

# Outcomes of Intracytoplasmic Sperm Injection in Infertile Men with Nontense Vaginal Hydrocele: A Prospective Cohort Study

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ABSTRACT

**Objective:** To evaluate the effect of nontense vaginal hydrocele in male partner with oligoasthenospermia on the success rates of the intracytoplasmic sperm injection (ICSI). **Patients and Methods:** Enrolled patients ( $n = 60$ ) were divided into two groups: Group I who have oligoasthenospermia with nontense vaginal hydrocele (study group) and Group II who have oligoasthenospermia with no hydrocele group (control group). The primary outcomes included the fertilization and pregnancy rates whereas the secondary outcomes included any complications occurred. **Results:** There were no differences in demographic characteristics between both groups. Semen parameters were poorer in the hydrocele group than in the nonhydrocele group regarding count and motility ( $P < 0.001$ ). The volume of testis was reduced significantly in the hydrocele group ( $P < 0.001$ ). The results of ICSI regarding fertilization rate, number and quality of developed embryos, and pregnancy rates are not statistically different between both groups. **Conclusion:** Hydrocele affects both sperm count and motility, but it has no effects on ICSI outcomes. Clinical pregnancy rate was comparable in patients with or without hydrocele. Hence, the surgical management of hydrocele before ICSI is not recommended.

**KEYWORDS:** Intracytoplasmic sperm injection, male infertility, nontense hydrocele, oligoasthenospermia

## INTRODUCTION

Hydrocele is defined as collection of fluid in the bilayered tunica vaginalis. In infants, the patent processus vaginalis allows accumulation of this fluid from peritoneal cavity. This fluid accumulates into the scrotum and surrounds the testicle. It may be a manifestation of certain severe underlying diseases.<sup>[1]</sup>

Hydrocele is usually painless, but if neglected can lead to physical problems and psychological complications.<sup>[2,3]</sup> Hydrocele that may cause pressure within the testis can decrease the efficiency of spermatogenesis. Dandapat *et al.* conducted testicular biopsies from 120 patients with and without hydrocele. They found that patients with hydrocele exhibited testicular atrophy in 8% and flattening of the testis in 22% of cases.<sup>[4]</sup> Moreover, affected patients may exhibit partial arrest of spermatogenesis in 10% of cases, whereas 8%

had a total arrest. Histological examinations revealed thickening of the basement membrane, tunica albuginea, and tunica vaginalis. They suggested that the arrests of spermatogenesis may be due to increased pressure on the blood supply to the testis from edema.<sup>[5,6]</sup>

Another pathology is found in patients with hydrocele, which is the rise in temperature leading to more failure in spermatogenesis.<sup>[4]</sup> As water is the major component of hydrocele, resistance to the thermoregulatory mechanism, water can hold heat very well for long periods, leading to failure of heat dissipation, resulting in impairment of spermatogenesis.<sup>[5,7]</sup> Semen quality decreases by 40% for every 1°C rise in scrotal temperature and eventually affecting male fertility.

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Moreover, sexual dysfunction is recorded in married men with vaginal hydrocele.<sup>[8]</sup> In this study, trials of intracytoplasmic sperm injection (ICSI) in infertile men with nontense types of vaginal hydrocele were conducted to evaluate if hydrocele affects the results of ICSI or not.

## PATIENTS AND METHODS

### Study design and setting

A prospective cohort study was conducted at Urology department and obstetrics and gynecology department, Fertility Unit of the Educational Hospital, Faculty of Medicine, Tanta University in the period between January 2016 and October 2018.

### Eligibility

Infertile couples with male oligoasthenospermia were recruited from outpatient clinic of urology department. Patients were selected according to inclusion and exclusion criteria. The inclusion criteria were infertile couples due to male factor with normal female partner, oligoasthenospermia with count <15 million/ml and progressive motility <32% or total motility <40%, normal hormonal profile (serum free and total testosterone, prolactin, estrogen, and luteinizing hormone), and presence or absence of nontense vaginal hydrocele. The exclusion criteria were presence of varicocele, history of recent testicular trauma, history of recent or old testicular inflammation, history of recent testicular surgery or biopsy, tense vaginal hydrocele, and presence of potential female pathologies.

Males were assessed by the fourth author including genital examination, ultrasound, and scrotal Doppler to measure testicular size, confirm hydrocele, and detect other pathologies and semen analysis using the WHO (2010) criteria after 3–4 days of abstinence. Testicular size or volume was measured by ultrasound using the following equation: width × length × depth × 0.71.<sup>[9]</sup>

Female partners were assessed by the first, second, and third authors including genital examination, radiological, and laboratory investigations. ICSI steps starting by ovarian controlled hyperstimulation using long agonist stimulation protocol, triggering with 10,000 IU human chorionic gonadotropin and ovum pickup, fertilization by sperms and then embryo transfer on day 5 by transferring two embryos of the best available quality. Demographic data of both couples, duration of infertility, seminal parameters (WHO-2010), and results of ICSI in these couples were recorded. Pregnancy was confirmed by serum pregnancy test.

