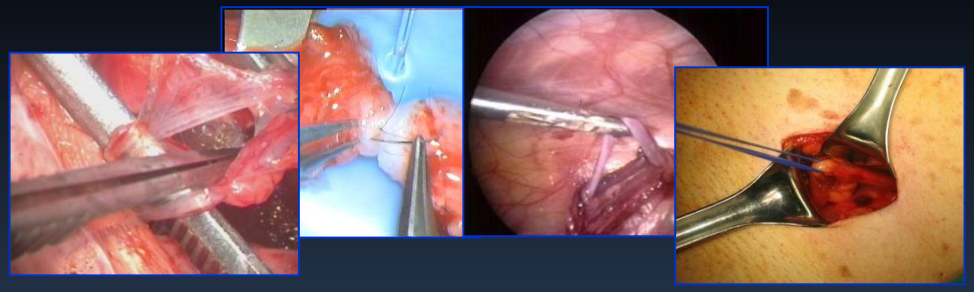

SIA
Società Italiana di Andrologia

SOCIETÀ ITALIANA DI ANDROLOGIA
Sezione Marche, Emilia-Romagna e S. Marino

XXI Congresso annuale
della sezione MERS
"L'Andrologia Sociale"

Ferrara 22 settembre 2017

AZOOSPERMIA

Le tecniche di recupero degli spermatozoi

Alessandro Franceschelli

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ANDROLOGIA BOLOGNA

DEFINIZIONE

AZOOSPERMIA:

assenza di spermatozoi nel liquido seminale anche dopo centrifugazione

AZOOSPERMIE

- OSTRUTTIVE
- NON-OSTRUTTIVE (SECRETORIE)

ORIGINAL ARTICLE International Journal of Andrology © 2010 European Academy of Andrology, **34**, 291–298

Clinical experience with azoospermia: aetiology and chances for spermatozoa detection upon biopsy

F. Tüttelmann,*† F. Werny,† T. G. Cooper,† S. Kliesch,† M. Simoni†‡ and E. Nieschlag†

General andrological diagnosis[b]	31.0
Maldescended testis/testes	16.7
Varicocele	10.3
Urogenital infections	10.3
Chromosomal aberration	15.4
Klinefelter syndrome (47,XXY)	14.2
XX male	0.6
Translocation	0.3
Other	0.3
Malignancy	15.0
Non-testicular (lymphoma, leukaemia, sarcoma)	8.1
Before gonadotoxic treatment	2.0
After treatment	6.2
Testicular tumour	6.8
Before gonadotoxic treatment	4.0
After treatment	2.8

Retrospective analysis of 1583 consecutive patients with azoospermia 1976 – 2009

Idiopathic azoospermia (no cause identifiable)	12.3
Obstruction	11.3
Vasectomy	5.9
CF, CBAVD	3.3
Other	2.0
Endocrine or other chronic disease (e.g. diabetes)	7.3
Primary hypogonadism	2.3
Secondary (hypogonadotropic) hypogonadism	2.0
Kallmann syndrome	0.5
Isolated hypogonadotropic hypogonadism	0.4
Pituitary insufficiency after surgery	0.4
Other	0.7
Y-chromosomal deletion	1.7
AZFa	0.1
AZFb	0.1
AZFc	1.2
Other	0.3
Other	1.7

Inquadramento clinico dell'Azoospermia

- Anamnesi
- Esame obiettivo
- 2 spermiogrammi con centrifugazione (300xg per 15 minuti)
- Profilo ormonale: testosterone totale, FSH, LH, Prolattina,
- Esami genetici: microdelezioni cromosoma Y, cariotipo, screening della fibrosi cistica
- Ecodoppler scrotale bilaterale in clino ed ortostatismo (ev. TRUS)

Practice Committee of American Society for Reproductive Medicine.
Diagnostic evaluation of the infertile male: a committee opinion.
Fertil Steril. 2012 Aug;98(2):294-301

The Optimal Evaluation of the Infertile Male: AUA Best Practice Statement

Revised, 2010

Recommendation: An initial endocrine evaluation should include at least a serum testosterone and FSH. It should be performed if there is: (1) an abnormally low sperm concentration, especially if less than 10 million/ml; (2) impaired sexual function; or (3) other clinical findings suggestive of a specific endocrinopathy.

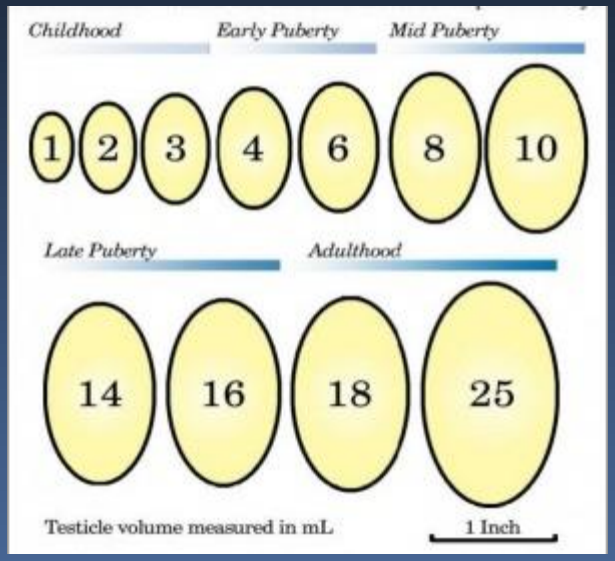
Clinical Condition	FSH	LH	Testosterone	Prolactin
Normal spermatogenesis	Normal	Normal	Normal	Normal
Hypogonadotropic hypogonadism	Low	Low	Low	Normal
Abnormal spermatogenesis*	High/Normal	Normal	Normal	Normal
Complete testicular failure/ Hypergonadotropic hypogonadism	High	High	Normal/Low	Normal
Prolactin-secreting pituitary tumor	Normal/Low	Normal/Low	Low	High

DIAGNOSI DIFFERENZIALE OA VS NOA

Valori **FSH** e **volumetria testicolare** identificano:

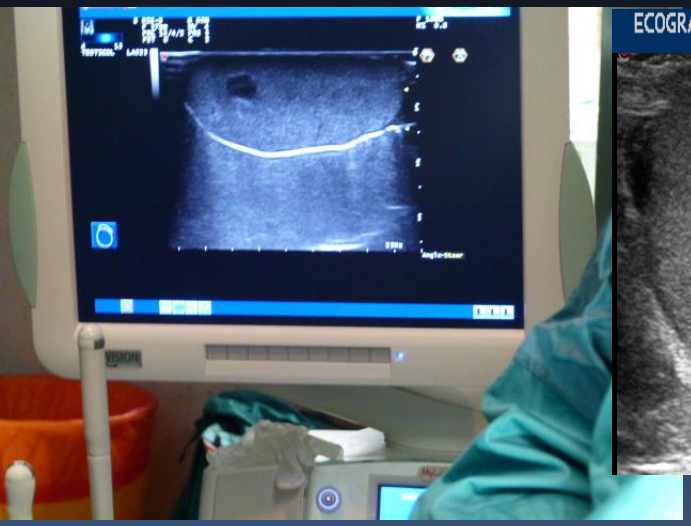
→il **96%** di **OA**

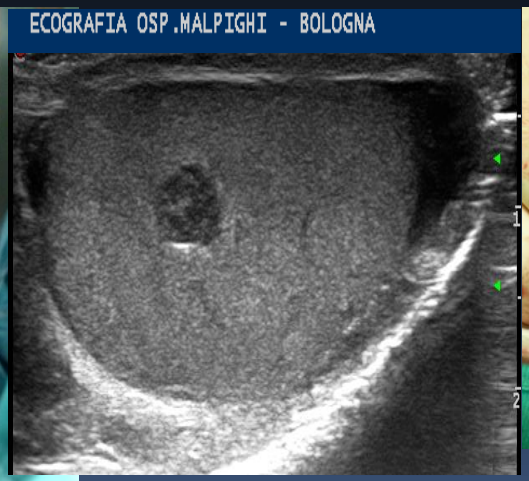
→ l'**89%** di **NOA**



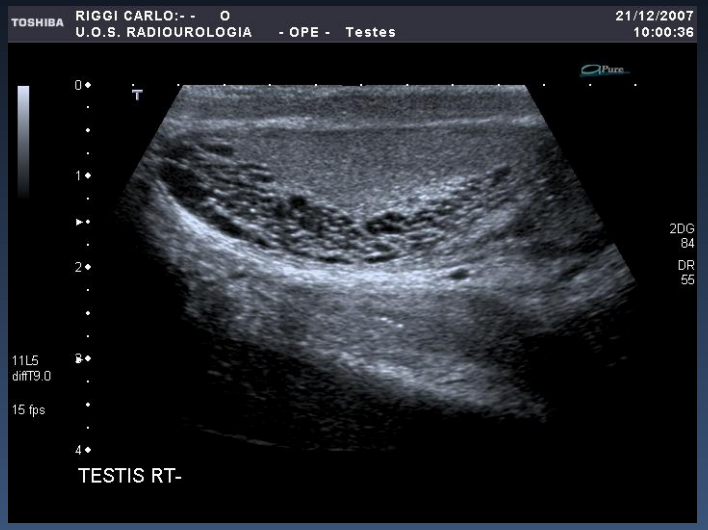
Gonadotropin, Testosterone, and Testis Volume Changes with OA and NOA

Etiology	Subtype	FSH	LH	Testosterone	Testis Volume
Obstructive Azoospermia		↔	↔	↔	↔
Non-obstructive Azoospermia	Primary Testicular Failure	↑	↑	↓	↓
	Hypogonadotropic Hypogonadism	↓	↓	↓	↓




ECOGRAFIA OSP.MALPIGHI - BOLOGNA

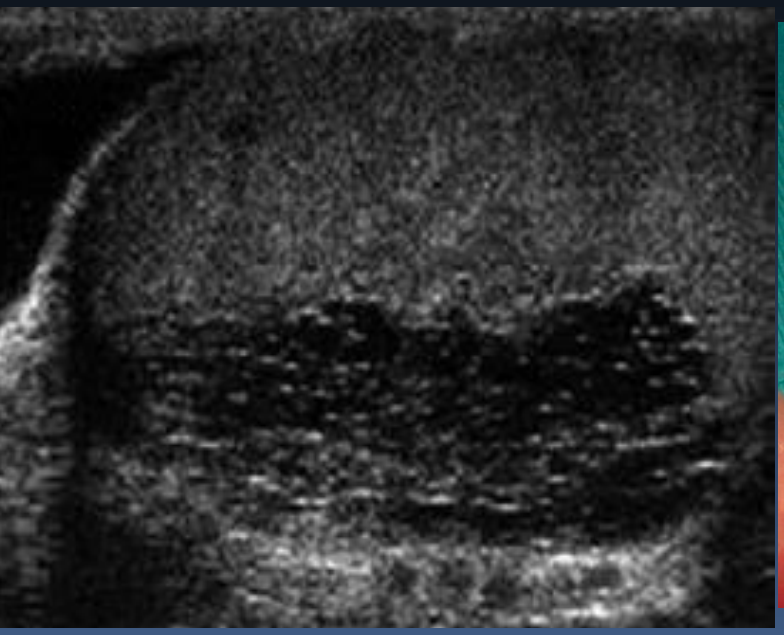
ecografia delle ostruzioni seminali

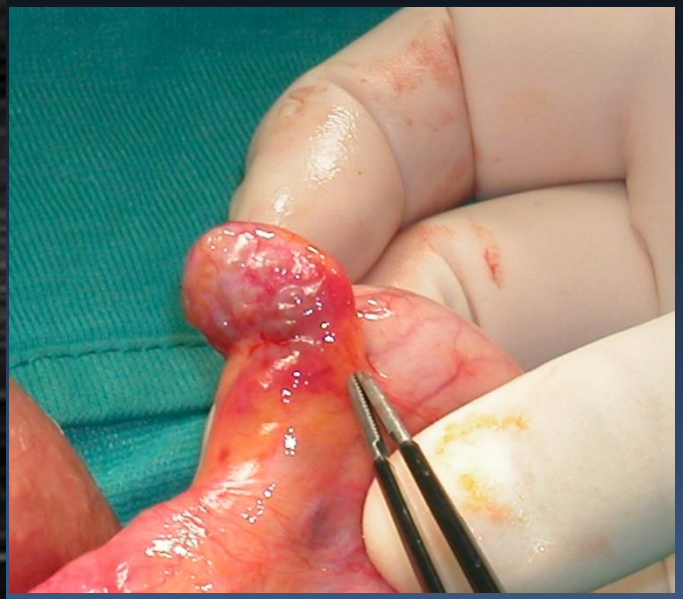


Ostruzioni prossimali (epididimo-deferente)

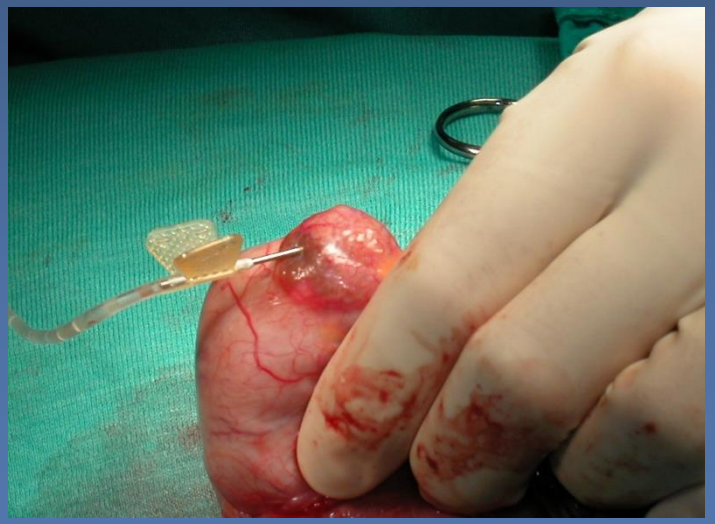
- normale volume testicolare
- testa epididimo aumentata di volume
- disomogeneità
- ectasia rete testis

ECTASIA DEL MEDIASTINUM TESTIS





AGENESIA CORPO CODA EPIDIDIMO



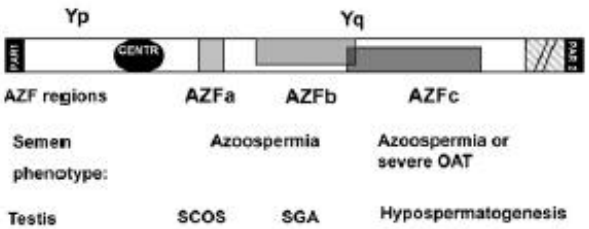
DIAGNOSI

ECOGRAFIA

CAUSE GENETICHE

Prevalence and phenotypes of common chromosomal abnormalities associated with male infertility.

