

Evaluation of colonoscopy requests in an open-access endoscopy unit

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Abstract

Aim: Improper colonoscopy requests from different medical fields, especially like in an open access endoscopy unit, increases workload of the unit and healthcare expenses. For standardize these requests, eligibility criterias emerged. The aim of this study was to evaluate the appropriateness of colonoscopy requests performed in an open-access endoscopy unit of a university hospital and determine possible causes of the improper requests by patient characteristics, colonoscopy indications and results.

Material and Methods: Between January 2009 and January 2015, 3259 patients who were referred for colonoscopy in an open-access endoscopy unit of a university hospital were enrolled into study. Post-procedure colonoscopy reports, along with their diagnoses, were recorded. All records were then evaluated retrospectively and the patient's indications and patients' results were compared and reasons for improper requests were discussed.

Results: The mean age of the patients who underwent colonoscopy was 56.68 year, and 56.2% of the patients were males. When the requests were placed in order of frequency, the first three cases were rectal bleeding, anemia, and abdominal pain. Most of the patients did not have any pathology on colonoscopy (37.8%, n = 1238). The other most common diagnoses were hemorrhoids and colon polyps. Malignancy detection rate by colonoscopy was 5.3%. Associations between requests and results were detailed.

Conclusion: Eligibility criterias should be used to minimize inappropriate requests and training should be provided for experts about colonoscopy these criterias, or a gastroenterologist should be consulted before colonoscopy procedure, especially for open-access endoscopy units.

Keywords: Endoscopy; Open-access; Colonoscopy.

INTRODUCTION

Colonoscopy is an endoscopic procedure that is used both diagnostically and therapeutically, allowing clear visualization of lesions of the rectum and colon and taking biopsy from these lesions, and it is the most sensitive and specific imaging method for the detection of adenomas and colorectal cancer (CRC) (1). In recent years, there has been a dramatic increase in the number of colonoscopy requests from doctors, and in many countries colonoscopy has become the most commonly used endoscopic procedure (2,3). One of the main reasons for this, is the technical progresses in endoscopic equipments, new drugs used in intestinal cleansing, and the sedation techniques used during the procedure, making colonoscopy more comfortable and safe for patients (4,5). The second reason is the screening programs for CRC in the framework of

health practices in developed and developing countries. Despite the availability of alternative methods such as virtual colonoscopy and capsule endoscopy, because of cost and reliability of these methods, colonoscopy is still the preferred screening and imaging method in case of occult blood test positivity in stool, in patients with family history of CRC, in adenomatous tumors and in follow-up after CRC operation. The third and last reason is the proliferation of open-access endoscopy units. Colonoscopy requests in these units can be made by all physicians without the need of consultation of these patients to gastroenterologists or gastroenterology surgeons (6).

Due to these three reasons, the number of colonoscopy requests is increasing day by day. Increasing the comfort and safety of the endoscopy procedure and facilitating

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its application reduces the drawbacks experienced by the physician during examination and causes the indications to be kept wide for colonoscopy requests. CRC screening programs increase the number of colonoscopy submissions in order to provide early diagnosis and treatment and open-access endoscopy units facilitate access of the patient to the endoscopy units, increase the unnecessary use of colonoscopy, increase the colonoscopy waiting list and cause time loss for patients who should be prioritized and of course increase the healthcare costs. Endoscopy units that operate in limited capacities are particularly difficult to meet this growing need. In addition, although it is seen with a low rate, the presence of serious complications and side effects of the colonoscopy procedure should not be overlooked (7-9).

