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Research Paper

Radiological Findings in Infertile Men in a Fertility Centre in Jos, Nigeria.

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ABSTRACT:*Infertility is a great psychological burden to the infertile couple. Scrotal ultrasonography and colour Doppler imaging of the scrotum are useful adjuncts to clinical examination in assessing intratesticular and extratesticular abnormalities.*
Methodology:*All men who presented with infertility were evaluated. These included comprehensive history, physical examination and investigation, in this case seminal fluid analysis and scrotal ultrasonography.*
Results:*This was prospective study carried out at the Jos University Teaching Hospital and a fertility centre in Jos from 2012 to 2017. A total of 67 men were involved in this study. The mean age was 39.39yrs. Age range was 28 to 59yrs. Sixty three (N=63) of the men had abnormal semen parameters representing 94.03% while four men (N=4) had normal semen parameters. Thirty eight patients representing 56.72% had azoospermia while 5.97% had normozoospermia following seminal fluid analysis. The mean volume of the right testis was 11.93ml. The range was 2.9ml to 25ml. The mean volume of the left testis was 11.76ml. The range was 2.9ml to 22ml. Overall mean testicular volume was 11.85ml. Forty two men (N=42) had abnormalities on scrotal ultrasound representing 62.69%. Abnormalities on ultrasonographyinclude varicocele33%, cryptorchidism31%, hydrocele 17%, testicularmicrolithiasis7%, multiple complex testicular cyst5%, epididymal cyst5% and echogenic testis2%.*
Conclusion:*Scrotal ultrasonography is important in the assessment of testicular volume and abnormalities such as varicocele, cryptorchidism and hydrocele which affects male fertility.*
Keywords:*Scrotal Ultrasonography, Testicular Volume, Intra and Extratesticular abnormalities.*

I. INTRODUCTION.

Infertility is a great psychological burden to the infertile couple. In this part of the world it is associated with stigmatization, family dysfunction and tension. Approximately fifteen per cent of couples are infertile, rendering nearly one of six childless [1].In the so called "African Infertility Belt," which stretches from east to west, across central Africa from Gabon to the United Republic of Tanzania,male factor infertility accounted for 43% of the problem [2].In Nigeria male factor plays a role in approximately 40 to 50% of infertility cases [3,4]. Proper assessment of the male partner is important in deciphering contributory factors especially scrotal pathologies. Ultrasonographyand colour Doppler imaging of the scrotum are useful adjuncts to clinical examination in assessing intratesticular and extratesticular abnormalities such as varicocele, hydrocele, testicular microlithiasis, tumors, epididymal cyst and cryptorchidism [5,6].The aim of the study is to determinecommon pathological conditions in infertile men during radiological assessment of the scrotum using ultrasonography as well as testicular volume.

II. METHODOLOGY.

All men who presented with infertility were evaluated. These included comprehensive history, physical examination and investigation, in this case seminal fluid analysis and scrotal ultrasonography. History consisted of duration of infertility, sexual pattern and coital frequency, fertility and reproductive history of the family, alcohol consumption, smoking and ingestion of recreational drugs. Occupational hazards, exposure to radiation,

past medical history of viral infection like mumps and sexually transmitted diseases (STD). Past surgical history like herniorrhaphy, orchidopexy and retroperitoneal dissection were ascertainedandtreatment had so far for infertility.

Systemic examinationconsisted of general examination, hair distribution, genitalia and digital rectal examination. Seminal fluid analysis was done using the WHO criteria. Scrotal ultrasound examination was performed using Siemens Sienna ultrasound machine fitted with 9.0MHz linear transducer by the researcher after obtaining an informed consent.Patient was placed in supine position and exposed to the mid-thigh. The scrotum was supported by a towel placed between the thighs and the penile shaft is positioned over the suprapubic region and draped. An ultrasound gel is applied on the scrotum and B-mode scans done for each hemi-scrotum in the transverse and longitudinal planes. Each scrotal sac was examined to measure the testicular volume, intra-testicular and extra-testicular pathologies. A Valsalva manoeuvrewas done and the necessary readings were taken. A Doppler interrogation with or without Valsalva manoeuvre was also done to assess flow of blood. The testicular volume measurement was obtained by measuring the testicular length, width and height using electronic callipers. The measurement was done three times and the averagevalues taken to determine testicular volumes. The scrotal sac was further examined to detect other scrotal abnormalities such as Varicocele, hydrocele, epididymitis, epididymal cyst, Microlithiasis, and testicular tumors.

