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The effect of open varicocelectomy on sperm parameters and pregnancy rates in infertile males with a varicocele

Ahmed O Abdlgadir[1*], **Malek S Ibrahim**[1], **Ashraf E Saad**[2], **Jecelyn K Refuerzo**[3]

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Authors' Affiliation:
[1]General Surgery Departments, Urology Unit, Armed Forces hospital, Wadi Aldawasir, Kingdom of Saudi Arabia (KSA)
[2]Preventive Medicine Department, Armed Forced Hospital, Wadi Aldawasir, KSA
[3]Outpatient Department, Armed Forced Hospital, Wadi Aldawasir, KSA

[*]**Corresponding author**
Urology Unit, General Surgery Departments, Armed Forces Hospital, Wadi Aldawasir, Wadi Aldawasir, Kingdom of Saudi Arabia; Email: cor.ahmed@gmail.com

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ABSTRACT

Background: Varicocele is a most common treatable cause of male with infertility. *Objective:* Aiming of the study is to evaluate and compare the sperms parameters and spontaneous pregnancy rate of patients with clinical varicocele and infertility (primary or secondary) at three to six months after varicocelectomy. *Materials and Methods*: in a retrospective study we evaluated the semen parameters of 34 male patients present with clinical varicocele and infertility, which underwent sub or inguinal varicocelectomy, and then compared the semen parameters (concentration & motility) with spontaneous pregnancy of their partner preoperatively, and at three to six months postoperative. *Results*: from (34) patients in this study, at a mean age of 29 years in a range: (25.0 – 33.0) years underwent the varicocelectomy, there is an increasing in semen parameters results at the third to sixth months' post-operative, The tested variations of the semen parameters result at the third to sixth month, conclude that there is a significant increasing in the sperm count and motility at six months ($p \leq 0.05$). *Conclusion:* the varicocelectomy is increased the success rate of percentage of the spontaneous pregnancy as also as live birth rates in infertile patient regardless the semen analysis results, the rate of success in a zoospermic men can be useful to retrieve sperm after varicocelectomy.

Keywords: Reproductive system, Urology, Fertility program, Pregnancy rate, Varicocele

1. INTRODUCTION

Infertility defined as a condition in which the couples are unable to conceive after the 1 year of regular sexual intercourse with unprotected sex (Minhas et al., 2021). The Varicocele is considered one of most common treatable cause of male with infertility (Hassanin et al., 2018); it affects 8–12% of reproductive-aged couples worldwide, Approximately 19-41% of the patients presenting

with primary infertility are diagnosed with varicocele (Leslie & Siref, 2018; Lomboy & Coward, 2016); in spite of semen parameter have been showed to improve after surgery, many fertility specialists want to learn the time which is best for improving the semen parameter after varicocele surgery (Al Bakri et al., 2012); in spite of this, some studies have showed that there are increasing in semen parameter, especially in patient with oligospermia after varicocelectomy (Masterson et al., 2019).

There are many theories describing the negative effects of varicocele on testes and spermatogenesis, including pressure, oxygen deprivation, toxins, and the possible effect of heat (Turgut, 2020). The standard of surgical treatment for clinical varicoceles is microsurgical varicocelectomy. The management of treatable cause such a varicocelectomy may be able to improve the sperm retrieval success rates (Chiba et al., 2016). Varicocelectomy has believed for a long time to increased semen quality in infertile men's, included those patients with azoospermia (Tian et al., 2018); however, the decisions to recommended varicocele repair prior to sperm retrieval in a fertility programs remain questionable. Extra damaging to the testes can be prevented by varicocele repair, and it leads to a good result in a positive outcome of spermatogenesis and increased Leydig cell functions in a large percentage of men (Turgut, 2020).

2. MATERIALS AND METHODS

This study done in small military hospital, in central Kingdom of Saudi Arabia; focused on men with infertility and varicocele with the pregnancy rate is a main outcome, it was conducted between the period January 2019 and June 2021, we compared a result of semen analysis pre and post varicocelectomy. Normozoospermia was defined based on the criteria of World Health Organization (WHO) at 2010 (Edition, 2010). Medical history was taken from each man who included: (i) age, (ii) couple age, (iii) the period of infertility and (iv) medical illness or drug intake. General and local examinations were performed to assess presence of a varicocele, its grades, and if, whether unilateral or bilateral. Scrotal ultrasound performed to diagnose any varicocele with an ultrasound machine. The intervention in the study was varicocelectomy.

