), 43 (37.71%) patients presented with a normal scan. Some of the patients in our study had two or more findings together, in those cases each finding was documented separately.

Hasan Y. Malkawi, Hussein S. Qublan et al[8] showed similar results and reported varicocoele in 54% patients, epididymal cyst in 11%, testicular microlithiasis in 29% of patients, so maximum number of infertile patients in his study suffered from varicocoele. Hayder M, Hayder Q. *et al.* [9] showed similar results and reported varicocoele in 74%,

epididymal cyst in 8%, atrophic testes in 4%, testicular microlithiasis in 4%. This study also depicted that varicocoele was the most common sonographic abnormality found in infertile male patients. Qublan HS, Al-Okoor K *et al*.[10] performed sonographic study in infertile couples and showed similar result in which he had reported varicocoele in 36%, microlithiasis in 10% was the most common abnormality in infertile male patients in his study followed by others abnormalities. K.H. Tijani' B.O. Oyende *et al*.[11] performed sonographic study in infertile male patients in west Africa and reported similar results and showed that varicocoele was the most common abnormality in infertile couples followed by any other. P D Kantartzi, Ch D Goulis *et al*. [12]. also reported varicocoele.

**Relationship between grades of varicocoele and mean sperm counts**

In our study no definite relationship was found between grade 1 and grade 2 varicocoele and mean sperm counts however, there was decrease in sperm counts in grade 3 varicocoele which became more pronounced in grade 4 varicocoele. In patients of grade 3 varicocoele mean sperm counts were 25.37 million/ejaculate which got further deteriorated in grade 4 varicocoele which was 15.9 million/ejaculate. Statistical analysis (Spearmen's test) showed that negative correlation between grades 4 and 3 varicocoele and mean sperm counts which was -0.81 and -0.035 respectively, which although was not statistically significant. In some patients two different grades of varicocoeles were present together, in those cases each grade was documented separately.

In the study done by Cocuzza M, Athayde KS et al[13] showed similar results in which he had showed that varicocoele of higher grades adversely affects semen volume and sperm counts. Belker AM[14]. also presented with similar results showed adverse effect of varicocoele on overall testicular function. Pastuszak AW, Wang R[15] also concluded similar results and stated negative impact on testicular functions by varicocoele, he also stated that higher grades of varicocoele were associated with low sperm counts and overall poor testicular functions. Reddy SV K[16]. in his study also suggested adverse effect of varicocoele on sperm counts. However study done by Hauser R *et al.*[17] stated no conclusive relationship between varicocoele and sperm counts. Similarly, Jarow J[18]. in his study suggested no relationship between grades of varicocoele and sperm counts.

**Number of patients with different sides affected in varicocoele**

In our study left sided varicocoele was present in 40 patients and right sided varicocoele was present in 21 patients. Isolated varicocoele of right side was not found in our study. Right sided varicocoele was always associated with left sided varicocoele.

It was due to the following reasons, the left testicular vein opens at a right angle to the left renal vein, secondly due to the fact that the loaded sigmoid colon exerts pressure on the left testicular vein and the opening of the left testicular vein is close to the opening of the adrenal veins, hence it was exposed to action of adrenergic hormones.

**Relationship between Testicular volume and sperm counts**

We found a positive relationship between testicular volumes and mean sperm counts. Low testicular volumes were associated with low sperm counts and as the testicular volume increases sperm count also increases.

Statistical analysis showed (Spearmen's test) a highly significant positive correlation between testicular and sperm counts which was 0.617.

Similar results were showed by Arai T, Kitahara S *et al*. [19] They have also stated that testicular volume had a direct positive correlation with testicular function. Condorelli R, Calogero AE et al[20] also showed similar results and stated that low testicular volume was associated with low testicular functions. Similarly the study done by Sakamoto H[21] showed similar results and suggested that low testicular volume was associated with low testicular functions and high testicular volume was associated with higher functions. Study done by Bujan L[22 ]demonstrated similar results and stated that testicular volume is a key marker of testicular functions and low testicular volume was associated with low testicular functions. Kristo A[23] in his study suggested similar results and concluded a direct positive correlation between testicular volume and conventional semen parameters.

**Testicular volume in various sonographic conditions**

In our study testicular volume varied very abruptly in various sonographic conditions, in varicocoele mean testicular volume was 19.20 cc, in epididymal cyst it was 18.78 cc, in atrophic testes it was 6.5 cc, in bulky seminal vesicle it was 12.0 cc, in absent testes it was 4.0 cc, testicular microlithiasis also presented with mean testicular volume of 11.5 cc, in prostatic cyst it was 10.0 cc, those patients that presented with normal sonographic scans had a maximum testicular volume of 19.62 cc.

