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Adenoma detection rate for screening colonoscopy: one center experience

Adenomų radimo dažnis atliekant prevencines kolonoskopijas: vieno centro patirtis

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Objective

Adenoma detection rate (ADR) is a recommended quality measure for screening colonoscopies in risk population. The main aim of our study was to calculate ADR in Vilnius University Hospital Santariskiu Klinikos (VUH SK) and determine inter-individual variations among practicing endoscopists.

Material and methods

Retrospective data review of all the patients who underwent screening colonoscopy in the VUH SK (Vilnius, Lithuania) between 2009 and 2012.

Results

A total of 1633 colonoscopies, which were performed by five practicing endoscopists were included. The overall cecal intubation rate was 96.8%. Bowel preparation was good, medium and poor in 65.2%, 28.1% and 6.7% cases, respectively. Polyps were found more commonly in men rather than women: adenomas 40.4% vs. 24% (p<0.001), hyperplastic polyps 11.1% vs. 6.6% (p=0.001), multiple adenomas 6.4% vs. 1.9% (p<0.001). Colorectal cancer was found in 76 patients (4.7%) and there was no statistically significant difference regarding sex (p=0.76). The overall ADR was 31.5%. ADR in men was statistically significantly higher compared with ADR in women (40.4% vs. 24%; p<0.001). ADR ranged among endoscopists from 26.8% to 36.5% (p=0.007). Overall multiple adenoma detection rate was 4% and ranged among endoscopists from 1.7% to 6.7% (p=0.03). Mean number of adenoma per procedure was 0.5 and mean number of adenoma per positive procedure was 1.59.

Conclusions

Adenoma detection rate in our center is high. Based on current recommendations ADR detected is sufficient for reporting high quality screening colonoscopy.

Key words: adenoma, adenomatous polyps, colon, colonoscopy, detection, colorectal neoplasms

Įvadas

Prevencinių kolonoskopijų kokybė vertinama apskaičiuojant adenomų radimo dažį (ARD). Mūsų tyrimo tikslas – apskaičiuoti prevencinių kolonoskopijų (storosios žarnos vėžio ankstyvosios diagnostikos programa) ARD ir kitus išvestinius kokybės rodiklius bei palyginti jų skirtumus tarp Vilniaus universiteto ligoninės Santariškių klinikų endoskopuotojų (VUL SK).

Metodai

Retrospektyvusis 2009–2012 metais VUL SK (Vilnius, Lietuva) atliktų prevencinių kolonoskopijų duomenų tyrimas.

Rezultatai

Į analizę buvo įtrauktos 1633 kolonoskopijos, kurias atliko 5 endoskopuotojai. Bendras aklosios žarnos intubacijos dažnis buvo 96,8%. Žarnynas tyrimui buvo paruoštas gerai 65,2% atvejų, vidutiniškai 28,1 % atvejų ir blogai 6,7 % atvejų. Polipai dažniau rasti vyrams nei moterims: adenomos 40,4 % vs. 24 % (p<0,001), hiperplaziniai polipai 11,1 % vs. 6,6 % (p=0,001), daugybinės adenomos 6,4 % vs. 1,9 % (p<0,001). Storosios žarnos vėžys buvo rastas 76 pacientams (4,6 %) ir statistiškai reikšmingai nesiskyrė tarp vyrų ir moterų grupių (p=0,76). Bendras ARD buvo 31,5 % ir jis statistiškai reikšmingai buvo didesnis vyrų nei moterų grupėje: 40,4 % vs. 24 % (p<0,001). Tarp endoskopuotojų ARD svyravo nuo 26,8 % iki 36,5 % (p=0,007). Bendras daugybinių adenomų radimo dažnis buvo 4 % ir tarp endoskopuotojų svyravo nuo 1,7 % iki 6,7 % (p=0,03). Vidutinis adenomų skaičius procedūros metu buvo 0,5, o vidutinis adenomų skaičius teigiamos procedūros metu – 1,59.

Išvados

Adenomų radimo atliekant prevencines kolonoskopijas VUL SK dažnis yra didelis ir atitinka rekomenduojamus kokybės standartus.