The finding of local physical examinations of the test is as follows; Grade I, varicocele is palpable only when patient is stand and performing the Valsalva maneuver; Grade II varicocele is palpable without the performances of the Valsalva maneuver and Grade III varicocele is a visible over through the scrotal skin (Lomboy & Coward, 2016). Doppler ultrasound of scrotum can determine the vein size which involved in a varicocele, a diameter of 2.5–3 mm is generally considered a varicocele (Belay et al., 2016). Samples were obtained by masturbation after 3 to 4 days of a sexual abstinence. The Pregnancy rate can define as a number of pregnancies that to be found via either spontaneous pregnancy or assisted reproductive technology (ART), but in our study, we work only on spontaneous pregnancy.

The inclusion criteria in this review were studies patient with clinical varicocele and infertility underwent open (inguinal or sub inguinal) varicocelectomy, then we exclude patient has recurrence varicocele from our study. The outcome of the study directed to either one or more from the following: the spontaneous pregnancy rate; and semen parameters improved after varicocelectomy

Statistical analysis of the data

Demographic data such as age, marital status, having new baby and Varicocele grades displayed in tables and graphs as numbers and percent. The Shapiro-Wilk test used to verify a normality of distribution. McNemar used to compute the significance between the different stages. "Statistical Package for Social Sciences" (SPSS) software program for MS©+version-20.0 (Armonk, NY: IBM Corp.) was utilized in computing the data. Results with p-values <0.05 would be considered statistically significant.

3. RESULTS

This study included about 34 adult male patients with a clinical varicocele. The mean age of patient was 29 years (range: (25.0 – 33.0), (table 1 & figure 1); 28(82.4%) married, 6(17.6%) single, (figure 2). The preoperative physical examination revealed grade 2, and 3 varicocele diagnosed in 4 (11.8%) and 30 (88.2%) patients, respectively, (figure 3).

Patients they underwent open sub or inguinal varicocelectomy operation with spinal anesthesia. None of patients had perioperative or postoperative complications related to anesthesia. Left mild Hydrocele not required surgical intervention found in 2 patients. Semen parameter (motility & concentration), fast, progressive motility (A), and slow forward motility (B) values were compared, preoperatively, and at three to six months postoperatively. Statistically significant increasing it observed in sperm parameters postoperatively at third to sixth month when compared to the result before surgery ($p \leq 0.05$). Spontaneous pregnancy was carried out in 9 couples (32.1%) this when we excluded the single 6 patients and increase up to (34.6%) this when we excluded the two-azoospermia patient, (figure 4).

Table 1 Distribution of the studied cases according to demographic data (n = 34)

Demographic data	No. (%)
Age (years)	
<25	8 (23.5%)
25 – 30	13 (38.2%)
>30	13 (38.2%)
Min. – Max.	19.0 – 44.0
Mean ± SD.	29.41 ± 6.13
Median (IQR)	29.0 (25.0 – 33.0)
Marital status	
Married	28 (82.4%)
Single	6 (17.6%)
New baby	
No	25 (73.5%)
Yes	9 (26.5%)
Varicocele	
Grade II	4 (11.8%)
Grade III	30 (88.2%)

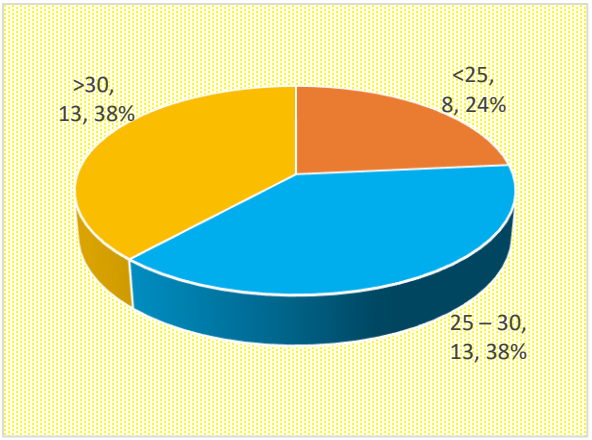

Figure 1 Distribution of the studied cases according to age (years)

