

Varicocele outcomes among patients with azoospermia and severe oligasthenoteratozoospermia

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Abstract

Background: Varicocele is a reversible cause of male infertility. However, there are conflicting data available concerning the benefit of varicocele repair for patients with nonobstructive azoospermia (NOA) and severe oligasthenoteratozoospermia (OAT).

Objective: To address the benefit of varicolectomy in patients with severe OAT and NOA with regard to their semen parameters and surgical sperm retrieval rate in those who underwent testicular sperm extraction (TESE) or testicular sperm aspiration (TESA).

Materials and Methods: This retrospective cohort study was conducted on a sample of 13 patients diagnosed with NOA and severe OAT who underwent varicolectomy for infertility treatment with no prespecified exclusion criteria.

Results: Thirteen patients were enrolled. Five patients were diagnosed with NOA; eight were diagnosed with severe OAT. For improvements in the semen parameters postoperatively, the semen concentration of all patients was significantly increased compared to the preoperative concentration ($3.59 \pm 10.0.8$ vs. 0.25 ± 0.31 , $P = 0.02$) and the remaining parameters were unchanged. Regarding sperm retrieval, three patients underwent TESE and two patients underwent TESA, in which all had positive results.

Conclusion: Varicocele repair was found to improve the semen parameters in patients with NOA and severe OAT and produced a successful surgical sperm retrieval rate in all patients who underwent TESA or TESE.

Keywords: Azoospermia, oligasthenoteratozoospermia, varicolectomy

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INTRODUCTION

Varicocele is encountered in 15% of the normal adult male population.^[1] The prevalence among adult males with primary infertility is 35% and up to 80% among adult males with secondary infertility.^[1] The benefit of varicolectomy in male infertility remains controversial; not all men who undergo varicolectomy experience an

improvement in their fertility after surgery.^[2] Associated factors have been studied in the literature, and authors have reported higher grade varicoceles, higher baseline sperm concentration, and higher total motile sperm will have marked improvements in their semen parameters and their reproductive outcomes.^[3]

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The data supporting varicocelectomy in men with nonobstructive azoospermia (NOA) and severe oligoasthenoteratozoospermia (OAT) are controversial.^[4,5] Therefore, our aim is to address the benefit of varicocelectomy in patients with NOA and severe OAT with regard to their semen analysis and surgical sperm retrieval rate in those who underwent testicular sperm extraction (TESE) or aspiration.

MATERIALS AND METHODS

This retrospective cohort study was conducted on a sample of 13 patients with NOA and severe OAT who underwent varicocelectomy for infertility treatment between April 2017 and October 2018 at King Abdul Aziz Medical City, King Fahad Hospital National Guard Hospital, Riyadh, Saudi Arabia. The study included all patients diagnosed with NOA and severe OAT who underwent varicocelectomy during the mentioned period with no prespecified exclusion criteria.

We reviewed each patient's file, and baseline demographic characteristics of included patients, as well as their previous medical and surgical history, were collected, including karyotyping (if obtained), female age, and female factor (if present). Baseline semen analysis was done, and follow-up analysis was done after 6 months for comparison. Data regarding testicular sperm aspiration (TESA)/TESE were collected, including: if performed, the number of attempts, and pregnancy status (whether spontaneously achieved or via artificial reproductive technologies [ART]).

Statistical analysis

All the data were retrieved from participants and entered into a standardized Excel sheet. The complete data were then entered into the Statistical Package for the Social Sciences for the analysis. A simple descriptive statistics was used to define the characteristics of the study variables as counts and percentages for the categorical variables and mean (standard deviation) for numerical variables. The significance of differences in preoperative and postoperative semen parameters was assessed using the paired *t*-test or related-samples Wilcoxon signed-rank test. The differences in postoperative and preoperative semen parameters between diagnoses were assessed using the independent samples *t*-test or Mann–Whitney *U*-test. The significance of differences in the categorical variables between groups was assessed using the Fisher's exact test. A significant difference was assumed for $P < 0.05$.

RESULTS

A total of 13 patients that met the inclusion criteria were enrolled in this study. The average age of the patients was

32.9 ± 3.8 years. Five patients (38.5%) were aged between 23 and 30 years, seven patients (53.8%) were aged between 31 and 40 years, and one patient (7.7%) aged between 41 and 50 years.

Regarding patients' history and other comorbidities, two patients (15.4%) were smokers, four patients (30.8%) had a history of other disorders, such as mumps, diabetes mellitus and obesity, one patient (7.7%) underwent a previous varicocelectomy, while the remaining six patients (46.2%) were nonsmokers and free from other comorbidities.

Ten patients (76.9%) were diagnosed with primary infertility and three patients (23.2%) were diagnosed with secondary infertility. Five patients (38.5%) were diagnosed with severe OAT, whereas eight patients (61.5%) were diagnosed with NOA.

Karyotyping was performed in five patients only (38.5%), in which all results were normal karyotyping. The age of the female partner was <35 years for ten patients (76.9%), while the age of the female partner was not known for the remaining three patients (23.1%). Six patients (46.2%) had recognized female factors, six patients (46.2%) had a normal female partner, whereas there was no available documentation about the female factor for the remaining patient (7.7%).

