

FNA mapping-guided sperm retrieval vs. Upfront microTESE in non-obstructive azoospermia

A comparison of retrieval, pregnancy, and live- birth rates

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BACKGROUND

- > Male factor accounts for ~50% of infertility ¹
 - ~20% male factor only
 - ~30-40% combined male-female factor
- > Azoospermia occurs in 1% of all men, and nearly 15% of infertile men ^{2,3}
- > Non-obstructive Azoospermia (NOA) due to spermatogenic failure ⁴
 - *Generally* defined by normal ejaculate volume, testis atrophy, and/or elevated gonadotropins
 - Most common form of azoospermia

BACKGROUND

- > Options for sperm retrieval in NOA ⁵
 - Upfront TESA or conventional TESE (cTESE)
 - Upfront Micro-dissection testicular sperm extraction (microTESE)
 - Testicular Fine Needle Aspiration Mapping (FNAM) guided sperm retrieval

BACKGROUND

> MicroTESE

- Advantages ⁶⁻⁸
 - > Higher likelihood of success compared to cTESE (1.5 x)
 - > Less tissue loss
- Disadvantages ⁹
 - > Invasive and requires general anesthesia
 - > High cost, “manpower,” and resources
 - > Simultaneous or pre-emptive partner procedure
 - > **>40% failure rate**

BACKGROUND

- > Testicular Fine Needle Aspiration Mapping (FNAM)
 - Advantages ¹⁰⁻¹²
 - > Minimally invasive
 - > Provides highly predictive results
 - > Guides sperm retrieval technique
 - > Reduces need for simultaneous or pre-emptive oocyte retrieval
 - Disadvantages
 - > Diagnostic procedure only
 - > Lower sensitivity than microTESE?

BACKGROUND

> FNAM

- More sensitive than open biopsy/cTESE ¹⁰
- Retrieval rate is 95% with positive FNAM ¹⁴

> However:

- No study has compared the reproductive outcomes of FNAM guided sperm retrieval vs. upfront microTESE

STUDY AIMS

To compare reproductive outcomes between upfront microTESE and FNAM-guided sperm retrieval at one institution with two clinical pathways based solely upon clinician preference.

- > Primary Endpoints
 - Sperm retrieval (SR) rates
 - Pregnancy and live-birth rates
- > Secondary Endpoints
 - FNAM positivity rate
 - SR technique utilization

METHODS

- > Study period and design: 10-year review (2010-2019)
- > Patients: Males diagnosed with NOA and corresponding partners treated by three reproductive urologists
- > Two study cohorts determined
 - Two surgeons → FNAM guided sperm retrieval
 - One surgeon → Upfront MicroTESE
- > Exclusion criterion
 - AZFa and AZFb deletions (YCMD)
- > χ^2 analyses: SR, pregnancy and live-birth rates

RESULTS

| | FNAM Cohort | Upfront MicroTESE cohort |
|-------------------------------------|----------------------|--------------------------|
| N | 60 | 36 |
| Patient Age | 34 | 34 |
| Partner Age | 32 | 33 |
| Klinefelter's syndrome | 0 | 6 |
| AZFc (YCMD) | 1 | 2 |
| FNAM Positivity | 56.7% (34/60) | N/A |
| Overall sperm retrieval rate | 54% (31/57) | 58.3% (21/36) |
| Overall pregnancy rate* | 42.1% (24/57) | 33.3% (12/36) |
| Overall live-birth rate* | 36.8% (21/57) | 33.3% (12/36) |
| *partner sperm only | | |

RESULTS

| | FNAM Cohort | Upfront MicroTESE cohort | χ^2 analysis |
|------------------------------|----------------------|--------------------------|---------------------------------------|
| Overall sperm retrieval rate | 54% (31/57) | 58.3% (21/36) | χ^2 (1, N = 93) = 0.14, p = 0.71 |
| Overall pregnancy rate* | 42.1% (24/57) | 33.3% (12/36) | χ^2 (1, N = 93) = 0.72, p = 0.40 |
| Overall live-birth rate* | 36.8% (21/57) | 33.3% (12/36) | χ^2 (1, N = 93) = 0.12, p = 0.73 |
| *partner sperm only | | | |

RESULTS

| FNAM Cytology | | SR Technique | SRR |
|------------------------------------|----------------------|----------------------|----------------------|
| Mature spermatozoa (+ FNAM) | 56.7% (34/60) | + FNAM Cohort | 96.8% (30/31) |
| Diffuse hypospermatogenesis (DH) | 61.8% (21/34) | DH → TESA/E | 100% (20/20) |
| Focal hypospermatogenesis (FH) | 38.2% (13/34) | FH → MicroTESE | 91% (10/11) |
| Maturation Arrest | 6.7% (4/60) | - | - |
| Germ cell aplasia (SCO) | 35% (21/60) | - | - |

SR = sperm retrieval; SRR = sperm retrieval rate

RESULTS

| Female Partner Management | FNAM Cohort | Upfront MicroTESE cohort |
|-------------------------------------|--------------------|--------------------------|
| Preemptive oocyte retrieval | | |
| | 18% (11/60) | 78% (28/36) |
| | MicroTESE (11) | |
| | TESA/E (0) | |
| | FNAM Negative (0) | |
| IVF Decision | | |
| IVF with partner sperm | 97% (30/31) | 58% (21/36) |
| IVF with donor sperm | 0 | 14% (5/36) |
| IVF Cancelled | 3% (1/31) | 15% (6/36) |
| <i>IVF = in-vitro fertilization</i> | | |

DISCUSSION

- > FNAM-guided sperm retrieval is comparable to microTESE in key reproductive outcomes
- > FNAM may allow for a less invasive, cost-effective approach to sperm retrieval
 - One-third (20 men) underwent TESA/E
 - 18% (11 men) required microTESE
 - 43% (26 men) avoided further intervention
- > FNAM may allow for strategic IVF planning with female partners

DISCUSSION

> Limitations

- Retrospective and non-randomized study
- Surgeon selection bias
 - > Patients with Klinefelter's syndrome were recommended upfront microTESE due to testis hypotrophy precluding standard template FNAM
- No validation microTESE following negative FNAM

CONCLUSION

- > Sperm retrieval, pregnancy, and live-birth rates with FNAM guided sperm retrieval are comparable to those with upfront microTESE
- > FNAM is currently the best predictor of successful sperm retrieval, and carries a high positive predictive value
- > As such, FNAM may be an excellent alternative to upfront sperm retrieval

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