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Longitudinal vs Horizontal Capsular Incision! Does it Alter Micro-TESE Outcome

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Abstract

Micro-TESE (Testicular Sperm Extraction), a procedure performed for treatment of Non-Obstructive Azoospermia, a leading infertility issue among males globally accounting for about 7% of the male population. Azoospermia is the absence of sperms in ejaculate upon semen analysis, 2% of the global population has encountered. A lot is discussed upon sperm retrieval success in both variants of Micro-TESE, which are Transverse or horizontal and longitudinal or vertical approaches, established studies have identified about 45% to 65% of success retrieving spermatozoa. The objective is the identification of the success of both the variants of procedure separately and also of postop complications to both approaches for micro-TESE. A cohort study, for which data, secondary (retrospective), was obtained from King Abdulaziz Medical City (KAMC), Riyadh. The time frame for data covered January 2016 to November 2018; 87 patients underwent micro-TESE, as in the logbook available in "Best Care System at KAMC. Data obtained was analyzed using SPSS Software, 87 of these patients who underwent micro-TESE procedure, 45 were done with the transverse approach and 42 with longitudinal approach, accounting for 51.7% and 48.3%, respectively. Upon postop evaluation, in the transverse approach, sperm were retrieved in 25.29% and for the longitudinal approach, retrieval was about 19.54%. The success rate was 48.9% out of 45 procedures in the transverse approach and 40.5% out of 42 procedures in the vertical/Longitudinal approach. The most common reported post-operative complication in transverse type was atrophy 20% and pain 13.3% on other hand common complications recorded for vertical type, atrophy was about 17.2% and pain in12.6% of patients. Not much statistical significance was observed between the transverse and longitudinal approach in either of the outcomes whether it is success rate or post-op complications. Both approaches are influenced by the factors of surgeon expertise and certain other factors that include pre and postop hormonal therapy, baseline hormonal status, and ICSI.

Keywords: Male, Infertility, Azoospermia, Sperm, Testis

Introduction

Infertility Is referred to as the couple does not conceive for more than a year of unprotected intercourse. Now it can be both male and female factors, among male factor infertility accounts for about 40-50% of cases (1), affecting 7% of all men (2). It was recorded in a previous study conducted in France that there was about 14.1% of infertility for which about 20% were male factors (1).

One of those male factors was Azoospermia, being elaborated as the absence of sperm in the ejaculate, upon semen analysis(2). Approximately 2% of the general population around the globe have azoospermia (3). Azoospermia is classified into two, one being Obstructive (OA) and the other Non-Obstructive (NOA), between both, 80% of azoospermia patients were found to be non-obstructed azoospermia (NOA) type. The clinical diagnosis is based on examining the volume and level of follicular stimulating hormone (FSH), before being small in volume and later with elevated levels are laboratory indicative of Azoospermia (3, 4). It was a breakthrough in introducing the technique of intracytoplasmic Sperm Injection (ICSI), in 1992, which has helped couples conceive with male counterparts having NOA (5-8).

Apart from that, a new modality, where it is focused on the patient's retrieval of spermatozoa after the procedure, is testicular sperm extraction (TESE) in other words Microdissection Testicular Sperm Extraction or Micro-TESE. This modality has increased much of success in sperm retrieval in patients with NOA. It was found to have retrieved sperms because of spermatozoa presences, by 45 to 63% of the patients underwent micro-TESE (8, 9). This could be well understood by the results of a study conducted in 2007, which recorded about 48% of success rate, out of 150 Patients, for the micro-TESE procedure (10).

As in conventional TESE procedure, more tissue damage can occur and tissue loss with possible hematomas and larger scars,

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but intervention and assisted reproductivity via micro-TESE has drastically decreased that incidences, only 2-10 mg samples are obtained which would otherwise have been 50-75 mg via the conventional method (11).

As there are two approaches to these procedures, one is the transverse approach, in lay terms also called horizontal approach for incision and the other one referred to as Longitudinal approach or also sometimes called a vertical approach.

Most studies have a generalized discussion upon the procedure success in countering the male azoospermia type infertility not focusing on individual variants of m-TESE, here this study will focus on each of the variants success rates in the retrieval of spermatozoa or sperms in the semen, and also will distinguishingly describe postoperative complication following individual procedural approaches.

Material and Methods

A retrospective cohort study was done at King Abdulaziz Medical City (KAMC) in Riyadh. Data were collected from January 2016 till November 2018. Patients who underwent micro-TESE procedure for sperm retrieval, in the time frame were included. The data was retrieved from a logbook available in the ''Best care system'' at KAMC, of which a sample of 87 was collected.