Since resources such as the endoscopy unit's capacity, number of endoscopes, number of assistant staff, and number of specialist physicians in endoscopy unit are limited, making a proper indication for colonoscopy is crucial. Standardizing these indications will reduce both the endoscopy unit's burden and the time loss of patients that should be prioritized, as well as reduce the risks and costs associated with colonoscopy. Many studies have been published on the effects of improper requests for colonoscopy, and several suggestions have been made to prevent it (10-15). Eligibility criterias developed by the American Society for Gastrointestinal Endoscopy (ASGE) (16) and the European Panel of Appropriateness of Gastrointestinal Endoscopy (EPAGE-II) (17) are the most commonly used methods today. With these criterias, it is planned to establish a standardization for colonoscopy requests, thus avoiding unnecessary colonoscopy applications. The aim of this study was to evaluate the appropriateness of colonoscopy requests performed in an open-access endoscopy unit of a university hospital in Turkey and determine possible causes of the improper requests by patient characteristics, colonoscopy indications and results.

MATERIAL and METHODS

Between January 2009 and January 2015, patients who were referred for colonoscopy in an open-access endoscopy unit of a university hospital were enrolled into study and patient records were reviewed retrospectively. Patients who were unable to undergo colonoscopy due to insufficient bowel clearing and urgent colonoscopic interventions were removed from study. The study was approved by the institute's ethics committee, and all patients were given a written confirmation form before the procedure.

Patients were referred to the colonoscopy unit by general practitioners, family physicians, internal medicine specialists, medical oncology specialists, gastroenterologists, general surgeons, physicians in other specialist areas who work in the same center or neighboring centers and health professionals working in cancer screening centers. Colonoscopy requests were made by a request form in which patients' demographic

data, short history, past abdominal procedures and colonoscopy request indications were recorded.

All patients underwent colonoscopy under sedation. Colonoscopies were performed by three experienced gastroenterologists and a gastroenterology surgeon. The quality of the intestinal cleansing was evaluated by the practicing physician and the procedures that were scored as clean and procedures that reached to the cecum were taken into consideration. Decision of biopsy or therapeutic intervention during the procedure was made by the physician performing the colonoscopy and performed independent of the first indication, if necessary. All lesions detected were recorded. Post-procedure colonoscopy reports, along with their diagnoses, were recorded in a computer program. All records were then evaluated retrospectively and the patient's indications and patients' results were compared.

Statistical Analysis

Statistical analysis was accomplished using the SPSS program for Windows 20.0 (SPSS, Chicago, IL, United States). The normal distribution suitability of numerical variables was assessed by the Kolmogorov-Smirnov Z test. Descriptive statistics were used; Student's t test, Chi square test, One-way ANOVA and Post hoc Tukey test were used for comparison. Statistical significance level was taken as $p < 0,05$.

RESULTS

Between January 2009 and January 2015 total of 3259 colonoscopies performed by three experienced gastroenterology specialists and a gastroenterology surgeon in an open access endoscopy unit in Recep Tayyip Erdogan University Medical Faculty Hospital, Rize, Turkey. Patients whose procedure could not be completed due to insufficiency of intestinal cleansing or colonoscopies that physician could not reach to the cecum were not included to the study. The mean age of the patients who underwent colonoscopy was 56.68 / year (range 17-94 / year) and 56.2% of the patients were males. The average age of women was 55.45 / year, and that of men was 57.63 / year. Seventy-six percent of patients undergoing colonoscopy were older than 45 years. Figure 1 shows the frequency distributions of patients undergoing colonoscopy, according to age.

The indications indicated in the colonoscopy request forms of patients who were referred from in-hospital or different centers are shown in Figure 2. For each patient, the first indication emphasized by the physician was taken into account. When the requests were placed in order of frequency, the first three cases were rectal bleeding (22.7%, n= 740), anemia (16.9%, n= 552) and abdominal pain (12.3%, n= 402). In colonoscopy requests, physicians mostly mentioned pre-diagnosis or complaints of the patients. Some complaints may be expressed with similar pre-diagnoses, but the classification is made according to the statement of the physician. In Figure 3, the end diagnoses reported in the colonoscopy reports of patients

are listed by frequency. According to this, most of the patients did not have any pathology on colonoscopy (37.8%, n = 1238). The other most common diagnoses were hemorrhoids (28.6%, n = 937) and colon polyps (11.8%, n = 385). Malignancy detection rate by colonoscopy was 5.3%.