### Embryo gradation

Two trained embryologists with more than 10 years' experience depend on the criteria proposed from

society of assisted reproductive technologies, a simple grading system that assesses cell number, fragmentation, symmetry, and stage on day 3 and assesses trophectoderm and quality of the inner cell mass (ICM) on day 5.<sup>[10]</sup> Embryos were graded into four grades, according to the percent of fragmentation (nofragmentations, 0%–10%, 10%–25%, and ≥25%) and cell counts and symmetry: grade 4, equal-sized symmetrical cells with no fragmentation and 6–8 cells; Grade 3, equal-sized symmetrical cells with <10% fragmentation and/or 4–5 cells; Grade 2, nonsymmetrical blastomers with 10%–25% fragmentation, <4 cells; and Grade 1 more than 25% fragmentation. Embryo quality was divided into good quality “G” (Grade 3 and 4) and poor quality “P” (Grade 1 and 2). Blastocysts were graded according to the extent to which the blastocoeles occupy the volume of the embryo, as well as the ICM and trophectoderm (number and organization of cells).<sup>[11]</sup> Good-quality embryos (Grade 3–4) were defined as those where at least: the blastocoele completely fills the embryo (Grade 3); the ICM is loosely grouped with several cells (Grade B); and the trophoectoderm has very few cells forming a loose epithelium (Grade B) (≥3BB). On day 5, poor-quality embryos (Grade 1 or 2) defined as lower than 3BB-quality embryos.

### Study outcomes

The primary outcomes included the fertilization and pregnancy rates whereas the secondary outcomes included any complications occurred.

### Ethical approval and trial registration

The patients were informed about the study objectives, results and risks. All included participants signed informed consent. This study was approved by the local institutional ethics committee of Tanta University. The study was registered on clinicaltrials.gov (NCT03532386).

### Statistical analysis

The data were collected and entered into a Microsoft Access database and then analyzed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA, version 22). Quantitative variables were presented in terms of mean and standard deviation. They were compared using a Student's *t*-test. Qualitative variables were presented as frequency and percentage. Chi-square test was used for comparison between groups. For analysis,  $P < 0.05$  was considered statistically significant.

## RESULTS

The recruitment included 65 couples from both departments of urology and obstetrics and gynecology where five couples were excluded due

to nonfulfillment of inclusion criteria ( $n = 4$ ) or declined to participate ( $n = 1$ ). Enrolled patients were divided into two groups: the first group ( $n = 30$ ) who have oligoasthenospermia with nontense vaginal hydrocele (study group) and the second group ( $n = 30$ ) who have oligoasthenospermia with no hydrocele group (control group).

The demographic criteria of enrolled couples are presented in Table 1. The mean age of male and female partners were matched in both groups with no significant differences ( $P = 0.284$  and  $0.573$ , respectively). The duration and types of infertility were also nonsignificantly different in both groups ( $P = 0.905$  and  $0.522$ , respectively). The semen parameters were notably poorer in the hydrocele group than in the nonhydrocele group regarding both count and motility. The counts were reduced in the study group than in the control group ( $2.34 \pm 0.5$  vs.  $4.8 \pm 1.10$  million/ml,  $P < 0.001$ ). The motility also was affected either progressive or total motility in the hydrocele group ( $10.7\% \pm 1.4\%$  and  $17.9\% \pm 0.75\%$  vs.  $12.3\% \pm 3.4\%$  and  $31.03\% \pm 1.5\%$ , respectively). Moreover, the size of testis was reduced in the hydrocele group than in the control group with  $P < 0.001$  as shown in Table 1.

The outcome parameters of this study are represented in Table 2 where there were no significant differences between both groups regarding the total dose of

gonadotropins, duration of stimulation, and number of retrieved oocytes. The fertilization rate and number and quality of developed embryos were nearly similar in both groups. Pregnancy rates were 53.33% and 56.67% in the study and control groups, respectively ( $P = 0.796$ ). Ovarian hyperstimulation syndrome was reported in two cases (6.67%) in the study group and three cases (10.00%) in the control group and mild cases were treated on outpatient basis.

## DISCUSSION

This study demonstrated that the presence of nontense hydrocele in oligoasthenospermic infertile males had no negative impact on ICSI results, which are determined by quality of embryos, endometrial receptivity, and techniques of assisted reproductive technology used. Only the quality of embryos was studied in both groups and found no difference.