Reikšminiai žodžiai: adenoma, polipai, kolonoskopija, kolorektalinis vėžys

Introduction

Colorectal cancer (CRC) is one of the major causes of morbidity and mortality in Lithuania as well as in the whole world. It accounts for 10.6% of all cancers cases in Lithuania [1]. Colonoscopy is effective in reducing CRC incidence and mortality [2] by endoscopic polypectomy, which removes benign adenomatous polyps before they progress and become neoplastic [3]. However, there are some limitations of colonoscopy as diagnostic procedure. It is estimated that up to 25% of polyps are missed during procedure [4]. Van Rijn et al [5] reported miss rates of 21% for very small (≤5mm), 13% for small (6-9mm) and 2% for large (≥10mm) adenomas. Also up to 8% of CRCs occur within 3 years after a previous colonoscopy and this cancer is known as interval or post-colonoscopic cancer [6-7]. Studies show that these CRCs are more likely due to missed lesions, rather than being new lesions [8].

Adenoma detection rate (ADR) is the proportion of screening colonoscopies performed by an endoscopist that detect at least one histologically confirmed adenoma [9]. ADR is a recommended quality measure for screening colonoscopies. It is known that optimal adenoma detection rate correlates with reduced rates of interval colorectal cancer following screening colonoscopy. Currently, societies recommends ADR of 25% for all patients and rates of 20% for women and 30% for men undergoing screening colonoscopy [10]. Large study from Poland has concluded, that adenoma detection rate is an independent predictor of the risk of interval colorectal cancer after screening colonoscopy and has validated a recommended ADR of 20% [11]. Recently, a large study also examined an impact of ADR on interval cancer: for each 1% increase in ADR, there was an associated 3% reduction in the risk of cancer [12]. The lowest risk for interval cancer in the latter study was for those endoscopists with ADRs of at least 33.5%. ADR is the most commonly used quality indicator for screening colonoscopy. Also some supplemental measurements such as multiple adenoma detection rate, mean number of adenoma per procedure, mean number of adenoma per positive procedure has been proposed.

ADR varies among endoscopists, so suboptimal performance is an important factor in the failure of colonoscopy to identify and prevent CRC [13]. Studies found, that ADR range from 3 to 6 times (including large adenomas) among different endoscopists [14].

The aim of our study was to calculate ADR and supplemental quality indicators for screening colonoscopies in VUH SK and determine inter-individual variations among our endoscopists.

Patients and methods.

All the patients, who underwent screening colonoscopy (national colorectal cancer prevention program) at VUH SK Department of endoscopic diagnostics and minimally invasive surgery between January 2009 and December 2012, were included in the present study. Data were collected retrospectively from colonoscopy and pathology reports. The inclusion criteria were as follows: patients of 50–74 years old, positive fecal occult blood test, first time screening colonoscopy. The exclusion criteria were as follows: a history of colonoscopy and diagnosis of colorectal pathology, a history of colorectal cancer, a history of colorectal surgery, endoscopist who performed less than 30 screening colonoscopies during the study period. Data collected included: demographic data (patient age, sex), bowel preparation quality, cecal intubation rate, findings and polyps detected, pathological type of the polyps. We have calculated overall and individual measurements for each endoscopist. Specific definitions of all measurements are detailed in Table 1.

Statistical analysis was performed using SPSS Statistics version 20.0 and Microsoft Office 2013. The chi-square test was used to compare ADR, FDR, MADR, cecal intubation rate between sex groups and among endoscopists. The differences in ADR, FDR and MADR between endoscopists were evaluated comparing the highest value (the endoscopist with the highest ADR, FDR or MADR) with the each other value. ANOVA was used for calculation of MAP and MAP+ among endoscopists. A p-value <0.05 was considered to indicate statistically significant differences.

Results

Between January 2009 and December 2012, 1658 persons underwent screening colonoscopy by six experienced endoscopists at VUH SK. We excluded one endoscopist who performed less than 30 colonoscopies within the study period, along with his 25 patients. That resulted a study sample size of 1633 screening colonoscopies performed by five endoscopists. The mean age of the 1633 patients was 62 years (± 6.8 years), with 750 men (45.9%) and 883 women (54.1%). Mean

Table 1. Definitions of measurements

Measurement	Definition
Adenoma detection rate (ADR, %)	Total number of procedures when ≥1 histologically confirmed adenoma (tubular, tubulovillous, villous, serrated) was found divided by the number of all screening procedures
Findings detection rate (FDR, %)	Total number of procedures when ≥1 polyp or any other finding despite histology was found divided by the number of all screening procedures
Multiple adenoma detection rate (MADR, %)	Total number of procedures when ≥3 histologically confirmed adenomas (tubular, tubulovillous, villous, serrated) was found divided by the number of all screening procedures
Mean number of adenoma per procedure (MAP, n)	Total number of histologically confirmed adenomas detected divided by the number of all screening procedures
MAP per positive procedure (MAP+, n)	Total number of histologically confirmed adenomas detected divided by the number of screening procedures positive for ≥1 adenoma
Cecal intubation rate, %	Total number of successful cecal intubations divided by all screening procedures. Cecal intubation was defined as the passage of the colonoscope tip proximal to the ileocecal valve and visualization of the entire cecum
Bowel preparation (subjectively)	1) Good: entire mucosa of bowel seen well 2) Medium: minor amount of residual staining, small fragments of stool and/or opaque liquid, but mucosa is seen well 3) Poor: unprepared colon segment with mucosa not seen due to solid stool that can not be cleared

