LETTERS

The learning curve for detection of non-polypoid (flat and depressed) colorectal neoplasms

We read with interest the two excellent studies on interval colorectal cancers (CRC) following colonoscopy and wish to present important data relevant to the prevention of interval CRC. In a pooled multicohort analysis, Robertson and coauthors found that invasive cancer was diagnosed in 0.6% of patients after clearing colonoscopy among eight large North American trials, and concluded that half of these were likely missed lesions.[1] In a population-based study, le Clercq and coauthors reported that CRC found following colonoscopy were more likely to have non-polypoid morphology than prevalent cancers.[2]

We previously described that non-polypoid colorectal neoplasms (NP-CRN) harbour more advanced pathology than polypoid neoplasms.[3] Indeed, due to their subtle appearance, NP-CRN may be a key contributor to interval CRC. The learning curve in their detection is largely unknown.

Using available data, we summarised the learning curve (see figure 1) for the detection of NP-CRN in four board-certified gastroenterologists in our unit, an academic Veterans hospital. The endoscopists learned the features of NP-CRN through review of colonoscopy atlases, such as the *Kudo Early Colon Cancer*, and through direct observations and discussions with expert Japanese endoscopists. Following training, we assessed their routine colonoscopies over a 5-year period. We calculated NP-CRN detection rates for each endoscopist as the percentage of patients in whom at least one NP-CRN was found per 200 colonoscopies individually performed over time and tracked these sequential detection rates to construct a learning curve. We measured the slope of the curve to assess immediate and sustained learning over time.

In this analysis, we found an overall detection rate of 6.6% (329 patients with NP-CRN over 5335 colonoscopies). Notably, all endoscopists had a low detection rate during their first 200 colonoscopies following their training, ranging from 1.5% to 3.5%. Detection of NP-CRN improved with time among the endoscopists, apart from one low-volume endoscopist. Following the 600th colonoscopy subsequent to training, the three high-volume endoscopists consistently sustained a detection rate of 4.5% or higher, and following the 1000th colonoscopy subsequent to training, the two highest-volume endoscopists found an overall detection rate of 7.4%.

The patients were mostly men (98%), with a mean age 68±10 years and body mass index 28.8±5.4, and the majority used tobacco (n=212, 64%) and non-steroidal anti-inflammatory drugs (n=180, 55%). Among the 495 NP-CRN found, the mean size was 10 mm (SD±6.6 mm) and 46% of these were advanced neoplasia.

The increased detection of NP-CRN in our longitudinal assessment suggests that the ability to detect non-polypoid adenoma is a skill that must be learned, requiring time and effort. Learning to detect non-polypoid lesions appears to follow the Miller pyramid of clinical competency, skills and performance[4]: it requires the *knowledge* of the lesion shape and features used to distinguish flat adenoma from normal mucosa, *know how* to detect and interpret the lesion, *ability to show* lesion detection during colonoscopy and *to do* by integrating into the practice. The joint gastroenterology societies recommend trainees to perform at least 140 colonoscopies to assess competency; from our findings, proficiency at detecting NP-CRN takes much longer. Our study also shows that endoscopists increase proficiency following an intensive training period using now readily available teaching tools. High-volume endoscopists achieved and maintained the highest rates of detection.

Both studies by Robertson's and le Clerqc's groups underscore the contribution of missed lesions to the development of interval cancers. Current efforts to improve lesion detection have focused on prolonging withdrawal times, improving bowel preparation and using technologies such as transparent caps. Our findings suggest that without the awareness and proficiency to detect and resect NP-CRN, even these efforts may fall short of achieving a complete clearing colonoscopy.

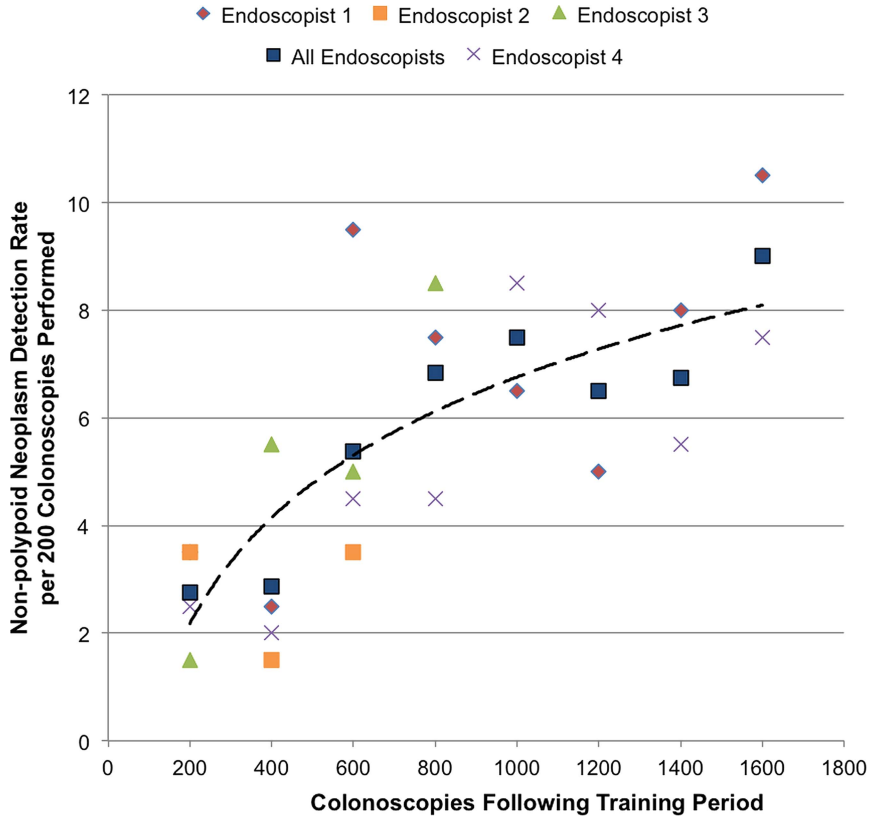

Figure 1 Learning curve for detection of non-polypoid neoplasms over time among four endoscopists. Detection rates are plotted as per cent of patients with at least one non-polypoid colorectal neoplasm found per sequential 200-colonoscopy blocks since training.

Sarah K McGill,[1,2] Tonya Kaltenbach,[1,2] Shai Friedland,[1,2] Roy Soetikno[1,2]

[1]Gastrointestinal Endoscopy Unit, Veterans Affairs Palo Alto Heath Care System, Palo Alto, California, USA
[2]Department of Gastroenterology and Hepatology, Stanford University School of Medicine, Stanford, California, USA

Correspondence to Dr Roy Soetikno, Department of Gastroenterology and Hepatology, Veterans Affairs Palo Alto, 3801 Miranda ave, Palo Alto, CA 94304, USA and Department of Gastroenterology and Hepatology, Stanford University School of Medicine, Stanford, CA 94305, USA; soetikno@earthlink.net

Correction notice This article has been corrected since it was published Online First. The author name Sarah McGill has been amended to read Sarah K McGill.

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Notes