Genetic abnormality	Phenotype	Prevalence, %
Chromosomal abnormalities	Azoospermia to normozoospermia	5 (total infertile population); 15 (azoospermic)
Klinefelter syndrome	Azoospermia to severe oligozoospermia	5 (severe oligozoospermia); 10 (azoospermic)
Robertsonian translocation	Azoospermia to normozoospermia	0.8 (total infertile population); 1.6 (oligozoospermic); 0.09 (azoospermic)
Y chromosome microdeletions	Azoospermia to oligozoospermia	10–15 (azoospermic); 5–10 (oligozoospermic)
AZFa deletion	Azoospermia, Sertoli cell–only syndrome	0.5–1.0 (2)
AZFb deletion	Azoospermia, spermatogenic arrest	0.5–1.0 (2)
AZFc deletion	Severe oligozoospermia to nonobstructive azoospermia	6–12
Partial AZF-c deletions	From azoospermia to normozoospermia	3–5 (2)



Tecniche di recupero spermatozoi

OA

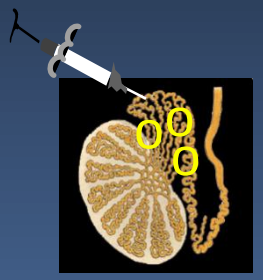
MESA: Microsurgical Epididymal Sperm Aspiration

PESA: Percutaneous Epididymal Sperm Aspiration

TESE: TEsticular Sperm Extraction

TESA: TEsticular Sperm Aspiration

ESE: Epididymal Sperm Extraction



MVSA: Microsurgical Vasal Sperm Aspiration

DISTA: DIstal Seminal Tract Aspiration

NOA

(TESA): TEsticular Sperm Aspiration

TESE: TEsticular Sperm Extraction

MicroTESE: Microsurgical TEsticular Sperm Extraction

Tecniche di recupero spermatozoi

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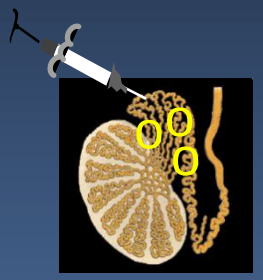

NOA

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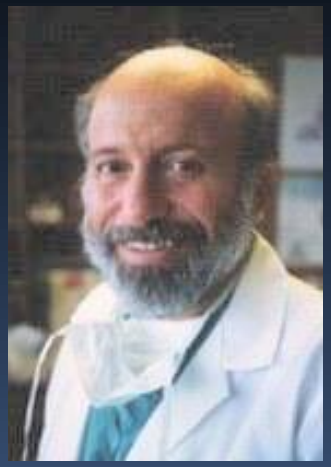
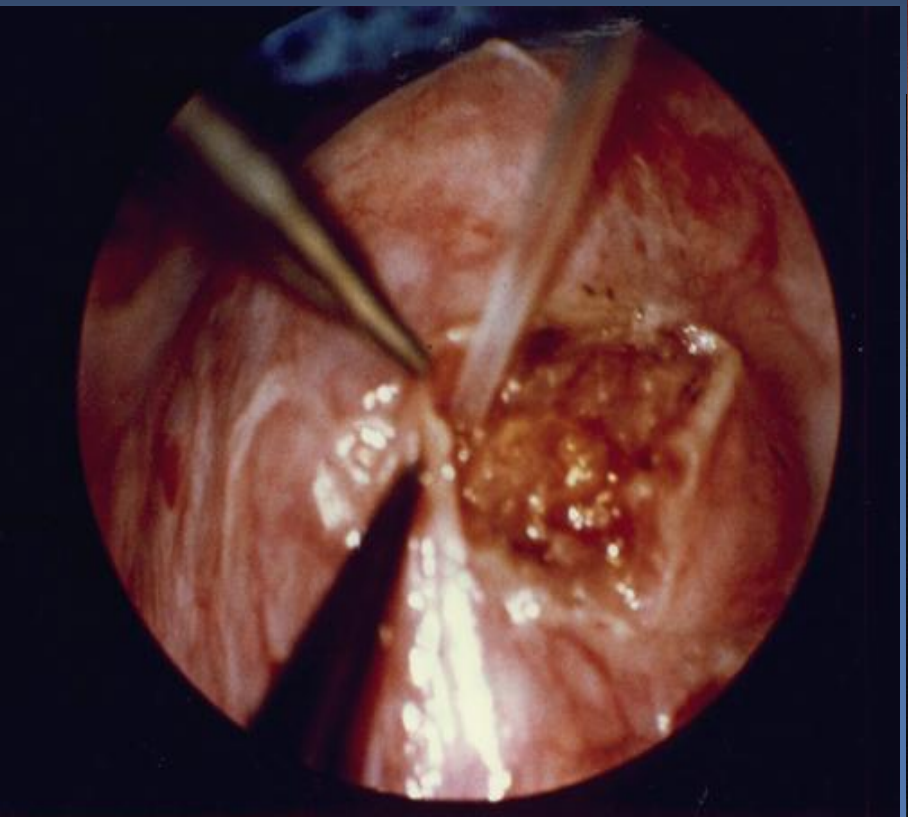
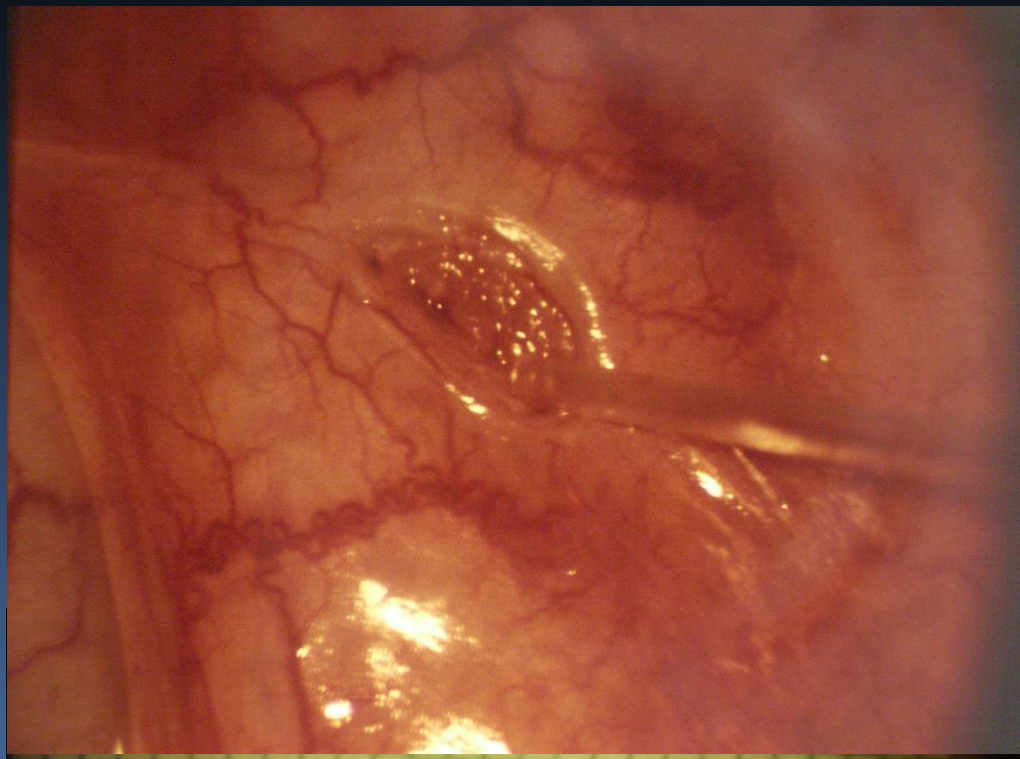
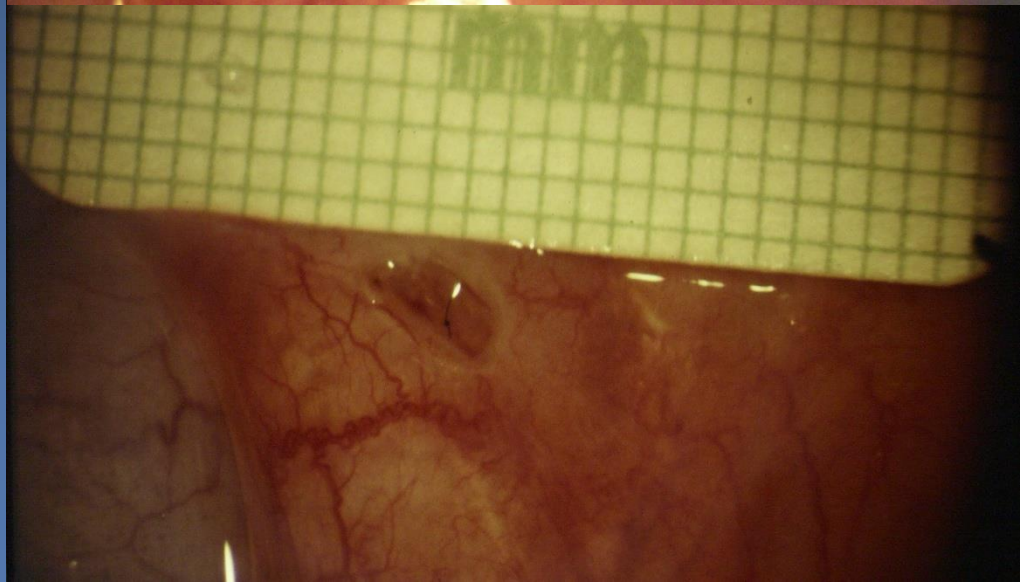
Trattamento azoospermie ostruttive

MESA
(Silber 1987)



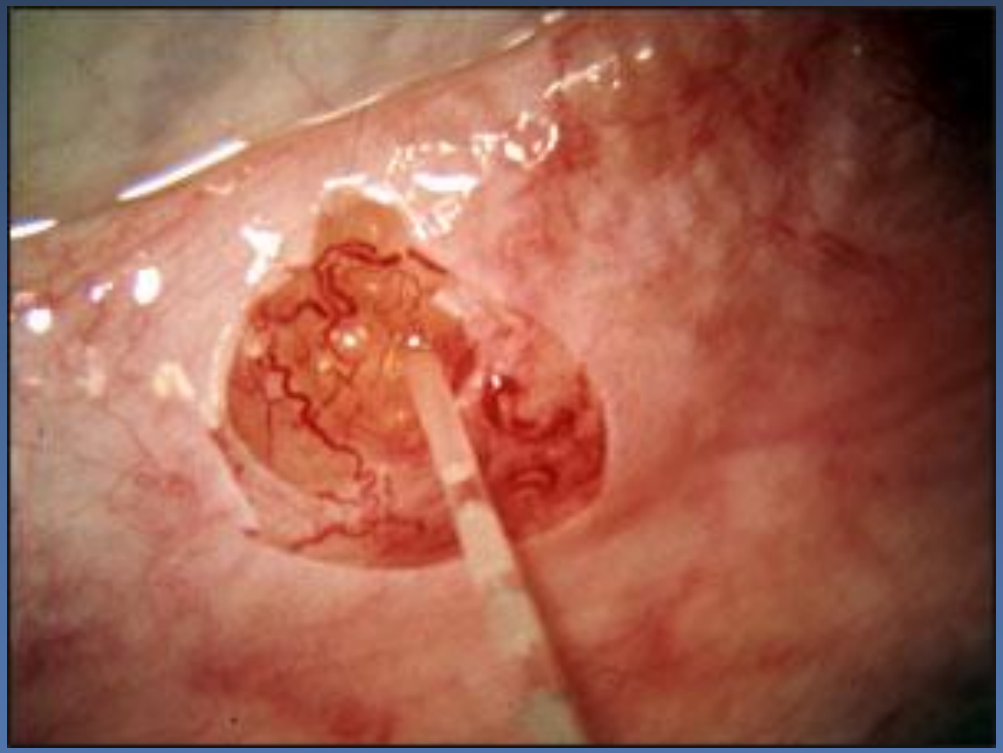






Trattamento azoospermie ostruttive

MESA
(Silber 1987)

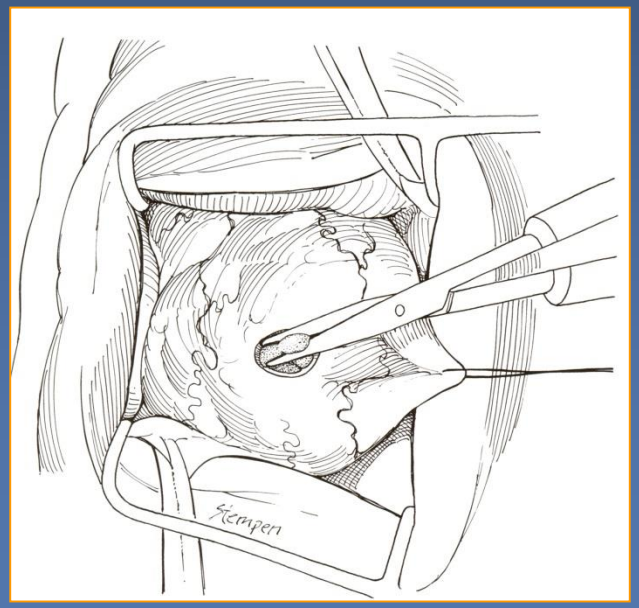


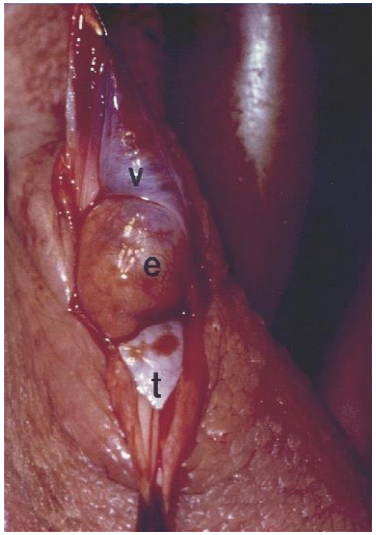
Mini-MESA

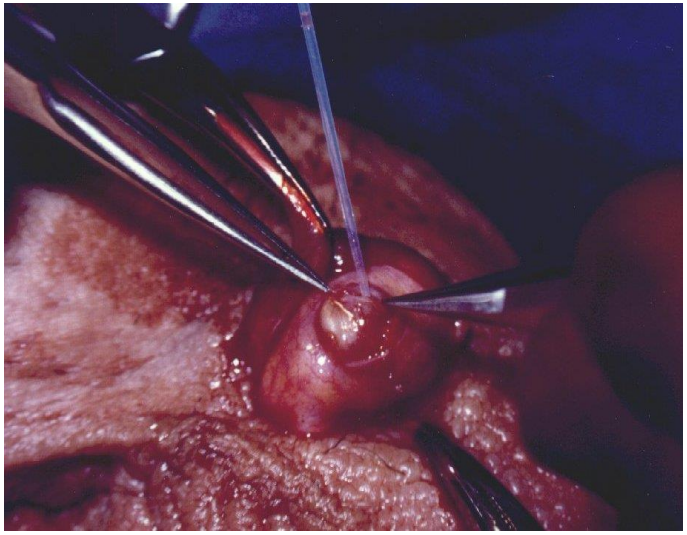
(evoluzione mini-invasiva della MESA)

Window-incision, avoiding testis extrusion:

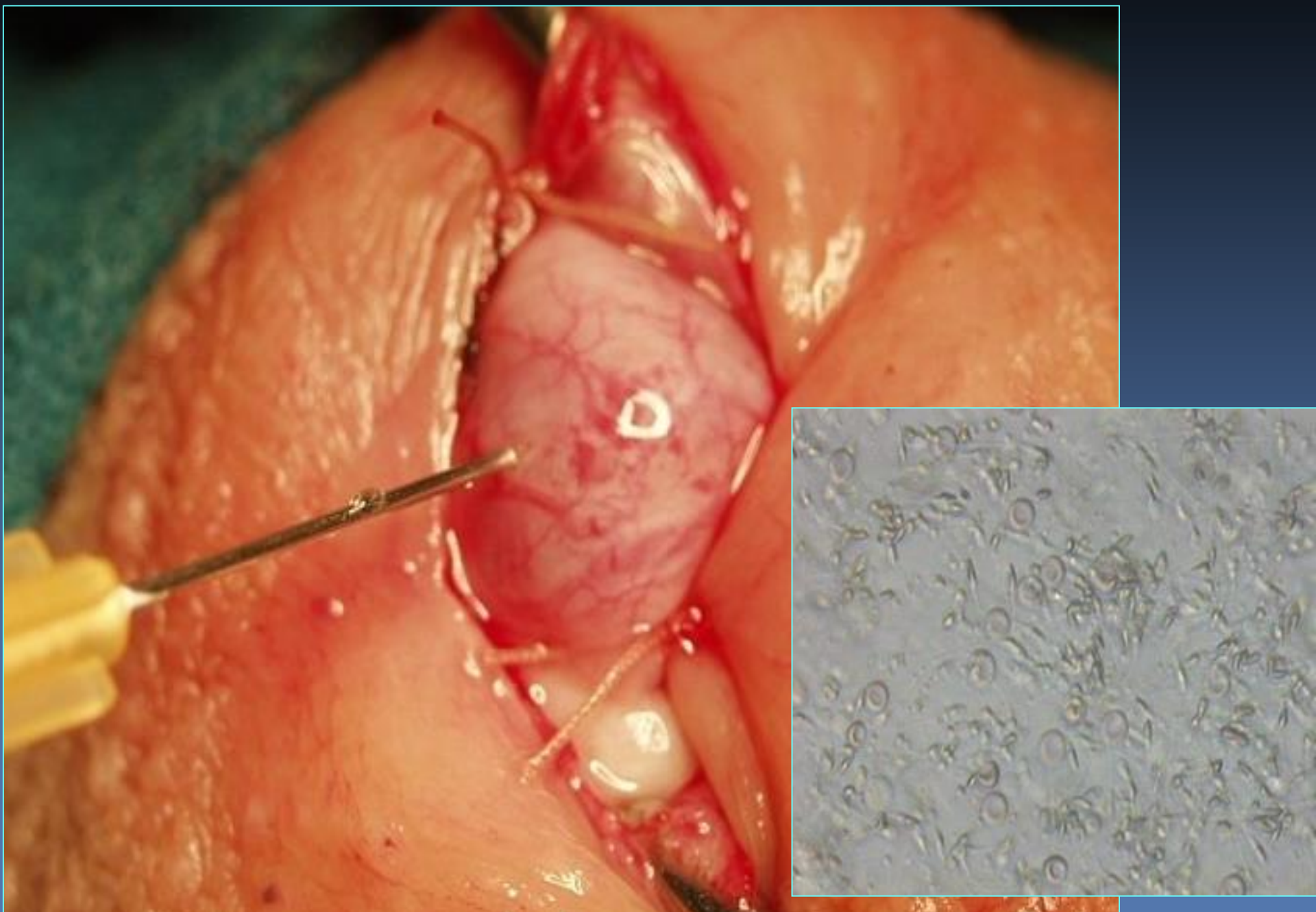
- less post-op pain,
- lower chanches of post-surgical adhesions



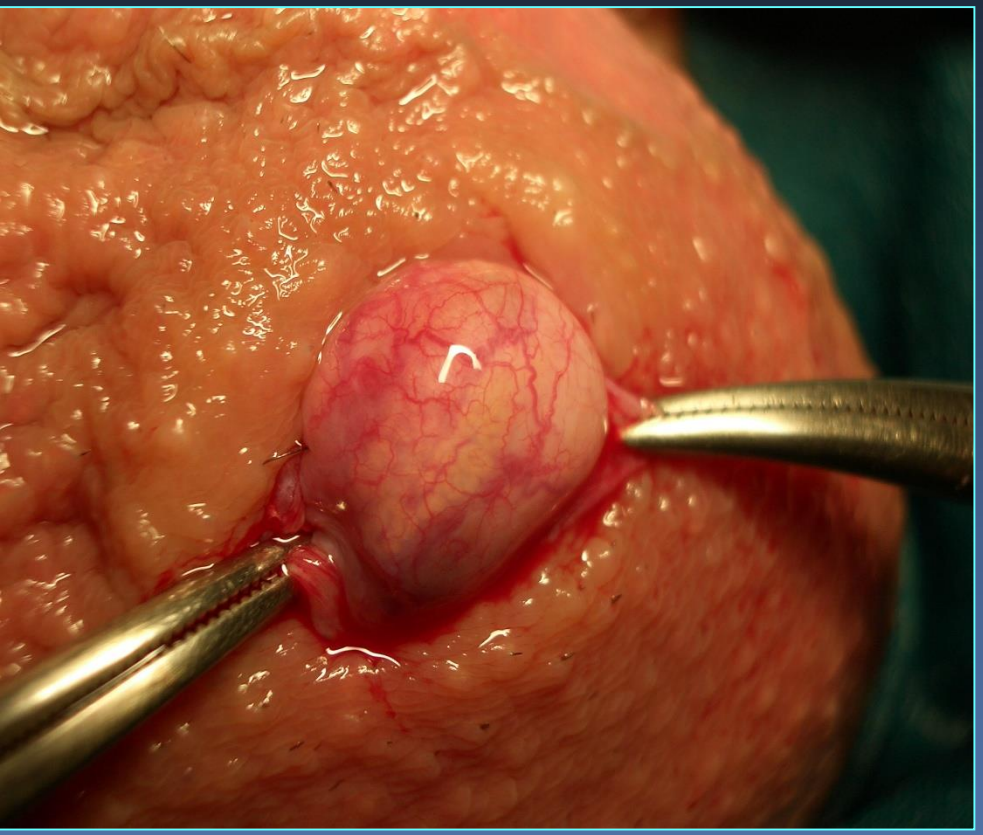


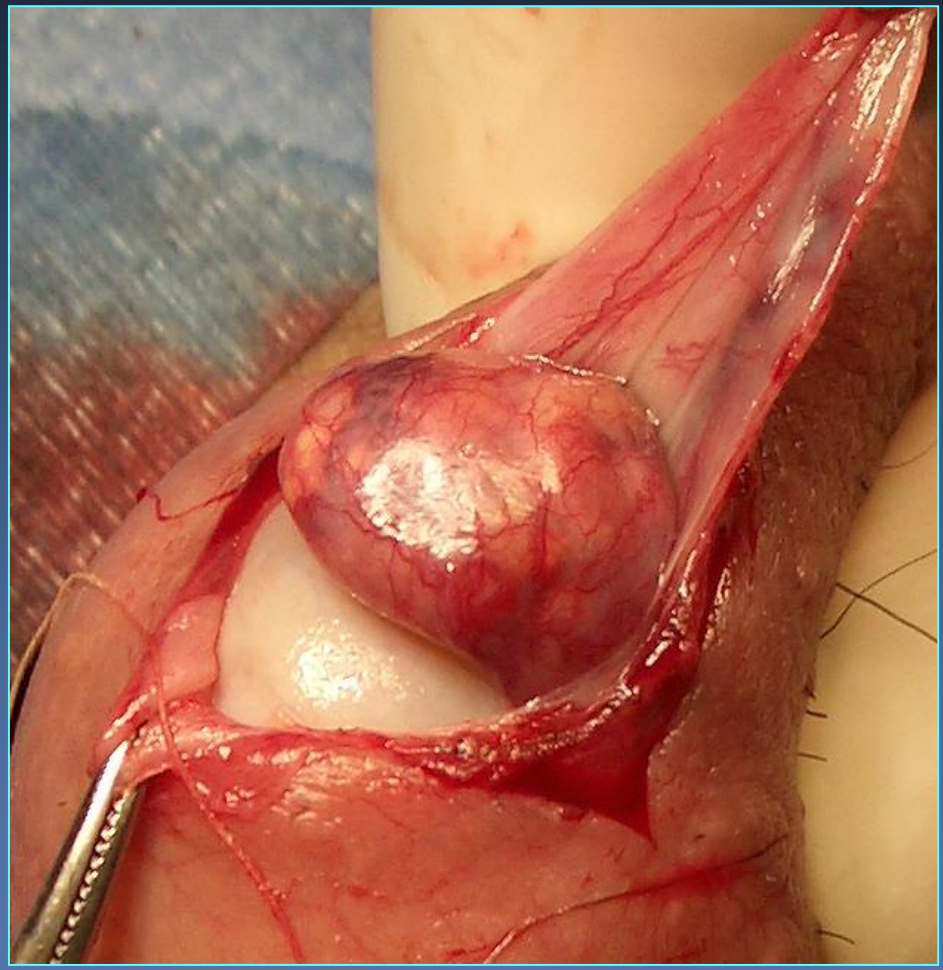


Mini-mesa

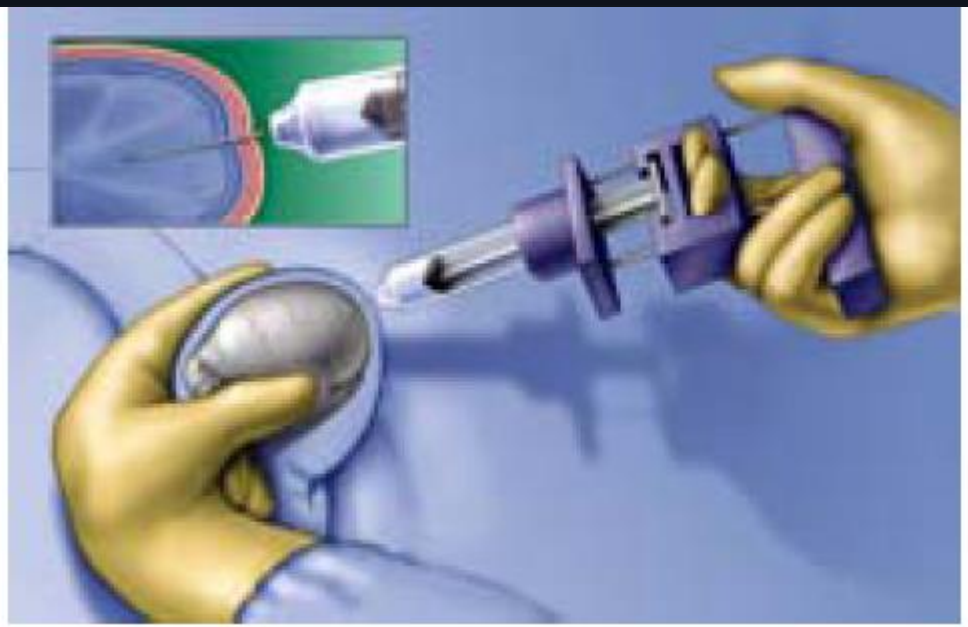


Mini-mesa

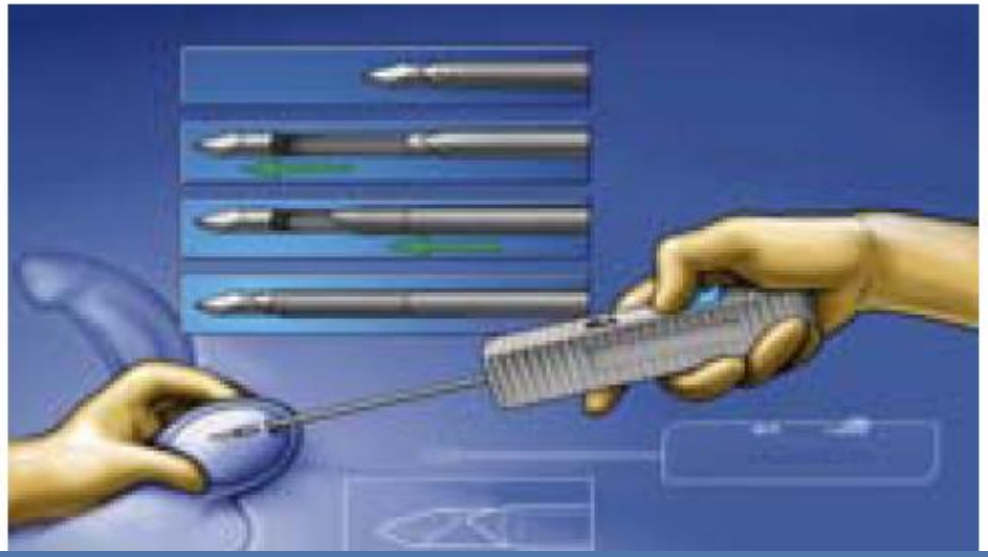




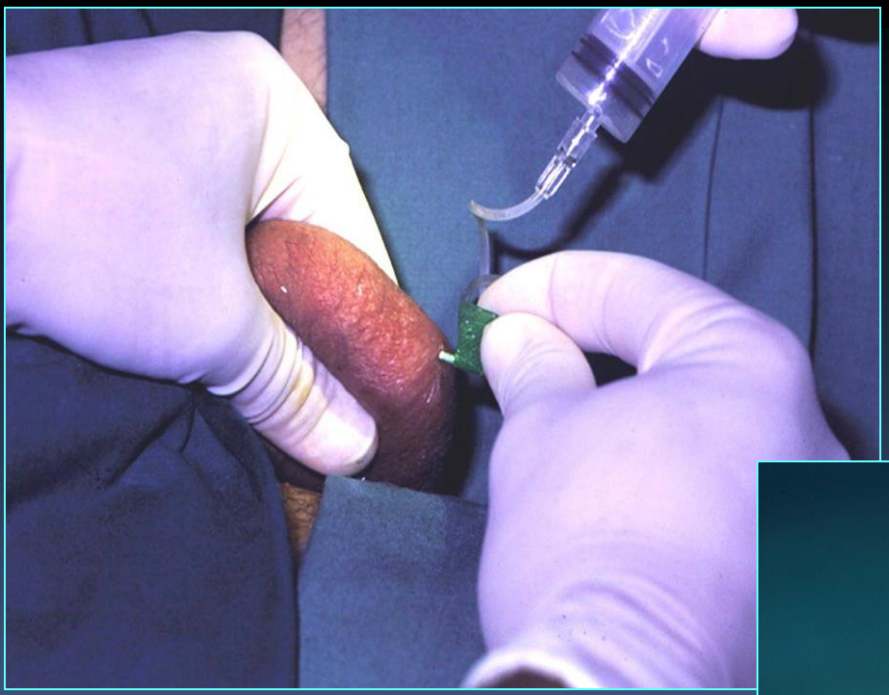
Testicular FNA (Tesa-Tefna)