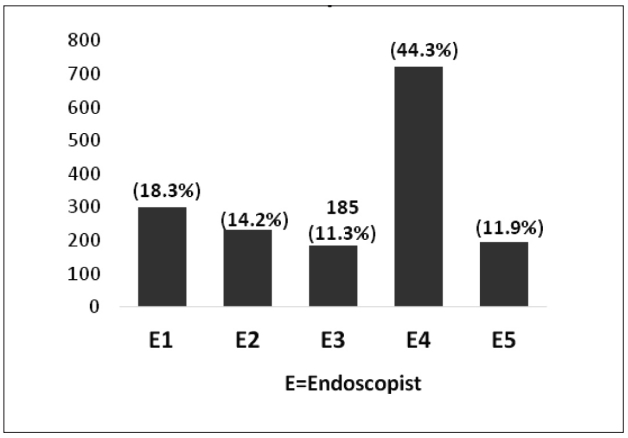

Figure 1. Number of performed colonoscopies by endoscopist

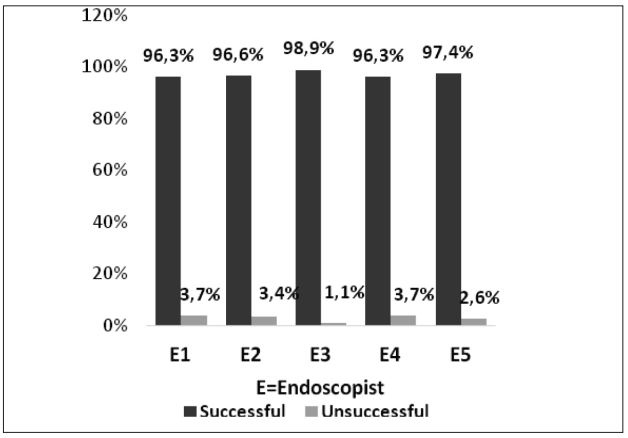

Figure 2. Cecal intubation rates

number of colonoscopies for one endoscopist was 327 and ranged from 185 to 723. Number of colonoscopies performed by each endoscopist is depicted in Figure 1. Cecal intubation was successful in 96.8% of patients. Cecal intubation rate was high for all endoscopists, ranging from 96.3% to 98.9% and these inter-individual variations among endoscopists were not statistically significant (χ^2 (4, N=1633)=3.79, p=0.34) (Figure 2). Bowel preparation was good, medium and poor in 65.2%, 28.1% and 6.7% cases, respectively. As we did not used any validated bowel preparation scale, the evaluation of bowel preparation quality in our study was subjective. Table 2 presents the findings detected by their characteristics. 49.9% of screening colonoscopies (n=816) were positive (polyps, tumors or any other masses were found) and 50.1% (n=817) of screening colonoscopies were negative (no findings). There were 1941 findings detected among 816 of the 1633 screened patients. Among all findings, adenomas were the most common finding: we found 821 adenomas among 515 patients (31.5%). Endoscopic findings were more common in men (Table 3). Men were more likely to have polyps than women: adenomas (40.4% vs. 24%; χ^2(1, N=1633)=50.46, p<0.001); hyperplastic polyps (11.1% vs. 6.6% χ^2(1, N=1633)=10.401, p=0.001) and multiple adenomas (6.4% vs. 1.9% χ^2(1,N=1633)=21.25, p<0.001). Colorectal adenocarcinoma was found in 76 persons (4.7%) and there was no statistically significant difference regarding sex (χ^2(2,N=1633)=0.53, p=0.76). The overall ADR was 31.5% and 40.4% in men and

Table 2. Findings characteristic

Type	Patients (n[%]) N=1633	Findings (n)
All findings	816(49.9)	1941
All polyps with histology	605(37)	1032
Adenocarcinoma	76(4.7)	78
Adenoma	515(31.5)	821
Multiple adenoma	65(4.0)	-
Hyperplastic polyp	141(8.6)	211
No findings	817 (50.1)	-