Varicocele was diagnosed when: (1) the largest pampiniform plexus vein measured more than 2 mm in diameter in supine position. (2) More than 1 mm increase in size of the largest vein during Valsalva on gray-scale examination. (3) more than 2-s retrograde flow during Valsalva manoeuvre on spectral. A combination of 1 and 2 above or 1 and 3 above was regarded as diagnostic of varicocele.The criterion for a thickened epididymis is a mean diameter of more than 12 mm in cross-section at the level of the caput while epididymal cyst were diagnosed by the presence of hypoechoic and circumscribed lesion with good transmission and posterior wall enhancement. The presence of echo-free (or faintly echoic) collection of fluid in the tunica vaginalis (or surrounding the testis) is diagnosed as hydrocele.The presence of multiple, diffuse, shadowing or non-shadowing hyper-echoic foci is diagnosed as microlithiasis.A suspicion of testicular tumor is defined as the presence of focal hypoechoic lesion within the normally homogenous testis.

III. Results

This was prospective study carried out at the Jos University Teaching Hospital and a fertility centre in Jos from 2012 to 2017. A total of 67 men were involved in this study. The mean age was39.39yrs. Agerange was 28 to 59yrs.Sixty three (N=63) of the men had abnormal semen parameters representing 94.03% while four men (N=4) had normal semen parameters.Thirty eight patients representing 56.72% had azoospermia while 5.97% had normozoospermia following seminal fluid analysis. Figure 1 shows the distribution of findings on seminal fluid analysis.

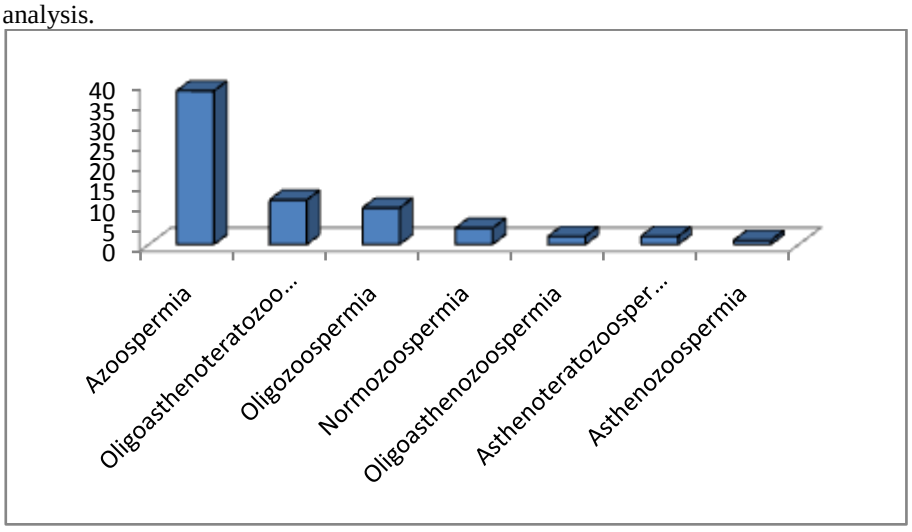

Figure 1: Semen parameters on seminal fluid analysis

The mean volume of the right testis was 11.93ml. The range was 2.9ml to 25ml.
The mean volume of the left testis was 11.76ml. The range was 2.9ml to 22ml.
Overall mean testicular volume was 11.85ml.
Forty two men (N=42) had abnormalities on scrotal ultrasound representing 62.69%.

Table 1: showing abnormalities on scrotal ultrasonography.