During the study period, three cases of perforation following colonoscopy were recorded (0.1%). These patients were treated surgically. Two patients with bleeding after polypectomy were treated endoscopically.

When the colonoscopy indications were grouped according to the patient age, the mean ages of the most frequent colonoscopy requests were 55.78 / year for rectal bleeding, 61.06 / year for anemia patients, and 53.54 / year for abdominal pain patients. Patients with a mean age below 45 / year were only patients with mucous stool defecation and frequent defecation complaints (44.90 and 43.92 / yr, respectively). The mean age of the patients with inflammatory bowel disease was 49.15 / year. The mean age of the patients whose colonoscopy was performed for malignancy suspect were 63.23. There was a statistically significant difference between the mean ages of patients according to colonoscopy indications. ($p < 0.001$)

When the endoscopic diagnoses were grouped according to age, the mean ages of the most frequent diagnosis were 53.79 / year for normal patients, 55.33 / year for hemorrhoid diagnosis and 61.73 / year for patients with colon polyp. Patients with a mean age below 45 / year were only patients with Crohn's disease (40.05 / year). The mean age of the patients who had endoscopically diagnosed as malignancy was 63.68 / year. There was a statistically significant difference between the mean ages of patients according to colonoscopy results. ($p < 0.001$) Tables 1 and 2 show the distribution of age groups according to requests and endoscopic diagnosis.

In Table 3, colonoscopy requests and colonoscopy diagnoses are presented on the same table. According to this, the patients who underwent colonoscopy for the most frequent colonoscopy request which is rectal bleeding were mostly diagnosed as hemorrhoid (63%). Most patients who underwent colonoscopy had normal results, but only 9.7% of the patients were reported to be normal when colonoscopy was performed for rectal bleeding. The rate of malignancy detected by this complaint was 4.7%. Almost half (43.7%) of the patients who underwent colonoscopy with anemia were reported as normal, and the most common pathologic diagnosis for his request was hemorrhoids. The rate of malignancy detected by this complaint was 8%. Almost half (43.8%) of patients undergoing colonoscopy for abdominal pain were reported as normal.

According to the diagnosis, 37.8% of the patients were found to be normal, regardless of the indication. The

percentage of normal reports for colonoscopies decreases only with indications for rectal bleeding and rectal pain. The most frequent request for hemorrhoid diagnoses was rectal bleeding, while the most frequent request for colonic polyp diagnoses was control colonoscopies for previous colon polyps (41.5%). The overall polyp rate was 11.8%.