Table 3. Findings characteristics between gender groups

Type	All subjects (n[%]) (n=1633)	Men (n[%]) (n=750)	Women (n[%]) (n=883)	p value
All findings	816(49.9)	459(61.2)	357(40.3)	<0.001
Mean all findings	1.19	1.71	0.75	<0.001
Adenoma	515(31.5)	303(40.4)	212(24)	<0.001
Mean adenoma	0.5	0.69	0.35	<0.001
Hyperplastic polyps	141(8.6)	83(11.1)	58(6.6)	0.001
Mean hyperplastic polyps	0.13	0.18	0.9	<0.001
Adenocarcinoma	76(4.7)	38(5.1)	38(4.3)	0.76
Multiple adenoma	65(4)	48(6.4)	17(1.9)	<0.001
No findings	817(50.1)	291(38.8)	526(59.6)	<0.001

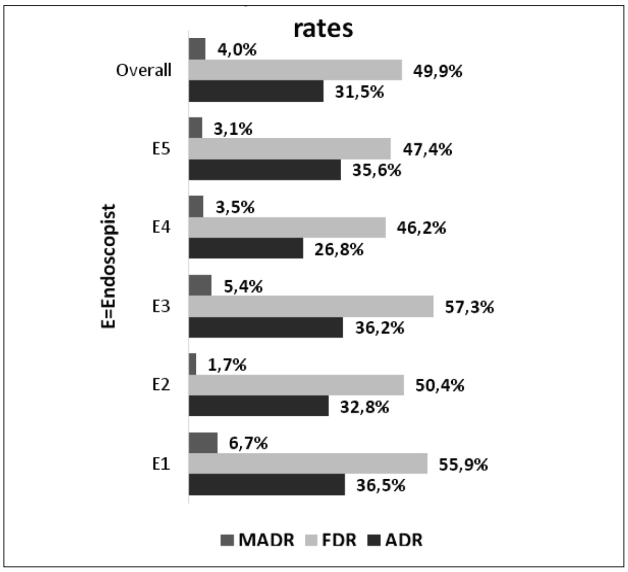

Figure 3. Principal measurements rates

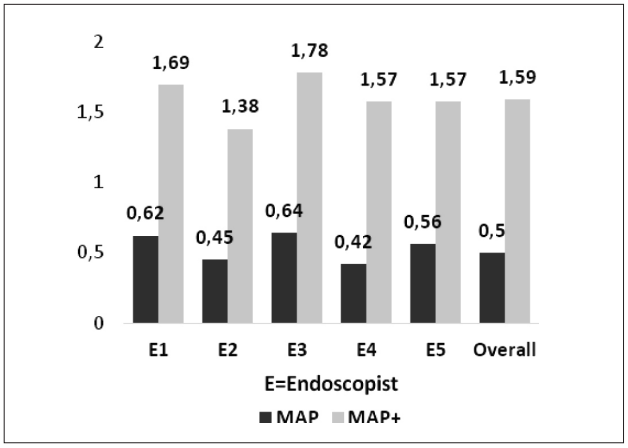

Figure 4. Mean number of adenoma per procedure and per positive procedure

24% in women (χ^2(1, N=1633)=50.46, p<0.001). ADR ranged among endoscopists from lowest 26.8% to highest 36.5% and there was a statistically significant difference between endoscopists E1 vs. E4 (χ^2(4, N=1633)=14.26, p=0.007). The overall FDR was 49.9% and ranged among endoscopists from 46.2% to 57.3%; there was also a significant difference between endoscopists E3 vs. E4 (χ^2(4, N=1633)=12.75, p=0.013). The overall MADR was 4% and ranged from 1.7% to 6.7%; there was also a statistically significant difference among endoscopists E1 vs. E2 (χ^2(4, N=1633)=10.73, p=0.03). ADR, FDR and MADR rates are shown in Figure 3. The overall MAP was 0.5; the overall MAP+ was 1.59. MAP ranged from 0.42 to 0.64 and there was statistically significant differences between endoscopists E1 (MAP 0.62) vs. E4 (MAP 0.42) and E3 (MAP 0.64) vs. E4 (MAP 0.42) (F(4.1628)=3.69, p=0.005). While MAP+ ranged from 1.38 to 1.78 and there was no statistically significant differences among endoscopists (F(4.510)=1.49, p=0.2). MAP and MAP+ results are shown in Figure 4.