Varicocele	14	33%
Cryptorchidism	13	31%
Hydrocele	7	17%
Testicular microlithiasis	3	7%
Multiple complex testicular cyst	2	5%
Epididymal cyst	2	5%
Echogenic Testis	1	2%

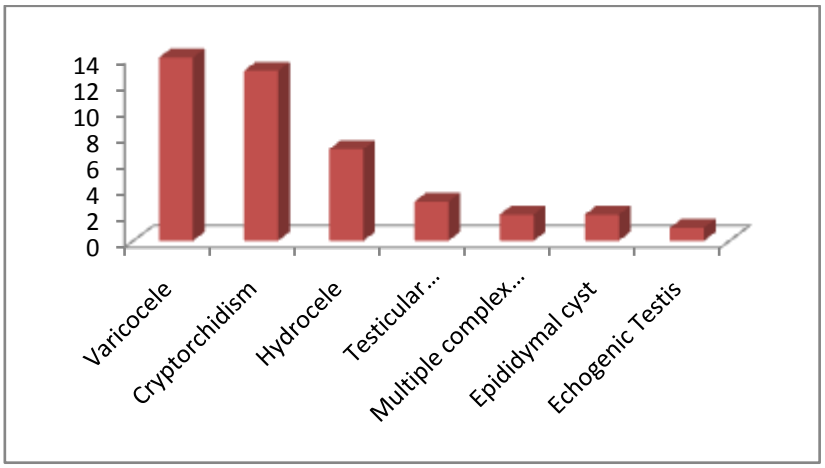

Figure 2: Scrotal abnormalities on scrotal ultrasound.

IV. DISCUSSION.

Globally infertility has become a major concern among health care providers. Europe and Africa are the worst hit especially as it concerns male factor infertility [2].The decreasing human semen parameters in terms of sperm count, morphology and motility in recent times pose a lot of questions. The biological significance of these changes isemphasised by a concomitant increase in the incidence of genitourinary abnormalities such as testicular cancer and possibly also cryptorchidism,varicocele and hypospadias, suggesting a growing impact of factors with serious effects on male gonadal function [7,8].

Scrotal ultrasonography is able to detect 38-65% of abnormalities in infertile men, of which about 60-70% were not clinically apparent on physical examination [9,10]. In our study, forty two men (N=42) had abnormalities on scrotal ultrasound representing 62.69%. Hassan et al [6] in his series recorded one hundred and thirty three of 156 (85.3%) patients with abnormal findings at scrotal ultrasonography. Scrotal ultrasound is invaluable in the evaluation of the infertile male as it provides information regarding possible causes, associated scrotal conditions that might impact negatively on fertility.

In this study the mean age was 39.39yrs with a range of 28 to 59yrs. Age is a significant factor affecting fertility. It has been shown that men less than thirty years are more fertile than older men and fertility starts to drop from age forty [11]. Achieving pregnancy becomes difficult as men age. Semen parameters are affected by age. Sperm morphology seems to decrease with age, with a decline in normal sperm morphology of 0.2% to 0.9% per year of age while motility decreases by of 0.17% to 0.6% per year of age [8,12]. However, the effect of aging on sperm concentration remains inconsistent, some studies show decrease others have shown increase, while other data report no change in sperm concentration up to age fifty [8,13,14].

Testicular volume is a surrogate marker of spermatogenesis [15]. Seminiferous tubules and germinal elements comprise approximately 98% of testicular mass and testes smaller than 14ml are associated with impaired sperm quantity and quality [16]. The mean testicular volume in this study was 11.95ml. This is similar to the findings by other investigators. Sakamoto et al [17]measured the volumes of 938 testes from 469 infertile males and found that 68.5% of testes were smaller than 15 ml. Bujan et al[18] assessed testicular volume in 1029 infertile men, 71 patients had unilateral and 213 had bilateral testicular hypotrophy; 4 had unilateral and 37 had bilateral atrophy. Sperm count and motility decreased in accordance with testicular volume. The lowest mean sperm counts and lowest mean motility percentages were found in patients with bilateral testicular atrophy. In a study conducted among infertile Japanese men Arai et al [19]noted that men with a testicular volume of less than 10ml were azoospermic, while volumes of less than 20ml were associated with severe oligozoospermia. Hence the measurement of testicular volume can be helpful for rapidly assessing fertility.

