

Comparative Effectiveness of Surgical Drainage Techniques and Postoperative Interventions for Reducing Complications: A Systematic Review of Randomized Controlled Trials

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Abstract:

This systematic review assessed the comparative effectiveness of surgical drainage techniques and postoperative interventions in reducing complications across various surgical fields. We conducted a comprehensive search across multiple databases, including PubMed, MEDLINE, Embase, the Cochrane Library, and CINAHL, covering studies from January 2019 to September 2024. Ten randomized controlled trials met our inclusion criteria, focusing on human surgical patients and comparing outcomes such as seroma, hematoma, infection rates, and postoperative pain. Techniques such as pigtail catheters and vacuum sealing drainage (VSD) demonstrated statistically significant improvements in thoracic and orthopedic surgeries, reducing postoperative pain (effect size: 0.35, $p < 0.05$), pleural effusion (risk ratio: 0.68, $p < 0.01$), and hospital stays (mean difference: -2.5 days, $p < 0.01$), while also accelerating wound healing. However, inconsistent results were observed for hemostatic agents like topical gelatin-thrombin matrix sealant and polysaccharide agents, which did not consistently reduce complications in spinal and breast surgeries (effect size range: 0.10-0.20, $p > 0.05$). These findings suggest that drainage techniques should be tailored to specific surgical procedures and that the routine use of hemostatic agents requires more critical evaluation. Based on these insights, the review recommends prioritizing the use of pigtail catheters and VSD in appropriate contexts while further investigating the effectiveness of hemostatic agents in different surgical fields. This review underscores the need

for additional long-term studies and personalized approaches to optimize drainage management in diverse patient populations. Overall, it provides clinicians with concrete recommendations and a framework for improving postoperative care and guiding clinical decision-making.

Keywords:

gelatin-thrombin matrix sealant (tgtms), hemostatic agents, pigtail catheter, polysaccharide agents, postoperative complications, randomized controlled trials, surgical drainage, vacuum-assisted drainage, vacuum sealing drainage (vsd).