Discussion

To our knowledge, this is the first report on measuring quality indicators for a screening colonoscopy in Lithuania. This study demonstrated high quality screening colonoscopy in our centre with a high adenoma detection rate, which exceeds current recommendations.

Several studies on ADR have been previously conducted. In the present retrospective study the ADR of the total 1633 patients was 31.5%. These results are in accordance with adenoma detection rates of 22–58.2% reported in large meta-analysis [15]. In the retrospective analysis performed by Raju and al ADR was higher and reached 60% without serrated lesions and 66% with serrated lesions [16]. However, we found total ADR (31.5%), ADR in men (40.4%) and ADR in women (24%) higher than the minimum benchmarks recommended for screening colonoscopies (total ADR of 25%, ADR of 30% for men and 20% for women [10]). In addition, similar to the results of previous studies, the total ADR in men was found to be significantly higher, compared with that in women in the present study [17–18].

In our study MADR was 4%, MAP and MAP+ was 0.5 and 1.59, respectively. French study retrospectively analyzed 42817 colonoscopies and found that endoscopists who had an adenoma detection rate around 35% had a MAP varying between 0.36 and 0.98 [19]. They concluded that MAP could be used as quality indicator for screening colonoscopies at the benchmark 0.6. Raju and al study found higher prevalence of adenomas comparing to our results: MADR 14% without serrated lesions and 16% with serrated lesions, MAP 1.4 without serrated lesions and 1.6 with serrated lesions

and MAP+ 1.9 with serrated lesions [16]. We think that some important factors resulted in such different ADR, MADR and MAP values, comparing with the results of our study. In Raju and al study intense and the same for all patients bowel preparation regimen was used, while in our study regimen of bowel preparation for colonoscopy varied per patient because of different schemes proposed for patients by referring family doctors. So we could not influence bowel preparation and we had 34.8% of inadequate preparation. Also we did not used any bowel preparation evaluation scale. Technical aspects, as transparent cap, simethicone flush, withdrawal time minimum 6 minutes has leaded to higher values of measurements in the mentioned study. Due to retrospective design of our study we could not influence these technical aspects. On the other hand, currently there is no enough evidence to recommend benchmark for MADR, MAP and MAP+ for screening colonoscopy.

We found some significant differences of the rates of our principal measurements among endoscopists and these results are in keeping with the results of other studies. The clinical impact of such findings regarding the occurrence of interval colorectal cancer is not clear and demands further evaluation. Barclay and al reported large differences among 12 gastroenterologists in the rates of adenoma detection: 10.5-fold in mean number of lesions per subject and 3.5-fold in adenoma per subject [14]. These differences correlated to colonoscope withdrawal time: those endoscopists with 6 minutes and more had higher neoplasia detection rates. Due to retrospective design of our study we had no data about colonoscope withdrawal times, so the impact of withdrawal time on our principal measures was not evaluated. Differences among endoscopists in our study were not so large: 1.36-fold in ADR, 3.9-fold in MADR, 1.5-fold in MAP and 1.3-fold in MAP+. In another study ADR and MADR differences among 18 endoscopists were also larger comparing to our study: ADR ranged from 25.4% to 46.8% (1.84-fold), MADR ranged from 2.7% to 12.4% (4.6-fold) [20]. They have concluded that endoscopist were independent predictor of detecting adenomas.

In clinical practice, the ADR was also found to be closely associated with the quality of bowel preparation, the cecal intubation rate, the level of operating techniques of the endoscopist and the quality of the endoscopic devices [17]. Noting that, the present study had certain limitations. Some important data (e.g. technical aspects, bowel preparation regimen, colonoscope withdrawal time) could not be verified due to retrospective design of the study. Subjective evaluation of bowel preparation quality did not allow us to evaluate how ADR was associated with the quality of bowel preparation. Also not all polyps detected were evaluated histologically (were lost during procedure) and that affected the adenoma detection rates. The study was completed in a single center and results presented does not reflect a national situation.

In conclusion, in this retrospective study of 1633 patients, an ADR of 31.5% was calculated which is sufficient for reporting high quality screening colonoscopy in our hospital. Adenomas were found to be more prevalent in male compared with female patients. We demonstrated that inter-endoscopist variability in adenoma detection exists. Further prospective multi-centre studies with larger sample size needed to determine quality of screening colonoscopies in our country. The effect of age, bowel preparation, colonoscope withdrawal time, different endoscopic innovations on ADR should be also evaluated.

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