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Evaluation of Treatment Modalities for Pure Asthenospermia Regarding Changes in Seminal Fluid Parameters

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Abstract: Background: Asthenospermia is one of the most common findings in the seminal fluid analysis of patients with infertility. In spite of a full diagnostic workup, the causes of Asthenospermia are not always clear; accordingly, there are a lot of controversies about the best treatment for such a condition.
Aim of the study: To evaluate the validity of two treatment modalities for patients with pure Asthenospermia, one surgical (varicocelectomy) and the other medical (L-carnitine supplementation), by following changes in seminal fluid parameters.
Patients and methods: A prospective study was conducted at AL-Yarmouk Teaching Hospital/Urology Department from 23rd August 2021 to 18th April 2022. One hundred eighteen infertile male patients were included. Patients were divided in two groups: Surgical arm (71 patients with different grades of varicoceles) and the medical arm (47 patients with no overt clinical varicoceles). For all patients, a full assessment had been done, including at least two seminal fluid analyses as a baseline (to document the presence of pure Asthenospermia). Surgical arm patients were treated with subinguinal varicocelectomy, and medical arm patients were treated with oral supplementation of L-carnitine 1 gm/day.
Patients in both groups were followed for 6-12 months by repeated seminal fluid analyses to check the changes in sperm motility. Adverse effects of the treatment were also checked during follow-up visits.
Results and Discussion: Surgical arm patients included were 26,23, and 12 patients with varicocele grades 1,2, and 3, respectively, and ten patients with subclinical varicoceles. Medical arm patients included were 32 patients with no varicoceles and 15 patients with subclinical varicoceles. Changes in seminal fluid parameters (total Sperms motility status) after treatment were statistically significant in the varicocelectomy group, and improvement

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in the seminal fluid parameters was directly related to the grade of the varicoceles with no significant improvement in the patients with subclinical varicoceles. In the medical arm, we achieved an improvement in sperm motility status, but it was not statistically significant. Conclusion: Patients with pure Asthenospermia and clinically detected varicoceles are best treated by varicocelectomy, and the more grade varicoceles, the better results are achieved. L-carnitine supplementation for patients with pure Asthenospermia proved to be beneficial and safe, but when given alone, it was not enough to raise sperm motility status to normal values.

Keywords: Asthenospermia, Treatment Modalities, and Seminal Fluid.

1. INTRODUCTION

Asthenospermia, another name for asthenozoospermia, is an infertility disorder in which a person's sperm motility-or sperm's capacity to move—is diminished. The likelihood of the sperm attaching to the egg within the female reproductive system is decreased by decreased sperm motility. One of the most frequent reasons for male-factor infertility as, in addition to oligospermia (low sperm count), is asthenospermia. [1,2]

Reduced sperm motility is a symptom of the infertility disorder asthenospermia. Sperm motility refers to the sperm's capacity to "swim" its way to the egg inside the female reproductive system. In the condition known as asthenozoospermia, there is no sperm motility. [3,4]

Along with oligospermia and low sperm count, asthenospermia is one of the most frequent reasons of infertility in men and can drastically lower the likelihood of getting pregnant [5]. Under forty percent motility of sperm or less below 32% progressive motility is considered asthenospermia. Sperm that exhibits progressive motility travels in broad arcs or straight lines. [6]

Asthenospermia, also known as teratospermia, is frequently accompanied with oligospermia and is commonly present in patients. Additionally, asthenospermia patients typically have greater levels of sperm DNA fragmentation. [7]

Male infertility is directly impacted by asthenospermia, which also greatly lowers the likelihood of pregnancy. Fertilization chances are considerably diminished if sperm cannot get to the egg in the female's reproductive system. [8,9]

Sperm motility is an essential prerequisite for establishing natural fertilization as well as pregnancy because sperm must travel a considerable distance through the fallopian tube in order to connect with and fertilize the egg. Therefore, asthenospermia may be detrimental to male fertility. [10,11]

Inflammatory conditions affecting the sperm duct, which is varicocele, immunologic factors, abnormalities in the genome, along with lifestyle and environmental variables, are only a few of the numerous probable causes of asthenospermia. Diagnose asthenospermia and learn about the general sperm concentration, morphology, and motility with a semen analysis test (SA). [12,13]

A smart initial step in treating asthenospermia is to adopt better lifestyle practices, including giving up smoking, consuming less alcohol, and eating a balanced diet. Asthenospermia-related infertility has also been treated using assisted reproductive technology (ART), such as

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intrauterine insemination (IUI), in vitro fertilization (IVF), and intracytoplasmic sperm injection (ICSI) [14,15]. This paper aims to Evaluate of treatment Modalities for pure Asthenospermia regarding changes in seminal fluid parameters.