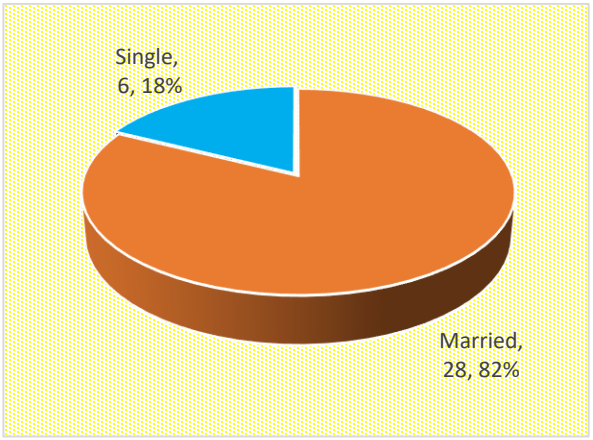

Figure 2 Distribution of the studied cases according to marital status

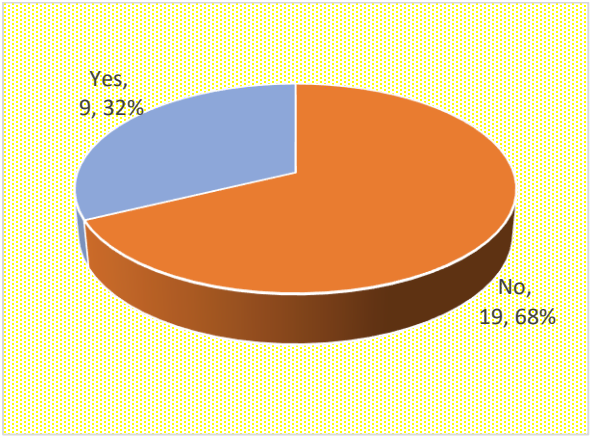

Figure 3 Distribution of the studied cases according to new baby

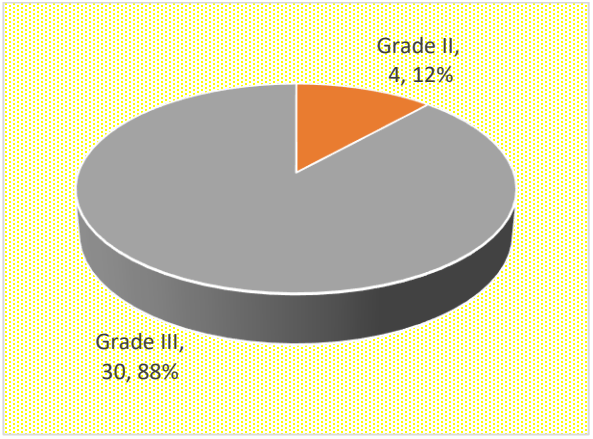

Figure 4 Distribution of the studied cases according to varicocele grade

This meta-analysis study assesses the effects of the open varicocelectomy on the sperm parameter and pregnancy rate in an infertile male with a clinical varicocele and the gynecological history of the female partner are normal. The findings showed, the

numbers of patients which improved their sperm parameter in 6 to 12 months after varicocelectomy, (table 2); they have spontaneous pregnancy to their couples in a rate of ≥ 12 months later, are significantly higher (Statistically significant $p \leq 0.05$). The results from this meta-analysis are consistent with those from previous reports. In a retrospective study in male patient with a varicocele who had been infertile for 1-year, postoperative sperms' concentration was improved in 32.4% and motility improved in 47.1%, (figure 5 & 6).

Table 2 Comparison between pre and post varicocelectomy according to different parameters (n = 34)

	Pre		Post		^{McN}p
	No.	%	No.	%	
Semen concentration					
<15 mill	17	50.0	11	32.4	0.180
>15 mill	17	50.0	23	67.6	
Motility					
Normal	11	32.4	16	47.1	0.302
Abnormal	23	67.6	18	52.9	