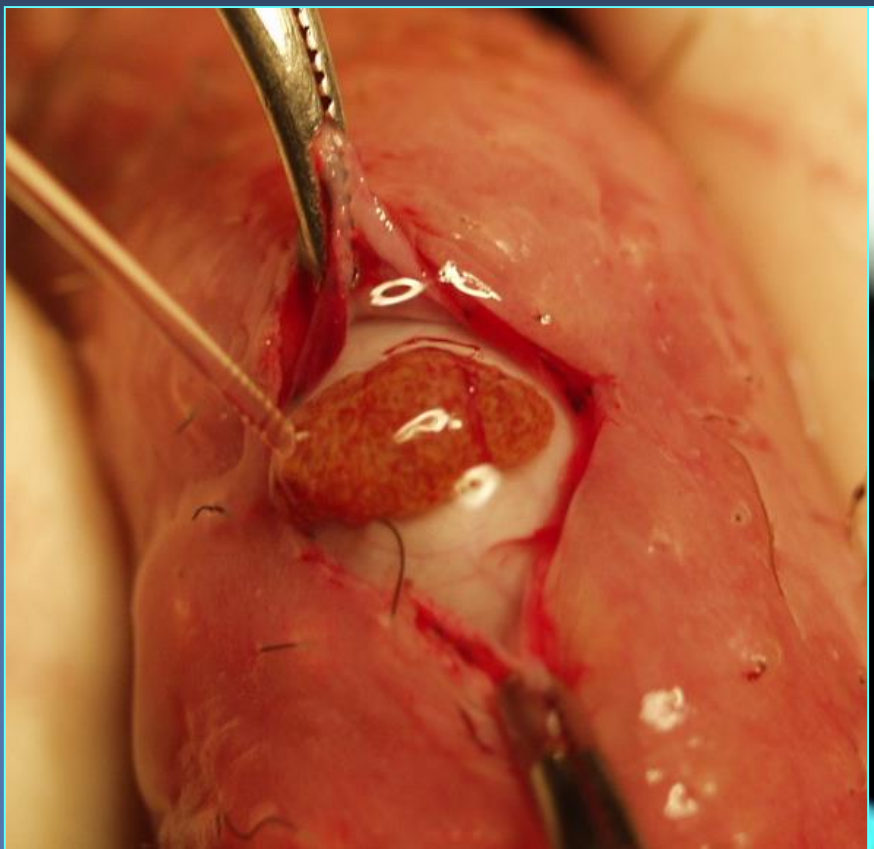
~~PercBiopsy~~



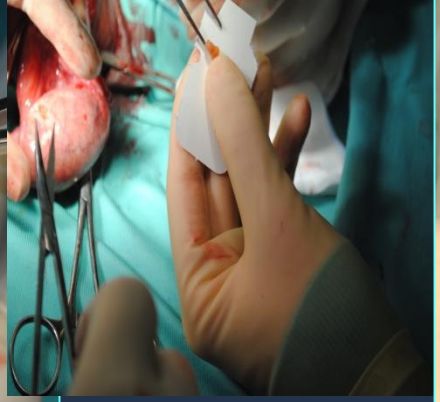
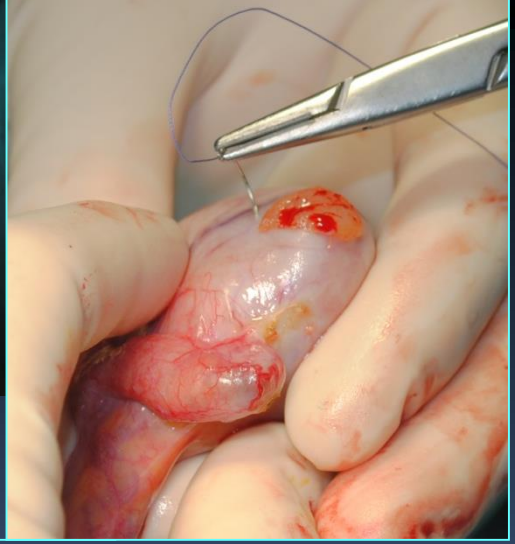
TESA (Tefna)

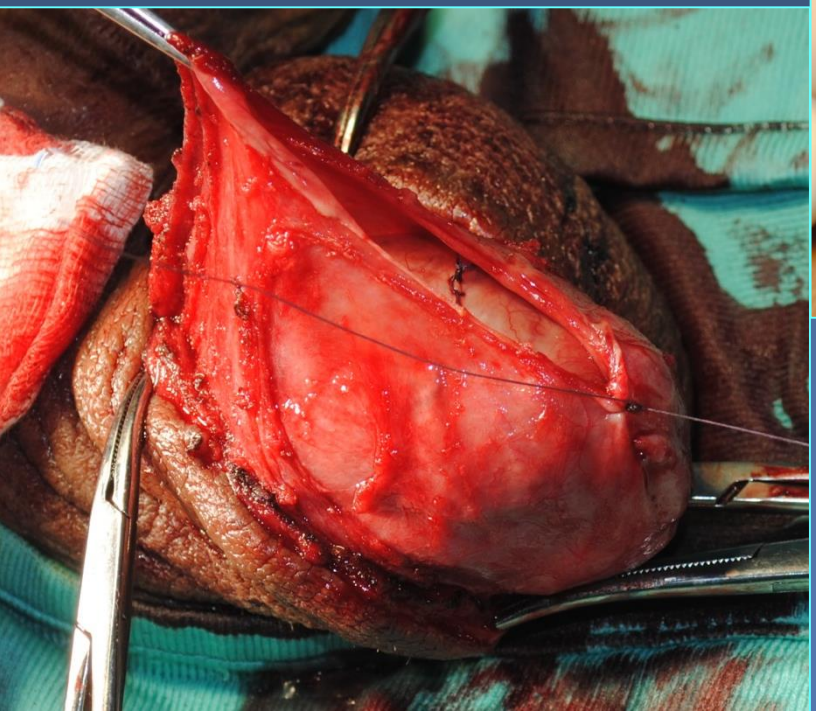
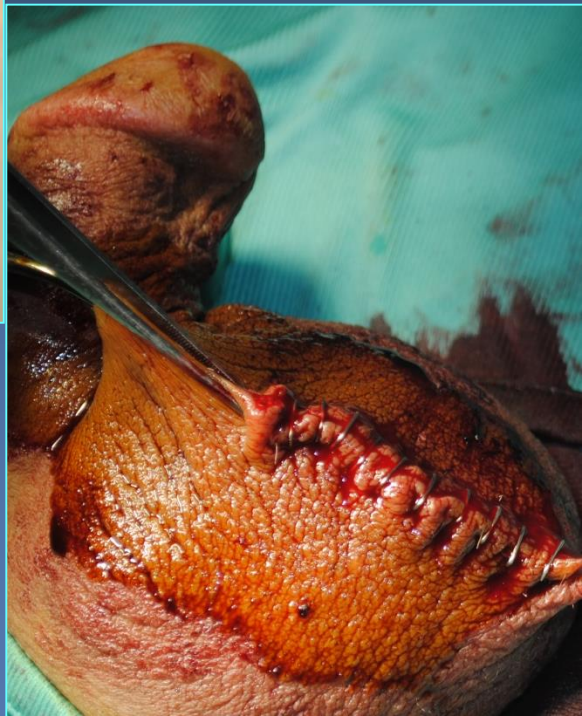


TESE con prelievo singolo





TESE

Sperm retrieval for obstructive azoospermia

The Practice Committee of the American Society for Reproductive Medicine

American Society for Reproductive Medicine, Birmingham, Alabama

Vol. 90, Suppl 3, November 2008

TABLE 2

Advantages and disadvantages of sperm retrieval techniques.

	Advantages	Disadvantages
MESA	Best clinical pregnancy rates Large number of sperm retrieved Excellent results with cryopreservation Reduced risk of hematoma	Requires microsurgical expertise Increased cost General or local anesthesia Incision required Postoperative discomfort
TESE	No microsurgical expertise required Local or general anesthesia Few instruments Fast and repeatable	Relatively few sperm retrieved Limited risk of testicular atrophy (with multiple biopsies)
PESA	No microsurgical expertise required Local anesthesia Few instruments Fast and repeatable Minimal postoperative discomfort	Few sperm retrieved Risk of hematoma Damage to adjacent tissue
PercBiopsy, TESA, TEFNA	No microsurgical expertise required Local anesthesia Few instruments Fast and repeatable Minimal postoperative discomfort	Few sperm retrieved Risk of testicular atrophy Risk of hematoma

Note: TESE = testicular sperm extraction; PercBiopsy = percutaneous testicular biopsy; TESA = testicular sperm aspiration; TEFNA = testicular fine-needle aspiration.

ASRM Practice Committee. Sperm retrieval for obstructive azoospermia. Fertil Steril 2008.

Tecniche di recupero spermatozoi

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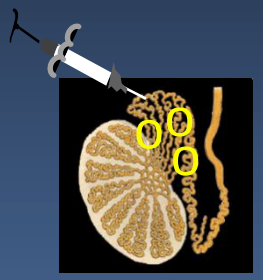

NOA

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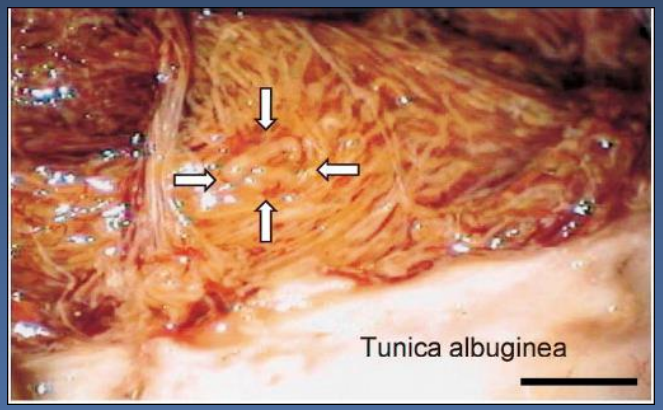
Human Reproduction vol.14 no.1 pp.131–135, 1999

Testicular sperm extraction: microdissection improves sperm yield with minimal tissue excision

(Schlegel 1998)

Seminiferous tubules that contain only Sertoli cells without any germ cells are thinner than tubules containing spermatogenic cells.

Tubules that have active spermatogenesis appear larger and more opaque, or whiter, than tubules without sperm production.



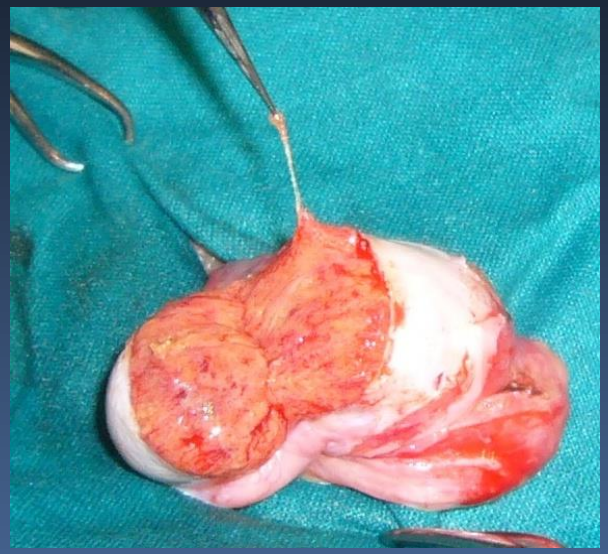
DIRECT EXAMINATION OF THE TESTICULAR PARENCHYMA WAS CARRIED OUT AT X 20–25 MAGNIFICATION UNDER THE OPERATING MICROSCOPE.

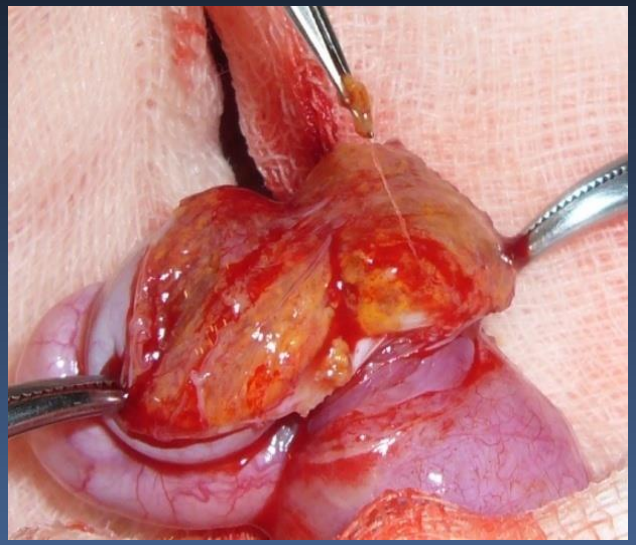
the ability to find spermatozoa increased from 45% (10/22) to 63% (17/ 27) after introduction of the microTESE.

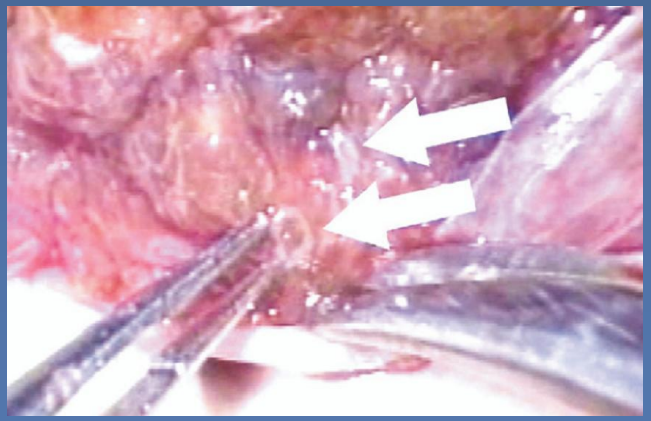
microTESE average of 160000 spermatozoa per sample in only 9.4 mg of tissue vs 64000 spermatozoa in standard biopsy samples that averaged 720 mg

MICROTESE (Schlegel, 1998)