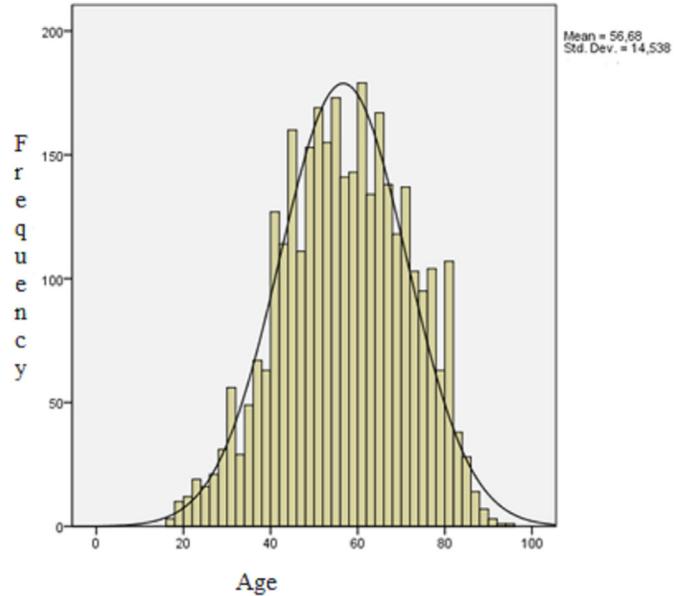


Figure 1. Frequency distributions of patients according to age

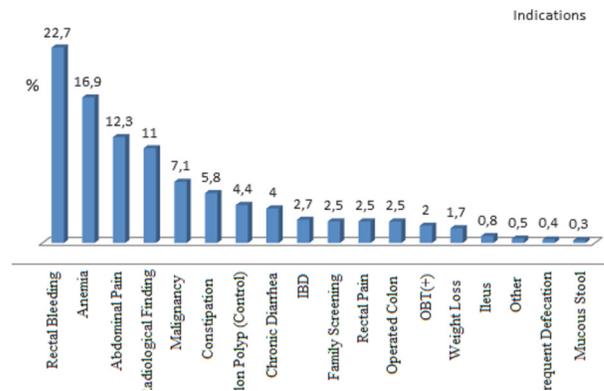


Figure 2. Frequency of indications indicated in the colonoscopy request form

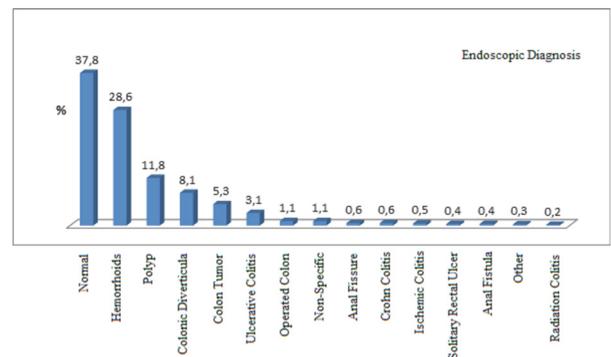


Figure 3. Frequency of end diagnoses reported in colonoscopy reports

Indications	Age Group		Total
	≤45 years	>45 years	
Rectal Bleeding	197	540	737
	25.5%	21.8%	22.7%
Constipation	54	136	190
	7.0%	5.5%	5.8%
Abdominal Pain	128	274	402
	16.5%	11.1%	12.4%
Radiological Finding	84	275	359
	10.9%	11.1%	11.0%
Anemia	89	459	548
	11.5%	18.5%	16.9%
Weight Loss	12	47	59
	1.4%	1.9%	1.8%
Chronic Diarrhea	40	90	130
	5.2%	3.6%	4.0%
Family Screening	27	55	82
	3.5%	2.2%	2.5%
Rectal Pain	29	53	82
	3.6%	2.1%	2.5%
Malignancy	18	212	230
	2.3%	8.6%	7.1%
Operated Colon	7	74	81
	8%	3.0%	2.5%
Mucous Stool	7	4	11
	9%	1%	3%
IBD	43	45	88
	5.6%	1.8%	2.7%
OBT (+)	7	58	65
	%	2.3%	2.0%
Colon Polyp (control)	21	119	140
	2.7%	4.8%	4.3%
Frequent Defecation	8	6	14
	1.0%	2%	4%
Ileus	4	22	26
	4%	9%	8%
Other	4	11	15
	5%	4%	5%
Total	779	2480	3259
	100,0%	100,0%	100,0%

Endoscopic Diagnoses	Age Group		Total
	≤45 years	>45 years	
Normal	373	858	1231
	48.0%	34.6%	37.8%
Hemorrhoid	242	693	935
	31.1%	27.9%	28.7%
Colorectal tumor	13	161	174
	1.7%	6.5%	5.3%
Polyp	52	331	383
	6.7%	13.3%	11.8%
Ulcerative Colitis	45	56	101
	5.8%	2.3%	3.1%
Crohn Disease	13	6	19
	1.7%	2%	6%
Solitary Rectal Ulcer	2	12	14
	3%	5%	4%
Nonspecific	13	23	36
	1.7%	9%	1.1%
Anal fissure	5	16	21
	6%	6%	6%
Anal fistula	4	8	12
	5%	3%	4%
Colonic diverticula	14	251	265
	1.8%	10.1%	8.1%
Operated Colon	1	36	37
	1%	1.5%	1.1%
Ischemic Colitis	0	14	14
	0%	6%	4%
Radiation Colitis	0	6	6
	0%	2%	2%
Other	0	11	11
	0%	4%	3%
Total	777	2482	3259
	100.0%	100.0%	100.0%

Colonoscopy requests of patients with colon cancer diagnosis are most often requested by the physician for malignancy doubt or for weight loss. Colorectal tumor detection rates were 4.7%, 8% and 4.7%, respectively, for colonoscopy requests for rectal bleeding, anemia and occult blood test (OBT) positivity as a screening test. The most frequent request for inflammatory bowel disease patients was prediagnosis of IBD and frequent defecation.