The collection of the data was following an established questionnaire, which included demographics of patients, procedure-related questions focusing on pre, intra, and postoperative, hematological factors, hormonal status, infections, and testacies volume, and other medical records.

In terms of ethical considerations, the respondents were informed and were asked for postop complications and conception, upon their consent and comfort, phone call interviews were held. Their personal information is kept confidential. Records were obtained as per King Abdulaziz Medical City's ethical committee approval.

Patients were called and were asked about postoperative complications and conception after they had gone for sperm retrieval via micro-TESE. All the data were analyzed via SPSS v 22.0 (IBM Corp.: Armonk, NY, USA). and is presented in tables and graphs of frequencies percentages and as the success rates of separate approaches for sperm retrieval.

Results

A total of 87 patients were included in the study, each was presented for surgery and underwent micro-TESE for sperm retrieval at National Guard Hospital from January 2016 till November 2018. The mean age observed was 37.78 and BMI in averages of 29.22 with standard deviations of 8.13 and 5.7 respectively. The range for age was 22-66 and for BMI 16-41.80 (Table 1).

Out of all 87 procedures, 45 were performed using the Transverse incision technique into the scrotum and 42 counted for longitudinal approach, contributing 51.7% and 48.3%, respectively. A total of 64 cases recorded were of a non-obstructive type and 20 were having obstructive azoospermia, contributing 73.6% and 23.0% respectively, this data also includes 3 (about 3.4%) of the cases which were of unknown type or were not recorded at all. Primary infertility was more prevalent accounting for 87.4% (76 out of 87) in the sample and secondary infertile were about 12.6% (11 out of 87) (Table 2).

The focus being sperm retrieval in this study, results obtained described that overall 44.8% of cases have been effectively retrieved, which in number are 39 out of 87 cases. (Table 2)

For success rate of both variants of micro-TESE in regards to sperm retrieval, was 48.9% for those who underwent Transverse approach and was 40.5% for longitudinal approach with the significance of 0.411 as per Pearson Chi-square, asymptotic, indicated not much of an effect of the procedure on the differential success of sperm retrieval (Tables 3, 4). In addition, in (Tables 5, 6) patients with positive sperm retrieval were sharing a mean level and standard deviation of Follicle-stimulating hormone (FSH) 13.71±9.9, Luteinizing hormone (LH) 6.31±3.9, Testosterone 13.66±9.5 and Body mass index (BMI) 29.4±5.8). In contrast, patients who had negative sperm retrieval were sharing mean level and standard deviation of FSH about 15.97±10.9, LH 9.03±7.4, Testosterone (14.28±9.9) and BMI (29.06±5.7).

Lastly, regarding the complication after micro-TESE, (Figure 1) showing that the most common reported post-operative complication in transverse type was atrophy 10.34% and pain 6.90%. In vertical type, the most common reported post-operative complication was atrophied about 6.90, and pain 5.75%. (Figure 1). However, the average pain score in the transverse type and vertical type were (3.93, 4.82), respectively. Post-operative complications regarding the type of incision results show no statistical significance with a p-value of 0.41.

The histopathology results with Sertoli cell-only syndrome 27.6%, hypo spermatogenesis 17.2% and severe hypo spermatogenesis 12.6%, and Complete maturation arrest was found in 12.6%. Other results combined made approximately 10.59% (crushed tissue, immotile sperms, atrophic tubules, Hyalinization of tubules and Sertoli cell-only and Leydig cell hyperplasia). 17.2% were unknown. (Figure 2).

Table 1. Age, BMI, Preoperative Hormonal Assay and Testacies volume

	Age	BMI	Preoperative			Preoperation Testacies Volume	
			FSH	LH	Testosterone	Right	Left
Number			87				
Mean	37.78	29.22	14.96	7.81	14.01	7.42	7.54
Median	36.00	29.30	13.65	6.52	12.49	7.22	7.80
S.D	8.139	5.78	10.49	6.26	9.73	5.57	5.466
Min.	25	16.00	.68	1.31	0.89	0.44	1.30
Max.	66	41.80	40.11	33.33	48.78	28	25

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Table 2. Frequencies and percentages of Azoospermia types, infertility, Sperm retrieval and surgery type

	Type of Azoospermia		
	Frequency	**%Age**	**Cumulative Percent**
Non-Obstructive Azoospermia	64	73.6%	73.6%
Obstructive Azoospermia	20	23.0%	96.6%
Un-Known	3	3.4%	100.0%
	Infertility Type		
Primary Infertility	76	87.4%	87.4%
Secondary Infertility	11	12.6%	100.0%
	Sperm Retrieval		
Negative	48	55.2%	55.2%
Positive	39	44.8%	100.0%
	Type of Surgery		
Transverse micro-TESE	45	51.7%	51.7%
Longitudinal micro-TESE	42	48.3%	100.0%
Total	87	100.0%	

