

Predictive factors of successful sperm retrieval in men with nonobstructive azoospermia

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Abstract

Introduction: Our aim was to evaluate the predictive value of noninvasive parameters that indicate successful sperm retrieval for ICSI (intracytoplasmic sperm injection) in men with nonobstructive azoospermia without a preoperative testicular biopsy, which is a relatively invasive examination. **Materials and methods:** Were assessed 36 patients with nonobstructive azoospermia who underwent bilateral testicular biopsies. Factors that we assessed in relation with the biopsy results were: age, duration of infertility, surgical history, testicular volume, testicular consistency, serum follicle-stimulating hormone (FSH), and serum total testosterone. **Results:** Sperm retrieval through testicular sperm extraction (TESE) was successful on 16 patients (44%). Follicle-stimulating hormone, testosterone concentration, and the testicular volume

were associated with the results of the sperm retrieval. Men with a high testicular volume and a low value of FSH had successful sperm retrieval. The cut-off point was established as 14,4 ml for testicular volume, 19,8 UI/L for serum FSH. The sensitivities and specificities were 75% and 65% for testicular volume, 62% and 85% for FSH. **Conclusion:** Although FSH, testosterone concentration, and the testicular volume cannot predict with maximum accuracy the presence of the spermatozoa at the level of the testicle in the case of patients with obstructive azoospermia, the association of these 3 parameters makes a more precise evaluation raising the chances of TESE to succeed.

Keywords: nonobstructive azoospermia, sperm retrieval, testicular biopsy, follicle-stimulating hormone, testicular volume

Introduction

Nonobstructive azoospermia is caused by severe impairment of spermatogenesis, representing the most critical case of male infertility. The only option to reproduce for men with nonobstructive azoospermia is In Vitro Fertilization (IVF) with intracytoplasmic sperm injection (ICSI), if sperm can be retrieved by TESE.

The purpose of the study was to measure the predictive value of some noninvasive parameters that indicate the successful sperm retrieval from the men with nonobstructive azoospermia, thus avoiding the diagnostic testicular biopsy, an invasive method of diagnosis and which hasn't an absolute predictive value.

Materials and methods

We made a retrospective study, on 36 patients with male-factor infertility referred to Department of Assisted Reproduction of "Panait Sarbu" Hospital and Gynera Medical Center. All patients had nonobstructive azoospermia.

The patients' age was between 26 and 50, the average age being 34 years old.

Table 1

Comparative analysis of patients with positive and negative TESE test

	consistenta testiculara	volum testicular	FSH	testosteron seric	varsta	durata infertilitatii
Mann-Whitney U	78.500	45.000	35.500	80.500	134.500	158.500
Wilcoxon W	288.500	255.000	171.500	290.500	270.500	294.500
Z	-2.853	-3.664	-3.966	-2.536	-.814	-.048
Asymp. Sig. (2-tailed)	.004	.000	.000	.011	.415	.962
Exact Sig. (2* (1-tailed Sig.))	.006	.000	.000	.010	.422	.962

a. Not corrected for ties.

b. Grouping Variable: testicular biopsy

Count		biopsie testiculara		Total
		nu	da	
antecedente	nu	13	12	25
chirurgicale	da	7	4	11
Total		20	16	36

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.419 ^b	1	.517		
Continuity Correction ^a	.080	1	.777		
Likelihood Ratio	.423	1	.515		
Fisher's Exact Test				.718	.391
Linear-by-Linear Association	.407	1	.523		
N of Valid Cases	36				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.89.

All patients have been clinically assessed: history, physical examination and measurement of FSH (N=1-10 UI/L) and total serical testosterone (N= 2,4-12 ng/dl).

Azoospermia was diagnosed by the ejaculate' centrifuge (300g) for 10 minutes and the microscopically examination of the resulting pellet, performing at least two spermiograms in different time intervals.

Testicular volume was evaluated clinically and by ultrasonography (a 7.5 MHz ultrasonic probe).

The testis consistency was appreciated in levels from 1 to 5 as follows: 1 - very low; 2 - low; 3 - normal; 4 - high; 5 - very high.

All patients have been genetically assessed by using the FISH test (Fluorescence in situ hybridization) in order to detect the genetic abnormalities.

The retrieval of testicular sperm was made by TESE from one or both testis under general anesthesia.

Statistical analyses were performed with SPSS software (Statistical Package for the Social Sciences version 13.0).

