

OPEN EPIDIDYMAL SPERM ASPIRATION (OESA): MINIMALLY INVASIVE SURGICAL TECHNIQUE FOR SPERM RETRIEVAL.

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Summary.- OBJECTIVES: Male infertility caused by irreparable obstructive azoospermia is widely treated with MESA (Microsurgical Epididymal Sperm Aspiration) or TESE (Testicular Sperm Extraction) or PESA (Percutaneous Epididymal Sperm Aspiration) followed by an Intracytoplasmic Spermatozoa Injection (ICSI). For each procedures are claimed advantages and disadvantages. Aim of this work is to describe our technique (OESA) for sperm retrieval reporting the results.

METHODS: From 1998 to 2003 153 sperm retrieval procedures in azoospermic patients were performed. The technique consists in a small (1 cm.) surgical incision of scrotal wall under local or spinal anaesthesia. After inspecting the intrascrotal component to record the status of the epididymis and of the testicle, epididymal sperm aspiration was performed in the most appropriate site with 18 gauge needle. The aspirated spermatozoa were used immediately after aspiration not being permitted in our Institute cryopreservation. When no sperms were found TESE was performed.

RESULTS: In 78 cases aspiration from epididymis was successful (OESA). In the other patients (75) TESE was performed. Higher count of spermatozoa were retrieved

in all cases of OESA. Pregnancy rate was 26,6% for OESA and 6,4% for TESE. No complications occurred.

CONCLUSIONS: This technique is very simple and easy allowing to obtain the advantages of microsurgical techniques (mainly choice of the most appropriate site of aspiration and immediate haemostasis if needed) with minimal invasivity (avoiding epididymal surgical incision). Moreover if OESA does not allow sperm extraction is possible to perform immediately TESE.

Keywords: Male infertility. Azoospermia. Surgical therapy. Sperm retrieval.

Resumen.- OBJETIVO: La infertilidad masculina causada por azoospermia obstructiva irreparable se trata ampliamente con aspiración epididimaria microquirúrgica (MESA- microsurgical Epididymal sperm Aspiration) o percutánea (PESA- Percutaneous Epididymal Sperm Aspiration), o con extracción testicular (TESE- Testicular Sperm Extraction) seguida por ICSI (Intracytoplasmic spermatozoa injection). Cada uno de los procedimientos tiene ventajas e inconvenientes. El objetivo del presente artículo es describir nuestra técnica para la obtención de espermatozoides (OESA- Open Epididymal Sperm Aspiration) y comunicar nuestros resultados.

MÉTODOS: Entre 1998 y 2003 se realizaron 153 procedimientos para la obtención de espermatozoides. La técnica consiste en una pequeña incisión escrotal (1 cm) bajo anestesia local o espinal. Después de inspeccionar el contenido escrotal para evaluar el estado del epidídimo y del testículo se procede a la aspiración epididimaria en el sitio más apropiado con una aguja del 18 gauge. Los espermatozoides aspirados se utilizan inmediatamente después de la aspiración porque nuestra institución no permite la criopreservación. Cuando no se encuentran espermatozoides se procede a TESE.

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RESULTADOS: La aspiración epididimaria fue satisfactoria en 78 casos. En los otros pacientes (75) se realizó TESE. En los casos de OESA se obtuvo un número mayor de espermatozoides. La tasa de embarazos fue del 26,6% con OESA y 6,4 % con TESE. No hubo complicaciones.

CONCLUSIONES: Esta técnica es muy simple y fácil de realizar, permitiendo conseguir las ventajas de las técnicas microquirúrgicas (principalmente la elección del sitio más apropiado para la aspiración y hemostasia inmediata cuando es necesario) con mínima invasión (evitando la incisión quirúrgica del epidídimo). Además, si la OESA no obtiene espermatozoides es posible realizar inmediatamente TESE.

Palabras clave: Infertilidad masculina. Azoospermia. Tratamiento quirúrgico. Obtención de espermatozoides.

INTRODUCTION

The considerable development of ART (Assisted Reproductive Technology), unimaginable until a few years ago, and especially the introduction of ICSI (Intracytoplasmic Sperm Injection) have enlarged the therapeutic options for management of infertile men.

Particularly, male infertility caused by azoospermia due to non-reconstructable obstruction or congenital aplasia of vas deferens can be treated using different surgical techniques for epididymal or testicular sperm retrieval.

Retrieved sperm can be used immediately (fresh) for ICSI or after cryopreservation (frozen) (1).

The objective of the present study is to describe our technique for sperm retrieval (OESA), reporting the results, and to compare the advantages and the disadvantages of each technique.

MATERIALS AND METHODS

From 1998 to 2003 we performed 153 surgical procedures of sperm retrieval in 86 infertile men whose infertility was due to irreparable azoospermia.