The varicocele was located unilaterally to the left side in nine patients (69.2%), and bilaterally in four patients (30.8%). Regarding the clinical grade in patients with unilateral varicocele, two patients (22.2%) had subclinical, one patient (11.2%) had Grade I, three patients (33.3%) had Grade II, and three patients had Grade III varicocele. In patients with bilateral varicocele, one patient (25%) had bilateral Grade II, one patient (25%) had subclinical, and Grade III and two patients (50%) had Grade III and II varicocele.

The mean ejaculate volume of all patients was not significantly altered postoperatively compared with the preoperative volume (2.92 ± 1.1 vs. 3.05 ± 1.1 , $P = 0.69$). On the other hand, the postoperative semen concentration of all patients was significantly increased compared to the preoperative concentration (3.59 ± 10.08 vs. 0.25 ± 0.31 , $P = 0.02$). In addition, all patients with NOA have documented zero sperm concentration postoperatively except one of them had sperm seen in the ejaculate. The percentage of motile sperms, forward progression, and abnormal forms was not significantly altered postoperatively compared to the preoperative levels. When patients were stratified by the diagnosis, the differences in

postoperative and preoperative semen parameters were not significantly different between patients diagnosed with NOA and patients diagnosed with severe OAT [Table 1].

Three patients (23.3%) underwent TESE and two patients (15.4%) underwent TESA, where all had positive results.

Regarding the pregnancy outcome, the overall live birth rate achieved after varicocele repair was 30.8%. Two (15.4%) of these were spontaneously achieved and the other two (15.4%) were assisted pregnancies. For those who had achieved successful assisted pregnancy, one had positive TESA and the other from an ejaculate sample [Table 2]. Pregnancy outcomes were not significantly different between patients diagnosed with NOA and patients diagnosed with severe OAT ($P = 0.79$).

On the other hand, pregnancy with ART failed in the female partner of three patients (23.1%), one who underwent positive TESA, one positive TESE, and the last one from the ejaculated sample. Five couples (38.5%) were sent for an *in vitro* fertilization unit awaiting to be evaluated, and the pregnancy outcome of one couple was unknown.

DISCUSSION

According to the American Urological Association and the American Society of Reproductive Medicine, varicocele repair is recommended for patients with clinically palpable varicocele, documented male factor infertility in an abnormal semen parameter, or in the setting of normal or potentially correctable female infertility.^[1,4] This is in contrast to the European Association of Urology guidelines that recommend varicocele repair in the case

of clinically palpable varicocele, oligozoospermia, and unexplained infertility.

Many studies establish the significant improvement in semen parameters after varicocele repair in infertile men with oligospermia with regard to their sperm count, morphology, motility, and pregnancy rate, whether it is spontaneous or after ART. However, very few studies addressed the impact of varicocele repair in azoospermic and OAT patients in terms of improvement of semen parameters, Surgical sperm retrieval (SSR), and pregnancy rate.^[6,7]

A retrospective study was conducted among 31 patients known to have NOA, which showed only 9.6% of the patients had documented motile sperm in the ejaculate post varicocele repair sufficient for ICSI.^[8] The necessity for TESE in those patients was not affected by varicocele repair.

On the other hand, a prospective non-randomized study was done over azoospermic and OAT patients questioning the role of varicocele repair in the sperm count and pregnancy rate. Post-operative mean sperm count for patients with OAT is $9.5 \pm 3.3 \times 10^6$ ($P = 0.007$) and $2.2 \pm 1.1 \times 10^6$ for azoospermic patients. The overall live birth rate achieved was 31%, of whom 19% were spontaneous pregnancy and remaining 12% were assisted pregnancy, emphasizing the beneficial role of varicocele repair on fertility status of such patients.^[9]

Similarly, our study showed significant improvement of semen concentration and successful surgical sperm retrieval rate in patients with NOA and severe OAT, and variable pregnancy outcome, as mentioned earlier.

CONCLUSION

Varicocele repair was found to improve the semen parameter in infertile men with oligospermia; however, limited data are available for patients with NOA and severe OAT. Our study showed significant improvement in semen parameters and resulted in a promising positive SSRR favoring the varicocele repair in that population.

Data availability

Data collected are secured and kept confidential. Data access allowed by corresponding author upon request.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Table 1: Semen parameters before and after varicocele repair

	Mean±SD		P
	Preoperative	Postoperative	
Ejaculate volume (mL)	3.05±1.14	2.92±1.09	0.69 ^a
Semen concentration ($\times 10^6$ /mL)	0.25±0.31	3.59±10.08	0.02 ^b
Motile sperms (%)	15.77±24.61	21.77±29.40	0.18 ^b
Forward progression (%)	0.46±0.88	1.00±1.16	0.06 ^b
Abnormal forms (%)	100±0	99.85±0.55	0.32 ^b

^aPaired *t*-test, ^bRelated-samples Wilcoxon signed-rank test. Data are presented as mean±SD. SD: Standard deviation

Table 2: Pregnancy outcomes stratified by diagnosis

Diagnosis	Pregnancy outcomes			P
	Successful, n (%)	Unsuccessful, n (%)	Unknown status, n (%)	
Sever OAT	1 (25)	1 (33.3)	3 (50)	0.79 ^a
NOA	3 (75)	2 (66.7)	3 (50)	

^aFisher's exact test. OAT: Oligoastheneratozoospermia, NOA: Nonobstructive azoospermia

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