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The Study on Comparison of Clinical Outcomes of Intracytoplasmic Sperm Injection in Patients with Epididymal Sperm and Testicular Sperm

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Objective: This study was carried out to compare the clinical outcomes of intracytoplasmic sperm injection (ICSI) in patients with obstructive azoospermia according to sperm retrieval site and technique; microsurgical epididymal sperm aspiration (MESA), percutaneous epididymal sperm aspiration (PESA), testicular sperm extraction by open biopsy (TESE).

Methods: The outcomes of ICSI and IVF-ET were evaluated and compared among 3 groups. Seventy three men suffering from infertility due to obstructive azoospermia had 107 ICSI cycles using MESA (21 cycles in 15 patients), PESA (26 cycles in 17 patients) and TESE (60 cycles in 41 patients).

Results: In the clinical outcomes in patients undergoing ICSI with epididymal or testicular sperm, there were no significant differences in fertilization rate (66.1% vs. 60.5%), cleavage rate (94.9% vs. 97.6%), cumulative embryo score (CES) (51.3 vs. 58.8), implantation rate (7.9% vs. 6.1), and clinical pregnancy rate per ET (30.4% (14/46) vs. 25.4% (15/59)) between both groups. Also, in the clinical outcomes in ICSI patients using MESA, PESA, TESE, there were no significant differences in fertilization rate (61.8%, 69.4%, 60.5%), cleavage rate (92.1%, 97.3%, 97.6%), CES (38.1, 52.0, 58.8), implantation rate (9.5%, 6.6%, 6.1%), and clinical pregnancy rate per ET (35% (7/20), 26.9% (7/26), 25.4% (15/59)) among 3 groups.

Conclusion: When compared with MESA or TESE, PESA, the clinical outcomes were similar in ICSI patients with obstructive azoospermia whatever the origin or the technique of sperm retrieval. However, we considered PESA is more time-saving and cost effective for ICSI in patients with obstructive azoospermia.

Key Words: Obstructive azoospermia, microsurgical epididymal sperm aspiration (MESA), Percutaneous epididymal sperm aspiration (PESA), Testicular sperm extraction by open biopsy (TESE), Intracytoplasmic sperm injection (ICSI)

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(male factor infertility) 50~60%

가

가

가

(obstructive azoospermia)

(nonobstructive azoospermia)

15%

85%,

3

(microsurgical epididymal sperm aspiration, MESA), (percutaneous epididymal sperm aspiration, PESA)

(intracytoplasmic sperm injection, ICSI)

1.

1998 1 2002 10

가

4 MESA 73 , 107 ICSI

7%

5

(congenital absence of vas deferens, CAVD)

50~80%

6,7

가

2.

가

1)

(luteal phase long protocol)

ICSI , gonadotropin-releasing hormone (GnRH) agonist D-Trp-6 -LHRH (Decapeptyl, Fer-

ring, Malmö, Sweden) IVF medium 가

E₂ (estradiol) 16 mm PESA TESE

가 2 E₂ 가

hCG (human chorionic gonadotropin; Profasi, Serono, Aubonne, Switzerland) 10,000 IU TESE 1 cm (tunica albuginea)

hCG 36 가

2)

D-PBS 1 ml IVF medium

D-PBS가 1,000 rpm 10 2 ,

(dissecting microscope) - 가 IVF medium 1,000

(oocyte-cumulus cell complex) - rpm 10 IVF medium 1,000

IVF medium 2 ml가 rpm 10 IVF medium ICSI

37 , 5% CO₂ IVF medium ICSI

, 1~2

0.1% hyaluronidase Pa- 4) (ICSI)

steur pipette ICSI (Diaphot 300, Nikon, (inverted microscope) MII 88, Narishige, Japan) 1 (micromanipulator; NT-

(Metaphase II) ICSI (holding pipettes) (injection pipettes)

ICSI 3 (tool holder)

MI (Metaphase I) 가 MII (microinjector)

ICSI ICSI micropipette (10-MIC, Humagen Fertility Diagnostic, Inc. Virginia) ,

3) MESA, PESA, TESE Narishige GD-1 (glass capillary tube)

MESA 가 puller

가 가

plastic pipette microforge (MF-9, Narishige)

IVF medium 15~20 μm, 100~120 μm

, epididymal tubule 10-0 nylon periad- 30~40°

ventital tissue 9-0 nylon

PESA Oil IVF medium

23 gauge

(scalp needle) 10 ml 10% polyvinyl-

IVF medium 가 pyrrolidone (PVP)

(midpiece) mobilization) 가 (im- progesterone (Progset, Sabil, Korea) 50 mg

MII 1 가 12 3 9 11 β -hCG 가 3 mIU/ml , 1 β -hCG 가 , 5~6 (gestational sac)