Results

From the total of 36 patients we succeeded in retrieving the spermatozoa from 16

patients (44%), in 56% of cases (20 patients) TESE being negative.

There were analyzed through comparison the group of patients with nonobstructive azoospermia, where the testicular biopsy was positive with the one of whose biopsy was negative, comparing the age, the duration of infertility, the surgical history that might be the cause of azoospermia, the testicular volume and consistency and the values of the total serum testosterone and FSH (Table 1).

The mean age of the patients with nonobstructive azoospermia was not statistically different between the two groups of patients.

Also, the duration of infertility and the past surgical history of the patients with nonobstructive azoospermia were not statistically different between the two groups of patients.

Testicular volume, estimated clinically and ultrasonographically, was significantly greater in patients with successful sperm retrieval by TESE (Figure 1).

The score of testicular consistency was significantly different between the two groups of patients (Figure 2).

The value of the serum concentration of FSH was significantly lower in pati-

ents with successful sperm retrieval (Figure 3).

No matter the success or failure in retrieving the sperm by TESE, the value of the total seric testosterone concentration was low, without finding significant differences between the two groups (Figure 4).

The cutoff values of the FSH and the testicular volume for the two groups of patients were determined by using the ROC curves (Figure 5, Figure 6), these were for the serum concentration of FSH =19,08 UI/L and for the testicular volume 14,4 ml (the areas from above the curb being of 0,889 for the FSH and of 0,859 for the testicular volume).

A value of the FSH below 19,08 UI/L predicted, with a specificity of 85% and a sensibility of 62%, the success of TESE on patients with nonobstructive azoospermia, in the studied cohort (Figure 5).

A mean testicular volume greater than 14,4 cm³, predicted with a specificity of 65% and a sensibility of 75% the TESE success on patients suffering from nonobstructive azoospermia in the studied cohort (Figure 6).

On the multivariate analysis (binary logistic regression), the average testicular volume, the total seric testosterone concentration and the FSH concentration are independent

