Combining Sperm Mapping and Sperm Vitrification to Minimize Repetitive Testicular Biopsy

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Introduction

Men with azoospermia present both a diagnostic and therapeutic challenge. The vast majority of these cases are managed with micro-TESE combined with IVF/ICSI. However, mTESE is invasive, expensive, difficult to schedule concurrently with egg retrieval, and inevitably causes some damage to the testes. Sperm mapping is less expensive[1], less invasive, easy to schedule, causes virtually no damage to the testes[2], and if negative prevents the partner from going through an unnecessary IVF cycle[3].

Methods

When the sperm mapping reveals areas with spermatogenesis, it is almost invariably followed by mTESE. However, since it by definition yields a "map" of where the sperm should be, we have begun to do a percutaneous needle biopsy (PNB) in those areas. We then searched for and froze excess sperm using Extended Sperm Search and Microfreeze (ESSM), involving individual sperm vitrification.

We hypothesized the combination of sperm mapping, PNB, and ESSM would yield adequate sperm for both a fresh cycle and future frozen cycles.

We present two case reports managed with the above protocol.

Conclusion

The combination of sperm mapping followed by targeted PNB and sperm vitrification allows men to be screened for sperm, and then biopsied when appropriated, without ever undergoing an open and damaging mTESE. This protocol simultaneously provides the patient with enough sperm for multiple egg retrieval cycles without the need for future procedures.

Future Applications

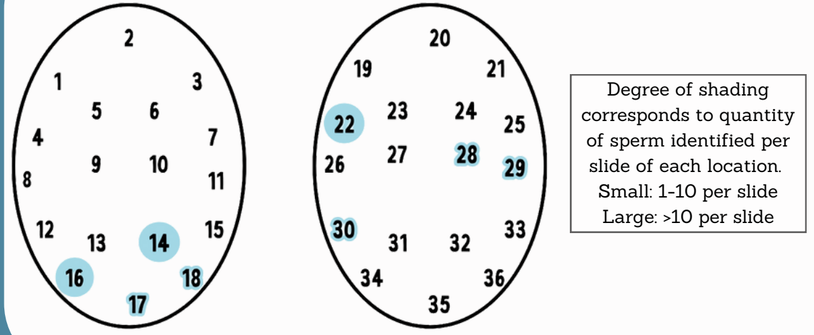
One critique of sperm mapping is the introduction of a second procedure that delays IVF cycle and sperm recovery. The use of extended search techniques and single sperm freezing can eliminate the need for both an outside pathology lab and for a follow up procedure. Sperm identified during the mapping procedure can be vitrified for future use.

Case #1

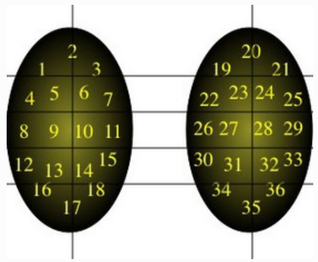
Patient Demographics: 33-year-old male with history of testicular torsion, b2/b3 Y-chromosome microdeletion, and mildly atrophied testicles.

Results: 8 of 36 sperm mapping slides demonstrated sperm. Using the map, a PNB targeting those areas with sperm was performed. 65 sperm were identified for ICSI. This cycle resulted in 3 euploid embryos and an ongoing pregnancy. 136 additional sperm were isolated and vitrified, divided between 7 SpermVDs for future use.

Case #1



The Official Sperm Map



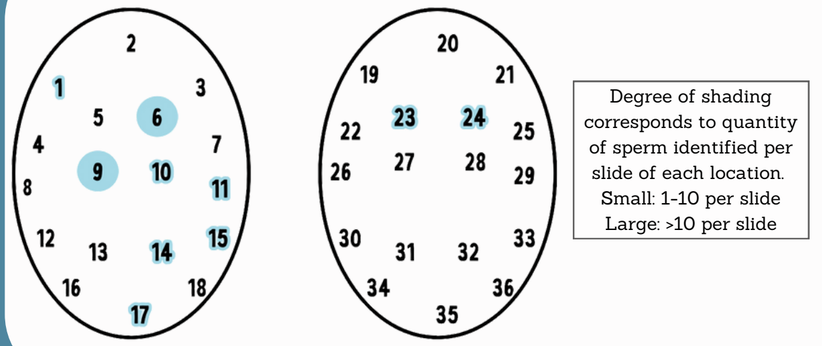
(Beliveau and Turek, 2011)

Case #2

Patient Demographics: 43-year-old male with mildly atrophied testicles with history of diagnostic biopsy that demonstrated rare spermatids.

Results: 10 of 36 sperm mapping slides demonstrated sperm. Using this information, an appropriately targeted PNB was performed, and the sample was divided between the IVF lab and our andrology lab. The IVF lab recovered 6 intact sperm, which were used for ICSI with 3 retrieved oocytes (female partner 43-years-old). The andrology lab recovered an additional 23 sperm which were vitrified for future use, divided between 4 SpermVDs.

Case #2



Footnote

1. In our practice, accounting for all surgical fees, anesthesia, OR facility fee and sperm freezing, total cost for sperm mapping with PNB/ESSM is 24% less expensive to the patient than mTESE with standard sperm freezing.

References

2. Turek PJ, Ljung B-M, Cha I, Conaghan J. 2000. Diagnostic Findings from Testis Fine Needle Aspiration Mapping in Obstructed and Nonobstructed Azoospermic Men. Journal of Urology. 163(6):1709–1716. doi:https://doi.org/10.1016/s0022-5347(05)67526-x.

3. Turek PJ, Cha I, Ljung BM. 1997. Systematic fine-needle aspiration of the testis: correlation to biopsy and results of organ "mapping" for mature sperm in azoospermic men. Urology. 49(5):743–748. doi:https://doi.org/10.1016/S0090-4295(97)00154-4. [accessed 2022 May 3]. https://pubmed.ncbi.nlm.nih.gov/9145981/.