The assessment of all patients has been the following:

- careful medical history
- physical examination
- serial spermograms and centrifuged seminal fluid examination
- hormone assay (FSH, LH, Testosterone, Prolactin)

- post-ejaculation urinalysis
- transrectal ultrasound
- genetic tests (karyotype, cystic fibrosis gene, Y chromosome microdeletion)
- testicular biopsy

When the diagnosis of obstructive azoospermia was clear, patients underwent the program of sperm retrieval combined with ICSI.

We stress the impossibility of cryopreservation of spermatozoa in our Institute for ethical principles.

The technique is the following: by a careful palpation of testis and epididymis, we choose the bigger epididymis; under local anaesthesia with infiltration of scrotal wall and funiculus (38%) or spinal anaesthesia (62%), a short scrotal incision (< 1 cm) is performed, creating a direct view of caput epididymis; epididymal sperm aspiration is performed in the most appropriate site with 18 gauge needle and syringe, keeping continuous aspiration by clamping the tube. A delicate squeezing of epididymis facilitates sperm retrieval; finally, haemostasis is carried out by bipolar coagulation. When no epididymal sperms are found, the 'scrotal window' is easily shifted on the testis, permitting testicular sperm extraction by a minimal incision of albuginea, sutured with vicryl 5/0.

RESULTS

In 78 cases aspiration from epididymis was successful (OESA). In the other cases (75) TESE was performed. Higher count of spermatozoa were retrieved in all cases of OESA.

No complication occurred. There was no need to convert to general anaesthesia because of patient's intolerance to local anaesthesia.

Pregnancy rate was 26,6% for OESA and 6,4% for TESE. (11)

We can formulate the following hypothesis in order to explain the great difference of pregnancy rate:

- spermatozoa without epididymal passage are less fertile.

- impaired spermatogenesis is associated to obstructive azoospermia in some patients.

We must highlight that testicular sperm retrieval has been performed after testing the lack of epididymal spermatozoa, therefore in patients with most unfavourable conditions.

It is reasonable to consider that performing TESE like the first surgical procedure would enhance successful rate in accord to the literature.

DISCUSSION

The most severe expression of male infertility factor is azoospermia, where no sperm are present in the ejaculate. Azoospermia is found in 15-20% of men evaluated for infertility. Causes of azoospermia include congenital and acquired reproductive tract obstruction as well as spermatogenic failure.

Azoospermia may have different aetiologies previously described as pretesticular (i.e. abnormal Hypothalamo-Pituitary-Gonadal hormonal axis), testicular (i.e. secondary to abnormal testicular function) and post testicular (i.e. obstruction or ejaculatory dysfunction). This classification, although physiologically correct, is not always practical for treatment decision making. The division of azoospermia into **OBSTRUCTIVE and NON-OBSTRUCTIVE** categories allows a better determination of specific treatment options available for a particular patient. It is also critically important since patients with nonobstructive azoospermia have different genetic problems.

The approach to azoospermic patient has changed significantly with the introduction of sperm retrieval techniques and assisted reproduction, especially IVF/ ICSI.

In fact the introduction of ICSI has resulted in a significant improvement in IVF rates in cases of severely impaired male fertility. In the performance of ICSI, 1 sperm is injected directly into the cytoplasm of each egg, and the resulting embryos are subsequently transferred.

In addition to improving pregnancy rates using sperm from semen, ICSI has opened new possibilities for achieving pregnancy with sperm obtained from either the epididymis or from the testis itself. In cases of uncorrectable ductal obstruction, sperm often can be obtained from the epididymis or through laboratory processing of testis tissue. (5,6)

Since ICSI literally requires only 1 motile sperm per egg, its use has enhanced fertilization and pregnancy rates in such settings. In 1 report of 424 pregnancies achieved through the use of ICSI for severe male factor infertility, outcomes were similar to those obtained by using conventional IVF with normal semen (2).

In another study, no difference in the ICSI fertilization rates was noted with fresh versus frozen/thawed sperm or sperm obtained via electroejaculation (fresh sperm, 66%; frozen sperm, 66%; electroejaculated sperm, 68%) (3,4)

Fertilization and clinical pregnancy rates using ICSI with epididymal and testicular sperm are shown in Table I.

We describe the main techniques for sperm retrieval and their advantages and disadvantages.

MICROSURGICAL EPIDIDYMAL SPERM ASPIRATION (MESA)

It was the first technique of sperm retrieval for ART (Silber, 1987). It allows to choose the best tu-

TABLE I. FERTILIZATION AND CLINICAL PREGNANCY RATES USING ICSI WITH EPIDIDYMAL AND TESTICULAR SPERM.

	Sperm source	Number of cycles	Clinical pregnancy rate (%)
Palermo, 1995(7)	E	35	51,4
	E (AI)	17	82,4
Silber, 1996(8)	T	47	36
	T (M)	7	57
	T (S)	18	27,7
Hovatta, 1995(9)	E	9	17
	T	21	21
Schlegel, 1997(10)	T	98	50
Lania, 2004(11)	E	78	26
	T (EE)	75	6,4

ICSI, intracytoplasmic sperm injection; E, epididymal sperm; AI, aggressive sperm immobilization; T, sperm from testicular tissue; M, maturation arrest; S, Sertoli-cell-only syndrome; EE, empty epididymis

bules for sperm aspiration (95%). Open haemostasis reduces the occurrence of intrascrotal hematoma.