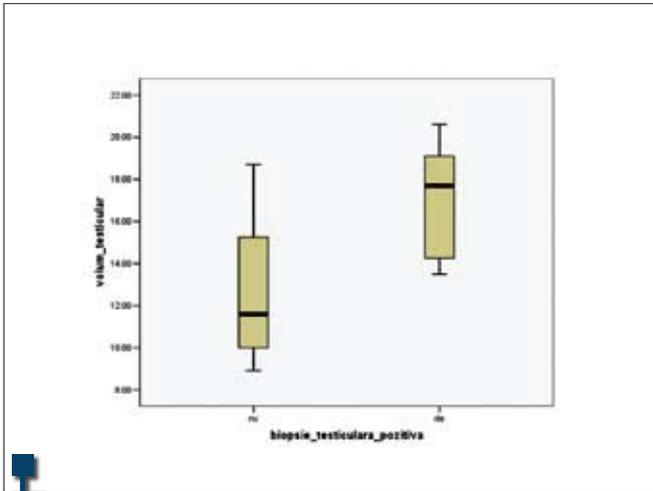


Figure 1. Testicular volume in patients with negative and positive TESE

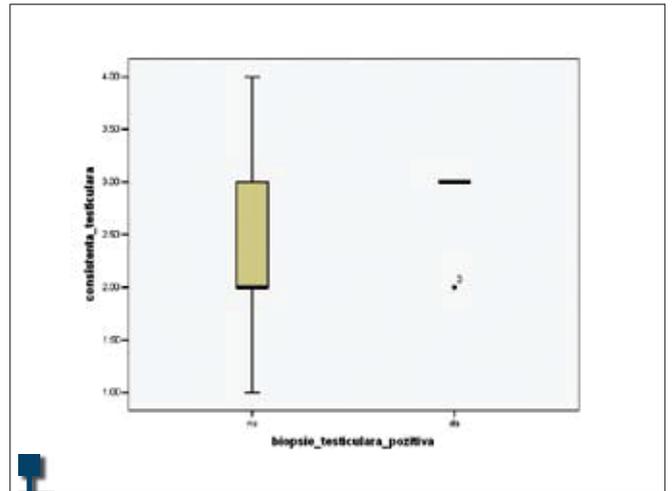


Figure 2. Testicular consistency in patients with negative and positive TESE

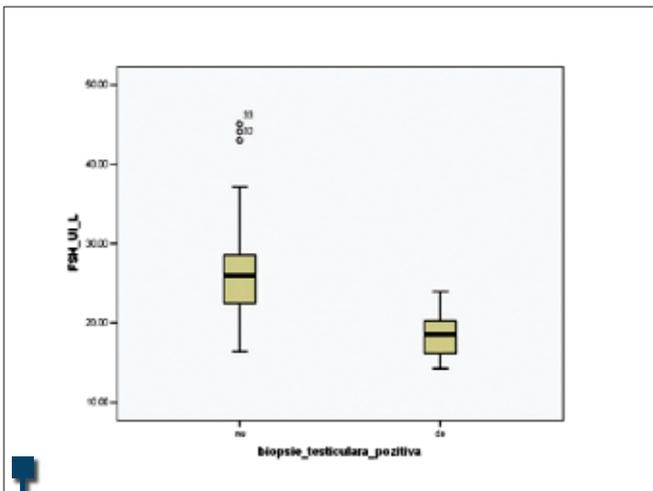


Figure 3. The value of serum FSH in men with negative and positive TESE

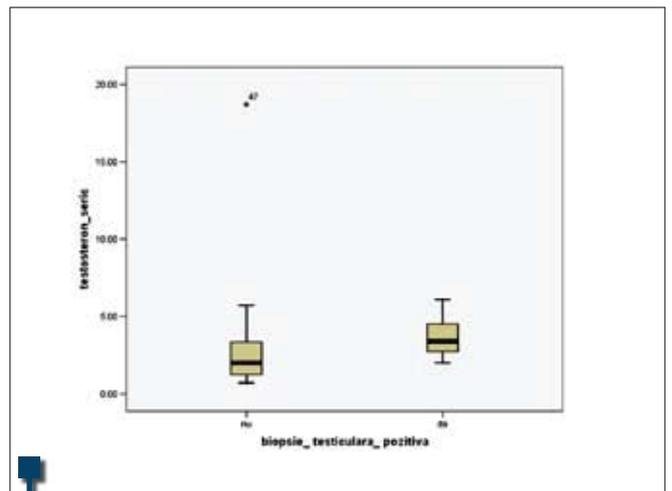


Figure 4. The value of total serum testosterone concentration in men with positive and negative TESE.

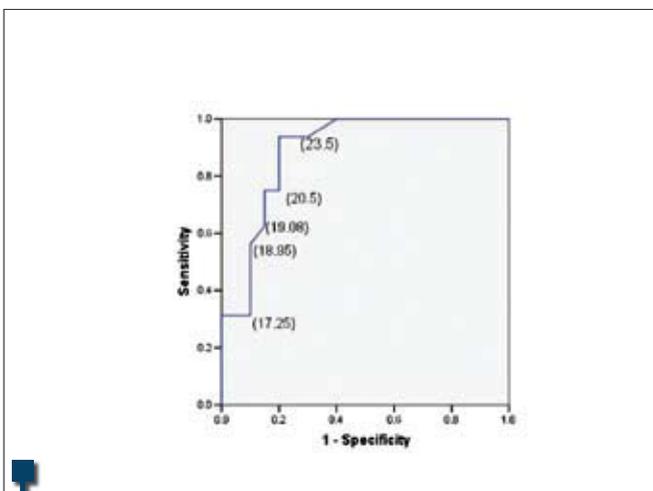


Figure 5. ROC curve for serum FSH

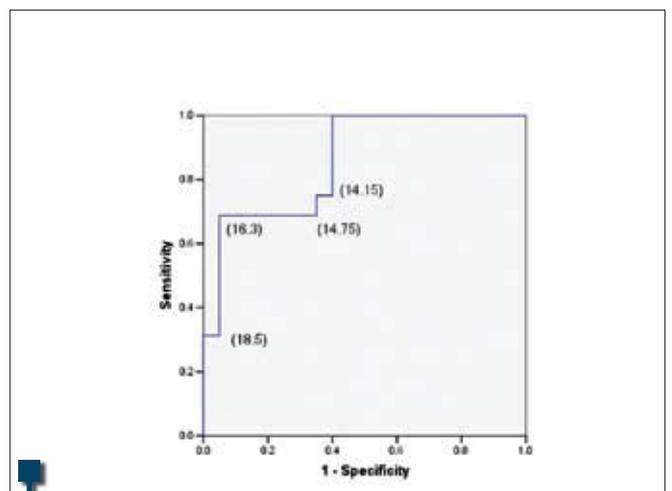


Figure 6. ROC curve for mean testicular volume

Table 2

Multivariate logistic binary regression analysis of independent factors for TESE success in patients with non-obstructive azoospermia.

