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Correlation between adenoma and serrated lesion detection rates in an unselected outpatient population

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ABSTRACT

Background: Serrated lesions have been recently implicated in colorectal carcinogenesis. Adenoma detection rate has been related with the risk of interval cancer. The correlation between adenoma detection rate and the serrated lesion detection rate is unclear.
Aim: To assess the correlation between adenoma- and serrated lesion-detection rate in an unselected setting of outpatient colonoscopies.
Methods: Consecutive outpatients were retrospectively evaluated in one centre. Detection rates were expressed as number of patients with at least one serrated lesion or adenoma. For each endoscopist, correlation between adenoma detection rate and serrated lesions detection rate was calculated.
Results: Six endoscopists performed 2974 colonoscopies. 3240 lesions (59.5% adenomas, 37.8% serrated lesions, 0.5% cancer, and 2.3% other histology) were detected in 1228 procedures. Median adenoma detection rate and serrated lesions detection rate per endoscopist were 29.3% and 22.4%, respectively. A positive correlation between adenoma and serrated lesion detection rate ($r^2 = 0.78$, $p < 0.001$) was detected.
Conclusions: Our study showed a statistically significant correlation between adenoma detection rate and serrated detection rate.

1. Introduction

Colorectal cancer (CRC) is a major cause of morbidity and mortality [1,2]. Colonoscopy is highly effective in detecting advanced neoplasia, and CRC prevention by endoscopic resection reduces disease-specific incidence and mortality [3]. As such, its use as a preferred screening and diagnostic strategy is supported by official guidelines [4].

The long-term efficacy of colonoscopy in preventing CRC incidence and/or mortality has been addressed in cohort and case–control studies [3,5–7]. Although the majority of these studies showed a very high CRC prevention rate, some studies showed a suboptimal CRC protection rate [5,6]. In particular, a suboptimal efficacy of colonoscopy in preventing proximal CRC has been shown in epidemiological and clinical studies. This has been at least partially related with a different pathway of carcinogenesis in the proximal colon. In detail, a 'serrated pathway' characterized by *BRAF mutations*, epigenetic DNA promoter hypermethylation, silencing of mismatch repair genes and microsatellite instability (MSI-H) has been shown in proximal and interval CRC and in sessile serrated adenoma (SSA).

Quality of endoscopy has been strictly related with the risk of post-colonoscopy CRC, as well as with the associated risk of death, and it may be assessed by using simple pre-defined quality-indicators [8–11]. In large administrative cohort or case–control studies, the risk of early post-colonoscopy cancer appeared to be independently predicted by a relatively low polyp/adenoma detection rates (PDR/ADR) [12–15]. At colonoscopy, serrated lesions (SL) frequently appear as flat, subtle lesions covered by a mucus layer, so that such lesions are at high risk of being overlooked during the colonoscopy.

Quality of colonoscopy in relation to the detection of SL has been only scarcely address. In a recent study, a dramatic variability between 0% and 20% in the prevalence of proximal serrated lesions-detection rate (pSL-DR) according to the endoscopist has been shown [16–18]. In these studies, a positive correlation between ADR (i.e. number of patients with at least one or more adenomas/all patients) and pSL-DR was found.

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Primary aim of our study was to assess the detection rate of both adenomatous and serrated lesions for different endoscopists, also calculating the correlation rate between the detection of these two types of lesions.

2. Materials and methods

We retrospectively reviewed data from our prospectively updated database of all consecutive patients undergoing colonoscopy between January and December 2011 for CRC screening programs (work up of positive faecal occult blood test or sigmoidoscopy), symptoms or post-polypectomy surveillance in one centre (Novara). Exclusion criteria were previous colorectal surgery, the assumptions of anticoagulants, clopidrogrel or already known bleeding disorders. At endoscopy, colonoscopy indications, patient demographics, polyp-size (by comparison with open biopsy forceps), shape (diminutive, protruding, non-protruding), location (proximal or distal to splenic flexure), the type of colonoscope: high definition/non-high definition (HD/non-HD), withdrawal time, quality of bowel preparation were systematically collected, as well as the endoscopist performing the procedure. All colonoscopies were performed with Olympus H180 or 165 series with HD monitors by 6 skilled endoscopists (previous experience: >1000 colonoscopies). Low-volume polyethylene-glycol bowel preparation (2 Liter) was administered the 'day before' for morning procedures and with a 'split' regimen, if the procedure was performed in the afternoon. Midazolam and occasionally meperidine or propofol were used for sedation. All observed lesions during colonoscopy were removed or biopsied and tissue was routinely sent to pathology. At histology, polyps were classified – according to WHO criteria – as adenomas, serrated lesions (SL), hyperplastic (HP), sessile serrated adenomas (SSA), traditional serrated adenoma (TSA), adenocarcinoma or others (inflammatory polyps, leiomioma, etc.).

The study protocol was approved by the Institutional Review Board of the participating centre.