2. PATIENTS AND METHODOLOGIES

This is a prospective study conducted at Al-Yarmouk Teaching Hospital /urology department from 23rd August 2021 to 18th April 2022.118 male patients were included.

Inclusion criteria:
All patients were married and overall healthy; their ages ranged from 20- 39 years with primary or secondary infertility for more than one year of unprotected intercourse with pure or isolated asthenospermia.

Exclusion criteria
Normal semen parameters, patients with azoospermia, oligospermia, teratospermia, low ejaculatory volume, abnormal hormonal profile, Antisperm antibody test +ve, significant genital infection, and occupational exposure to heat or chemicals
Patients were divided into two groups:
In surgical arm patients with all grades of varicocele, including the clinical palpable varicoceles (G1-G3) and subclinical (detected by Doppler U/S), with pure asthenospermia.
In medical arm patients either, with or without subclinical varicoceles (determined by scrotal Doppler U/S) with no other identifiable risk factors or idiopathic.
All patients were clinically assessed by history, physical examination, and seminal fluid analysis.
All patients underwent two or more seminal fluid analyses before intervention as a baseline with a constant number of days of sexual abstinence, 3-5 days.
We depend on total sperm progressive motility (grade A +grade B) as a standard for comparison.
According to the treatment method, patients with asthenospermia were divided into two groups:
1: surgical arm: Was subjected to subinguinal varicocelectomy (for clinical and subclinical varicoceles).
2: medical arm" L-carnitine group" (patients without or with subclinical varicoceles) were subjected to medical treatment with L-carnitine supplementation 1gm /day for at least six months and instructed to avoid using other relevant medications during the treatment period.

Outcome measures
Were changes from the mean baseline level of semen parameters (sperm motility) and the occurance of adverse events of treatment during the 6- 12 –months period of follow-up after treatment?

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Follow up

- For both groups, follow-up was at 3,6,12 months after the intervention. Changes in Seminal fluid analyses at 3,6,12 months were documented. All participants were assessed for adverse effects of treatment throughout the study period
- Surgical arm:

Patients were evaluated for Varicocele recurrence,
Hydrocele formation and Changes in testicular size.

- Medical arm:

Patients were evaluated for side effects of medical treatment and any changes in varicocele grade.
Changes in seminal fluid parameters (motility) were also correlated with the grade of varicocele in the surgical arm, and the impact of treatment on patients with subclinical varicocele in both groups was also studied.
Statistical method used in our study was according to the Statistical Packages for social scientists (SPSS) version 20 program
For quantitative data, we used T-test, and for qualitative data, we used the Chi-square test.

3. RESULTS

Table (1): preliminary data of the patients:

		Surgical Group Varicocelectomy (n=71)		**Medical Group L-Carnitine (n=47)**		**χ2;d.f.;P value**
		No	**%**	**No**	**%**	
Age (years)	**Mean±SD (Range)**	28.4±5.7 (17-40)		29.3±5.7 (17-40)		0.403
Varicocele Grade	**G1**	26	36.6	-	-	-
	G2	23	32.4	-	-	
	G3	12	16.9	-	-	
	Subclinical	10	14.1	15	31.9	
	Without	-	-	32	68.1	
	Total number	71	100	47	100	
*Significant using Students-test for two independent means at 0.05 level						

Table (2): Baseline levels of mean motility status in each group:-

Group	**Varicocele Grade**	**Mean motility status%**				**χ2;d.f.;P value**
		0---19%		20---39%		
		No	**%**	**No**	**%**	
Surgical Varicocelectomy (n=71)	**G1**	12	46.2	14	53.8	0.428
	G2	7	30.4	16	69.6	
	G3	5	41.7	7	58.3	
	Subclinical	6	60.0	4	40.0	
	Subclinical	9	60.0	6	40.0	0.809

