Research Article

Testicular biopsy in the study of azoospermia

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Date Submitted:8.3.2012

Date Accepted:8.4.2012

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Abstract

Aims: to evaluate the role of testicular biopsy in the study of azoospermic patients.

Patients and methods: a total of 67 infertile men with azoospermia were studied over 5 years period (February 2005 – March 2009). Their mean age was 33 years. They underwent bilateral testicular biopsy under general anaesthesia and the specimens were categorized according to histopathological patterns.

Results: the histological evaluation of the testes revealed normal spermatogenesis in 12 patients (17.9 %), hypospermatogenesis in 4 (5.9 %), spermatogenic arrest in 39 (58.2 %), sertoli cell only in 7 (10.4 %) and complete tubular hyalinization in 5 patients (7.4 %).

Conclusions: This study highlights the role of testicular biopsy as a reliable and useful technique for the investigation of patients with azoospermia.

Keywords: Male infertility, Azoospermia, Testicular biopsy, Histopathology

INTRODUCTION

Azoospermia, defined as the absence of spermatozoa in the ejaculate after assessment of centrifugated semen on at least 2 occasions, is observed in 1% of the general population and in 10-15% of infertile men.[1, 2]

It is one of the most difficult conditions to manage. Its causes include ductal obstruction from inflammatory, congenital and traumatic conditions as well as endocrine and primary testicular pathology [3-5]. Inflammatory occlusion usually occurs at the junction of the lower vas and the cauda of the epididymis. A differential diagnosis of obstruction (ejaculatory duct, vasal or epididymal) from primary testicular failure must be made.[6]

Azoospermia is usually considered to be an indication for testicular biopsy as part of the investigation of an infertile man. Histological examination of the testes gives a clear assessment of spermatogenesis and allows a rational choice for the future management of the couple by reconstructive surgery, hormonal therapy, artificial donor insemination or adoption.[7]

Currently some patients with obstructive and non obstructive azoospermia have been treated successfully with intracytoplasmic sperm injection (ICSI) using surgically retrieved sperm from the epididymis or testis.[8, 9]

The purpose of the present study was to evaluate the role of testicular biopsy in the patients with azoospermia by determining the histology picture so that we could be able to predict accurately which patient might benefit from (ICSI) procedure.

PATIENTS AND METHODS

The study included 67 male patients with ages ranged from 22 to 50 years and infertility ranged from 1 to 20 years. They attended the andrology clinic at Al-Yarmouk teaching hospital in the period between February 2004 and March 2009.

History taking (including fertility, sexual, genitourinary, general medical and drug history) and a complete physical examination were done for each patient with special emphasis on the genitalia (penis, testes size & consistency, epididymides consistency, vasa differentia presence & consistency, spermatic cords and inguinal regions).

Laboratory testing including urinalysis and endocrine evaluation were performed on all patients. Karyotyping to exclude chromosomal abnormalities was done only for azoospermic patients with very small testes and high serum follicular stimulating hormone (S. FSH), those patients with Klinefelter's syndrome were not included in the study. Scrotal ultrasound (U/S) and Trans rectal ultrasound (TRUS), to evaluate the seminal vesicles and the ejaculatory ducts, were done as indicated.

All patients underwent bilateral testicular biopsy under general anesthesia. The anterior scrotal skin was stretched while the testis was lifted & biopsy samples were obtained with small curved scissors through a small scrotal incision without delivering the testis outside the skin or tunica vaginalis to minimize postoperative scarring. Hemostasis was obtained with careful use of electrocautery, & the tunica albuginea was closed with fine, absorbable suture as were the layers of the scrotum. The testicular biopsy specimens were immediately placed into freshly prepared Bouins solution (a fixative that does not destroy the testicular architecture) and studied histopathologically both to document the pattern of sperm production and to rule out underlying testicular pathology such as intratubular germ cell neoplasia.

RESULTS

A total of 67 patients were included in this study. Three men out of the total had unilateral testis. The mean age of the patients studied was 33 years and the mean duration of infertility was 6 years. The clinical characteristics of the patients are shown in table (1).

Associated urogenital diseases were detected in 31 (46.2%) patients and varicocele was the most common finding in them (22.3%), table (2).

Table 1. the clinical characteristics of the patients with azoospermia.