Tecnica

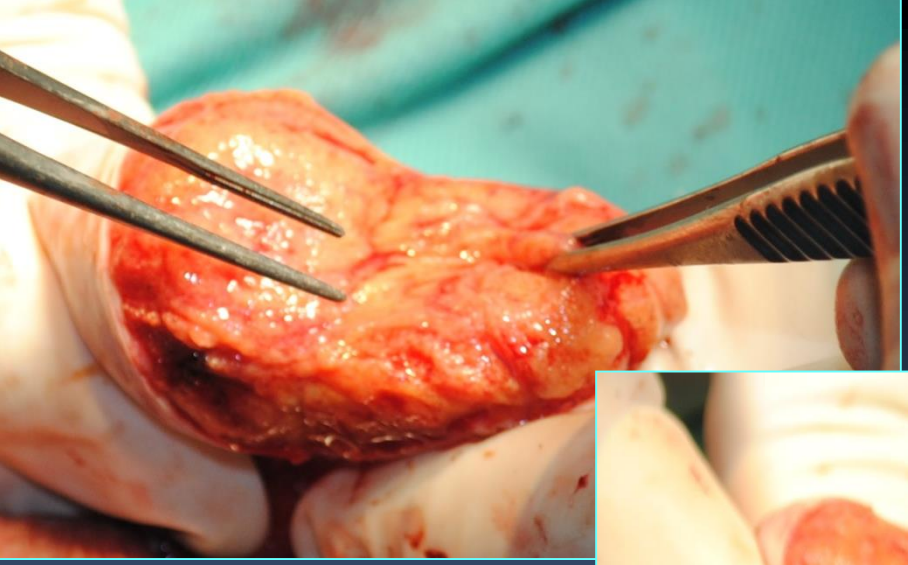


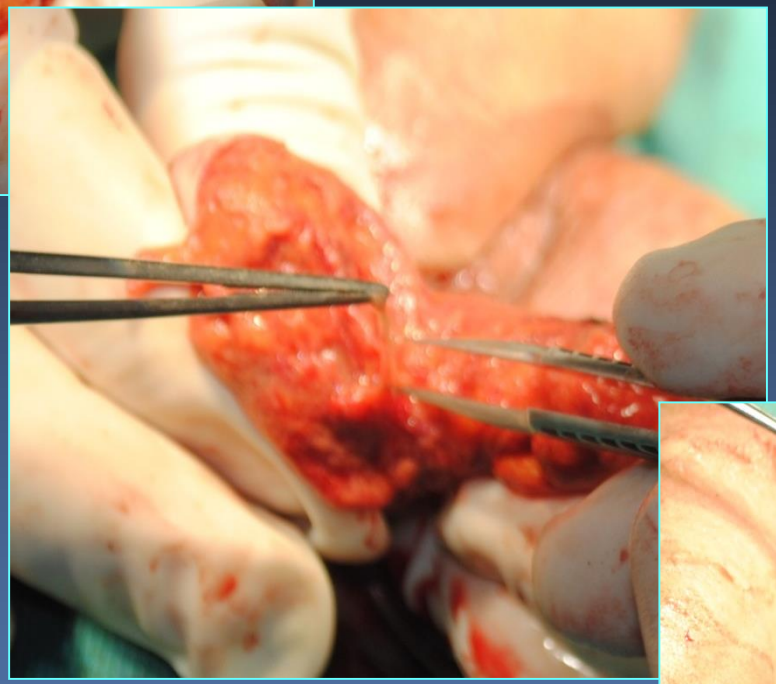


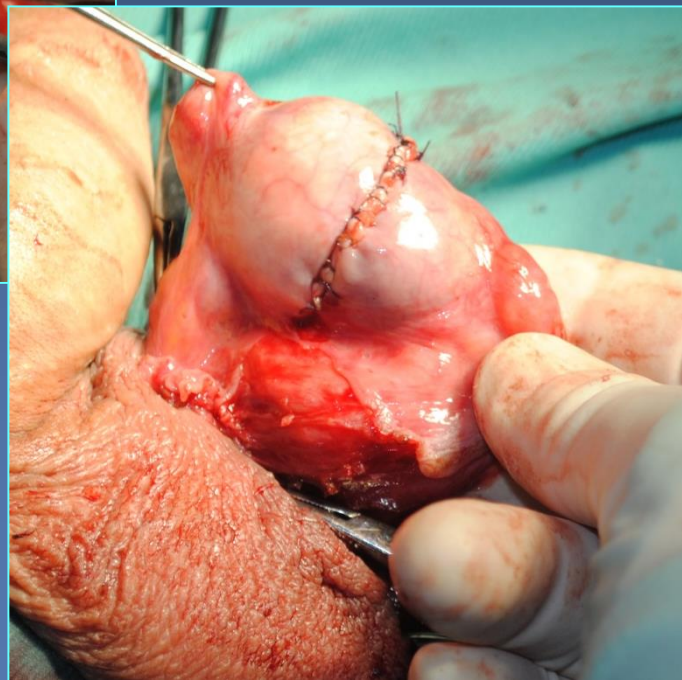


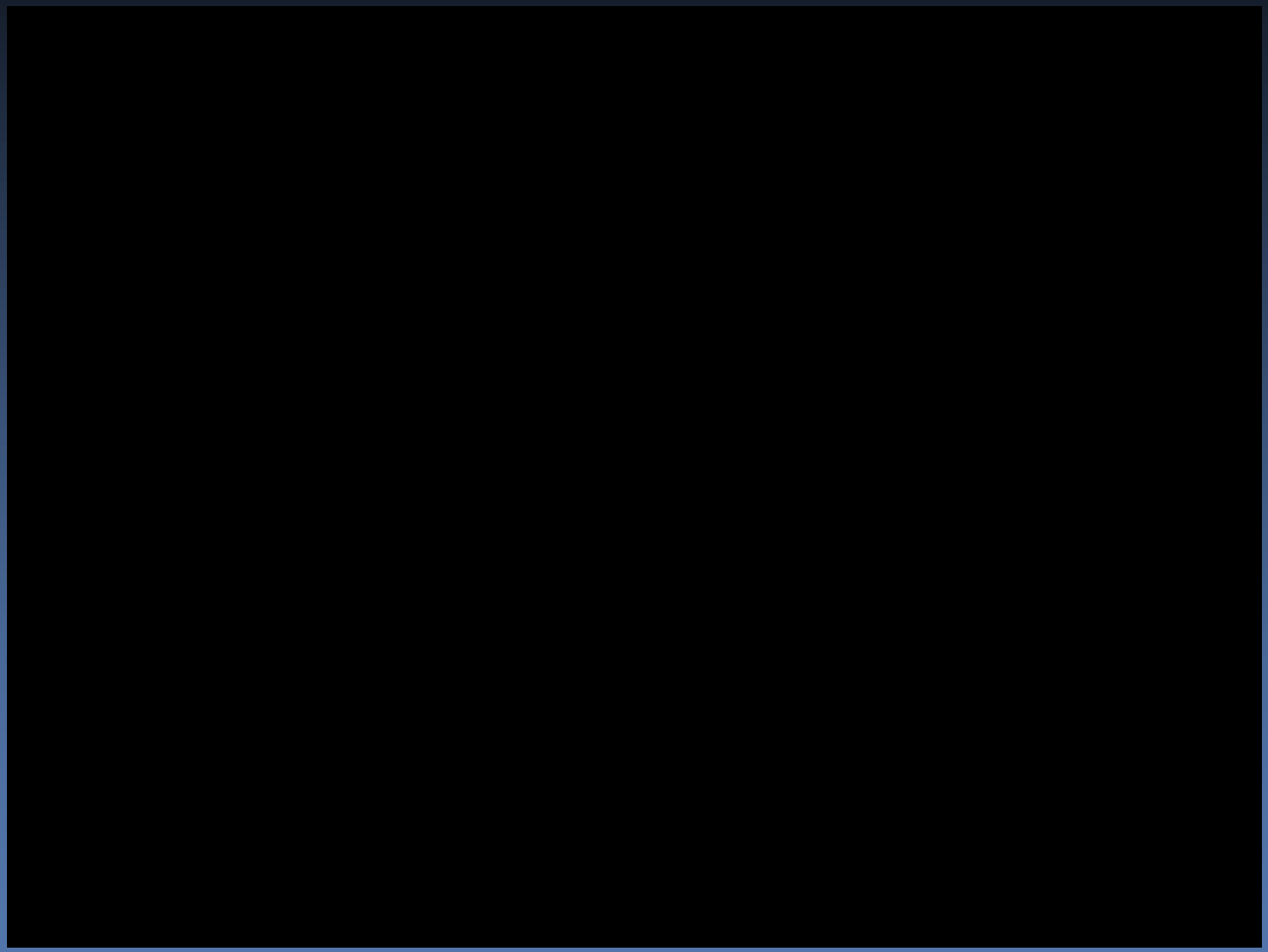
MICROTESE

MICROTESE









Comparison of Efficacy of Two Techniques for Testicular Sperm Retrieval in Nonobstructive Azoospermia: Multifocal Testicular Sperm Extraction Versus Multifocal Testicular Sperm Aspiration

Journal of Andrology, Vol. 27, No. 1, January/February 2006

RON HAUSER, LEAH YOGEV, GEDALIA PAZ, HAIM YAVETZ, FUAD AZEM, JOSEPH B. LESSING, AND AMNON BOTCHAN

The TESE procedure yielded significantly more sperm cells, as was also reflected by the difference in number of straws with cryopreserved sperm. This comparative prospective clinical study revealed that multifocal TESE is more efficient than multifocal TESA for sperm detection and recovery in men with NOA and should be the procedure of choice for sperm retrieval for them.

ORIGINAL ARTICLE

Fine needle aspiration vs. mTESE in non-obstructive azoospermia

S. El-Haggar,* T. Mostafa,* T. Abdel Nasser,* R. Hany† and A. Abdel Hadi*

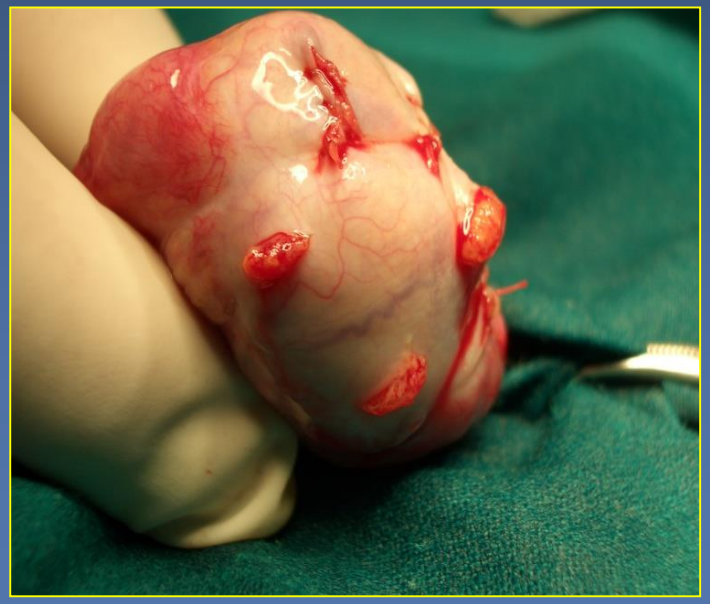
6 months. The overall sperm retrieval rate was 54% by mTESE and 10% by FNA. Spermatozoa were retrieved by mTESE from all cases with hypospermatogenesis, severe hypospermatogenesis, 30% of Sertoli cell only (SCO), 16.7% of germ cell arrest and in 28.6% of tubular hyalinization. Sperms were retrieved

2007 European Academy of Andrology • *International Journal of Andrology* **31,** 595–601

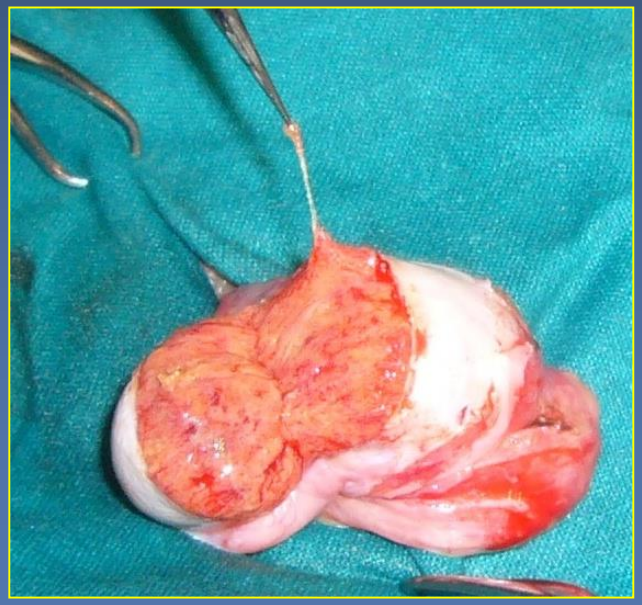
INDICAZIONI

Trattamento azoospermie NON-OSTRUTTIVE

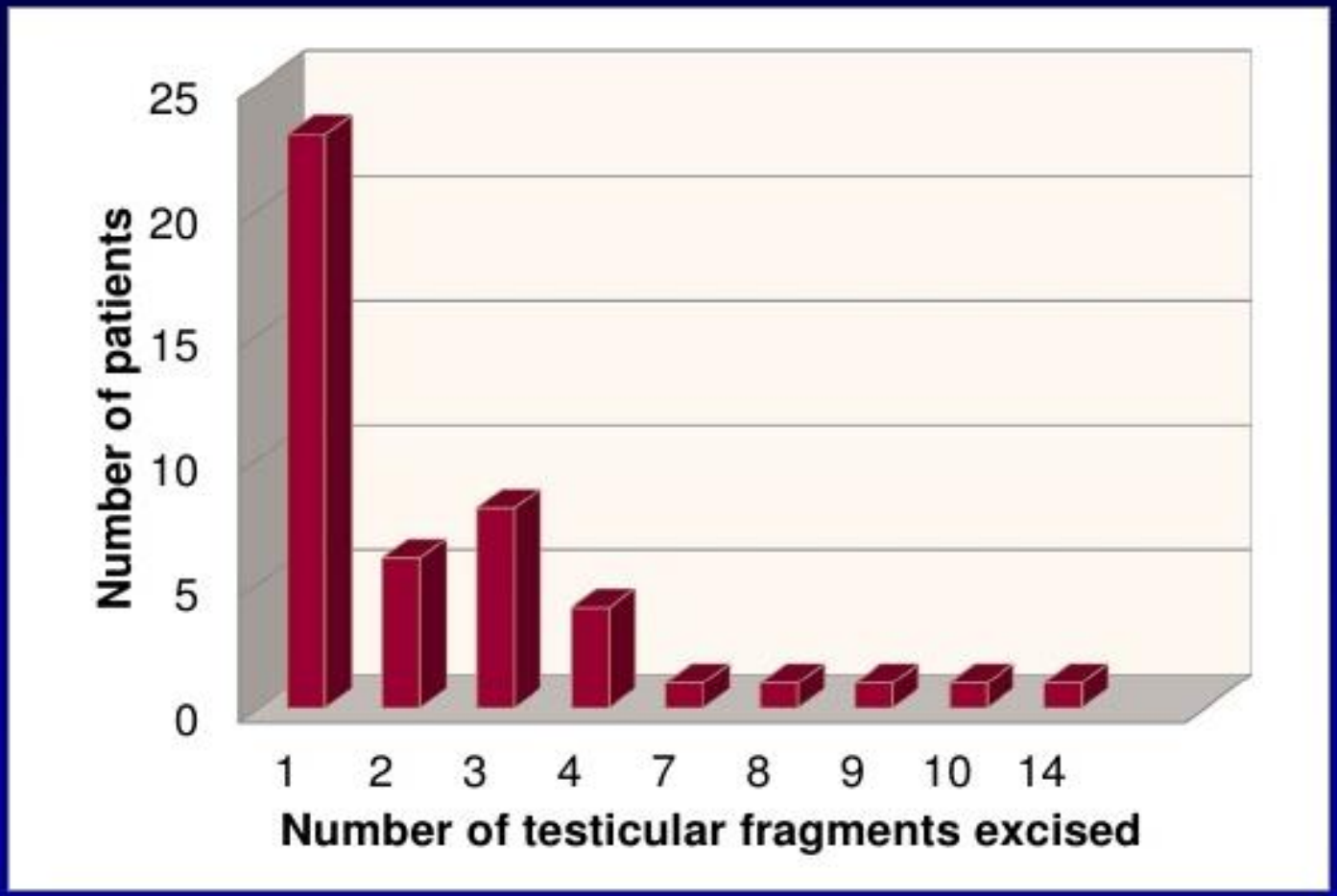
tese



microtese



Conventional TESE (open biopsy) in NOA



Ostad *et al.*, Urology 52:692, 1998.

In the era of micro-dissection sperm retrieval (m-TESE) is an isolated testicular biopsy necessary in the management of men with non-obstructive azoospermia?

Jas Kalsi*†, Meen-Yau Thum‡, Asif Muneer*, Hossam Abdullah‡ and Suks Minhas*‡

TESE con prelievo singolo?

NO!!!!!