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Medical L-Carnitine (n=47)	**Without**	18	56.3	14	43.7	
*Significant using Pearson Chi-square test at 0.05 level						

Chart (1): Baseline levels of mean sperms motility status in the surgical group:-

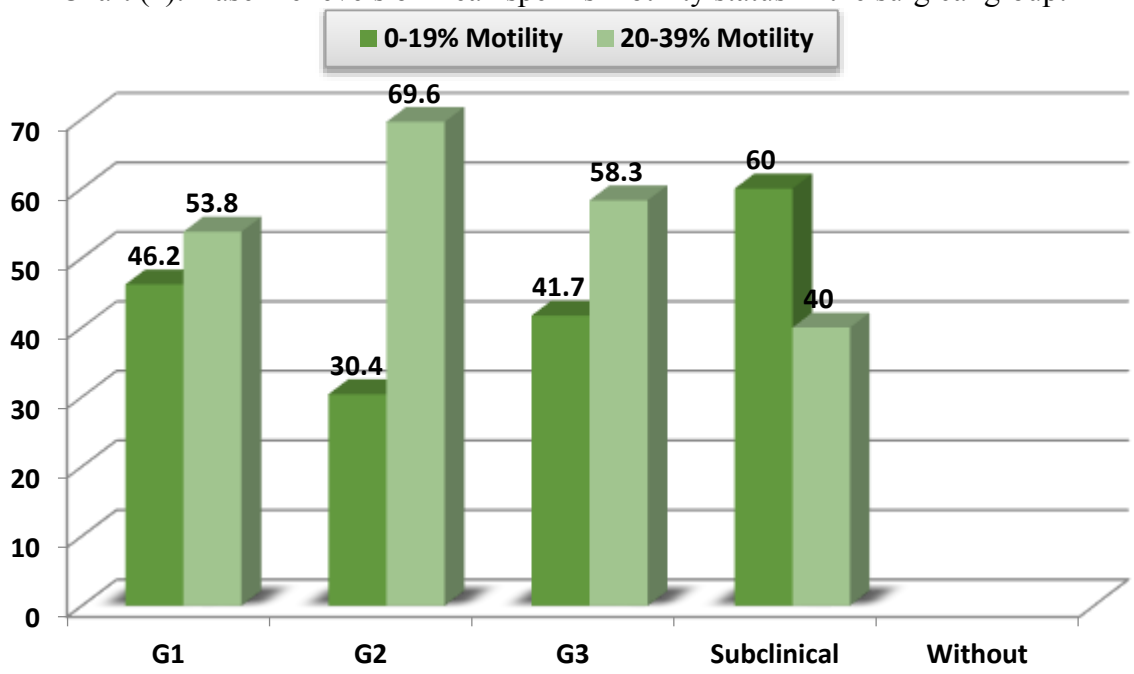

Chart (2): Baseline levels of mean sperms motility status in the medical group: -

