TESE
Testicular Sperm Extraction, Open Testicular Biopsy

Removal of a small portion of testicular tissue in order to extract a few viable sperm.

About TESE
Testicular sperm extraction (TESE) is the process of removing a small portion of tissue from the testicle under local anesthesia and extracting the few viable sperm cells present in that tissue for intracytoplasmic sperm injection (ICSI).

The testicular sperm extraction process is recommended to men who cannot produce sperm by ejaculation due to azoospermia, such as that caused by primary testicular failure, congenital absence of the vas deferens or non-reconstructed vasectomy.

The introduction of the technique of intracytoplasmic sperm injection to achieve fertilization, especially using surgically retrieved testicular or epididymal sperm from men with obstructive or non-obstructive azoospermia, has revolutionized the field of assisted reproduction. Testicular sperm retrieval techniques associated with intracytoplasmic sperm injection have reduced the need for donor sperm and given many azoospermic men the chance to become biological fathers.

The extraction of the testicular parenchyma for sperm search and isolation was first described in 1995. For conventional TESE, a standard open surgical biopsy technique is used to remove the testicular parenchyma without the aid of optical magnification. This procedure is usually carried out without delivering the testis. Briefly, a 2-cm transverse incision is made through the anterior scrotal skin, dartos and tunic vaginalis. A small self-retaining retractor can be used to ensure proper exposure of the tunica albuginea. A 1-cm incision is made in the albuginea, and gentle pressure is applied to the testis to aid the extrusion of the testicular parenchyma. A fragment of approximately 5x5 mm is excised with sharp scissors and placed in sperm culture media. Single or multiple specimens can be extracted from the same incision. Alternatively, individual albuginea incisions can be made in the upper, middle and lower testicular poles in an organized manner for the sampling of different areas. The testicular specimens are sent to the laboratory for processing and immediate microscopic examination. The tunica albuginea is closed with a running, non-absorbable suture.

Success or failure factors
TESE is an invasive procedure and should be done with the intention of treatment. Sperm retrieval procedures are associated with uncertainties and high costs. In general, microdissection TESE or open biopsy are more successful than needle aspiration. Anyway, the prognostic factors of sperm retrieval are important to understand. They have included testis size, follicle stimulating hormone (FSH), inhibin beta, the etiology of infertility, and genetic alterations; however, the histological testicular pattern remains the best predictor of sperm retrieval, although with the inconvenience of a second invasive procedure.
The probability of sperm retrieval in non-obstructive azoospermia (NOA) is dependent on two factors, namely the etiology of NOA and the surgical approach.

In general, the total number of sperm retrieved in NOA is significantly less than that obtained in OA. In approximately 13% of men diagnosed with NOA, the failure of spermatogenesis may be attributed to Y chromosome microdeletions. The probability of retrieving spermatozoa in men who have microdeletions in the AZFa and/or AZFb regions is close to zero, whereas men with AZFc microdeletions have an approximately 70% chance of having enough sperm available for ICSI. Although the reports detailing the rates of testicular sperm retrieval in men with NOA range from 14% to 87%, a conservative estimate of an overall 50-60% chance of successful sperm retrieval is appropriate.

No reliable positive prognostic factors guarantee sperm recovery for patients with non obstructive azoospermia. Serum inhibin-B weakly indicates presence of sperm cells in the testes, raising chances for successfully achieving pregnancy through TESE, although the association is not very substantial, having a sensitivity of 0.65 and a specificity of 0.83 for prediction the presence of sperm in the testes in non-obstructive azoospermia. Seminal plasma proteins TEX101 and EC11 were recently proposed for the differential diagnosis of azoospermia forms and subtypes, and for prediction of TESE outcome.

After TESE, part of the freshly retrieved sperm may be stored for later use. The cryopreservation of sperm in general results in a decrease in post-thaw motility and vitality. This loss of viability can be of great concern in NOA because of the low number of sperm available; however, unique approaches to the freezing of single/individual sperm now offer excellent post-thaw recoveries.

Another important fact, which should be considered in the context of TESE is an increased incidence of sperm chromosome abnormalities in men with oligoasthenoteratozoospermia. Interestingly, a comparison of aneuploidy frequency between embryos derived from testicular sperm from men with OA and from those with NOA revealed no difference between the two groups, suggesting the chromosomal normacy of the testicular sperm. However, a study comparing surgically retrieved versus ejaculated sperm showed a significantly higher incidence of chromosomal abnormalities in surgically retrieved sperm from men with OA and NOA compared with normospermic ejaculated sperm. Despite differences in the study designs that make any comparison of outcome results between OA and NOA difficult, it appears that if sperm are retrieved and viable gametes are available for ICSI, the fertilization, implantation, and pregnancy rates resulting from the use of fresh sperm from men with NOA are in line with those resulting from the use of sperm from men with OA. Therefore, the cryopreservation of sperm does not affect the fertilization and pregnancy outcomes.

### Complications

The major drawback of open biopsy, from the point of view of the patient, is the size of the wound and the healing time compared with other forms of aspiration, namely needle aspiration. Patients with NOA often have decreased testicular volumes, and multiple biopsies with the excision of excessive testicular parenchyma carry the risk of irreversible damage and atrophy.

The number of sperm retrieved for cryopreservation in NOA patients may be extremely low, the loss of a few sperm during the freeze/thaw cycle can be significant and is a very real disadvantage.