These observations were possibly due to adverse effects of various conditions on testicular functions, leading to decrease in testicular volume. Although reasons for non-uniform variation of testicular volume may be due presence of two or more conditions together in some patients that produced synergistic adverse effect on testicular volume.

**Testicular volume among infertile patients**

In our study maximum number of patients that attended infertility clinic had testicular volume in range of 16-20 cc, which constituted 28 patients followed by 26 patients with testicular volume in range of 11-15 cc.

In the study done by Tijani K [24] showed mean testicular volume of 15.32 cc in infertile male patients which was closely related to our study.

**Mean sperm counts in different patients**

In our study there was an irregular distribution of mean sperm counts among patients with different sonographic findings. Patients of varicocoele had a mean sperm counts of 26.98 million/ejaculate, in epididymal cyst mean sperm counts of 25.11 million/ejaculate, in atrophic testes mean sperm counts of 3.45 million/ejaculate. Patients that were having normal sonographic scan were having highest mean sperm counts of 35.98 million/ejaculate.

As mean sperm counts were below normal in most of these conditions. Atrophic testes affected sperm counts most adversely as already mentioned that testicular volume has a direct correlation with testicular functions. Possible causes of low sperm counts in other sonographic conditions were due to negative effects of various conditions on overall testicular functions.

Tsvetkov D [25] in his study showed similar results and stated possible negative effects of epididymal cyst on overall testicular functions leading to low sperm counts. Xu C *et al*. [26] showed similar results and stated negative effects of testicular microlithiasis on testicular functions leading to worsening of semen parameters. Contrary to our study Catanzariti F *et al*. [27] showed that testicular microlithiasis did not affects sperm parameters. In patients of absent testis Fantasia J *et al*. [28] showed similar results and stated a possible negative effect of absent testis on sperm counts

**SUMMARY**

This prospective study was carried out in 100 male patients attending the outpatient department of Infertility clinic of Department of Surgery, Jawaharlal Nehru medical college and hospital over a period of 18 months.

- In our study clinically varicocoele was the most common anomaly found followed by atrophic testes, epididymal cyst and others.
- On colour Doppler sonography varicocoele was the most common sonographic abnormality that was present in 40 (35.08%) patients. Left sided varicocoele was more common than right sided varicocoele. Right sided varicocoele was always associated with left sided varicocoele.
- Sonography had an overall sensitivity of 57% whereas clinical examination had an overall sensitivity of 22% only.
- There was a definite relationship between grades of varicocoele and mean sperm counts. Patients that had lower grades of varicocoele have a near normal sperm counts and those patients that had higher grades of varicocoele were having low sperm counts.
- Testicular volume and mean sperm counts/ ejaculate have shown a proportionate relationship in our study. Those patients that were having low testicular volume were having low sperm counts and as the testicular volume increases sperm counts also increases.
- We have found an uneven distribution of testicular volume among various sonographic conditions. Although testicular volume was below normal in all abnormal sonographic conditions. Patients with normal sonographic scans had largest testicular volume.
- Most sonographic abnormalities including varicocoele, atrophic testes, epididymal cyst were common in 25-30 years age group. Absent testes, testicular microlithiasis and bulky seminal vesicle were not found in any specific age groups as the numbers of patients of those sonographic abnormalities were quite less.

**CONCLUSIONS**

- This study emphasizes that colour Doppler ultrasonography is a very sensitive investigation in detecting various abnormalities that were often missed by repeated clinical examinations.
- Ultrasound is a non-invasive method, easy to perform and is cost effective. It provides important information without any post- examination consequences.
- Due to the high incidence of abnormalities detected by colour Doppler ultrasonography we advocate that it should be used as a routine investigation in infertile male patients.
- Given the prevalence of male infertility, the surgeon's and radiologist's familiarity with its appropriate imaging workup and recognition of the commonly involved pathologic processes is critical.
- Imaging plays a key role in the evaluation of the hypospermic or azoospermic men. It can detect correctable abnormalities, which can lead to a successful conception. It can also reveal potentially life-threatening disorders in the course of an infertility evaluation.
- Ultrasonography continues to be a fast and effective modality for evaluation of the acutely painful scrotum, scrotal masses and male infertility.
- We recommend routine sonographic evaluation of all infertile male patients by USG scrotum followed by TRUS.

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