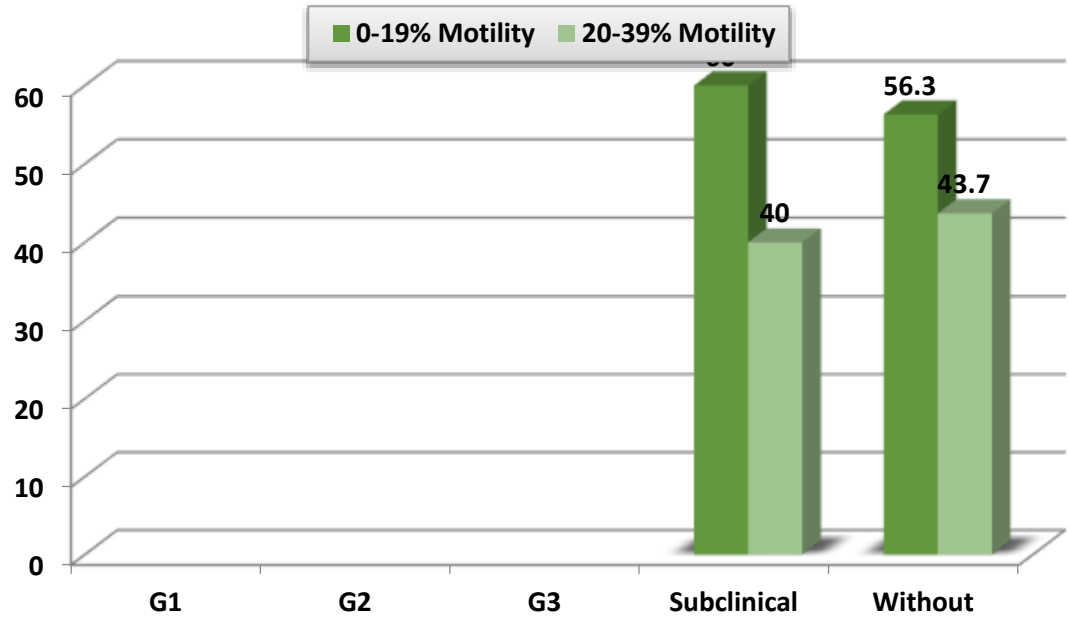

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Table (3): Changes in sperms motility after varicocelectomy treatment:

Surgical Group Varicocelectomy (n=71)	Varicocele Grade								P value
	G1 (n=26)		G2 (n=23)		G3 (n=12)		Subclinical (n=10)		
Improvement;	19	73.1	19	82.6	9	75.0	4	40.0	0.093
Good	4	15.4	6	26.1	8	66.7	2	20.0	0.006*
Minimal	15	57.7	13	56.5	1	8.3	2	20.0	
No improvement	7	26.9	4	17.4	3	25.0	6	60.0	
*Significant using Pearson Chi-square test at 0.05 level									

Table (4): Changes in sperms motility after L-carnitine treatment:

Medical Group (L-Carnitine)(n=47)	No subclinical varicocele (n=32)		Subclinical varicocele (n=15)		χ2;d.f.;P value
	No	%	No	%	
Improvement;	13	40.6	6	40.0	0.968
Good	4	12.5	1	6.7	0.516
Minimal	9	28.1	5	33.3	
No improvement	19	59.4	9	60.0	-
*Significant using Pearson Chi-square test at 0.05 level					

Chart (3): Sperms motility status in surgical group after varicocelectomy:-

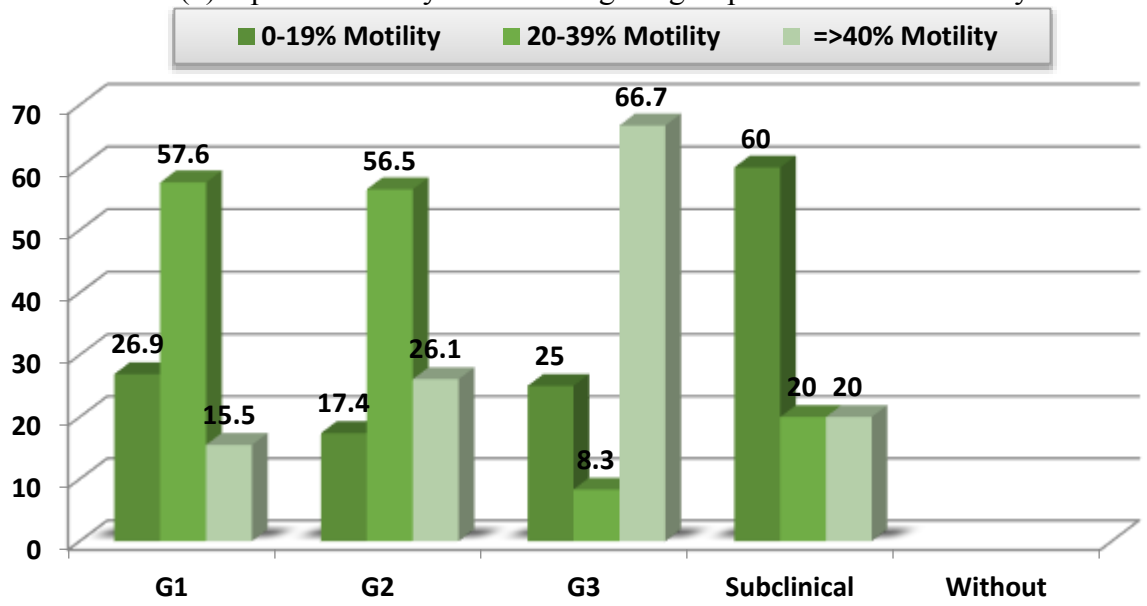

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Chart (4): Sperms motility status in L-carnitine group after medical treatment:-