2011 BJU INTERNATIONAL | 109, 418–424

Outcome of microdissection TESE compared with conventional TESE in non-obstructive azoospermia: a systematic review

Table 2 Comparison of sperm retrieval rates (SRR)

Study	Overall SRR (%) cTESE (*n*) microTESE (*n*)	SRR in SCO (%) cTESE (*n*) microTESE (*n*)	SRR in maturation arrest (%) cTESE (*n*) microTESE (*n*)	SRR in hypospermatogenesis (%) cTESE (*n*) microTESE (*n*)
Schlegel (1999)	45 ($n = 22$) 63 ($n = 27$)			
Amer *et al.* (2000)	30 ($n = 100$ testes) 47 ($n = 100$ testes)*			
Okada *et al.* (2002)	16.7 ($n = 24$) 44.6 ($n = 74$)*	6.3 ($n = 16$) 33.9 ($n = 56$)*	37.5 ($n = 8$) 75 ($n = 12$)	
Tsujimura *et al.* (2002)	35.1 ($n = 37$) 42.9 ($n = 56$)	13 ($n = 23$) 22.5 ($n = 40$)	0 ($n = 1$) 75 ($n = 4$)	76.9 ($n = 13$) 100 ($n = 12$)
Ramasamy *et al.* (2005)	32 ($n = 83$) 57 ($n = 460$)*	29 ($n = 24$) 41 ($n = 237$)	20 ($n = 10$) 44 ($n = 62$)	50 ($n = 14$) 81 ($n = 73$)*
Ghalayini *et al.* (2011)	38.2 ($n = 68$) 56.9 ($n = 65$)*	6.2 ($n = 32$) 26.9 ($n = 26$)*	27.3 ($n = 11$) 36.4 ($n = 11$)	84 ($n = 25$) 92.9 ($n = 28$)
Mean SRR weighed by sample size	33 54	14 37	27 49	73 85

Andrology, 2014, 2, 20–24

STRUCTURAL AND FUNCTIONAL CHANGES TO THE TESTIS AFTER CONVENTIONAL VERSUS MICRODISSECTION TESTICULAR SPERM EXTRACTION

RANJITH RAMASAMY, NEDA YAGAN, AND PETER N. SCHLEGEL

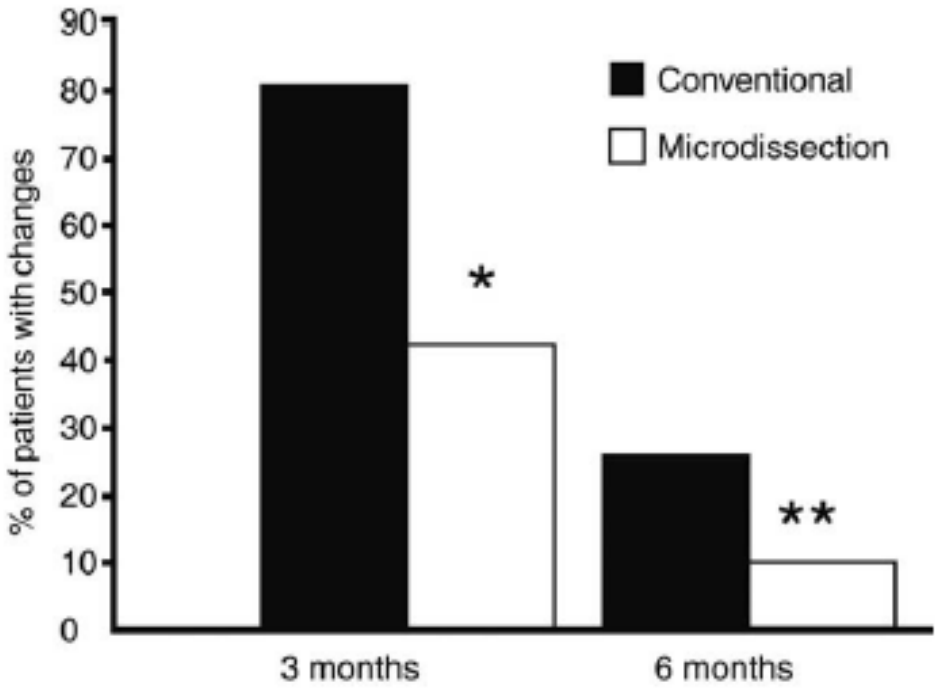


FIGURE 2. *Comparison of percentages of acute changes seen in ultrasound evaluation of patients after conventional[6] and microdissection TESE procedures.* *P = 0.001. **P = 0.04.

UROLOGY 65: 1190–1194, 2005.

.....ALTRE INDICAZIONI.....

Intracytoplasmic sperm injection outcome of ejaculated versus extracted testicular spermatozoa in cryptozoospermic men

Ido Ben-Ami, M.D., Ph.D., Arieh Raziel, M.D., Deborah Strassburger, Ph.D., Daphna Komarovsky, B.Sc., Raphael Ron-El, M.D., and Shevach Friedler, M.D.

Pregnancy rates after ICSI of ejaculated versus testicular spermatozoa cycles.

	Ejaculated	TESE fresh and frozen	*P* value
Cycle (n)	68	48	
Embryos transferred (per cycle)	1.8 ± 1.2	2.5 ± 1.5	.011
Implantation rate (%)	5.7	20.7	.003
Pregnancy (n)	8	17	
Pregnancy rate (per ET)	15.1	42.5	.004
Missed abortion (n)	2	6	
Take home baby rate (per ET)	9.4	27.5	.028

A multivariable logistic regression analysis showed three significant predictors for pregnancy, namely the use of testicular sperm (odds ratio [OR] 5.1, 95% confidence interval [95% CI] 1.8–14.8; $P = .003$), use of motile sperm (OR 12.9, 95% CI 2.1–79.1; $P = .006$), and female age (OR 0.83, 95% CI 0.7–0.9;

Pz criptozoospermici che falliscono ICSI

↓

TESE

Fertility and Sterility® Vol. 99, No. 7, June 2013

Use of testicular versus ejaculated sperm for intracytoplasmic sperm injection among men with cryptozoospermia: a meta-analysis

Nikita Abhyankar, M.B.ChB.,[a] Martin Kathrins, M.D.,[b] and Craig Niederberger, M.D.[a]

[a] Department of Urology, University of Illinois at Chicago, Chicago, Illinois; and [b] Division of Urology, Brigham and Women's Hospital, Boston, Massachusetts

Objective: To examine outcomes of intracytoplasmic sperm injection (ICSI) using testicular versus ejaculated sperm among men with cryptozoospermia.

Design: Meta-analysis.

Setting: Not applicable.

Patient(s): Men with cryptozoospermia undergoing consecutive ICSI cycles using ejaculated or testicular sperm.

Intervention(s): A systematic search was performed using PubMed (inception to August 2015). Inclusion criteria were studies comparing ICSI outcomes among men with cryptozoospermia using ejaculated and testicular sperm.

Main Outcome Measure(s): Primary outcomes included ICSI fertilization or pregnancy rates (PRs). Secondary analysis included number of retrieved oocytes, maternal and paternal ages. Meta-analysis of weighted data using a random effects model was performed. Results are reported as relative risk or weighted mean differences (WMD) with 95% confidence intervals (CI).

Result(s): Five cohort studies were included, encompassing 272 ICSI cycles and 4,596 injected oocytes. There were no differences in ICSI PRs (relative risk [RR] 0.53, 95% CI 0.19–1.42, $I^2 = 67\%$) or fertilization rates (RR 0.91, 95% CI 0.78–1.06, $I^2 = 73\%$) between testicular and ejaculated sperm groups. There was a significant trend toward increasing maternal age (WMD 1.69 years, 95% CI −2.71 to −0.66) and paternal age (WMD 2.61 years, 95% CI −4.73 to −0.48) with testicular sperm. There was no difference between numbers of oocytes retrieved (WMD 0.95, 95% CI −0.15 to 2.05). Post-hoc power analysis revealed pβ <20% for PR analysis and pβ <10% for fertilization rate analysis.

Conclusion(s): The existing literature does not support a recommendation for men with cryptozoospermia to use testicular sperm in preference over ejaculated sperm for ICSI. (Fertil Steril 2016;105:1469–75. ©2016 by American Society for Reproductive Medicine.)

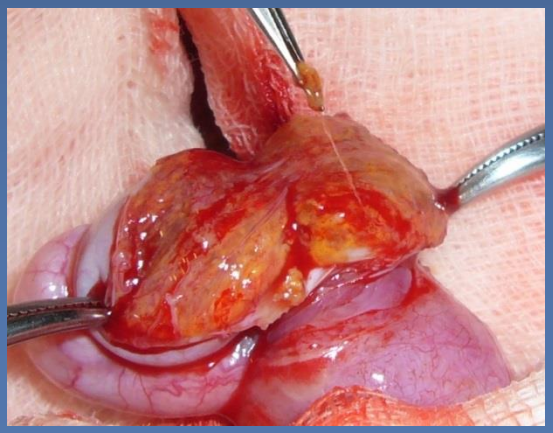
Infertility

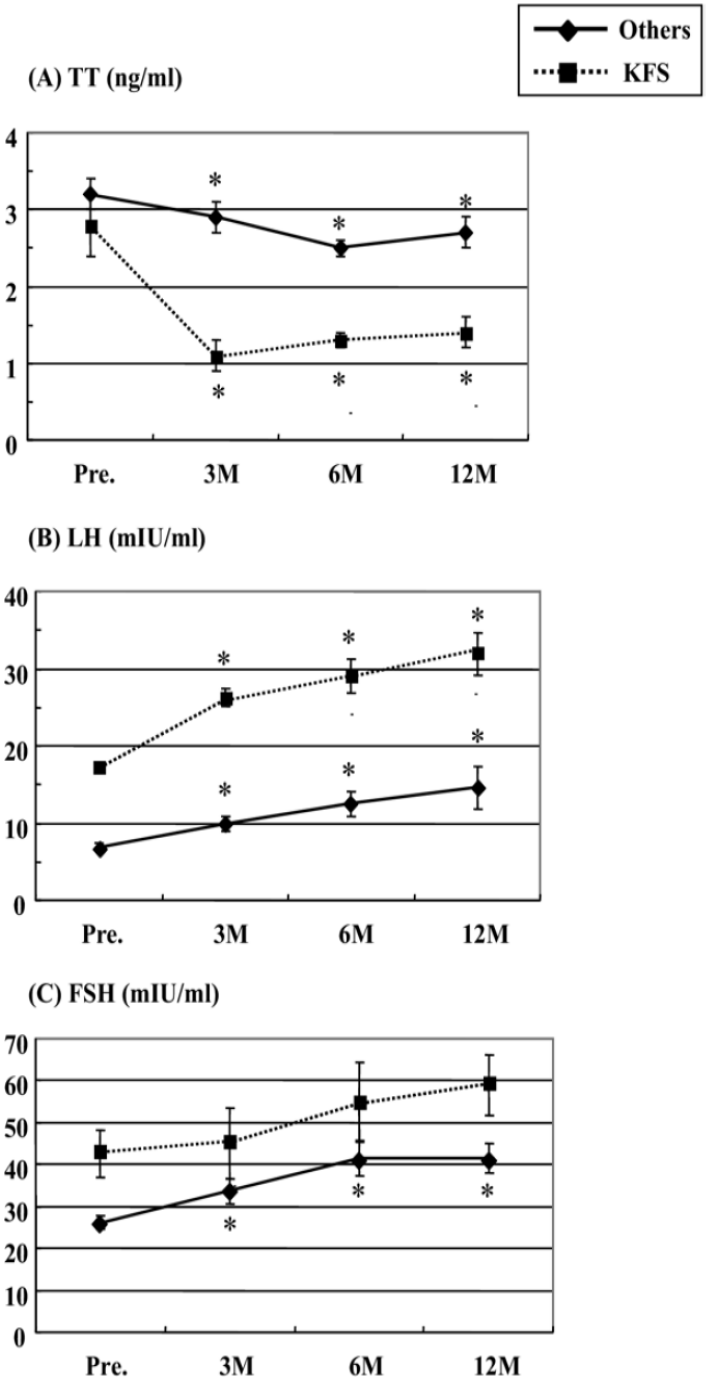
Androgen Decline in Patients with Nonobstructive Azoospemia After Microdissection Testicular Sperm Extraction

Shingo Takada, Akira Tsujimura, Tomohiro Ueda, Yasuhiro Matsuoka, Tetsuya Takao, Yasushi Miyagawa, Minoru Koga, Masami Takeyama, Yoshio Okamoto, Kiyomi Matsumiya, Hideki Fujioka, Norio Nonomura, and Akihiko Okuyama

UROLOGY 72: 114–118, 2008.

Danni da MICROTESE





Esistono fattori predittivi per la presenza e il recupero degli spermatozoi

- ✓ Età
- ✓ assetto ormonale
- ✓ Volume testicolare

……

ORIGINAL ARTICLE

Predictive value of FSH, testicular volume, and histopathological findings for the sperm retrieval rate of microdissection TESE in nonobstructive azoospermia: a meta-analysis

Human Reproduction, Vol.31, No.9 pp. 1934–1941, 2016

STUDY QUESTION: Can an externally validated model, based on biological variables, be developed to predict successful sperm retrieval with testicular sperm extraction (TESE) in men with non-obstructive azoospermia (NOA) using a large nationwide cohort?

SUMMARY ANSWER: Our prediction model including six variables was able to make a good distinction between men with a good chance and men with a poor chance of obtaining spermatozoa with TESE.

WHAT IS KNOWN ALREADY: Using ICSI in combination with TESE even men suffering from NOA are able to father their own biological child. Only in approximately half of the patients with NOA can testicular sperm be retrieved successfully. The few models that have been developed to predict the chance of obtaining spermatozoa with TESE were based on small datasets and none of them have been validated externally.

STUDY DESIGN, SIZE, DURATION: We performed a retrospective nationwide cohort study. Data from 1371 TESE procedures were collected between June 2007 and June 2015 in the two fertility centres.

PARTICIPANTS/MATERIALS, SETTING, METHODS: All men with NOA undergoing their first TESE procedure as part of a fertility treatment were included. The primary end-point was the presence of one or more spermatozoa (regardless of their motility) in the testicular biopsies.

We constructed a model for the prediction of successful sperm retrieval, using univariable and multivariable binary logistic regression analysis and the dataset from one centre. This model was then validated using the dataset from the other centre. The area under the receiver-operating characteristic curve (AUC) was calculated and model calibration was assessed.

MAIN RESULTS AND THE ROLE OF CHANCE: There were 599 (43.7%) successful sperm retrievals after a first TESE procedure. The prediction model, built after multivariable logistic regression analysis, demonstrated that higher male age, higher levels of serum testosterone and lower levels of FSH and LH were predictive for successful sperm retrieval. Diagnosis of idiopathic NOA and the presence of an azoospermia factor c gene deletion were predictive for unsuccessful sperm retrieval. The AUC was 0.69 (95% confidence interval (CI): 0.66–0.72). The difference between the mean observed chance and the mean predicted chance was <2.0% in all groups, indicating good calibration. In validation, the model had moderate discriminative capacity (AUC 0.65, 95% CI: 0.62–0.72) and moderate calibration: the predicted probability never differed by more than 9.2% of the mean observed probability.

ORIGINAL ARTICLE

Asian Journal of Andrology (2017) 19, 1–7

Male Infertility

Predictive value of FSH, testicular volume, and histopathological findings for the sperm retrieval rate of microdissection TESE in nonobstructive azoospermia: a meta-analysis

Hao Li[1,2], Li-Ping Chen[1,2], Jun Yang[1,2], Ming-Chao Li[1,2], Rui-Bao Chen[1,2], Ru-Zhu Lan[1,2], Shao-Gang Wang[1,2], Ji-Hong Liu[1,2], Tao Wang[1,2]

CONCLUSIONS

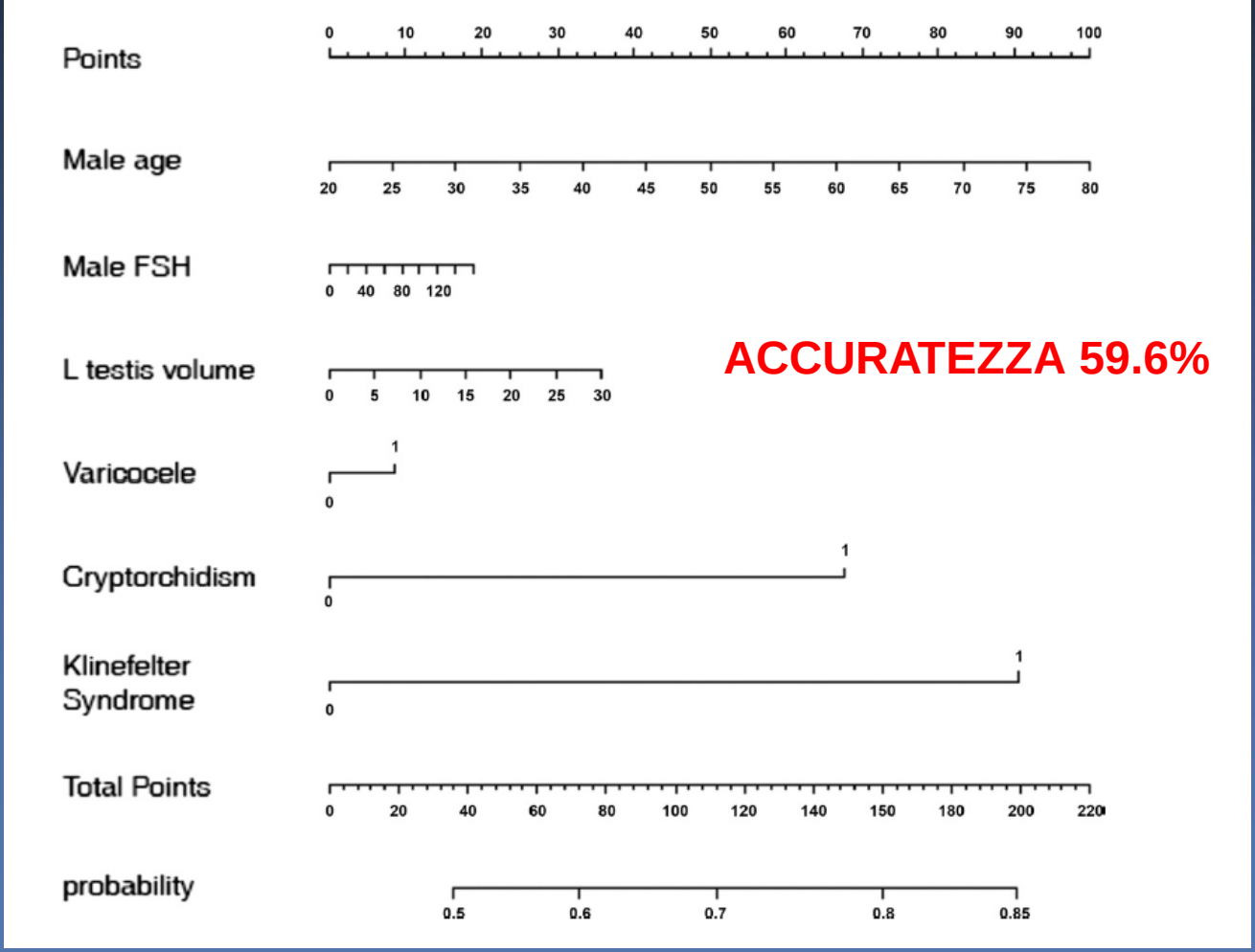
All three investigated factors had limited predictive values and none could be used as a sole predictive factor in clinical practice. Other factors, such as inhibin B and age, might also be helpful to predict the probability of successful sperm retrieval, but further study is required. The combination of different parameters might be a novel approach for predicting SRR in microdissection TESE, and we expect that more relevant studies will be performed.