Disadvantages: it is a difficult technique; it requires time, skilled operators, availability of operating microscope and adequate instruments; therefore it's a more expensive surgical procedure.

PERCUTANEOUS EPIDIDYMAL SPERM ASPIRATION (PESA)

It's performed since 1995. Advantage: it is an easy and low cost technique.

Disadvantages: lower count of sperm retrieval (60-70%); occurrence of hematoma and injury of tubules

TESTICULAR SPERM ASPIRATION (TESA) O TESTICULAR FINE NEEDLE ASPIRATION (TEFNA)

It permits an adequate count of sperm retrieval for ICSI, but not for cryo-preservation.

It is a simple and minimally invasive technique.

Disadvantages: occurrence of hematoma

TESTICULAR SPERM EXTRACTION (TESE)

It is carried out by open biopsies, frequently in a multilocular technique.

It can be used if other techniques (MESA, PESA, TESA) fail because it is simple and it doesn't require operating microscope.

It doesn't damage tubules.

Disadvantages: it involves loss of a certain proportion of testicular tissue.

CONCLUSIONS

Finally each one of the mentioned techniques can be performed for ICSI in men with obstructive azoospermia. In fact, in the literature, the results of pregnancy rate show that statistically there is no significant difference using the various techniques.

The final choice will depend on: operator's skill; availability of Centres for ART to perform microsurgical procedures; costs (higher for microsurgery); the patient's preference for a procedure that allows cryopreservation or for repeated needle aspirations.

OESA is an effective and affordable procedure to treat men with irreparable azoospermia.

In fact:

- this technique is very simple and easy to perform
- it's cost-effective
- it allows to obtain the advantages of microsurgical techniques (mainly choice of the most appropriate site

of aspiration and immediate haemostasis if needed)
- it's minimally invasive (avoiding epididymal surgical incision)

- when recovery of epididymal sperm is not possible, it enables to perform immediately TESE, reducing operation time, and allowing to continue the procedure under local anaesthesia

- it can be performed, therefore, in Centres, where cryopreservation is permitted, like the first surgical and diagnostic procedure in male infertility due to azoospermia.

REFERENCES AND RECOMENDED READING

(*of special interest, **of outstanding interest)

- **1. Atlante di Urologia Clinica; Infertilità, Marc Goldstein; sez. 9,1- Piccin Ed, Padova, 2000.
2. WISANTO, A.; MAGNUS, M.; BONDUELLE, M. y cols.: "Obstetric outcome of 424 pregnancies after intracytoplasmic sperm injection". Hum. Reprod.,10: 2713, 1995.
3. NAGY, Z.P.; LIU, H.; JORIS, H. y cols.: "The result of intracytoplasmic sperm injection is not related to any of the three basic sperm parameters". Hum. Reprod., 10: 1123, 1995.
4. GIL-SALMO, M.; MINGUEZ, Y.; RUBIO, C. y cols.: "Intracytoplasmic sperm injection: a treatment for extreme oligozoospermia". J. Urol., 156: 1001, 1996.
5. NIJS, M.; VANDERZ WALMEN, P.; VANDAMME, B. y cols.: "Fertilizing ability of immotile spermatozoa after intracytoplasmic sperm injection". Hum. Reprod., 11: 2180, 1996.
6. SVALANDER, P.; JAKOBSSON, A.H.; FORSBERG, A.S. y cols.: "The outcome of intracytoplasmic sperm injection is unrelated to "strict criteria" sperm morphology". Hum. Reprod., 11: 1019, 1996.
- *7. PALERMO, H.; COHEN, J.; ALIKANI, M. y cols.: "Intracytoplasmic sperm injection: a novel treatment for all forms of male factor infertility". Fertil Steril, 63: 1231, 1995.
- *8. SILBER, S.J.; VAN STEIRTEGHEM, A.; NAGY, Z. y cols.: "Normal pregnancies resulting from testicular sperm extraction and intracytoplasmic sperm injection for azoospermia due to maturation arrest". Fertil Steril, 66: 110, 1996.
- *9. HOVATTA, O.; MOILANEN, J.; VON SMITTEN, K.; REIMA, I.: "Testicular needle biopsy, open biopsy, epididymal aspiration and intracytoplasmic sperm injection in obstructive azoospermia". Hum. Reprod., 10: 2595, 1995.
- *10. SCHLEGEL, P.N.; GIRARDI, S.K.: "Clinical review 87: in vitro fertilization for male factor infertility". J. Clin. Endocrinol. Metab., 82: 709, 1997.
- *11. LANIA, C.; GRASSO, M.; DE SANTIS, L. et al: "Nuova tecnica per recupero seminale con minimo approccio chirurgico". Abs. XXI Congress of Italian Society of Andrology. Italian Journal of Andrology, 11-4:135, 2004.