		Variables in the Equation					
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	volum testicular	.550	.200	7.580	1	.006	1.734
	FSH	-.397	.174	5.244	1	.022	.672
	testosteron seric	.321	.192	2.792	1	.095	1.378
	varsta	-.041	.100	.172	1	.678	.959
Step 2	durata infertilitatii	.008	.017	.220	1	.639	1.008
	volum testicular	.518	.179	8.350	1	.004	1.678
	FSH	-.434	.157	7.646	1	.006	.648
	testosteron seric	.319	.192	2.768	1	.096	1.376
Step 3	durata infertilitatii	.005	.015	.129	1	.720	1.005
	volum testicular	.517	.181	8.212	1	.004	1.678
	FSH	-.416	.144	8.314	1	.004	.660
	testosteron seric	.316	.190	2.777	1	.096	1.372

predictors of the positive testicular biopsy, on patients with nonobstructive azoospermia.

Discussions

Retrieval of testicular sperm for ICSI represents the only possibility to reproduce in patients with nonobstructive azoospermia. Depending on the techniques, the success of sperm retrieval for each biopsy is between 20% and 60% in these patients. The expensive cost of this procedure, emotional stress, testicular lesions produced by the useless testicular biopsies, the risk of a negative biopsy, as well as the preparation of the female partner and the important drug reactions, motivated many researchers to study different noninvasive methods that might predict the TESE success. In our study TESE

was successful in 44%, satisfactory result in comparison with the literature data.

In accordance with other studies, the difference between the FSH value in patients with positive TESE, in comparison with the ones who had negative TESE, was significant in our study.

The mean testicular volume was another factor that influenced the success of TESE, being greater in patients on which we succeeded in retrieving the sperm by TESE, in comparison with the ones in which TESE was negative. Even if there is a strong relationship between the total testicular volume and the spermatogenesis, the topographical distribution of the different histopathological patterns is independent of the testicular volume in men suffering from nonobstructi-

ve azoospermia; the testicular volume may not predict with a maximum sensibility and specificity the TESE success.

In patients on which we succeeded to retrieve spermatozoa by TESE, the score of the testicular consistency was close to normal^(2,8), a low testicular consistency denoting the change in spermatogenesis.

Conclusion

Although FSH, testosterone concentration and the testicular volume cannot predict with maximum accuracy the presence of the spermatozoa in the testicle, in men with nonobstructive azoospermia, the association of these 3 parameters makes a more precise evaluation raising the chances of TESE to be successful. ■

References

1. Rajasingam S. Jeyendran-Sperm Collection and Processing Methods, A practical guide. Cambridge University Press 2003; 90-96.
2. Kinloch Nelson and Peter Schlegel-Obstructive and Non-obstructive Azoospermia, Office Andrology, Humana Press Inc. 2005;
3. Sherman J. Silber-Testis Biopsy and Infertile Male, Office Andrology, Humana Press Inc. 2005;
4. Tsujimura A, Matsumiya K, Miyagawa Y, et al.-Prediction of successful outcome of microdissection testicular sperm extraction in men with idiopathic nonobstructive azoospermia. J Urol. 2004;172:1944-7.
5. Schoor RA, Elhanbly S, Niederberger CS, Ross LS. The role of testicular biopsy in the modern management of male infertility. J Urol. 2002; 167:197-200.
6. Mansour R T, Kamal A, Fahmy I, Tawab N, Serour and Aboulgahar M A-Intracitoplasmatic sperm injection in obstructive and non-obstructive azoospermia. J Urol. 1997;174-1979.
7. Lipshultz L I et al.-Infertility in the Male, Mosby 1997.
8. Patrick J, Frank H. Comhaire, Timothy B. Hargreave, Ahmed M. A. Mahmoud-WHO Manual for the Standardized Investigation, Diagnosis and Management of the Infertile Male. Cambridge University Press 2000;57.
9. Sayed A, Mohammadreza E, Hamidreza A, Seyed M Hosseini - Prediction of Successful Sperm Retrieval in Patient with Nonobstructive Azoospermia. J Urol 2006; 92-6.