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Role of trans rectal and scrotal ultrasonography with color Doppler for evaluation of male infertility with low semen volume

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ABSTRACT

Background: About 15% of couple worldwide suffering from infertility. The testicular ultrasound with color Doppler and transrectal (TRUS) good diagnostic tool in evaluation of infertile males with hypo spermia and obstructive azoospermia.
Aim of The Work: to evaluate role of trans rectal ultrasonography and scrotal ultrasonography with color Doppler in infertility diagnosing in men with low semen volume.
Patients and Methods: This study included 120 infertile male patients with azoospermia or hypo spermia, the age of the patients in this study ranged from 17 years to 63 years. All patients were subjected to clinical examination, laboratory investigation and radiological examination including (TRUS, scrotal ultrasound associated with color duplex).
Results: According to TRUS and scrotal ultrasonograpy with color Doppler findings, 7.5 % of the 120 patients evaluated were normal, where as 92.5 % of the patients had abnormal findings. 9.9% of patients had hypoplastic seminal vesicles, while 24.3% had dilated seminal vesicles, (21.6% of them associated with dilated and ejaculatory duct). Congenital bilateral absent vas 1.8%, while congenital unilateral missing vas affected 0.9 %. Prostatic midline cyst was found in 5.4%, and prostatic calcification was found in the same percentage. In 32.4% with left side varicocele , and 17.1% with bilateral varicocele, while 3.6% of cases are left testicular atrophy and 1.8% bilateral testicular atrophy.
Conclusion: Transrectal and scrotal ultrasonography with color Doppler found to be effective diagnostic method in evaluation of infertility with low seminal volume.

Keywords: *Trans rectal ; infertility ; Azospermia ; Hypospermia; scrotal.*

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INTRODUCTION

Infertility can be defined as a couple's inability to have children after 12 months of regular intercourse without the use of contraception in women below age of 35[1,2] , The hormonal assessment (including follicle stimulating hormone , luteinizing hormone , and testosterone) is more prevalent in conditions of dysfunctional semen parameters[3]. , Men with obstructive azoospermia also have a higher rate of chromosomal abnormalities[4] . Ultrasonography is a valuable tool for determining intra scrotal disorders, and it can detect a varicocele in nearly 30% of infertile males. Testicular tumours are present in about 0.5 percent of subfertile boys, and testicular microcalcifications are found in about 2–5%. TRUS is the corner stone in diagnoses of ejaculatory ducts disorders in men who have a minimal amount of ejaculate (less than 1.5 ml) [5].Transrectal ultrasonography is becoming increasingly used in the imaging of male infertility since it is non-invasive, affordable, and known to urologists. TRUS play useful role in diagnoses of azoospermia, especially when that associated with decreased seminal fluid volume. It is now considered as a more sensitive tool in diagnoses of ejaculatory duct obstruction, Seminal vesicles abnormalities, Vas deferens abnormalities, and prostatic abnormalities[7,8]. Scrotal ultrasonography considered as excellent toolin testicular as well as epididymal assessment and varicoceles diagnoses[6] .

The goal of such study to see how trans rectal ultrasonography and scrotal ultrasonography with color Doppler affect in diagnosing infertility in men with low semen volume.

PATIENTS AND METHODS

Our study included 120 infertile male with azoospermia or severe oligospermia (count <5 mill/ml) with low semen volume (<1.5 ml),. The age of the patients in this study ranged from 17 years to 63 years with mean age 30.5 ± 7.8 years. An informed consent was obtained from all patients , all patients were subjected to Physical examination including genital and digital rectal examination , Laboratory tests the including (semen analysis , Alpha-glucosidase level in seminal fluid (when indicated if epididymal obstruction is suspected),

post ejaculate urine analysis to exclude retrograde ejaculation, and hormonal assessment and radiological investigations including (TRUS, scrotal ultrasound associated with color Doppler).

As regard to TRUS technique, the tip of the probe was lubricated with lubricant gel, the examination was then performed with the patient in the left lateral decubitus position. The prostate and seminal vesicles were first examined in the transverse plane starting superior to the gland at the seminal vesicles and showing the bladder and then the probe was withdrawn in a caudal direction manually, until the apex of the prostate was reached.The proper technique for visualization of vas deference and ejaculatory duct is transverse and saggittal views.

As regard to scrotal ultrasonography with color Doppler technique , the scanner combines a real time B-mode imaging system with pulsed wave Doppler facility together with availability of color coding and power Doppler capability. The scrotum is supported by folded sheet placed beneath it with the patients' leg together with the penis resting on the lower abdomen. The scrotal contents are best examined with a high frequency (12 MHz) high resolution linear transducer, the patient examined on rest and during valsalva maneuver.