Table 3. Success Rates of Transverse and Longitudinal Approaches for micro-TESE procedure

Type of Surgery %Ages	**Transverse micro-TESE**			**Longitudinal micro-TESE**		
	Sperm Retrieval		**Total**	**Sperm Retrieval**		**Total**
	Positive (success)	**Negative (Failure)**		**Positive (success)**	**Negative (Failure)**	
	22	23		17	25	
Success & Failure Rates (% with in procedure)	48.9% (out of 45)	51.1% (out of 45)	45	40.5% (out of 42)	59.5% (out of 42)	42
Sperm retrieval in total	25.29% of 87 cases	26.4% of 87 cases		19.54% of 87 cases	28.7 % of 87 cases	

Total				
Positive Sperm Retrieval	**Negative Sperm retrieval**	**Transverse micro-TESE**	**Longitudinal micro-TESE**	**Sample**
39 (44.82%)	48 (55.17%)	45 (51.7%)	42 (48.3%)	87

Table 4. Chi Square Test and significance of the results as per Pearson Chi-Square Asymptotic Significance for Success rates

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	9.286[a]	9	.411
Likelihood Ratio	11.841	9	.222
Linear-by-Linear Association	.527	1	.468
N of Valid Cases	87		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .48.

Table 5. Preoperation hormonal assay and BMI for Cases with Positive sperm retrieval

		For Positive sperm retrieval			
		Preoperation FSH	**Preoperation Testosterone**	**Preoperation LH**	**BMI**
N	**Valid**	39	39	39	39
	Missing	0	0	0	0
Mean		13.7162	13.6690	6.3121	29.4308
Median		12.2000	12.4900	5.8800	29.4000
Std. Deviation		9.96533	9.56213	3.98935	5.86449
Minimum		.00	.00	.00	16.70
Maximum		32.75	36.18	15.45	41.80

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Table 6. Preoperation hormonal assay and BMI for Cases with Negative sperm retrieval

		Negative Sperm Retrieval			
		Preoperation FSH	**Preoperation Testosterone**	**Preoperation LH**	**BMI**
N	**Valid**	48	48	48	48
	Missing	0	0	0	0
Mean		15.9752	14.2890	9.0369	29.0604
Median		13.9500	12.6050	6.7600	28.5000
Std. Deviation		10.91265	9.96430	7.45713	5.77569
Minimum		.00	.00	.00	16.00
Maximum		40.11	48.78	33.33	41.80

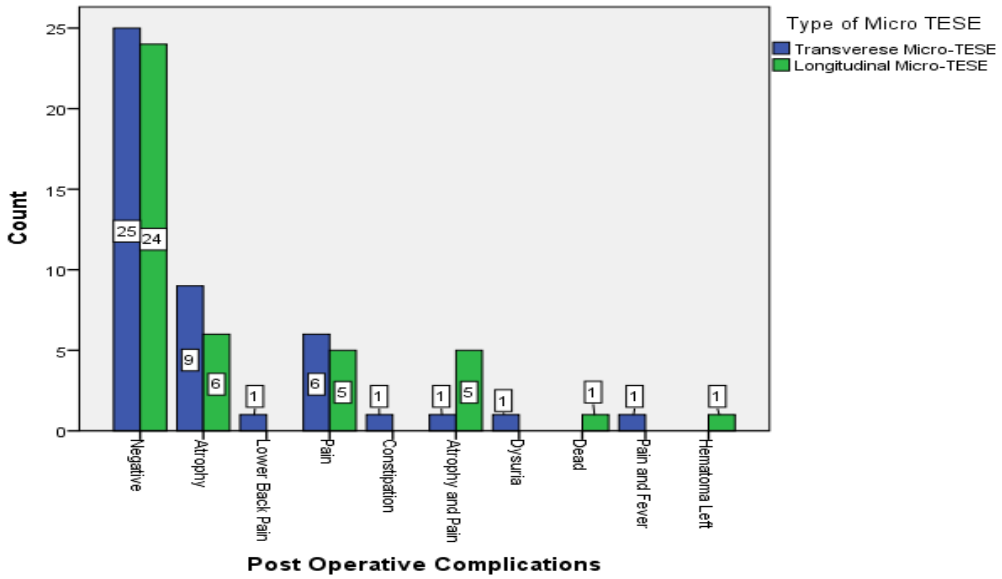

Figure 1. Postoperative Complications in both Transvers and Longitudinal Approaches