Testicular and extratesticular abnormalities found on scrotal ultrasonography in this study were, varicocele 33%, cryptorchidism 31%, hydrocele 17%, epididymal cyst 5%, multiple complex testicular cyst 5%,

testicular microlithiasis 7% and echogenic testis 2%. Varicocele is the commonest abnormality recorded. Pierik et al[9]in his series recorded varicocele in 29.7%, testicular cyst in 0.7%, testicular microlithiasis in 0.9%, epididymal cyst in 7.6%, hydrocele in 3.2% and testicular tumor was found in 0.5% of the cases.Similar findings have been made by other authors [6, 20 , 21], this underscores the invaluable contribution of ultrasonography in male factor infertility assessment.While the impact of some of these abnormalities on male fertility is known, the role of others remains largely unknown.

Varicocele is a pathological dilatation of the pampiniform plexus. It is demonstrable in 19-41% of infertile men [22]. Varicoceles produce a gradual loss of normal spermatogenesis over time due to raised intratesticular temperature with progressive germ cell injury, increased intratesticular pressure, hypoxia due to attenuation of blood flow, reflux of toxic metabolites from the adrenal glands and hormonal profile abnormalities [23,24,25]. There is associated oxidative stress which impairs fertility [26]. Total sperm count, sperm motility, and fast direct forward motility and direct forward motility were significantly lower in men with varicoceles, and the immotile sperm count was significantly higher. All these, impact negatively on fertility [27].

Cryptorchidism or undescended testis is a developmental defect in which the testis fails to descend completely into the scrotum. The prevalence of cryptorchidism in full-term newborns ranges between 1% and 3%, while in premature boys it is reported to be as high as 30% [28].Histologic hallmark between one and two years in the cryptochid testis include decreased numbers of Leydig cells, degeneration of Sertoli cells, delayed disappearance of gonocytes, delayed appearance of adult dark (Ad) spermatogonia, failure of primary spermatocytes to develop and reduced total germ cell counts [29,30]. There may be complete dysjunction of the epididymis, the epididymis may be absent, elongation or fused. Men with bilateral undescended testes have a 6-fold greater risk of being infertile when compared with unilaterally undescended testis and the general population [31]. The incidence of azoospermia in men with unilateral undescended testes is 13% irrespective of the fate of the testis. 98% will develop azoospermia in untreated bilateral undescended testes.However, the risk of azoospermia decreases to 32% among patients treated medically and 46% in men who underwent orchidopexy during childhood [32,33].

Dandapat et al [34] studied one hundred and twenty cases of hydrocele of the tunica vaginalis. He noted that therewas partial arrest of spermatogenesis in 10 per cent and total arrest of spermatogenesis in 8 per cent of cases. Srinath et al [35] described the adverse effect of vaginal hydrocele on male fertility.

Testicular microlithiasis is identified on scrotal ultrasound as speckled pattern with multiple small bright echoes generated by intratubular calcification. It is associated with germ cell neoplasm, cryptorchidism, testicular atrophy and infertility [36,37]. Its role in infertility remains unclear. Abnormal semen parameters have been noted by some authors while others have reported no effect at all [38,39,40].

Epididymal cysts are frequently observed during scrotal ultrasonography, there is no evidence to suggest thattheir presence is associated with infertility [41].

Intratesticular cysts, once thought to be a rarity, are now being reported with an increasing prevalence as a result of the wider use of scrotal ultrasonography [42]. There is paucity of literature on its effect on male factor infertility.

V. CONCLUSION

Globally, male factor infertility is a significant contributor to infertility. Testicular and extratesticular abnormalities such as reduced testicular volume, varicocele, cryptorchidism and hydrocele play a role in gonadal dysfunction. Scrotal ultrasonography serves as an adjunct in the assessment of the infertile male, as it provides rapid detection and diagnosis of scrotal abnormalities.

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