Although nontense hydrocele poses little risk and major consequences on future fertility, there is a potential for more fluid collection due to developmental connections between the abdominal cavity and scrotum. Also, there may be an underlying scrotal pathology requiring evaluation and surgical management.<sup>[12]</sup>

Studies addressing the effect of nontense hydrocele on semen parameter and fertility issues were few and

**Table 1: Clinical characteristics of enrolled patients**

	Group I Asthenospermia with nontense hydrocele ( $n=30$ )	Group II Asthenospermia without hydrocele ( $n=30$ )	<i>P</i>
Age of male partner (years)			
Range	22-41	23-38	0.284
Mean±SD	28.5±2.7	29.2±2.3	
Age of female partner (years)			
Range	20-35	21-34	0.573
Mean±SD	24.8±1.6	25.02±1.4	
Duration of infertility (years)			
Range	1-7	1-6	0.905
Mean±SD	4.44±2.1	4.5±1.8	
Type of infertility, <i>n</i> (%)			
Primary	25 (83.33)	23 (76.67)	0.522
Secondary	5 (16.67)	7 (23.33)	
Previous ICSI trials, <i>n</i> (%)			
Yes	13 (43.33)	10 (33.33)	0.429
No	17 (56.67)	20 (66.67)	
Sperm count (million/ml)			
Range	0.01-8	0.2-10	<0.001*
Mean±SD	2.34±0.5	4.8±1.10	
Sperm motility (%)			
Progressive	10.7±1.4	12.3±3.4	0.020*
Total	17.9±0.75	31.03±1.5	<0.001*
Volume of testis (ml)	11.1±2.1	16.4±1.5	<0.001*

\*Statistically significant difference. SD=Standard deviation, ICSI=Intracytoplasmic sperm injection

**Table 2: The outcome parameters of the study**

	Group 1 Asthenospermia with nontense hydrocele (n=30)	Group 2 Asthenospermia without hydrocele (n=30)	P
Total dose of gonadotropins (IU)			
Range	2250-2850	2300-2750	0.544
Mean±SD	2417±214.5	2450±205.00	
Duration of stimulation (days)			
Range	10-13	11-14	0.079
Mean±SD	11.3±1.4	11.9±1.2	
Number of retrieved follicles			
Range	10-14	10-15	0.767
Mean±SD	12.4±1.2	12.3±1.4	
Number of embryos			
Range	5-8	6-8	0.748
Mean±SD	6.7±1.3	6.8±1.1	
Quality of embryos, mean±SD			
Poor quality	2.4±0.33	2.3±0.31	0.231
Good quality	4.6±0.7	4.8±0.4	0.179
Clinical PR, n (%)	16 (53.33)	17 (56.67)	0.796
Primary infertility (cases)	13	12	
Secondary infertility (cases)	3	5	
Complications, n (%)			
OHSS	2 (6.67)	3 (10.00)	0.643
Cycle cancellation	0	0	-

PR=Pregnancy rate, OHSS=Ovarian hyperstimulation syndrome, SD=Standard deviation

contradictory. Previous studies stated that hydrocele affects fertility by raised intrascrotal temperature as water retains heat more than other liquids leading to resistance in the thermoregulatory mechanism in the scrotum and affecting spermatogenesis.<sup>[4,13]</sup> Semen quality also decreases by hydrocele and has a direct link to male infertility.<sup>[14]</sup> On the other hand, some studies concluded that hydrocele alone may not affect fertility except when associated with other pathologies.<sup>[15,16]</sup>

In the current study, it was found that nontense hydrocele affected semen parameters and size of testis. The affected parameters were count of semen where there was reduced count in the study group compared to the control group ( $2.34 \pm 0.5$  vs.  $4.8 \pm 1.10$  million/ml, respectively). The motility was also reduced either progressive or total motility in the study group compared to the control group as shown in Table 1. These effects were also found in studies done by Dandapat *et al.*<sup>[4]</sup> and Jung and Schuppe.<sup>[6]</sup>

This is the first study addressing the results of ICSI in patients with nontense hydrocele with oligoasthenospermia. There were no significant differences regarding dose of gonadotropins, duration of stimulation, and number of retrieved oocytes. The numbers of developed embryos were nearly similar in both groups ( $6.7 \pm 1.3$  vs.  $6.8 \pm 1.1$ ) with  $P = 0.748$ . The embryos' quality was not different in both groups.

Similarly, clinical pregnancy rate was not significant in both groups with  $P = 0.796$ . Minor complications were reported in the current study including mild ovarian hyperstimulation syndrome which was managed on outpatient basis.

## CONCLUSION

Although nontense hydrocele affects both sperm count and motility, it has no effects on ICSI outcomes. Clinical pregnancy rate was comparable in patients with or without hydrocele. Hence, the surgical management of hydrocele before ICSI is not recommended.

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## Conflicts of interest

There are no conflicts of interest.

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