Statistical analysis:- Statistical Package for the Social Sciences (SPSS) , is the program used for entry and analysis of the data and then assessment of negative and positive predictive values and compared ($P<0.05$ is significant)

RESULTS

This study included 120 infertile male patients with azoospermia or severe oligospermia (count <5 mill/ml) with low volume ejaculate (count <1.5 ml) The age of the patients in this study ranged from 17 years to 63 years with mean age 30.5 ± 7.8 years. According to residence, the patients distributed as 65% in rural area and 35% in urban area.

The duration of infertility in this study ranged from 1 year to 22 years with mean duration 3.55 ± 2.3 years. The type of infertility was primary in 93.3% of patients and secondary in 6.7% of patients. Family history was positive in 65.8% of patients. According to symptoms associated with infertility, ED was found in 10% of patients and testicular pain was found in 26.7% of patients. 9.2% of patients had surgical history while 19.2 of patients had medical history, Table (1) .

Total Testosterone of the studied patients ranged from 273 ng/ml to 834ng/ml with mean 565.91 ± 129.25ng/ml, FSH ranged from 3 mIU/ml to 18 mIU/ml with mean 9.24 ± 6.59 mIU/ml, LH ranged from 1.9 mIU/ml to 11 mIU/ml with mean 7.3 ± 7.31 mIU/ml, and PRL of the studied patients ranged from 3.8 ng/ml to 16.2 ng/ml with mean 11.68 ± 9.42 ng/ml. Table (2)

There were 49 patients had oligospermia with azoospermia accounted for 40.8% from the total studied patients, and 71 patients had oligospermia without azoospermia accounted for 59.2% from the total studied patients Table (3) .

According to TRUS and scrotal ultrasound with color Doppler findings, about 7.5% of patients were normal and 92.5% of patients had abnormal findings.Table (4)

With reference to abnormal TRUS and scrotal ultrasound with color Doppler findings (Table 5), we found 9.9% of patients had hypoplastic seminal vesicle (fig.1), 24.3% had dilated seminal vesicle, (21.6% of them associated with dilated and ejaculatory duct) (fig.2 and 3) . About 1.8% of patients had congenital bilateral absent vas (fig 2), and 0.9% had congenital unilateral absent vas. 5.4% of patients had prostatic midline cyst (fig 4) , and the same percentage of patients had prostatic calcification (fig 5). Also, we found left sided varicocele in 32.4% of patients and bilateral varicocele in 17.1% of patients (fig.6) and 3.6% with atrophic left testis but 1.8 % (fig 7) with bilateral atrophic testes (fig 8).

There is significant relation between patients' age and finding of semen analysis (p-value < 0.05) but, there is no significant relation between patients' residence and finding of semen analysis (p-value > 0.05). Table (6)

There is no significant relation between infertility history and finding of semen analysis (p-value > 0.05). Table (7)

There is no significant relation between hormonal profile and finding of semen analysis (p-value > 0.05) Table (8)

There is significant relation between TRUS and scrotal ultrasound with color Doppler findings and finding of semen analysis (p-value < 0.05) Table (9)

Duration of infertility (Years):	
(Range) Mean ± SD	(1-12) 3.55 ± 2.3
Types of infertility: n (%)	
Primary	112 (93.3)
Scondery	8 (6.7)
Family history: n (%)	
Positive	79 (65.8)
Negative	41 (34.2)
Associated symptoms: n (%)	
ED	12 (10)
Testicular pain	32 (26.7)
Negative	76 (63.3)
Past history: n (%)	
Surgical	11 (9.2)
Medical	23 (19.2))
Negative	86 (71.6)

Table (1) Infertility history of the studied patients.

Hormonal profile: (Range) Mean ± SD	
Total T. (ng/ml)	(273-834) 565.91 ± 129.25
FSH (mIU/ml)	(3-18) 9.24 ± 6.59
LH (mIU/ml)	(1.9-11) 7.3 ± 7.31
PRL (ng/ml)	(3.8-16.2) 11.68 ± 9.42

Table (2) :Hormonal profile of the studied patients

Finding of semen analysis: n (%)	
Oligospermia with azoospermia	49 (40.8)
Oligospermia without azoospermia	71 (59.2)

Table (3): Finding of semen analysis of the studied patients.

TRUS finding: n (%)	
Normal findings	9 (7.5)
Abnormal findings	111 (92.5)

Table (4): TRUS finding of the studied patients.