### Prognosis

The treatment of the female partner of NOA patients with gonadotropins in anticipation of oocyte retrieval and ICSI may be unnecessary in up to 50% of patients, as it is possible that no sperm may be available following the testicular biopsy. An exploratory testicular biopsy surgery with "possible testicular sperm freeze" is a valid option and should be offered to the couple. If there is evidence of rare sporadic hypo-spermatogenesis in the seminiferous tubules, the few spermatozoa that are retrieved may be frozen at this time. If it is doubtful whether enough spermatozoa will be available for ICSI post-thaw, the couple may be advised to undergo a fresh biopsy on the day before or on the morning of oocyte retrieval. Couples hesitant to undergo a repeat biopsy may be offered donor sperm as a back-up in case the number of mature oocytes exceeds the number of available viable testicular sperm for ICSI.
Diagnoses

**Anejaculation**
The pathological inability to ejaculate in males, with (orgasmic) or without (anorgasmic) orgasm.
Learn more at: [www.fertilypedia.org/therapy/diag/anejaculation](http://www.fertilypedia.org/therapy/diag/anejaculation)

**Aspermia**
Male diagnosis connected with male infertility characterised by the complete absence of semen.
Learn more at: [www.fertilypedia.org/therapy/diag/aspermia](http://www.fertilypedia.org/therapy/diag/aspermia)

**Azoospermia**
Complete absence of sperm in the ejaculate of a man.
Learn more at: [www.fertilypedia.org/therapy/diag/azoospermia](http://www.fertilypedia.org/therapy/diag/azoospermia)

**Cryptozoospermia**
Male infertility diagnosis characterized by extremely low concentration of sperm in semen.
Learn more at: [www.fertilypedia.org/therapy/diag/cryptozoospermia](http://www.fertilypedia.org/therapy/diag/cryptozoospermia)

**Hydrocele testis**
An accumulation of clear fluid in the tunica vaginalis, the most internal of membranes containing a testicle.
Learn more at: [www.fertilypedia.org/therapy/diag/hydrocele-testis](http://www.fertilypedia.org/therapy/diag/hydrocele-testis)

**Hypogonadism**
A medical term which describes a diminished functional activity of the gonads – the testes and ovaries.
Learn more at: [www.fertilypedia.org/therapy/diag/hypogonadism](http://www.fertilypedia.org/therapy/diag/hypogonadism)

**Kallmann syndrome**
A genetic condition where the primary symptom is a failure to start puberty or a failure to fully complete puberty.
Learn more at: [www.fertilypedia.org/therapy/diag/kallmann-syndrome](http://www.fertilypedia.org/therapy/diag/kallmann-syndrome)

**Klinefelter syndrome**
The set of symptoms that result from two or more X chromosome in males.
Learn more at: [www.fertilypedia.org/therapy/diag/klinefelter-syndrome](http://www.fertilypedia.org/therapy/diag/klinefelter-syndrome)

**Non-obstructive azoospermia**
Complete absence of sperm in the ejaculate due to testicular failure.
Learn more at: [www.fertilypedia.org/therapy/diag/non-obstructive-azoospermia](http://www.fertilypedia.org/therapy/diag/non-obstructive-azoospermia)

**Obstructive azoospermia**
Absence of sperm in the ejaculate despite normal spermatogenesis, caused by an obstruction of the genital tract.
Learn more at: [www.fertilypedia.org/therapy/diag/obstructive-azoospermia](http://www.fertilypedia.org/therapy/diag/obstructive-azoospermia)

**Sertoli cell-only syndrome**
The absence of any developmental stage of sperm cell in the testes.
Learn more at: [www.fertilypedia.org/therapy/diag/sertoli-cell-only-syndrome](http://www.fertilypedia.org/therapy/diag/sertoli-cell-only-syndrome)

**Testicular failure**
The inability of the testicles to produce sperm or testosterone.
Learn more at: [www.fertilypedia.org/therapy/diag/testicular-failure](http://www.fertilypedia.org/therapy/diag/testicular-failure)
XX male syndrome
The male sex chromosomal disorder characterized by a spectrum of clinical presentations, ranging from ambiguous to normal male genitalia.
Learn more at: www.fertilypedia.org/therapy/diag/xx-male-syndrome

Y-chromosome deletions
A family of genetic disorders caused by missing gene(s) in the Y chromosome.
Learn more at: www.fertilypedia.org/therapy/diag/y-chromosome-deletions

⚠️ Risk factors

Groin surgery
A surgery, which is performed in inguinal part of the body.
Learn more at: www.fertilypedia.org/therapy/RF/groin-surgery

Vasectomy
A surgical procedure for male sterilization or permanent contraception.
Learn more at: www.fertilypedia.org/therapy/RF/vasectomy

Mumps
An infection that primarily affects the parotid glands, caused by the mumps virus which can impair male fertility.
Learn more at: www.fertilypedia.org/therapy/RF/mumps

Gallery

Conventional testicular sperm extraction (TESE)
The illustration depicts TESE using a single open biopsy

Sources

" Testicular sperm extraction (https://en.wikipedia.org/wiki/Testicular_sperm_extraction)" —sourced from Wikipedia licensed under CC BY-SA 3.0

" An update on sperm retrieval techniques for azoospermic males (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-59322013001300011)" —by Esteves et al. licensed under CC BY-NC 4.0

" Cryopreservation of testicular and epididymal sperm: techniques and clinical outcomes of assisted conception (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-59322013001300015)" —by Gangrade licensed under CC BY-NC 4.0

" Prognostic factors for sperm retrieval in non-obstructive azoospermia (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-59322013001300013)" —by Giina and Vieira licensed under CC BY-NC 4.0