Clinical characteristics		No.
Mean age (years)		33
Mean duration of infertility (years)		6
S. FSH	Normal	52 (77.6%)
	Elevated	11 (16.4%)
	Grossly elevated	4 (5.9%)

Table 2. The urogenital diseases found in our patients.

The disease		No. of patients	%
Hydrocele		2	2.9
Varicocele	Left side	13	19.4
	Bilateral	2	2.9
Previous epididymo-orchitis		6	8.9
Single testis		3	4.4
Previous groin surgery (orchiopexy, hernia repair)		5	7.4
Total		31	46.2

The histology picture was identified in the testicular biopsies of all patients and the picture was always identical on both sides. The patients had a wide range in the appearance of the testicular biopsy so that they were grouped according to histopsthological patterns as presented in table (3).

Table 3. The different histopathological patterns encountered in the patients.

Histology picture	No. of patients	%
Normal spermatogenesis (obstructive azoospermia)	12	17.9
Hypospermatogenesis (germ cell hypoplasia)	4	5.9
Spermatogenic arrest	39	58.2
Sertoli cell only	7	10.4
No spermatogenesis (complete tubular hyalinization)	5	7.4
Total	67	100

Spermatogenic arrest at the primary spermatocyte or spermatid level presented the most frequently encountered pattern (58.2%) followed by normal

spermatogenesis (17.9%), sertoli cell only (10.4%), tubular sclerosis (7.4%) and germ cell hypoplasia (5.9%).

Most of the patients with non obstructive azoospermia (81.9%) had small size testis with elevated S. FSH level and those with maturation arrest appeared to have arrested spermatogenesis at the primary spermatocyte stage.

DISCUSSION

The investigation of male infertility continues for those factors that are of diagnostic or therapeutic importance in men with azoospermia or oligospermia. All azoospermic patients with normal pituitary function and palpable vasa should undergo testicular biopsy. Microscopic evaluation of testicular biopsies is an important tool in assessing spermatogenesis in the azoospermic men and this may provide information concerning the etiology and pathogenesis and in some instances may serve as a helpful guide to therapy.[10, 11]

In our study we had found that most of the patients with maturation arrest & elevated S.FSH level had their arrest at the primary spermatocyte stage. This is similar to the results reported by some studies (Amer et al.,[12] Schulze et al.,[13] Seo & Ko[14] and Tsujimura et al.[15]) which stated that S. FSH was elevated in those cases of azoospermia where gametogenesis was arrested prior to spermatid differentiation. This arrest might be caused by genetics or by secondary influences such as antibiotics, heat or general diseases.

In the present study, obstructive azoospermia (normal testicular volumes, serum FSH with normal histology) represented (17.9%) of cases. Similar studies recorded by Rashed et al.[16] (24%), Wong et al.[17] (25%) and Colgan et al.[18] (20%). Brannen and Roth[19] reported a higher incidence of obstructive azoospermia (35%), the same was reported by Al- Rayess et al.[20] (31%). Thomas J[21] reported an incidence (38%) for obstructive azoospermia. But on the other side there were studies that reported low incidence; Meinhard et al.[22] reported (5%) for obstructive azoospermia, also Haddad et al.,[23] a study at Jordan, reported (11.2%) for obstructive azoospermia, table (4). The variation in the incidence of obstructive azoospermia reported in these studies could be related to a combination of social habits, environmental conditions & genetics.

While the investigation of azoospermic patients aims at establishing the etiology of the abnormality, in many instances the available treatment is ineffective and the prognosis remains poor. Since the majority of patients in the present study were not keen on either artificial insemination with donor or adoption, they were referred for combination of testicular sperm extraction (TESE) and intracytoplasmic sperm injection (ICSI) procedures which become the major method for assisted fertilization in patients with azoospermia whether obstructive or non-obstructive.

Table 4. Comparison of obstructive azoospermia % with others reported in the literature.

Reference	% of obstructive azoospermia
Rashed et al. (2008)	24
Wong et al. (1973)	25
Colgan et al. (1980)	20
Brannen & Roth (1979)	35
Al-Rayess et al. (2000)	31
Thomas J (1990)	38
Meinhard et al. (1973)	5
Haddad et al. (2004)	11.2
Present study (2009)	17.9

Conclusion

Testicular biopsy is an important tool in the investigation & assessment of azoospermic men as it defines the histological diagnosis & the possibilities of having successful outcome before considering TESE combined with ICSI and also to exclude obstruction if surgical reconstruction is possible.

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