2.1. Statistical analysis

Mean, median, percentage, and 95% confidence intervals (CI) were calculated, as appropriate. All *p*-values involve hypothesis tests against a two-sided alternative. Differences were considered significant at a 5% probability level. Pearson correlation coefficients were calculated to evaluate the associations among ADR and SL-DR, pSL-DR, SSA/TSA-DR (proportion of colonoscopies with at least 1 adenoma or SL-DR, pSL-DR, SSA/TSA-DR).

3. Results

3.1. Study population

Overall, 2974 outpatients (males: 55.2%; mean age 64.1 ± 11 years) colonoscopies were performed by 6 endoscopist (mean 496 ± 135). The main indications for colonoscopy were screening/surveillance in 776/2974 (26%) cases, evaluation of alarm symptoms in 625/2974 (21%) and evaluation of other symptoms in the remaining 1573/2974 (53%).

3.2. Endoscopic findings

The overall caecal intubation rate was 98.5%, and bowel preparation was adequate in 77% of the cases. Overall, 3240 lesions were identified from 1228 colonoscopies, and retrieved for histological examination. Of these lesions, 59.5% (1928/3240) were adenomas, whilst SL/pSL/HP/SSA/TSA were found in 37.7% (1223/3240), 11.2% (364/3240), 31% (1005/3240), 6.4% (207/3240) and 0.3% (11/3240) respectively. In addition, invasive cancer and other type of lesions accounted for 0.5% (15/3240) and 2.3% (74/3240) of the all lesions (Table 1). Distribution of the different histological types of the detected lesions according to patient characteristics, size, location, shape, and type of instrument is provided in Tables 2–3.

Table 1
Number and percentages of lesions in the study population.

Any lesions	Adenoma	Serrated lesions	HP	SSA	TSA	Cancer	Other
3240	1928 (59.5%)	1223 (37.7%)	1005 (31%)	207 (6.4%)	11 (0.3%)	15 (0.5%)	74 (2.3%)

SL, serrated lesion; HP, hyperplastic polyps; SSA, serrated sessile adenoma; TSA, traditional serrated adenoma; SD, standard deviation.

Table 2
Number and percentages of adenomas and serrated lesions, expressed for site and morphology.

	Adenoma	Serrated Lesions	HP	SSA/TSA
TOT	1928	1223	1005	218
Distal (*N* = 1701)	842/1928 (43.67%)	859/1223 (70.23%)	774/1005 (77.01%)	85/218 (38.99%)
Proximal (*N* = 1450)	1086/1928 (56.32%)	364/1223 (29.75)	231/1005 (22.98%)	133/218 (61%)
Polypoid, non diminutive (*N* = 874)	687/1928 (35.63%)	187/1223 (15.29%)	106/1005 (10.54%)	81/218 (37.15%)
Non-polypoid, non diminutive (*N* = 212)	92/1928 (4.77%)	120/1223 (9.81%)	40/1005 (3.98%)	80/218 (36.69%)
Diminutive (*N* = 2065)	1149/1928 (59.59%)	916/1223 (74.89%)	859/1005 (85.47%)	57/218 (26.14%)

N, number; SL, serrated lesion; HP, hyperplastic polyps; SSA, serrated sessile adenoma; TSA, traditional serrated adenoma; SD, standard deviation.

Table 3
Size of serrated lesions expressed as number and percentages.

	Diameter < 5 mm	Diameter 5–9 mm	Diameter ≥ 10 mm
SL	917/1223 (75%) 208 proximal	261/1223 (21.3%) 122 proximal	45/1223 (3.7%) 34 proximal
HP	859/1005 (85.5%) 182 proximal	141/1005 (14%) 49 proximal	5/1005 (0.5%) –
SSA/TSA	57/218 (26.1%) 26 proximal	120/218(55%) 73 proximal	41/218(18.8%) 34 proximal

SL, serrated lesion; HP, hyperplastic polyps; SSA/TSA, serrated sessile adenoma/traditional serrated adenoma.

Detection rates for each type of polyp/lesion detected were calculated as the proportions of patients with at least one (or more) of polyps/lesions of either all types (1228), adenomatous polyps (872), or serrated lesions (667) detected among the total number of patients who underwent to colonoscopy (2974). Median detection rate for adenomas (ADR), serrated lesions (SL-DR) and proximal serrated lesions (pSL-DR) and SSA/TSA (SSA/TSA-DR) were respectively 29.3% (range 21.8–36.1%), 22.4% (range 10.2–25.6%), 7.9% (range 2.7–11.5%) and 4.5% (range 2.9–5.5%), as shown in Table 4. Mean ± SD ADR, SL-DR, pSL-DR, SSA/TSA-DR by each endoscopist are summarized in Table 5. Briefly, mean ADR varied between 21.8% and 36.1%, whilst the mean SL-DR ranged between 10.2% and 25.6%, respectively. In order to define the theoretical miss rate of each endoscopist, we calculated the ratio between the mean level of detection rate of each individual endoscopist against that of the endoscopist with the highest score. In detail, the relative miss rates