A Comparison of Models for Predicting Sperm Retrieval Before Microdissection Testicular Sperm Extraction in Men with Nonobstructive Azoospermia

THE JOURNAL OF UROLOGY® Vol. 189, 638-642, February 2013

Ranjith Ramasamy, Wendy O. Padilla, E. Charles Osterberg, Abhishek Srivastava, Jennifer E. Reifsnyder, Craig Niederberger* and Peter N. Schlegelt

1026 pazienti sottoposti a microTESE



ACCURATEZZA 59.6%

Struttura Dipartimentale di Andrologia
Azienda Ospedaliero - Universitaria Policlinico di S.Orsola

RECUPERO CHIRURGICO DEGLI SPERMATOZOI
(MESA – TESE – microTESE)
Gennaio 2012 → Aprile 2017

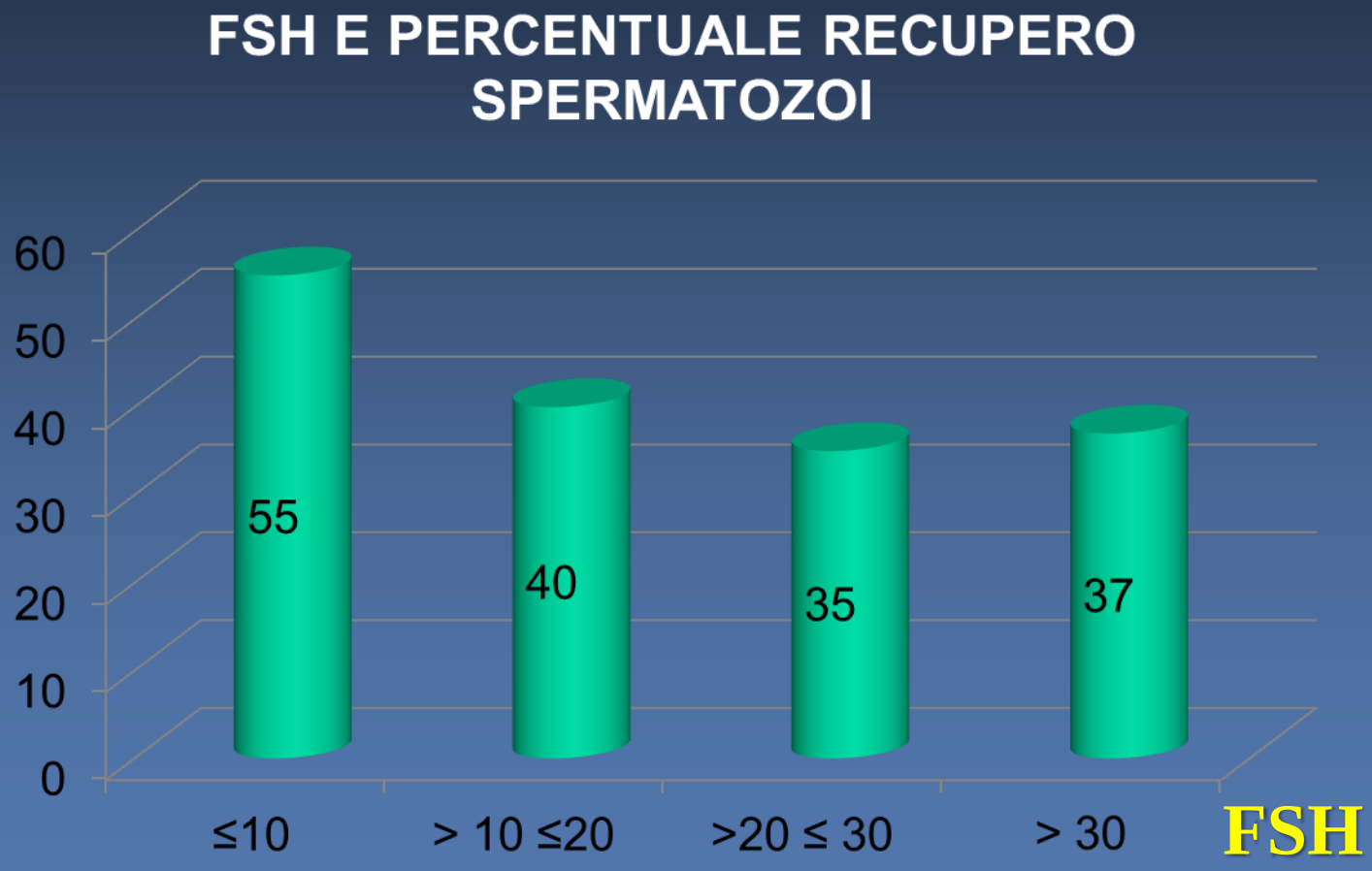
151 pazienti operati

36 pazienti con **azoospermia ostruttiva**
(FSH basso, volume testicolare bilateralmente normale)

115 pazienti con **azoospermia secretoria** sottoposti a **microTESE**
(FSH medio 28 mUI/ml, range 7-110 mUI/ml - volume testicolare medio 8 ml)

43% → CRIOCONSERVAZIONE

Struttura Dipartimentale di Andrologia
Azienda Ospedaliero - Universitaria Policlinico di S.Orsola



SINDROME DI KLINEFELTER

GENNAIO 2014 → APRILE 2017

10 pazienti

(età media 22 anni, range 17-35 aa; FSH medio 49.8 mUi/ml, range 22.1-110.5 mUi/ml)

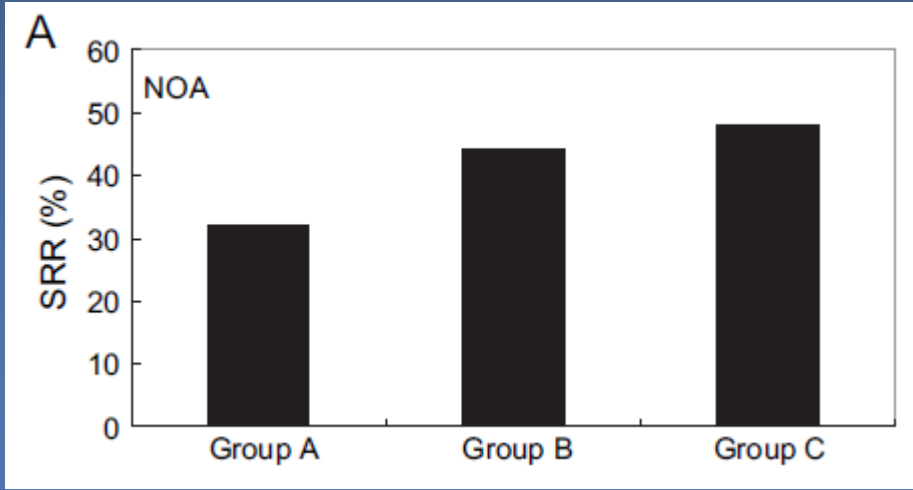
30% (3/10) → CRIOCONSERVAZIONE

Learning curves of microdissection testicular sperm extraction for nonobstructive azoospermia

Tomomoto Ishikawa, M.D., Ryuichiro Nose, M.D., Kohei Yamaguchi, M.D., Koji Chiba, M.D., and Masato Fujisawa, M.D.

The baseline clinical characteristics of the different subgroups of men with NOA.

	Group A	Group B	Group C	*P* value
Number	50	50	50	NS
Age	34.5 ± 5.4	34.2 ± 5.0	35.5 ± 6.7	NS
FSH (IU/L)	22.5 ± 10.1	19.6 ± 10.6	19.3 ± 11.3	NS
LH (IU/L)	7.8 ± 4.7	6.8 ± 4.9	7.7 ± 5.7	NS
T (ng/mL)	5.0 ± 2.1	4.5 ± 1.7	4.8 ± 2.0	NS
Testicular volume (mL)	10.4 ± 5.9	11.3 ± 5.8	11.9 ± 5.3	NS

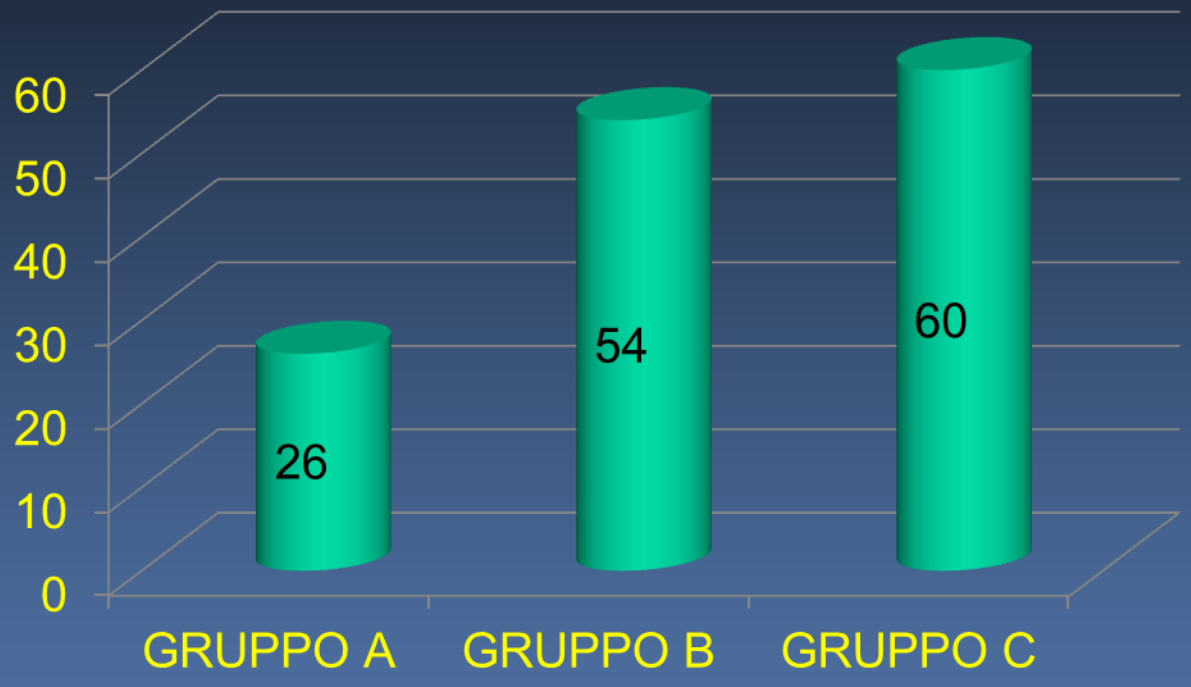


Fertility and Sterility® Vol. 94, No. 3, August 2010

Struttura Dipartimentale di Andrologia

Azienda Ospedaliero - Universitaria
Policlinico di S.Orsola

PERCENTUALE DI RECUPERO DI SPERMATOZOI



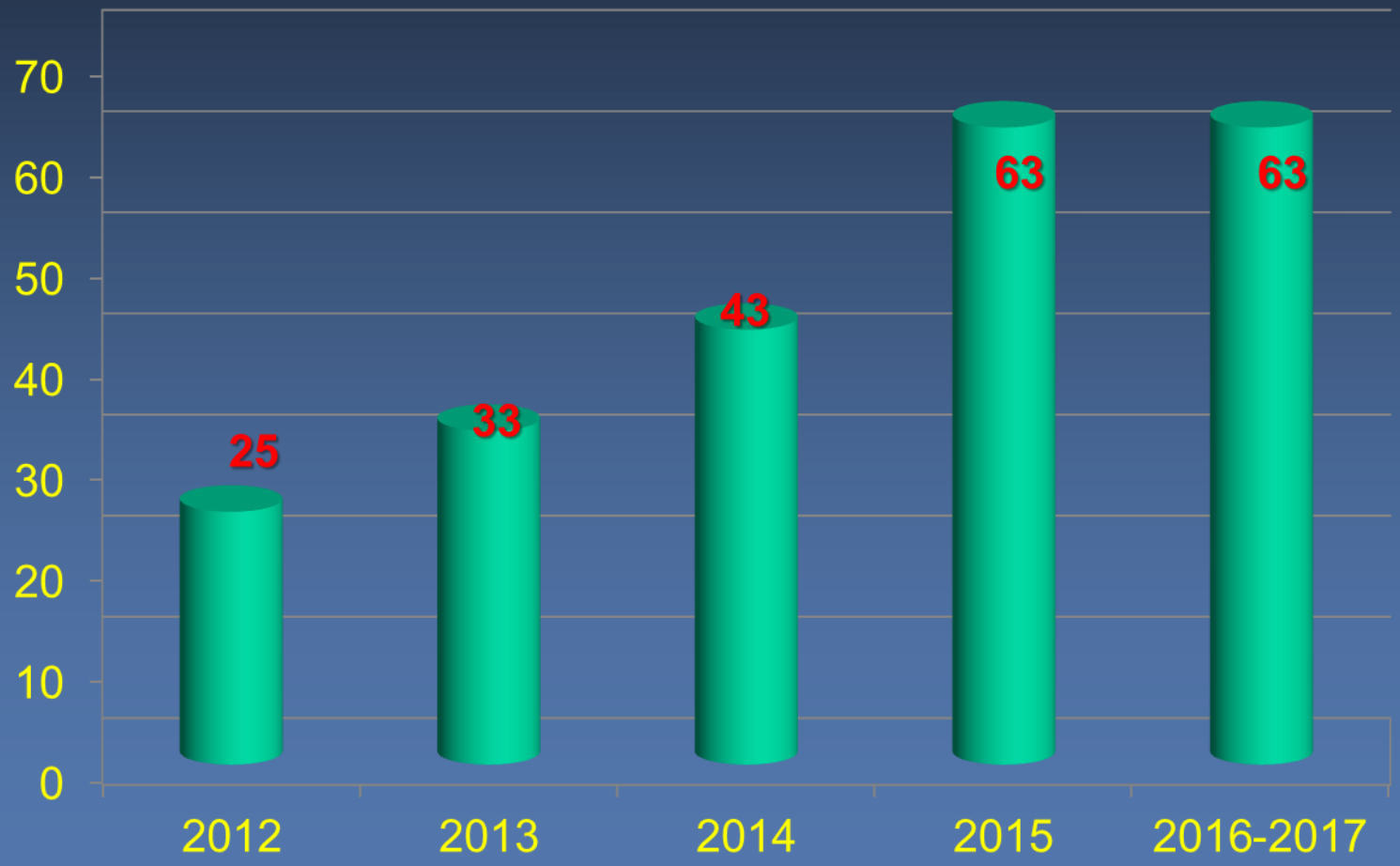
GRUPPO A : PRIMI 50 PAZIENTI FSH MEDIO 20 34.2 anni