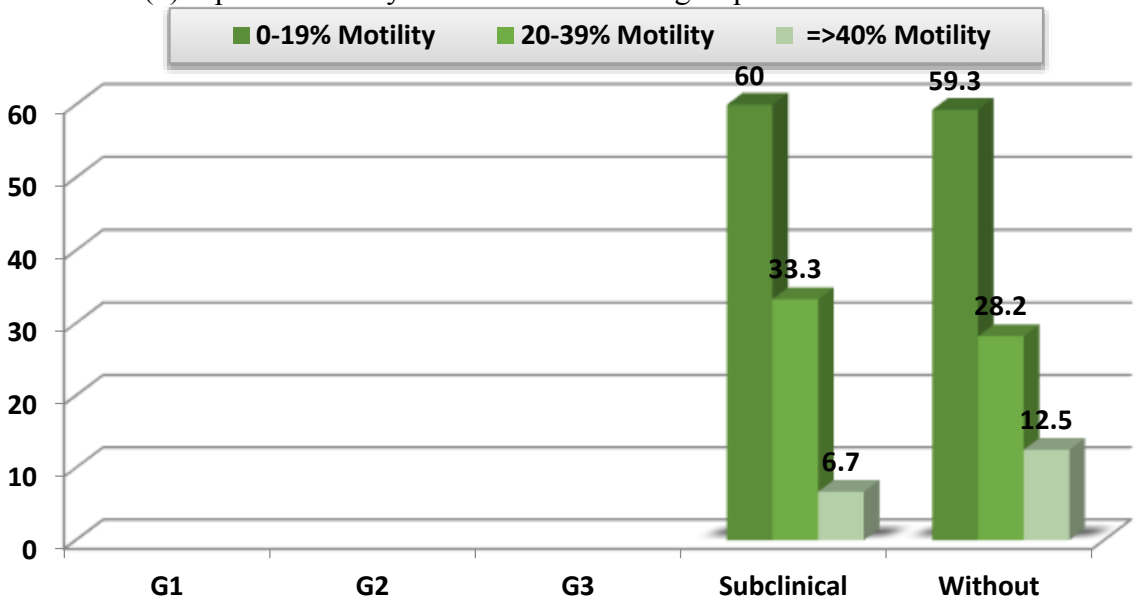

Table (5): Changes in sperms motility after treatment in each group:-

Group	Varicocele Grade	Mean motility status%						P value
		0---19%		20---39%		=>40%		
		No	%	No	%	No	%	
Surgical Varicocelectomy (n=71)	G1	7	26.9	15	57.6	4	15.5	0.010*
	G2	4	17.4	13	56.5	6	26.1	
	G3	3	25.0	1	8.3	8	66.7	
	Subclinical	6	60.0	2	20.0	2	20.0	
Medical L-Carnitine (n=47)	Subclinical	9	60.0	5	33.3	1	6.7	0.811
	Without	19	59.3	9	28.2	4	12.5	
*Significant using Pearson Chi-square test at 0.05 level								

Table (6): Changes in sperms motility according to treatment modality:-

	Surgical Group Varicocelectomy(n=71)		Medical Group L-Carnitine(n=47)		χ2;d.f.;P value
	No	%	No	%	
Improvement;	51	71.8	19	40.3	0.0007*
Good	20	28.2	5	10.5	
Minimal	31	43.6	14	29.8	
No improvement	20	28.2	28	59.7	0.317
*Significant using Pearson Chi-square test at 0.05 level					

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Table (7): Adverse effects/complications of each treatment modality:-