Seminal vesicle: n (%)	
Hypoplastic	11 (9.9)
Dilated	27 (24.3)
Ejaculatory duct: n (%)	
Dilated	24 (21.6)
Congenital absent vas: n (%)	
Bilateral	2 (1.8)
Unilateral	1 (0.9)
Prostate: n (%)	
Midline cyst	6 (5.4)
Calcification	6 (5.4)
Varicocele: n (%)	
Left sided	36 (32.4)
Bilateral	19 (17.1)
Atrophic testis: n (%)	
Left sided	4 (3.6)
Bilateral	2 (1.8)

Table (5): Abnormal TRUS and scrotal duplex finding of the studied patients (n=111).

	Oligospermia with azoospermia (49)	**Oligospermia without azoospermia (71)**	**p-value**
Age (Years):			
(Range) Mean ± SD	(20-63) 31.44 ± 8.7	(17-55) 28.54 ± 7.8	0.044*
Residence: n (%)			
Rural (78)	31 (63.2)	47 (66.2)	0.087
Urban (42)	18 (36.7)	24 (33.8)	0.087

Table (6): Relation between patients' demographic characteristics and Finding of semen analysis.

	Oligospermia with azoospermia (49)	**Oligospermia without azoospermia (71)**	**p-value**
Duration (Years):			
(Range) Mean ± SD	(2-22) 9.55 ± 6.3	(1-21) 9.54 ± 6.8	0.143
Types of infertility: n (%)			
Primary (112)	46 (93.9)	66 (92.9)	0.422
Secondary (8)	3 (6.1)	5 (7.1)	0.422
Family history: n (%)			
Positive (79)	29 (59.2)	50 (70.5)	0.053
Negative (41)	20 (40.8)	21 (29.5)	0.053
Associated symptoms: n (%)			
ED (12)	5 (10.2)	7 (9.8)	0.387
Testicular pain (32)	13 (26.5)	19 (26.7)	0.387
Negative (76)	31 (63.2)	45 (63.4)	0.387
Past history: n (%)			
Surgical (11)	4 (8.1)	7 (9.8)	0.414
Medical (23)	10 (20.4)	13 (18.3)	0.414
Negative (86)	35 (71.4)	51 (71.8)	0.414

Table (7): Relation between infertility history and Finding of semen analysis.

	Oligospermia with azoospermia (49)	Oligospermia without azoospermia (71)	p-value
Hormonal profile: (Range) Mean ± SD			
Total T. (ng/ml)	589.82 ± 123.21	522.71 ± 124.35	
FSH (mIU/ml)	9.18 ± 6.31	9.76 ± 6.23	0.422
LH (mIU/ml)	8.1 ± 7.11	7.1 ± 7.44	
PRL (ng/ml)	10.98 ± 9.12	11.23 ± 9.33	

Table (8): Relation between hormonal profile and Finding of semen analysis.

	Oligospermia with azoospermia (49)	Oligospermia without azoospermia (71)	p-value
TRUS finding: n (%)			
Normal findings (9)	0 (0)	9 (12.7)	0.001*
Abnormal findings (111)	49 (100)	62 (87.3)	0.001*

Table (9) :Relation between TRUS and scrotal ultrasound with color Doppler finding and Finding of semen analysis

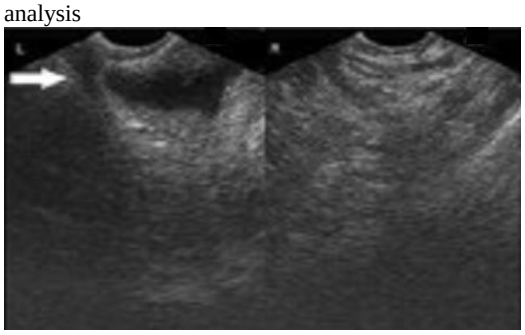


Fig. 1: A male patient, 28 years old, presented with 1ry infertility 4 years ago, with low semen volume, and normal hormonal profile. TRUS finding is hypoplastic seminal viscles

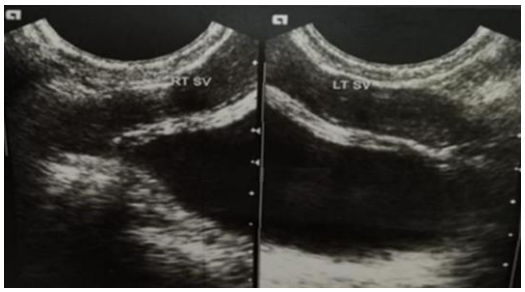


Fig. 2: A male patient, 26 years old, presented with 2ry infertility 2.5 years ago, with low semen volume, and normal hormonal profile. TRUS finding is congenital absence vas deference and dilated seminal viscles