GRUPPO B : DA 51 A 100 FSH MEDIO 22 35.1 anni

GRUPPO C : ULTIMI 15 PAZIENTI FSH MEDIO 24 eta 33.6 anni

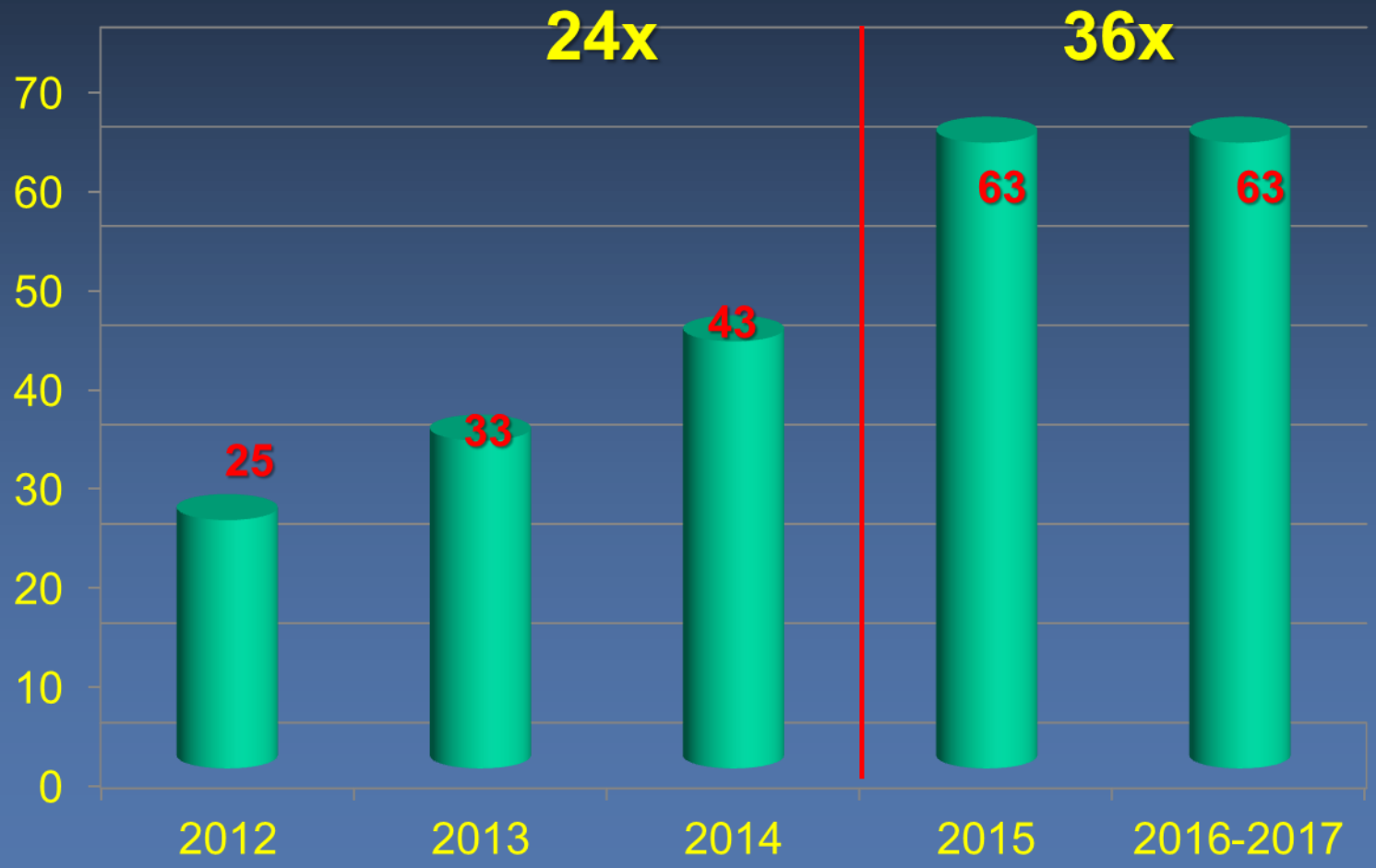
Struttura Dipartimentale di Andrologia

PERCENTUALE DI RECUPERODI SPERMATOZOI



Struttura Dipartimentale di Andrologia

PERCENTUALE DI RECUPERODI SPERMATOZOI



GRAZIE DELL'ATTENZIONE

Sindrome di Klinefelter

PREVALENZA

- 1/500 – 1/1000 popolazione maschile generale

- 3-4% pazienti infertili

- 10% pazienti azoospermici

SOLO 25% DEGLI UOMINI CON SK SONO REALMENTE DIAGNOSTICATI

Klinefelter's syndrome

Fabio Lanfranco, Axel Kamischke, Michael Zitzmann, Eberhard Nieschlag

11/131 (8.4%) pz con SK con spermatozoi nell'eiaculato

	Karyotype	Age, years	BV, mL*	LH, U/L	FSH, U/L	Testosterone, nmol/L	Oestradiol, pmol/L	Sexual abstinence, days	Ejaculate volume, mL	Sperm		
										Motility†	Number ×10⁶/mL	Normal morphology (%)
1	47,XXY	18·6	2·8	19·2	37·5	9·9	94	4	1·1	40	0·6	10
2	47,XXY	30·9	3·0	14·7	21·0	8·6	82	..	..	37	7·6	18
3	47,XXY	23·8	2·8	15·4	21·1	11·1	88	4	1·7	0	<0·1	0
4	46,XY 47,XXY	31·9	27·7	4·0	8·8	27·5	101	8	3·1	10	3·1	4
5	47,XXY	19·7	5·1	8·9	16·5	22·6	69	4	2·7	40	0·1	25
6	47,XXY	19·3	..	40·0	28·0	10·0	..	..	..	2	0·1	0
7	47,XXY	20·2	5·1	28·7	41·2	19·0	34	4	3·0	0	<0·1	0
8	47,XXY	29·9	9·0	16·9	37·0	8·9	..	..	1·4	0	<0·1	0
9	47,XXY	34·8	7·2	13·5	20·9	13·5	82	2	2·5	15	<0·1	3
10	47,XXY	28·2	3·8	28·1	45·2	19·5	92	7	4·5	1	<0·1	0
11	47,XXY	20·6	..	85 ng/mL	8·7 ng/mL	14·0	104	5	5·0	54	4	7

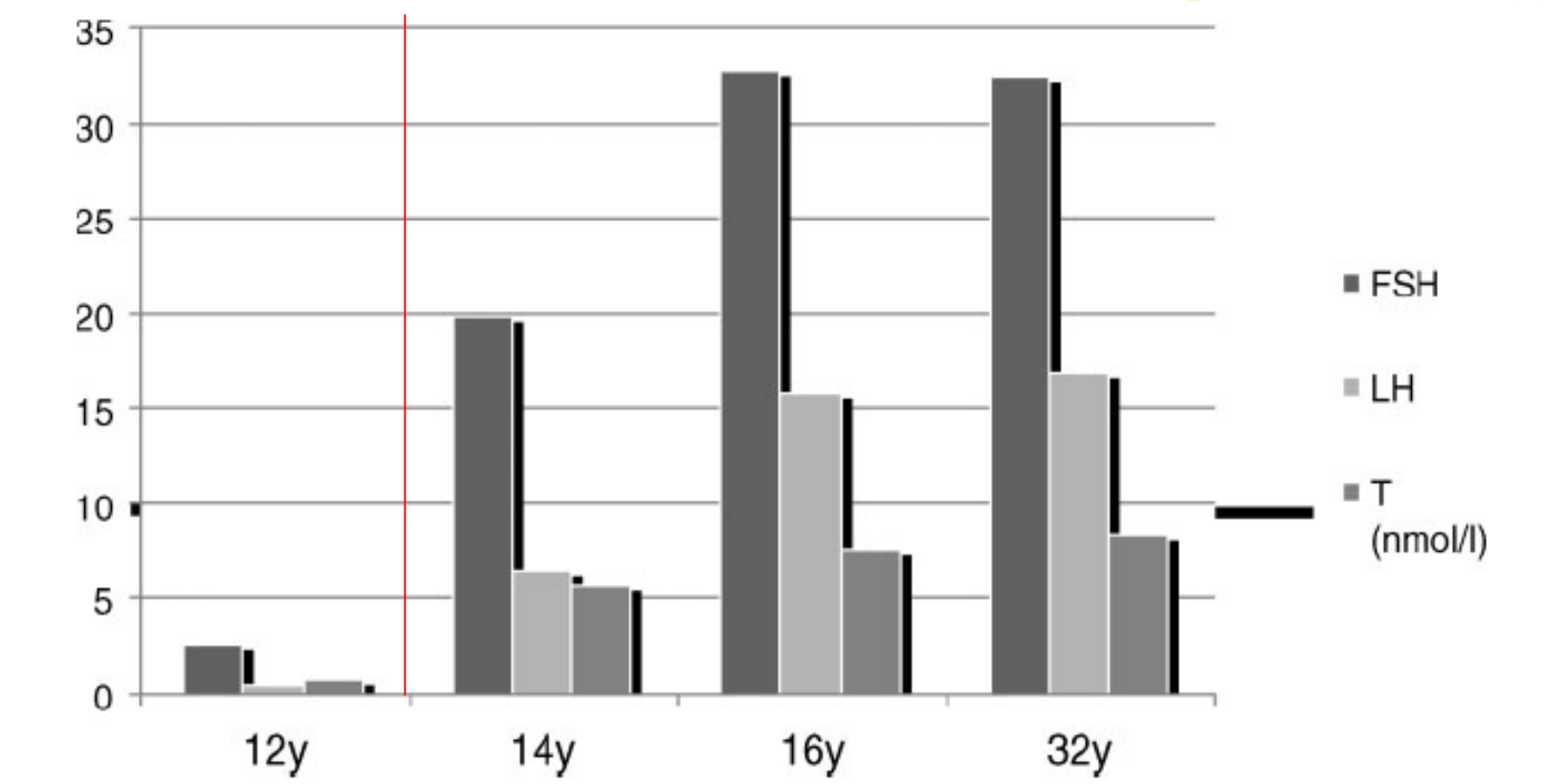
* Bitesticular volume by ultrasonography. †% WHO grade a and b.[74]

Table 2: Clinical features of patients with Klinefelter's syndrome and spermatozoa in the ejaculate

Lancet 2004; 364: 273–83

Fertilità

Paduch D et al Semin Reprod Med 2009 27(2):137-48



It is reasonable to assume that most men with KS are born with spermatogonia. During early puberty the spermatogonia undergo massive apoptosis a process which corresponds to rapid increase in FSH levels during early puberty in boys with KS. Identification and recovery of sperm in adult men with KS indicates that spermatogonia are present in at least half of men with KS identification of sperm in ejaculate of men with KS; biopsy data from KS boys at different ages and development stages indicating that boys with KS have spermatogonia at birth and that the damage to germinal epithelium occurs early during puberty.

LA SINDROME DI KLINEFELTER

Fertilità

E' stato dimostrato che anche nei soggetti azoospermici possono essere presenti foci contenenti una residua spermatogenesi

La presenza di attività spermatogenetica nei soggetti con SK potrebbe essere spiegata in due modi:

a) mosaicismo intratesticolare : spermatogoni 46 XY in grado di differenziarsi normalmente

b) con la capacità da parte di spermatogoni 47XXY di completare la spermatogenesi e dare origine a spermatozoi maturi

Foresta C *et al.* J Clin Endocrinol Metab 1999;84:3807-10.
Ferhi K *et al.* Andrologia 2009;41:84-7.
Paduch *et al.* Sem Reprod Med 2009;27:137-48.

TESE–ICSI in patients with non-mosaic Klinefelter syndrome: a comparative study

Parameter	*Klinefelter syndrome*	*Controls*
No. of patients	33	113
No. of TESE attempts	39	130
Male age years (mean ± SD)	32.0 ± 6.4[a]	34.3 ± 5.8[b]
Female age years (mean ± SD)	28.5 ± 6.1	29.9 ± 5.4
Successful retrieval of spermatozoa/total TESE attempts (%)	22/39 (56)	57/130 (44)
Successful retrieval of spermatozoa/first TESE attempt (%)	17/33 (52)	45/113 (40)
Successful retrieval of spermatozoa/2nd or further TESE attempt (%)	5/6 (83)	12/17 (71)

Parameter	*Klinefelter syndrome*	*Controls*
No. of cumulus–oocyte complexes (mean ± SD)	13.1 ± 7.7	11.2 ± 6.4
Fertilization rate (%)	48	54
No. of embryos transferred (mean ± SD)	2.4 ± 1.2	2.7 ± 1.0
Biochemical pregnancy/embryo transfer (%)	11/18 (61)	19/46 (41)
Clinical pregnancy/embryo transfer (%)	7/18 (39)	15/46 (33)
Implantation rate (%)	23	26
Live birth rate/embryo transfer (%)	28	26

H Yarali et al. Vol 18. No 6. 2009 756-760 Reproductive BioMedicine Online.

TESE e ICSI in SK

Study	*No. of TESE procedures*		*TESE with successful sperm retrieval (%)*	*Clinical pregnancy/ embryo transfer*
Tournaye *et al.* 1996	10		4 (40)	0/4
Levron *et al.* 2000	20		8 (40)	4/8
Friedler *et al.* 2001	12		5 (42)	5/10[a]
Vernaeve *et al.* 2003	50		24 (48)	Not available
Ulug *et al.* 2003	11	**micro**	6 (55)	2/6
Schiff *et al.* 2005	54	**micro**	39 (72)	22/39
Kyono *et al.* 2007	17		6 (35)	7/9[b]
Present study	39	**micro**	22 (56)	7/18

Klinefelter syndrome: does it confer a bad prognosis in treatment of nonobstructive azoospermia?

Patient characteristics and sperm recovery.

Parameter	Klinefelter syndrome	NOA	*P* value
Micro-TESE procedures, n	106	379	
Male age, y	34.3 ± 5.9	35.2 ± 5.9	.174
Female age, y	29.2 ± 5.5	30.9 ± 5.2	.005
Sperm recovery, n (%)	50 (47)	188 (50)	.723

- ✓ **In the KS group, men who had successful sperm recovery were younger than men who did not have successful recovery (32.5±4.9 vs. 35.8±6.2 years; P<.003)**
- ✓ **In the NOA group, age did not differ between the men who had successful or unsuccessful sperm recovery (35.2±5.5 vs. 35.1±6.3 years)**

Conclusion(s): Sperm recovery rates in men with KS were similar to those of men with NOA and normal karyotypes. The fertilization rate was statistically significantly lower for men with KS than men with NOA, but pregnancy and abortion rates were similar. We observed good sperm recovery and ICSI outcomes for patients with KS. (Fertil Steril® 2011;■:■–■. ©2011 by American Society for Reproductive Medicine.)