Side effects	Surgical Group Varicocelectomy(n=71)		Medical Group L-Carnitine(n=47)	
	No	%	No	%
Hydrocele	5	7.0	-	-
Varicocele recurrence	3	4.2	-	-
Testicular atrophy	1	1.4	-	-
GIT side effect	-	-	7	14.9
Insomnia	-	-	1	2.1
Headache	-	-	9	19.1
Wound infection	7	9.8	-	-
Prolonged testicular pain	3	4.2	-	-
Allergy to L-carnitine	-	-	1	2.1

4. DISCUSSION

Asthenospermia is one of the most common findings in the seminal fluid analysis of patients with infertility. Isolated asthenospermia refers to low levels of motility or forwards progression or both. It may be caused by overt causes, or it may be idiopathic, so in spite of a full diagnostic workup, the causes of asthenospermia are not always clear. Accordingly, there are a lot of controversies about the best treatment for such conditions, but in general, the best results are achieved when treatment is directed toward an overt cause. Our study included two groups of patients, those with varicocele (with its different grades) and those patients with no overt identifiable cause [16] because these two groups are the most commonest groups of patients with asthenospermia seen in our clinical practice. Varicocele is the most common surgically correctable abnormality found in infertile men and may be responsible for sperm motility defects as well as defects in sperm count and shape. An important subgroup of patients with this condition is those with subclinical varicoceles that are not palpable or suspected on physical examination but are diagnosed radiologically [17]. The need to treat subclinical varicoceles and the direct effect these vascular lesions have on male infertility have been debated. Treatment modalities used in our study were logically varicocelectomy for those patients with clinical varicocele (as a surgical problem), while those patients with no overt cause for their Asthenospermia were treated empirically by medical treatment. From a wide spectrum of drugs used as empirical treatment for Asthenospermia (vitamins, trace elements, hormones. etc.) [18], we decided to use L-carnitine because of its promising effects on sperms motility as mentioned in many published articles, and because of its relatively recent availability in our pharmacies. As we needed to test these two treatment modalities on a group of patients with the same characteristics (for a better-controlled comparison), we designed our study to put patients with subclinical varicocele into the two arms of treatment [19]. In our study, Patients in the surgical arm (clinical varicocele group) treated by varicocelectomy show significant improvement in sperm motility during the follow-up period, and at the same time, patients with subclinical varicoceles who were treated with varicocelectomy show no such significant improvement. Good improvement (>40%) was obvious in patients with G2 and G3

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varicocele, while minimal improvement (20%-40%) was seen more in patients with G1 and G2 varicocele, and no improvement in sperm motility was the commonest finding in subclinical varicoceles group. Many studies have demonstrated that subclinical varicoceles have no impact on fertility and that repair of subclinical varicoceles does not improve fertility rates. The result in our study goes with most of previous studies in that varicocelectomy for clinically detected varicoceles significantly improves sperm motility. In the other hand, the varicocelectomy for subclinical varicoceles does not significantly improve sperm motility (40). This may be explained in that higher-grade varicoceles are seemed to be the real pathology behind Asthenospermia, while low-grade and subclinical varicoceles maybe not be involved in this pathology. Nevertheless, some studies, such as that done by: R. D. Mc [20] Cure et al., recommended surgical treatment as the best option for the management of subclinical varicoceles. In our study, in spite of the low response of subclinical varicoceles to both types of treatment, the improvement in motility after varicocelectomy was relatively better than after L-carnitine supplementation.

5. CONCLUSIONS

1-Dignostic workup for infertile patients with Asthenospermia may reveal an overt cause for this problem, but a good proportion of patients have no clear identifiable cause.
2-Best results of treatment are usually achieved when the treatment is directed to an overt cause.
3-patients with Asthenospermia and clinically detected varicoceles are best treated by varicocelectomy, and the more the grade of varicoceles, the better results achieved.
4-L-carnitine supplementation for patients with Asthenospermia proved to be beneficial and safe, but when given alone, it was not enough to raise motility status to normal values.
5-for patients with Asthenospermia and subclinical varicoceles, an efficient treatment still needs to be addressed because the two treatment modalities (varicocelectomy and L-carnitine) tested in our study were not so effective.

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