Article

Analysis of spermatogenesis in non-obstructive azoospermic and virtually azoospermic men with known testicular pathology

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Abstract

It is widely thought that human testicles affected by unilateral pathology will have greater impairment of spermatogenesis than the otherwise unaffected testis. This study reviewed records of non-obstructive azoospermic (NOA) and virtually azoospermic (NOVA) men with associated testicular pathology who underwent testicular fine needle aspiration (FNA) mapping. Concentration of spermatozoa found in each testis was analysed to discern sperm-lateralization patterns in affected and unaffected testes. A total of 1098 FNA sites from 56 men (32 varicocele, 16 cryptorchidism, three epididymo-orchitis, two mumps orchitis, three torsion) were analysed. Overall, 38 patients (68%) had spermatozoa detected in at least one testis. Most men (68%) had equal proportions of FNA sites showing spermatozoa from both testes, 29% had more spermatozoa from the unaffected testis and 3% had more spermatozoa from the affected testis. Significantly fewer sperm-positive sites were observed on the affected (272 out of 752) than unaffected side (164 out of 346) ($P < 0.0001$, chi-squared test). When assessed by FNA mapping, most NOA and NOVA men with known unilateral testis pathology will have equal proportions of spermatozoa in both testes. However, when sperm production differs between sides, the unaffected side is much more likely to have spermatozoa. This information may be used to refine sperm-retrieval strategies in selected patients.

Keywords: *ICSI, IVF, male infertility, non-obstructive azoospermia, spermatogenesis, testis mapping*

Introduction

It is well recognized that spermatogenesis in infertile men with non-obstructive azoospermic (NOA) can be focal or patchy, and not homogeneous in nature (Turek *et al.*, 2000). Indeed, failing testes are known to harbour significant spatial variation regarding the location of mature spermatozoa for assisted reproduction (Jow *et al.*, 1993; Turek *et al.*, 2000). This observation makes testis sperm retrieval for assisted reproduction harder and less successful in NOA patients than in obstructive azoospermic patients. In addition, virtually azoospermic (NOVA) patients commonly have low numbers of spermatozoa or no spermatozoa in the ejaculate for assisted reproduction. As a result, NOVA patients are often also directed to complex testis sperm-retrieval procedures and, similar to NOA patients, commonly harbour focal or patchy spermatogenesis. A complicating feature in the clinical presentation of both NOA and NOVA patients is that they, like other infertile men, commonly have coexisting conditions such as varicocele or cryptorchidism. Although found unilaterally, these conditions are suspected to induce bilateral effects on spermatogenesis, based on studies in animal models (Saypol *et al.*, 1981; Hackett *et al.*, 1988; Zhang *et al.*, 2002; Vigueras *et al.*, 2004). Clinically, this issue can complicate the already complex process of sperm retrieval from NOA and NOVA patients. Should the affected or unaffected side be approached first for sperm retrieval? Based on animal studies, the study's hypothesis is that men with NOA or NOVA, who have associated unilateral testis pathology, are