Asian Journal of Andrology (2011) 13, 225–230

www.nature.com/aja

REVIEW

The value of testicular 'mapping' in men with non-obstructive azoospermia

Monika E Beliveau and Paul J Turek

As the field of assisted reproduction has advanced, many previously untreatable men are now biological fathers. Although finding sperm in men with obstructive azoospermia is not difficult, locating and retrieving spermatozoa in men with non-obstructive azoospermia remains a clinical challenge, largely because sperm production in these men can be patchy or focal in nature. In response to this challenge, strategies such as fine-needle aspiration (FNA) mapping have been developed to find spermatozoa. This review discusses the history, evolution and current clinical utility and findings with FNA mapping for male infertility). Review of the current literature in the English language on FNA (diagnostic or therapeutic) with a keyword focuses on sperm detection, retrieval, safety and complications. FNA was described in human medicine over 100 years ago. Testis FNA was described 45 years ago and FNA 'mapping' of spermatozoa was described in 1997. This comparative review of the literature on sperm detection and complication rates with FNA and open testis biopsy or microdissection procedures suggests that FNA is highly informative, minimally invasive and is associated with fewer complications than other commonly used approaches to sperm detection in non-obstructive azoospermic patients. FNA mapping has gained considerable traction as an informative, 'testis sparing' technique for sperm detection in non-obstructive azoospermia. With knowledge of sperm presence and location prior to sperm retrieval, FNA maps can help clinicians tailor sperm retrieval to optimize time, effort and extent of procedures needed to procure spermatozoa in these difficult cases.
Asian Journal of Andrology (2011) **13,** 225–230; doi:10.1038/aja.2010.178; published online 24 January 2011

Keywords: azoospermia; fine-needle aspiration; hypogonadism; sperm mapping; sperm retrieval

INTRODUCTION

As the field of assisted reproduction has advanced, many previously untreatable men have now become biological fathers. Developed in 1992, intracytoplasmic sperm injection (ICSI) was a significant advance that decreased the sperm requirement for egg fertilization from hundreds of thousands with *in vitro* fertilization (IVF) to one. ICSI also allowed spermatozoa with limited intrinsic fertilizing capacity to reliably fertilize eggs, including 'immature' spermatozoa derived from the male reproductive tract. Although finding spermatozoa in men with obstruction as a cause of azoospermia is not difficult,[1] locating and retrieving spermatozoa in men with non-obstructive azoospermia remains a clinical challenge, largely because sperm production in men with testicular failure can be patchy or focal in nature.[1]

In response to this challenge, several strategies were developed to find spermatozoa in men with non-obstructive azoospermia. As originally described, open (conventional) testicular sperm extraction (TESE) is performed using single or multiple small incisions in the testicular tunica albuginea.[2,3] Early experience with multibiopsy TESE, however, suggested that as the number of biopsies increased, so too did the concerns of vascular injury resulting in testicular atrophy and hypogonadism due to extensive tissue removal.[4,5] This led to the development of 'testis-sparing' strategies for finding spermatozoa in these patients. One approach, microdissection TESE, involves a single large, 3–4 cm equatorial or polar incision in the testicular tunica albuginea, followed by physically inverting the testis to expose the entire parenchyma for inspection.[6] Subsequently, by the use of operative microscopy, dilated and opaque seminiferous tubules are selectively harvested and evaluated for viable sperm.[7] A second 'testis-sparing' approach, reported several years earlier, involves minimally invasive fine-needle aspiration (FNA) diagnostically to 'map' the location of spermatozoa in the testis in anticipation of later sperm retrieval.[8] Armed with the knowledge of sperm presence and location before egg retrieval for IVF–ICSI, investigators could consider the theoretical possibilities of a more limited or 'directed' sperm retrieval procedure, employing percutaneous (testicular sperm aspiration (TESA)), open (TESE) or microdissection methods. This review discusses the history, evolution and current clinical utility and findings with FNA mapping for male infertility.

HISTORY OF FNA MAPPING

First described by Posner over 100 years ago, FNA has been performed in almost every organ in the body.[9] In 1965, the first FNA procedures were reported in the human testes of infertile men.[10] In 1988, Schenk and Schill[11] first described the cytological features of seminiferous epithelium in detail. Since then, it has been convincingly demonstrated that an excellent correlation exists between testicular cytology by FNA and histology by open testicular biopsy (Table 1). In addition, the ability to interpret histological patterns accurately from cytological

The Turek Clinic, 55 Francisco St. Suite 300, San Francisco, CA 94010, USA
Correspondence: Dr Paul Turek (DrPaulTurek@gmail.com)
Received: 6 December 2010; Accepted: 11 December 2010; Published online: 24 January 2011