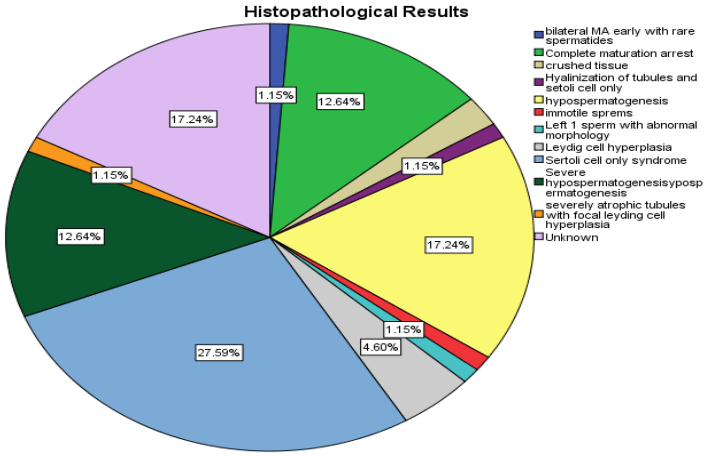

Figure 2. Histopathological Aspects for the patients with Azoospermia

Discussion

Testicular Sperm Extraction and Intracytoplasmic Injection were first introduced in 1993 for the treatment of obstructive Azoospermia (12), which was widely used for men diagnosed to have Non-Obstructive Azoospermia (13). Microdissection Testicular Sperm Extraction is considered the Gold Standard method for surgical sperm retrieval among patients with non-obstructive Azoospermia (14).

Although the technique of micro-TESE is mostly standardized for scrotal and Tunica Vaginalis incision, but the Tunica Albuginea Incision is still somewhat controversial, as the pioneers of micro-TESE, Dr. Peter Schlegel used to open tunica albuginea by a Transverse incision to avoid equatorial testicular vessels (14). The rationale behind it is that sub tunical vessels run horizontally and are clearly visible under the microscope, so the risk of bleeding and later on hematoma formation is significantly reduced to near zero.

While a significant number of surgeons still use Vertical incisions to open the tunica albuginea, as this allows wider exposure to testicular mass and making better access to polar regions of the testis.

Both groups have their pros and cons. Originally Peter Schlegel reported the opening of the Tunica Albuginea in a Transverse plane as a vertical incision will be harmful to the testicular artery (15). However, Silber noted a wide vertical incision allows extensive visualization of the seminiferous tubule and subtunical vessels (16).

Although the outcome of micro-TESE is measured in terms of sperm retrieval initially and later on pregnancy rate. Most of the metanalysis studies for micro-TESE done in the past have results comparing those two goals as the end outcome. Post-procedure complications like hematoma collection and hydrocele are mostly mentioned. The question being success rate of both variants of micro-TESE concerning sperm retrieval and also postop complications, this study is a landmark, as in literature and metanalysis made no such comparison which is comparing the transverse versus vertical incision of the tunica albuginea for sperm retrieval and postop complications.

Although till now no study has compared the sperm retrieval rate concerning incision of tunica albuginea, this study contradicts the hypothesis that vertical incision has a better sperm retrieval rate versus transverse incision. Other factors that were included were post-procedure hematoma formation in both groups, regarding the type of tunical incision. In the vertical incision group, only one patient had a hematoma collection, while the transverse group had none. This again supports the rationale that there is less bleeding or vascular injury to sub tunical vessels in transverse incision (15).

Conclusion

It was obvious that there was not much significance on accepting which approach is better than other in terms of sperm retrieval and postoperative complication specially hematoma or hydrocele formation. Much of study is required in this to find out surgeon preferences parameters in choosing specific approach, this was done for small sample size and creating a landmark for further research on this on larger scales may be, Observe prospectively to the outcomes of the procedural approaches. As the results have indicated that both have an almost close-ranged success rate in sperm retrieval and both approaches have many similarities and proportions are in close approximation for postop complications.

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Not applicable

Conflict of Interest

No conflict of interests was declared by the authors.

Ethical Issue

No ethical issues were encountered, data was collected as per participants' consent and proper ethical committee approval from the organization involved which is King Abdulaziz Medical City.

Author's Contribution

Hani Albadawe is the core contributor to the research, the idea, and problem identification were presented and discussed among authors. Hani Albadawe worked on data retrieval, the development of the questionnaire, and writing the main research report. Rizwanul Haque contributed to Writing the thesis and manuscript for the research, tabulation graphs were also organized by him. Naif Alhfthi, Abdulllah Almousa, Turki A Alferayan, Khalid A Alrabeeah, and Saad M Abumelha also contributed to research work, and supporting material was provided in helping with data collection and analysis.

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