

Real-time analysis of the frequency distributions of looping patterns of the colon during colonoscopy

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Abstract

Colonoscopy is an endoscopic examination that provides visualisation of the colonic lumen for diagnostic and therapeutic purposes. Although the procedure carries a low risk of serious complications, its clinical effectiveness is limited by a reduced completion rate due to loop formation in different colonic segments which resists endoscopic passage. In this study, 103 videos of screening colonoscopies performed by the same consultant gastroenterologist using ScopeGuide™ magnetic imaging technology were analysed. ScopeGuide™ provides a real-time 3D reconstruction of the position and configuration of the endoscope within the colon, allowing rapid identification and resolution of newly formed loops. The videos also enable accurate description and categorisation of colonic loops. This investigation aims to introduce standard definitions for looping patterns of the sigmoid and transverse colons during colonoscopy, and determine if there are significant gender differences in the frequency distributions of such looping configurations using Fisher's exact test. Looping patterns in the sigmoid colon fall into four categories: straight, N-, alpha and reverse alpha loops. In this cohort, the alpha loop was most prevalent (50.4%), whereas the straight configuration (31.1%) and N-loops (17.5%) were less common. There was a single case of the reverse alpha loop. N-loops occurred with greater frequency in females ($p=0.0188$). There were no significant gender differences in the frequency of the other looping patterns. In the transverse colon, a new classification is proposed for the looping patterns observed, with three categories being identified: straight, intermediate and deep transverse loops. Deep loops were more common (42.7%) than intermediate loops (35.0%) and straight configurations (22.3%). Straight transverse colons were more prevalent in males ($p=0.0018$), whereas deep loops were more common in females ($p=0.0013$). There was no significant gender difference in the prevalence of intermediate loops. In conclusion, this study has identified statistically significant gender differences in colonoscopic looping patterns. The new definitions of sigmoid and transverse loops will assist in standardising descriptions to enable consistent comparisons between studies. A better understanding of looping patterns will also result in decreased pain and increased completion rate, with improved clinical effectiveness, evidenced by increased polyp detection and a decreased risk of colonic carcinoma.

(Word count: 349)