Comparison of Artificial Intelligence with other interventions to improve Adenoma Detection Rate for Colonoscopy: A Network Meta-analysis

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Introduction: Recent randomized controlled trials (RCTs) and meta-analysis have demonstrated improved adenoma detection rate (ADR) for colonoscopy with artificial intelligence (AI) compared to high-definition (HD) colonoscopy without AI. We aimed to perform a systematic review and network meta-analysis of all RCTs to assess the impact of AI compared to other endoscopic interventions aimed at increasing ADR such as distal attachment devices, dye-based/virtual chromoendoscopy, water-based techniques and balloon-assisted devices.

Methods: A comprehensive literature search of PubMed/Medline, Embase, and Cochrane was performed through May 6, 2022 to include RCTs comparing ADR for any endoscopic intervention mentioned above. Network meta-analysis was conducted using a frequentist approach and random effects model. Relative risk (RR) and 95% confidence interval (CI) were calculated for proportional outcome.

Results: A total of 94 RCTs with 61172 patients (mean age 59.1±5.2 years, females 45.8%) and 20 discrete study interventions were included. Network meta-analysis demonstrated significantly improved ADR for AI compared to Autofluorescence imaging (RR: 1.33, CI: 1.06-1.66), dye-based chromoendoscopy (RR: 1.22, CI: 1.06-1.40), Endocap (RR: 1.32, CI: 1.17-1.50), Endocuff (RR: 1.19, CI: 1.04-1.35), Endocuff-Vision (RR: 1.26, CI: 1.13-1.41), Endoring (RR: 1.30, CI: 1.10-1.52), flexible spectral imaging color enhancement (RR: 1.26, CI: 1.09-1.46), Full-spectrum Endoscopy (RR: 1.40, CI: 1.19-1.65), High-Definition (RR: 1.41, CI: 1.28-1.54), Linked Color Imaging (RR: 1.21, CI: 1.08-1.36), Narrow Band Imaging (RR: 1.33, CI: 1.18-1.48), Water-Exchange (RR: 1.22, CI: 1.06-1.42), and Water-Immersion (RR: 1.47, CI: 1.19-1.82).

Conclusion: AI demonstrated significantly improved ADR when compared to most endoscopic interventions. Future RCTs directly assessing these associations are encouraged.