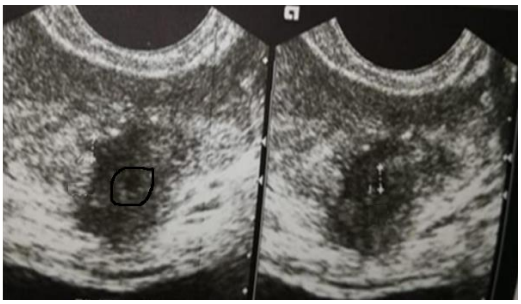


Fig. 3: A male patient, 44 years old, presented with 2ry infertility 4 years ago, with low semen volume, and normal hormonal profile. TRUS finding ejaculatory duct dilatation .

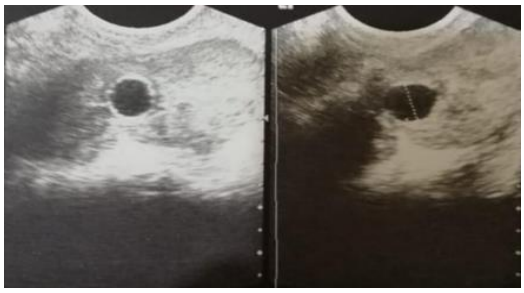


Fig. 4 : A male patient, 26 years old, presented with 2ry infertility 2.5 years ago, with low semen volume, and normal hormonal profile. TRUS finding is mid line simple prostatic cyst

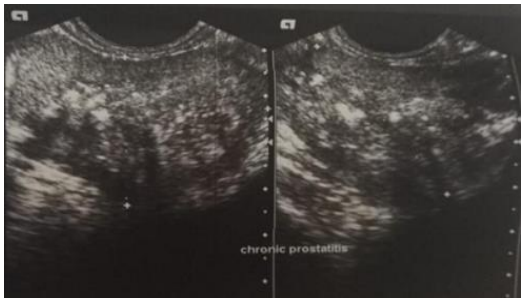
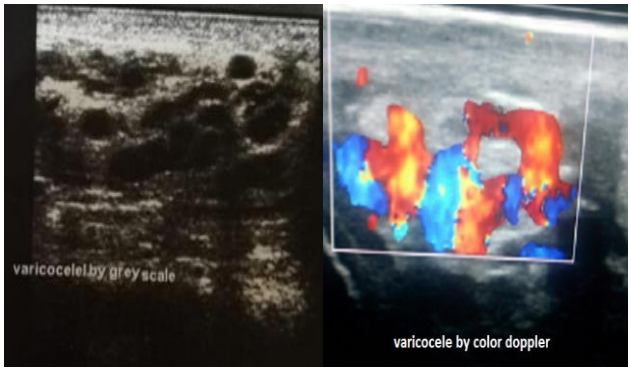


Fig. 5: A male patient, 57 years old, presented with 1ry infertility 11 years ago, with low semen volume, azospermia and normal hormonal profile. TRUS finding is chronic prostatitis and calcification



A **B**

Fig. 6 : A male patient, 29 years old, presented with 1ry infertility 6 years ago, with low semen volume, and normal hormonal profile. Scrotal ultrasound with color duplex finding is refluxing varicocele , by gray scale mode (A), color Doppler mode (B).

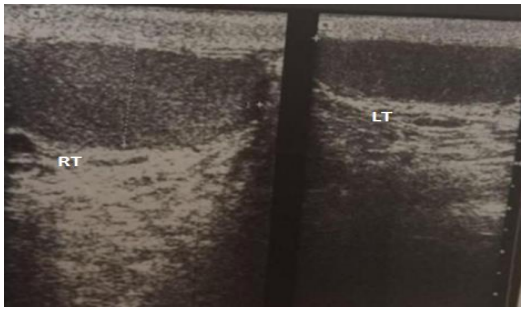


Fig. 7 : A male patient, 24 years old, presented with 1ry infertility 2 year ago, with low semen volume and normal hormonal profile. Scrotal ultrasound finding is atrophic left testis .

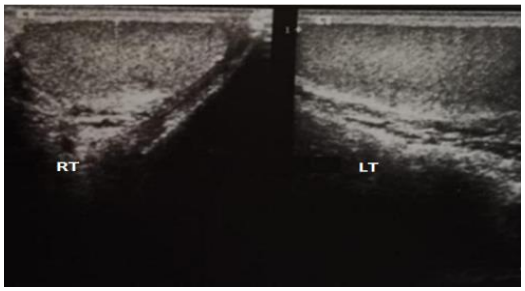


Fig. 8: A male patient, 22 years old, presented with 1ry infertility 1.5 year ago, with low semen volume and normal hormonal profile. Scrotal ultrasound finding is atrophic both testes .

