Background and Aims: The present study was carried out to examine the predictive value of endocrine profiles as indicators of the sperm retrieval rate on testicular sperm extraction (TESE) in azoospermic men.

Methods: Prior to TESE, the serum levels of follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin, testosterone, dihydrotestosterone (DHT), estradiol and 17α-hydroxyprogesterone were measured and the sagittal cross-sections of the testis were acquired using ultrasonography.

Results: The sperm retrieval rates according to the cause of azoospermia were 40% for idiopathic azoospermia, and 100% for obstructive azoospermia, cryptorchidism and ejaculatory disorder. Based on the endocrinological profiles, the sperm retrieval rates showed significant differences at 100% for FSH ≤ 15 mIU/mL or LH ≤ 2 mIU/mL, 0% for FSH > 60 mIU/mL or LH > 12 mIU/mL, and 33% for the intermediate groups (P < 0.01). Comparison of the retrieval of spermatozoa and serum DHT level for the intermediate group also showed a significant difference, with retrieval rates of 58% for DHT ≤ 0.5 ng/mL and 0% for DHT > 0.5 ng/mL (P < 0.01).

Conclusions: The etiology, serum FSH, LH and DHT levels are useful in predicting the sperm retrieval rates on TESE in azoospermic patients. (Reprod Med Biol 2005; 4: 239–245)

Key words: azoospermia, endocrinology, etiology, sperm retrieval rate, testicular sperm extraction.

INTRODUCTION

AZOOSPERMIA IS THE most severe form of male infertility. In the past, it was not possible for azoospermic patients to father their own children and they had to resort to the only measure available to them, which was artificial insemination with donor spermatozoa. Recently, however, fertilization can be achieved by injecting a spermatozoon into the cytoplasm of an oocyte with a micromanipulator. This method, known as intracytoplasmic sperm injection (ICSI), has made remarkable progress1 and, thus, it is now possible to fertilize an oocyte with just a single spermatozoon. Pregnancy is achieved through the following set of procedures: (i) surgical extraction of the testicular tissue from the azoospermic patient; (ii) retrieval of testicular spermatozoa under the microscope; and (iii) fertilization with ICSI.2

The sperm recovery rate from the testicular sperm extraction (TESE) procedure ranges from 40 to 60%3 and it is often the case that no spermatozoon can be recovered from patients with atrophied testes. However, at present there is still no treatment for azoospermia itself and TESE-ICSI is the only option available that offers azoospermic patients the possibility of fathering children with their own genetic material. As such, despite the knowledge that half of the cases will result in failure, patients still opt to try TESE. The present study examines some non-invasive measures of predicting the presence or absence of testicular spermatozoa in azoospermic men before TESE.

METHODS

Patients and study design

THE POPULATION COMPRISED 43 azoospermic patients who were thoroughly briefed about the procedures and consented to them. The patients underwent semen analyses more than three times and those whose semen contained no spermatozoon every time were classified as azoospermic. The etiologies of
azoospermia were idiopathic azoospermia (35 cases),
azoospermia secondary to cryptorchidism (two cases),
obstructive azoospermia (three cases) and others (three
cases: congenital abnormality and ejaculatory disorder
resulting from spinal cord trauma). The mean age
(SEM) of patients was 36.4 ± 1.0 years.
A month before carrying out TESE, the serum levels
of follicle-stimulating hormone (FSH), luteinizing
hormone (LH), prolactin (PRL), testosterone (T),
dihydrotestosterone (DHT), estradiol (E2) and 17 α-
hydroxyprogesterone (17α-OHP) were measured. Using
ultrasound tomography, the sagittal cross-section area
of the testes was also measured. Following the retrieval
of testicular spermatozoa on TESE, ICSI was subsequently
carried out. Furthermore, the correlations between etiology,
serum hormone levels and sagittal cross-section area to
the presence or absence of testicular sperm were analyzed.