(oolemma)

PVP 가 oil 1 β -hCG (biochemical pregnancy)

G1.2 20 μ l 37 , 5% CO₂

5) ICSI 16~18 (\times 200, student's t-test, Sheffe's F \times 400) 2 (polar body) 2 post-hoc analysis of variance p<0.05 (pronucleus) 24 (cleavage) 1. ICSI 32 (47 (blastomeres) , (anucleate frag-) 41 (60) ments)) MII , ICSI (2PN) 가 (Table 1). (embryo grading) 가 ¹³ 5 ICSI (CES) 가 (Table 2). Veek's classification system (1990)¹⁴ 5 grade 1 5 , grade 2 4 , grade 3 3 , grade 4 2 , grade 5 1 (number of bla- stomeres) , 가 (Table 2). (cumulative embryo score, CES) . 2PN 0 6.1% 가 , 7.9% , 30.4% 1PN , 8- 8- (14/46), 25.4% (15/59)

¹³

6) 48 4~6 (cryopreservation) ¹⁵ 4 MESA , PESA , TESE , PESA 35.5 \pm 4.0 MESA 32.6 \pm 5.4 , TESE 32.4 \pm 4.6

Table 1. Clinical parameters in patients with obstructive azoospermia according to sperm retrieval site

No.	Epididymal sperm	Testicular sperm	p value
Cycles	47	60	
Age (yrs)	34.1±4.9	32.4±4.6	0.576
Oocytes retrieved	10.6±6.7	11.2±4.9	0.452
Metaphase II oocytes	8.4±5.6	9.4±4.2	0.560
Oocytes fertilized (2PN)	5.7±4.4	4.7±3.6	0.764

Mean±SD, Student's t-test

Table 2. Results of IVF-ICSI in patients with obstructive azoospermia according to sperm retrieval site

No.	Epididymal sperm	Testicular sperm	p value
Cycles	47	60	
Fertilization rate (%)	66.1±24.1	60.5±26.5	0.411
Cleavage rate (%)	94.9±17.6	97.6±8.8	0.809
Embryos transferred	3.6±1.6	3.8±1.2	0.969
CES	51.3±40.5	58.8±37.1	0.206
Implantation rate (%)	7.9±13.7	6.1±13.9	0.506
CPR/ET (%)	14/46 (30.4)	15/59 (25.4)	0.716

Mean±SD, Student's t-test, CES: cumulative embryo score, CPR: clinical pregnancy rate with fresh transfer

Table 3. Clinical parameters in patients with obstructive azoospermia according to sperm retrieval technique

No.	MESA	PESA	TESE
Cycles	21	26	60
Age (yrs)	32.6±5.4*	35.5±4.0	32.4±4.6*
Oocytes retrieved	11.2±7.7	9.6±5.7	11.2±4.9
Metaphase II oocytes	8.9±6.2	7.5±4.9	9.4±4.2
Oocytes fertilized (2PN)	5.8±4.5	4.8±4.0	4.7±3.6

Mean±SD, Sheffé's F post-hoc analysis of variance, *: p<0.05

MESA (Table 3). PESA (Table 4). ICSI (Table 4). MESA 9.5%

MESA 26.9% (7/26), TESE 25.4% (15/59) MESA (Table 4).

MESA 35.0% (7/20), PESA 25.4% (15/59) MESA (Table 4).

Table 4. Results of IVF-ICSI in patients with obstructive azoospermia according to sperm retrieval technique

No.	MESA	PESA	TESE	p value
Cycles	21	26	60	
Fertilization rate (%)	61.8±27.1	69.4±21.3	60.5±26.5	NS
Cleavage rate (%)	92.1±23.9	97.3±10.1	97.6±8.8	NS
Embryos transferred	3.2±1.5	3.8±1.8	3.8±1.2	NS
CES	38.1±33.8	52.0±33.1	58.8±37.1	NS
Implantation rate (%)	9.5±15.0	6.6±12.7	6.1±13.9	NS
CPR/ET (%)	7/20 (35.0)	7/26 (26.9)	15/59 (25.4)	NS

Mean±SD, Sheffe's F post-hoc analysis of variance, NS: not significant

가 , ^{10,18} PESA 가

가 , MESA ,⁵ PESA

7%

^{16,17} 10~20%

¹⁹ MESA PESA 가

(TESE) ICSI ^{20,21}

가 MESA PESA TESE

가 ¹⁷

가 MESA가 가

(epididymo-vasostomy) 1 MESA

가 가 MESA , ICSI

ICSI

MESA 3가

가 ,

40~60% ¹² 가 가 27.6% (29/105) PESA

35

ICSI

, PESA가

- 22,23
- ICSI
- 가
- MESA TESE
- PESA가
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