DISCUSSION

Infertility has become the common trouble in the andrologist'sclinic , where there is about 8% of male in reproductive age seek medical advice for infertility problems.9. Infertile men with a reduced ejaculate volume have either ejaculatory dysfunction, congenital anomalies of the accessory sex organs or ejaculatory duct obstruction10, Ultrasound imaging and color duplex ultrasound are non invasive technique , they considered as risk free examination playing a crucial role in the diagnosis of men with low seminal volume[11,12] .

The patients in our study were 30.5 years old on average. Punab et al., (2017) reported a mean age of 33.2 years for their patients[13]. Also, Al-Turki, (2015) reported that, the mean age of their patients was 33.8 years[14]. Raviv et al., (2006) reported that, the mean age of their patients was 29 years[15]. In this study, the patients distributed as 65% in rural area and 35% in urban area. Sherrod, (2004) reported the same results. It can be explained by, the access to reproductive health care specifically for infertility can be very limited in rural areas .The mostly primary care physicians in rural areas are more likely to be without the knowledge and skills to assist the couple[16] .

In our study, the mean duration of infertility was 3.55 years. Punab et al., (2017) reported the same results. Also, Al-Turki, (2015) reported that, the mean duration of infertility was 3.76 years14. Primary infertility was dominant and positive in 93.3% of patients in our study. Al-Turki, (2015) reported that, high prevalence of primary infertility versus secondary infertility and it was positive in 80.5% of patients[14]. Family history was positive in 65.8% of patients in our study group. Meschede et al., (2000), reported the same results. Family history of infertility may be a mirror of underlying genetic cause[17]

Our results of the hormonal profile, including testosterone, FSH, and luteinizing hormone, and prolactin were in normal ranges. Raviv et al., (2006) reported the same results. Prevalences of azoospermia with oligozoospermia was 40.8% in our studied patients. This results agree with the results of Mehta et al., (2006), who reported that, the prevalence of azoospermia was 38.3% in their study group. With reference to abnormal TRUS findings, we found that, 9.9% of patients had hypoplastic seminal vesicle, 24.3% had dilated seminal vesicle. [18] .

Our results agree with the results of Yalcin and Yildirim, 2004. They studied 50 patients and found seminal vesicles dilatation in 24% patients and seminal vesicle hypoplasia, aplasia or atrophy in 9.4% patients and these findings were bilateral[19] , Abdulwahed et al., (2013), reported that, 4.2% of patients had hypoplastic seminal vesicle, and 1.8% had dilated seminal vesicle[20]. Also Worischeck and Parra, 1993 studied 25 infertile male patients using TRUS and found seminal vesicle dilatation in 3 and seminal vesicle aplasia in 2 patients 21 and these results are comparable with our results where in our study, we found that, 1.8% of patients had bilateral absent vas and 0.9% had unilateral absent vas, This results agree with the results of Abdulwahed et al., (2013).

In our study, the cause of ejaculatory duct obstruction was midline cyst in 5.4% cases and calcification in 5.4% cases. This results agree with the results of Worischeck and Parra (1993), who reported the cause ofejaculatory duct obstruction was ductal calculi in 5% of cases, midline cyst in 5% of cases[21]. However, Abdulwahed et al., (2013), reported that, 1.8% of patients had midline, and 1.8% had ductal calculi [20] and these results are comparable with our results. Varicocele was the most frequent finding and was noted in 54% of our patients. These varicocele were generally on the Lt side in 36% of patients and bilateral in 18.9% of patients. Our results agree with the results of Alsaikhan et al., (2016) as varicocele was the most common prevalent lesion. Varicocele prevalence was 50% and it was prevalent on the left side in 33% of patients and bilateral in 12% of patients[21].

In this study, there is significant relation between patients' age and finding of semen analysis as patients with low semen volume and azoospermia had older age than patients with low semen volume without azoospermia. This agree with the results of Kumar et al., (2017). There is no significant relation between infertility history and finding of semen analysis in our study. This goes in agree with (Roberts and Jarvi, 2009). In our study, there is no significant relation between infertility history and finding of semen analysis. This goes in agree with (Raviv et al., 2006). In this study, there is significant relation between TRUS finding and finding of semen analysis as patients with low semen volume and azoospermia had higher incidence of abnormal

finding than patients with low semen volume without azoospermia. This agree with the results of (Ozgök et al., 2011).

CONCLUSION

ultrasonography are the most useful tools for identification of pathology related to male infertility.

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