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The efficacy and safety of tranexamic acid use during radical cystectomy: A systematic review and meta-analysis

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Background

Radical cystectomy (RC) is the standard treatment for muscle-invasive bladder cancer (MIBC) but is associated with significant perioperative blood loss and transfusion rates. Tranexamic acid (TXA), an antifibrinolytic agent, has shown efficacy in reducing blood loss in various surgical fields; however, its role in RC remains unclear.

Methods

We conducted a systematic review and meta-analysis following PRISMA guidelines. Studies evaluating TXA during RC were identified through a comprehensive search of multiple databases up to September 2024. Primary outcomes included intraoperative and perioperative blood transfusion rates and estimated blood loss. The secondary outcome assessed was thromboembolic events

Results

Five studies comprising 1,736 patients were included. TXA did not significantly reduce estimated blood loss (MD: 85.56 mL; 95% CI: –191.13 to 20.02; p > 0.05) or intraoperative transfusion rates (OR: 0.73; 95% CI: 0.40–1.33; p > 0.05). However, TXA was associated with a lower likelihood of perioperative transfusions (OR: 0.56; 95% CI: 0.32 0.97; p < 0.05). Notably, TXA increased the risk of thromboembolic events (OR: 2.05; 95% CI: 1.15–4.65; p < 0.05) Heterogeneity varied across analyses, with robotic-assisted RC underrepresented in the included studies.

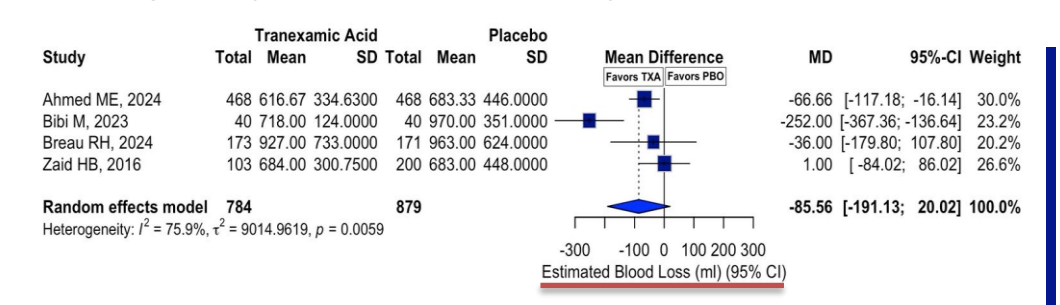

Figure 1. Mean difference in estimated blood loss (mL) between patients receiving tranexamic acid and placebo in patients who underwent radical cystectomy.

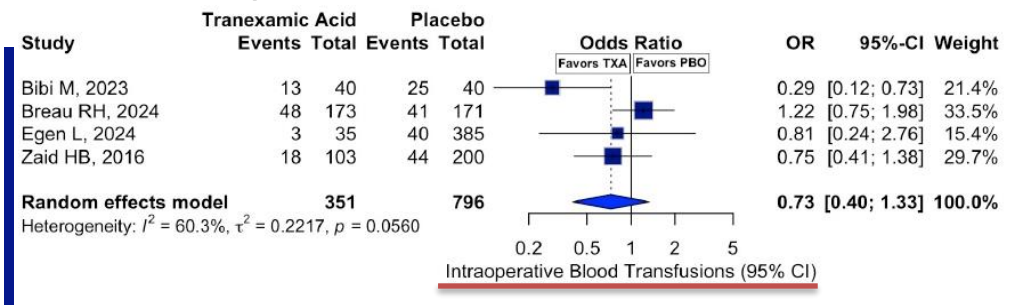

Figure 2. Comparative analysis of intraoperative blood transfusions between tranexamic acid and placebo groups in patients who underwent radical cystectomy.

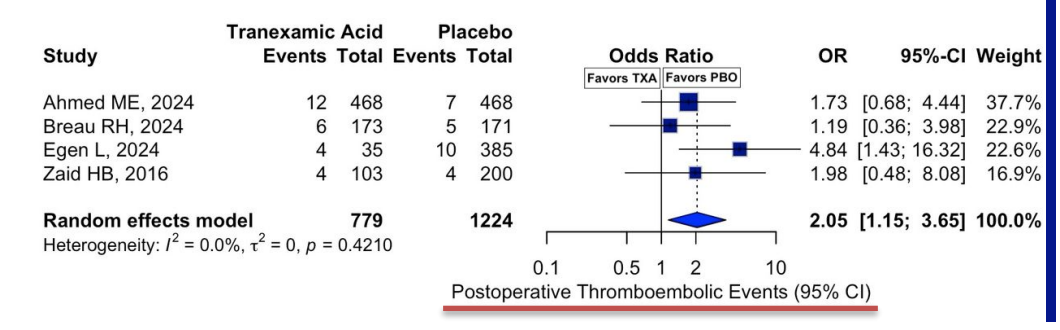

Figure 3. Comparative analysis of postoperative thromboembolic events in patients receiving tranexamic acid versus placebo in radical cystectomy.

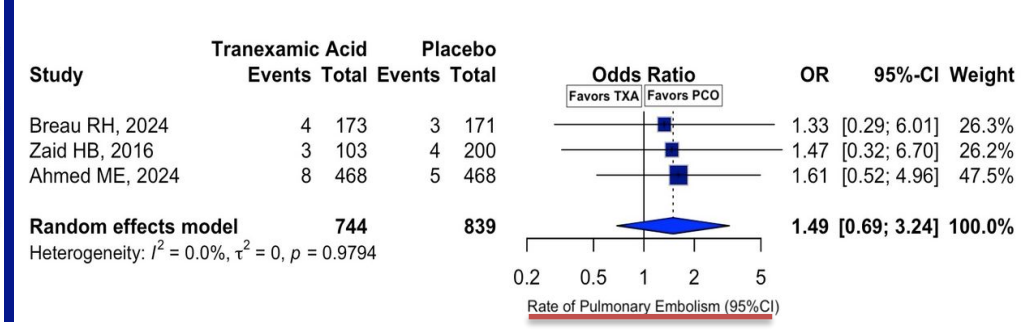

Figure 4. Comparative analysis for postoperative pulmonary embolism in patients receiving tranexamic acid versus placebo in radical cystectomy.

Conclusion

In patients undergoing radical cystectomy, tranexamic acid does not appear to provide a meaningful reduction in estimated blood loss or intraoperative transfusion rates. Furthermore, its pro-thrombotic properties are associated with an increased risk of thromboembolic events. Given these concerns, the overall benefit remains uncertain, and its routine use should be reconsidered to minimize postoperative thrombotic complications.

Keywords

Tranexamic acid, radical cystectomy, blood transfusion, thromboembolism, systematic review, meta-analysis.

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