Comparing the perioperative, postoperative, and oncological outcomes between robotic and transanal total mesorectal excision for rectal cancer: an updated systematic review and meta-analysis of prospective studies with a subgroup analysis for overweight patients

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ABSTRACT

Short Abstract

Background: Whether **robotic** or **transanal** TME offers superior outcomes for rectal cancer remains uncertain; prior syntheses were largely retrospective.

Methods: PRISMA/Cochrane systematic review of **prospective** studies comparing **RoTME vs TaTME**. Random-effects (HKSJ) meta-analysis; leave-one-out sensitivity; overweight subgroup; ROBINS-I bias assessment.

Results: 5 studies; n=1,941. No significant differences in operative time, length of stay, blood loss, minor/major complications, anastomotic leak, mortality, overall morbidity, or lymph-node yield. Conversion and sphincter preservation **numerically** favored TaTME but **CIs crossed 1**. R0 favored RoTME (P=0.02) but **CI included 1**. Sensitivity analyses reduced heterogeneity and suggested longer operative time with RoTME in some scenarios.

In **overweight** patients, **TaTME reduced LOS** (MD 1.50 days).

Conclusions: RoTME and TaTME are broadly comparable on short-term outcomes; current prospective evidence does **not** support routine preference for one. Choice should be individualized; robust RCTs with long-term and functional endpoints are needed.

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INTRODUCTION

Total mesorectal excision (TME) is standard for rectal cancer. Two minimally invasive options—**robotic TME (RoTME)**and **transanal TME (TaTME)**—are widely used, but prior meta-analyses relied heavily on retrospective data. We synthesized **prospective** evidence only, and added a subgroup analysis for **overweight** patients.

METHODS AND MATERIALS

PRISMA/Cochrane systematic review of **prospective** comparative studies (≥10 patients/arm) of **RoTME vs TaTME** for rectal cancer. Outcomes: operative duration, length of stay (LOS), blood loss, conversion, sphincter preservation, minor/major complications, anastomotic leak, mortality, overall morbidity, R0 resection, lymph-node yield. Random-effects (HKSJ) models; MD/OR with 95% CIs; I^2 for heterogeneity. **Leave-one-out** sensitivity analyses;

RESULTS

5 prospective studies; n = 1,941 (RoTME 1,316; TaTME 625).

•**Peri-operative:**

• Operative time: **NS** (MD 27.29 min; 95% CI −56.18 to 110.76; I^2=95%).

• LOS: **NS** (MD 3.12 days; −6.14 to 12.39; I^2=98%).

• Blood loss: **NS** (MD −22.70 mL; −145.80 to 100.40; I^2=89%).

• Conversion: point estimate favored **TaTME** (OR 2.39) but **very wide CI crossing 1** (0.39–14.69; I^2=26%) → **uncertain**.

• Sphincter preservation: point estimate favored **TaTME** (OR 0.44) but **CI crosses 1** (0.17–1.16; I^2=32%) → **uncertain**.

•**Complications:**

• Minor (CD I–II): **NS** (OR 0.88; 0.50–1.54; I^2=37%).

• Major (CD III–IV): **NS** (OR 1.21; 0.77–1.90; I^2=7%).

• Anastomotic leak: **NS** (OR 1.35; 0.92–1.98; I^2=0%).

• Mortality: **NS** (OR 1.15; 0.29–4.59; I^2=0%).

• Overall morbidity: **NS** (OR 1.26; 0.15–10.59; I^2=95%).

•**Oncology:**

• **R0 resection**: RoTME point estimate higher (OR 1.70; **P=0.02**) but **CI includes 1** (0.92–3.16; I^2=0%) → interpret **cautiously**.

• Lymph-node yield: **NS** (MD 1.83; −2.57 to 6.24; I^2=51%).

•**Sensitivity:** Excluding specific studies reduced heterogeneity; operative time then **favored TaTME by ~47 min**and anastomotic-leak signal shifted, but remained **non-significant** overall.

•**Overweight subgroup: TaTME had shorter LOS** (MD 1.50 days; 1.07–1.92; I^2=0%); all other outcomes **NS**. (Only two studies retained.)

DISCUSSION

Across five prospective cohorts, **RoTME and TaTME show comparable short-term peri-operative, postoperative, and oncologic results**. Apparent advantages (lower conversion & higher sphincter preservation with TaTME; higher R0 with RoTME) are **not definitive** due to **imprecision/heterogeneity**. In overweight patients,

CONCLUSIONS

TaTME shortened LOS, but evidence is limited. Until higher-quality data arrive, **tailor approach** to surgeon expertise, tumor height, pelvic anatomy, and institutional capability.