#647: The Effect of Body Mass Index on Clinical and Functional Outcomes in Varicocele Treatment: A Comparative Analysis of Microscopic Varicocelectomy vs. IR Embolization

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Introduction

Varicocele is a leading cause of male infertility and can be associated with scrotal pain. It can be treated through different modalities including subinguinal microscopic varicocelectomy (MV) and angioembolization (AE) according to American Urologic Association Guidelines. Despite its utilization, reproductive outcomes and complication rates between MV and AE remain sparse.

Objective: This study aims to compare clinical characteristics, postoperative changes in semen parameters, complication rates, pain relief, need for additional interventions, and the influence of body mass index (BMI).

Methods and Materials

We conducted a retrospective cohort study at Cleveland Clinic Abu Dhabi from July 2015 to July 2024.
We assessed the association between BMI and key clinical outcomes: infertility status, pre- and post-operative semen parameters, complications, operative time, pain resolution, and re-intervention.
Procedural outcomes were compared between MV and AE.
Data analysis was performed using SPSS (v29). Categorical variables were analyzed using chi-square and Fisher's exact test. For continuous variables, Mann–Whitney U test was used for between-group comparisons, and Wilcoxon Signed-Rank test for paired (pre-post) analysis. Effect sizes included rank-biserial correlation (r) and Cohen's d where applicable.

Results

A total of 214 patients underwent microscopic varicocelectomy (MV) and 50 underwent angioembolization (AE), after excluding those lost to follow-up. The mean age was 28.7 ± 9.3 years in the MV group and 31.5 ± 11.1 in the AE group. Mean BMI was similar between groups (27.0 ± 6.1 vs. 26.7 ± 6.5 kg/m²).

Infertility was the presenting complaint in 99 MV patients (46.3%) and 20 AE patients (31.7%); the rest presented with scrotal pain.

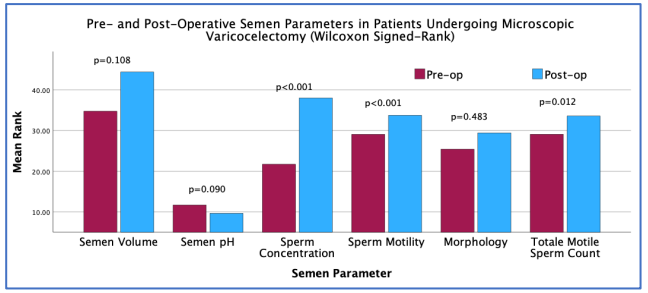
Operative time was significantly longer for MV (83.4 ± 29.6 min) vs AE (72.3 ± 25.6 min). Persistent post-op pain was observed in 32.6% of MV patients and 39.4% of AE patients with preoperative pain.

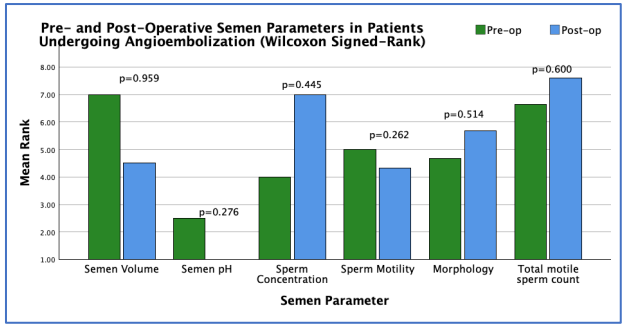
The MV group had a 8.9% complication rate, including hydrocele (4.2%), hematoma (4.2%), and surgical site infection (0.4%). No complications were reported in the AE group. Testicular atrophy occurred in 3 MV patients (1.4%) and none in the AE group.

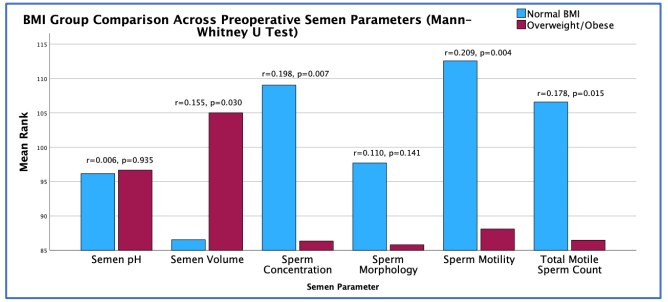
BMI was not significantly associated with complication risk ($p = 0.238$) or operative time ($p = 0.754$, $d = –0.04$), but was strongly associated with infertility: 53.0% of overweight/obese patients were infertile vs 26.8% of normal-BMI patients ($\chi^2(1) = 17.1$, $p < 0.001$).
Overweight/obese patients had significantly worse preoperative semen parameters including lower total motile sperm count ($p = 0.015$, $r = 0.178$), sperm concentration ($p = 0.007$, $r = 0.198$), progressive motility ($p = 0.004$, $r = 0.209$), and volume ($p = 0.030$, $r = 0.155$); pH and morphology were unaffected.

Postoperatively, only the MV group showed significant improvements in sperm concentration ($p < 0.001$), motility ($p < 0.001$), and TMSC ($p = 0.012$). No semen parameters improved significantly after AE.

Variables:	Microscopic Varicocelectomy (n=217)	IR Embolization (n=63)
Mean Age, years (SD)	28.70 ± 9.26	31.52 ± 11.09
Mean BMI, kg/m² (SD)	27.05 ± 6.07	26.65 ± 6.45
Smoker, n (%)	85 (39.2%)	21 (33.3%)
Alcoholic, n (%)	4 (1.8%)	2 (3.2%)
Diabetes, n	2	2
Hypertension, n	3	0
CAD, n	0	1
Stroke, n	0	1
BMI Class - Underweight, n (%)	13 (5.99%)	4 (6.35%)
BMI Class - Healthy Weight, n (%)	59 (27.19%)	14 (22.22%)
BMI Class - Overweight, n (%)	85 (39.17%)	27 (42.86%)
BMI Class - Obese I, n (%)	40 (18.43%)	13 (20.63%)
BMI Class - Obese II, n (%)	14 (6.45%)	3 (4.76%)
BMI Class - Obese III, n (%)	6 (2.76%)	2 (3.17%)
Varicocele Grade – Subclinical, n (%)	12 (5.53%)	2 (3.17%)
Varicocele Grade - Grade 1, n (%)	32 (14.75%)	20 (31.75%)
Varicocele Grade - Grade 2, n (%)	79 (36.41%)	18 (28.57%)
Varicocele Grade - Grade 3, n (%)	94 (43.32%)	23 (36.51%)
Laterality - Left, n (%)	155 (71.43%)	45 (71.43%)
Laterality - Right, n (%)	6 (2.76%)	0 (0.0%)
Laterality - Bilateral, n (%)	56 (25.81%)	18 (28.57%)







Conclusions

Within 3–6 months post-treatment, varicocelectomy yielded greater improvement in semen quality, while angioembolization offered a favorable safety profile but less reproductive benefit and a higher retreatment rate. Both approaches were safe across BMI categories. Longer-term studies are needed to clarify patient selection and delayed outcomes.

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