Ultrasound scanning of the testis and serum
hormone level measurements
Ultrasonography of the testes of azoospermic patients
was carried out by grasping the scrotum and applying a
7.5 MHz transvaginal sonographic probe (GE Yokogawa
Medical Systems, Tokyo, Japan) from the direction of the
feet upward to acquire a sagittal cross-section image
of the testis. The largest possible image of the sagittal
cross-section area was obtained and the area was traced
and automatically measured. The testicular sagittal area
was defined as the sum of the maximum sagittal cross-
section areas of the left and right testes.

Radioimmunoassay (RIA) was used to measure the
serum FSH, PRL, 17α-OHP, T, DHT and E2 levels (Spack-
S FSH and Spack-S PRL, Daichi Radiosotope Laboratories,
Tokyo, Japan; DPC 17α-OH-Progesterone Kit, DPC Total
Testosterone Kit, DPC Dihydrotestosterone Kit and
DPC Estradiol Kit, Diagnostics Products, Los Angeles,
CA, USA). As for serum LH level, it was measured using
enzyme immunoassay (Immulyze LH; Diagnostics
Products). The sensitivity, and the intra- and interassay
coefficients of variation were found to be 0.5 IU/L, 4.0%
and 3.0% for FSH; 0.7 IU/L, 6.2% and 5.5% for LH;
1.0 ng/mL, 6.3% and 6.9% for PRL; 0.07 ng/mL, 10.2%
and 9.4% for 17α-OHP; 4 ng/mL, 6.1% and 8.3% for T;
0.019 ng/mL, 7.6% and 14.6% for DHT; and 10 pg/mL,
5.6% and 6.8% for E2, respectively.

Testicular sperm extraction
A vertical incision of approximately 1 cm was made in
the scrotal skin up to the tunica albuginea. The testis was
fixed during the incision by passing a thread through it.
While holding the testes with one hand, applying
pressure on the testicular tissue and at the same time
slightly pulling with forceps, the protruding testicular
tissue was excised. The tunica albuginea and the scrotal
skin were closed with 3-0 Vicryl stitches. The collected
testicular tissue was placed in a culture dish (Falcon 3002;
Becton Dickinson Labware, Franklin Lakes, NJ, USA)
containing HTF medium supplemented with 10% serum.
Dissection of the testicular tissue was carried out under
a stereomicroscope using an ophthalmic blade and a
27G needle and the contents of the seminiferous tubules
were pushed out. The extracted tissue suspension was
centrifuged and resuspended in 1 mL of HTF medium
supplemented with 10% serum. This testicular sample
was checked for the presence of spermatozoa under a
microscope at ×200–400 magnifications. Using the pipette
for sperm injection in ICSI, the retrieved sperm were
collected into a droplet. After obtaining an amount com-
parable to the number of oocytes, ICSI was initialized.
The spermatozoa for injection were transferred to the
ICSI droplet and after washing well, they were immobi-
lized (regardless of the sperm motility).

Ovarian stimulation
Stimulations of the ovaries were carried out using either
the long protocol (L protocol) of gonadotropin-releasing
hormone (GnRH) agonist and human menopausal
gonadotropin (hMG) regimen or the bromocriptine-
rebound method (BR method).4
In the L protocol, nasal administration of buserelin
(Suprecur, 900 µg/day; Hoechst, Tokyo, Japan) was started
on day 4 of the high phase. Ovarian suppression was
confirmed by a serum E2 level of <20 pg/mL and the
absence of ovarian follicles greater than 12 mm in diameter
on transvaginal sonography. Daily intramuscular admin-
istration of three ampules of hMG (Pergonal, Teikoku
Zouki, Tokyo; 75 IU LH plus 75 IU FSH in each ampule)
was started. When the serum E2 level exceeded 400 pg/
ml and the leading follicle was greater than 14 mm in
diameter, the dosage of hMG was reduced to two ampules
per day. Buserelin and hMG administration were discon-
tinued and 10 000 IU hCG was given intramuscularly
when the diameter of the leading follicle reached 17–
19 mm and the serum E2 level was above 400 pg/mL.
Thirty-six hours after hCG administration, the oocytes
were retrieved by puncturing the follicle and aspirating
the contents under transvaginal ultrasound guidance.
In the BR method, bromocriptine (Parlodel, Sandoz,
Tokyo) was given orally before going to sleep from

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