McN: McNemar test

p: p value for comparing between Pre and Post surgery

*: Statistically significant at $p \leq 0.05$

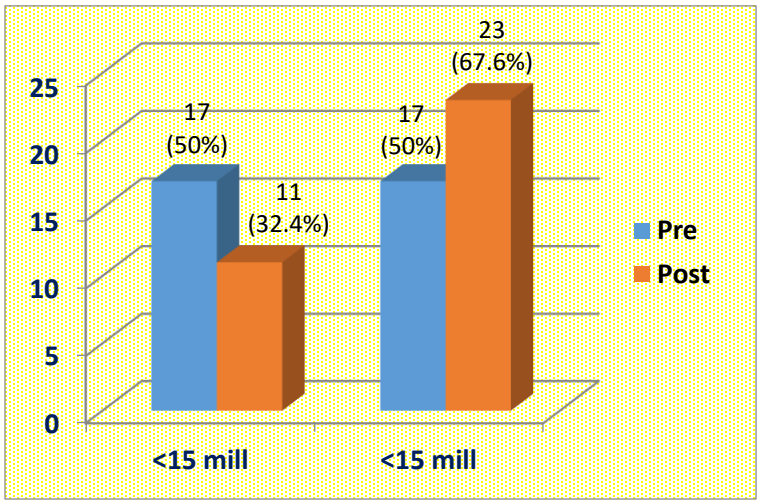

Figure 5 Pre and post varicocelectomy semen concentration

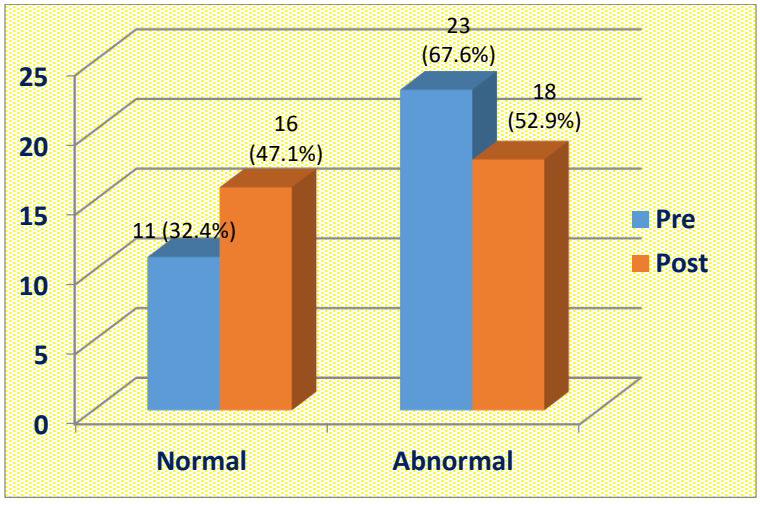

Figure 6 Pre and post varicocelectomy sperms motility

4. DISCUSSION

This study showed that varicocele repair leads to a positive result in all parameters of a fertility program regardless of the semen analysis improvement of patients; some patient they have pregnancy to their partner without significant improvement in semen analysis. The spontaneous pregnancy rate as well as live birth rates are the main points of my study, because they are the actual goal of couples when came to fertility clinics. The Varicocele is associated with an increasing in oxidative stress, and this can lead to DNA fragmentation of the sperm (Kizilkan et al., 2019). The implication of this, it lowers the chances of successful conception and delivery rate (Cho et al., 2016). Similarly, recent study displayed that; sperm DNA fragmentation index (SDF), is reduced after varicocelectomy significantly, along with improving of all sperm parameters. This result suggests a varicocele repair might increase pregnancy rates; through this pathway; and it's important to consider in patient with abnormal SDF (Birowo et al., 2020). However, this study yielded an important result to help clinicians explain to his patients regarding a varicocele repair, because the infertile men's with varicocele who came to the clinics most likely asking about this topic. In addition, in this study we showed that, patient with suboptimal sperm parameter get benefit from the varicocele repair because it increases the chances of the spontaneous pregnancy.

One limitation of this study was a difficulty to contact some patient to get more information. However, the quality of selected observational studies was good.

5. CONCLUSION

The current evidence supports that varicocele repair is increase the pregnancy rate regardless of the prior semen analysis result. This study agrees with other study, the fertility rate after varicocelectomy about 20-30%. Patient did not take any medication after surgery; open inguinal and sub inguinal varicocelectomy has a feasible result like microsurgery varicocelectomy. Most of the patient their wives get pregnant after 8 months to 1 year of pregnancy. The varicocelectomy of single patient are related to other indications.

Author's contributions

Author A.O.A developed the theory, methodology and performed the computations, verified the analytical methods, data display and report review, held ethical approvals, manuscript preparation. Author A.S.I conceived of the presented idea and supervised findings of this work. Author A.E.S shared in setting study concept, results display, manuscript preparation, publication logistics, final manuscript editing. Author J.K.R shared in data collection. All authors review and approved the final manuscript.

Informed consent

Written and oral informed consent was obtained from all patients before the surgery. Additional informed consent was obtained from all patients for whom identifying information is included in this manuscript.

Ethical approval

This study was approved by the Research Ethics Committee of Armed Forces Hospital Wadi Aldawasir (Ethical approval #: 131/2/18-07/03/2022).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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