SUTURED VS NON-SUTURED FIXATION IN CATHETERS AND TUBES: A BAYESIAN META-ANALYSIS OF COMPLICATION RATES RESEARCH

Shaival Sharma, MD[1], Zeel Patel, MD[1], Sakshar Patel, MD[1]

INTRODUCTION:

Techniques for optimal fixation of indwelling medical catheter/tube is an important consideration, pertaining to infection and dislodgment risks. This metanalysis evaluates the competitive efficacy of sutured vs non-sutured techniques for fixation of central venous lines(CVC), arterial lines(a-line), tracheostomy tubes, percutaneous endoscopic gastrostomy tubes(PEG) and chest tubes with focus on dislodgement frequency, infection rates and overall complication burden.

METHOD:

A systematic review was done to identify studies assessing the sutured vs non-sutured techniques for catheter/tube fixation. Pooled odds ratios (OR) and 95% confidence interval (CI) were formulated using a Bayesian random-effects model. Heterogeneity was quantified using the I^2 statistic. Methodological bias was addressed via Cochrane Risk of Bias 2 (RoB 2) tool for randomized controlled trials and ROBINS-I framework for observational studies. Finally, Egger's test and visual funnel plot analysis was used for publication bias.

RESULTS:

A total of multiple studies encompassing diverse catheter/tube types were included. Non-sutured CVC fixation was associated with a significantly increased dislodgement risk (OR 3.00, 95% CI 1.50–6.02) without a corresponding rise in infection incidence. Similarly, non-sutured chest tubes demonstrated a markedly elevated dislodgement risk (OR 4.58, 95% CI 2.10–9.99). Infection risks exhibited device-specific variability, with tracheostomy tubes displaying a notably heightened susceptibility when non-sutured (OR 8.1, 95% CI 1.5–43.6). Bayesian modeling corroborated the robustness of these findings, while Knapp-Hartung adjustments yielded conservative CI estimates. Moderate heterogeneity was observed (I^2 = 42%), and publication bias was statistically nonsignificant (Egger's test p = 0.283)

CONCLUSION:

Non-sutured fixation confers a significantly higher risk of dislodgement for CVCs and chest tubes, while infection risk is highly dependent on device type, particularly in tracheostomy tubes. Rigorous Bayesian modeling and bias mitigation techniques reinforced the validity of these conclusions. Future research should incorporate cost-effectiveness assessments and optimization of fixation methodologies.