DISCUSSION

Upper and lower endoscopy procedures are widely used in the diagnosis of gastrointestinal system diseases. Particularly in countries with a colon cancer screening program, and in areas where colon cancer or other diseases such as inflammatory bowel diseases are common, rates of colonoscopy requests have increased. Depending on the country's health programs or individual endoscopy programs of the hospitals, the indication for colonoscopy may only be prescribed by specialists who perform colonoscopy, such as gastroenterologists and surgeons, or may be requested by all physicians, such as in open-access endoscopy units, and administered by gastroenterologists and surgeons. In this study, indications and results of colonoscopy examinations performed in a university open-access endoscopy center were evaluated.

Colonoscopy is an invasive procedure that is usually performed under sedation for the comfort of the patient and the physician, and complications should not be overlooked although it may be seen at low rates. When all of these are considered together, endoscopic procedures have an important place in health expenses. With the technical advances in endoscopic equipments, more comfortable intestinal cleansing drugs and new sedation techniques, colonoscopy has become more comfortable and safe for patients. However, these developments have also increased the patient burden and health expenditures in the endoscopy units by causing the physician to feel more comfortable with colonoscopy examination and to keep the indications wider (13-17).

In order to minimize these inappropriate requests and expenditures, appropriateness criterias such as ASGE (16) and EPAGE (17) have been established and standardization has been attempted. In the study of Argüella L. et al, 17.4% of the colonoscopy requests were found to be inappropriate when evaluated with EPAGE II eligibility criteria and claim that the procedures were performed unnecessarily (18). According to their studies, inappropriate requests are increasing in younger patients. Eligibility rates have increased in hospitalized patients and with clinically relevant requests. In different studies, it is seen that the proportion of inappropriate requests has increased up to 30% (19). In our center with open access endoscopy unit, 37.8% of colonoscopies performed were reported as normal. However, there are two factors that may affect this result. First of all no criteria were used for evaluation of appropriateness, only the indications and results were compared. Secondly, non-complete

colonoscopies were not included to the study. We think that these two factors can change the eligibility rates. However, colonoscopy results were reported to be normal in nearly 50% of clinically unrelated requests (abdominal pain, constipation, and diarrhea) (Table 3). When colonoscopies requested for reasons such as rectal bleeding and rectal pain, a significant diagnosis was reached, but the majority of these diagnoses were perianal benign diseases.

Total polyp finding rate was 11.8%. In the study of Sanaka MR et al with 2167 consecutive colonoscopies, adenoma and sessile serrated polyp detection rates were 25% and 2% respectively (20). Nearly half of this diagnoses was made after surveillance colonoscopy for previously detected polyps. This result should indicate the importance of surveillance colonoscopy after detected adenomas or polyps.

Total malignancy rate was 5.3% in this study. Malignancy rate was 4.7% in OBT positivity. As a screening test, it is known that OBT and colonoscopy reduce the risk of colorectal cancer-related mortality (21). However, when the clinician has a high degree of suspicion for malignancy and in patients with weight loss the value of colonoscopy increases. Whether for rectal bleeding or other causes, it is seen that the rates of negative results increase in evaluations that are not performed under eligibility criterias. Improper OBT testing (diet, drug use, non-repetition) also increases unnecessary colonoscopy requests.

Despite it was an open access endoscopy unit, it has not been evaluated that which indications come from which specialists, by which proportions. However, Grassini M. et al have shown that with training about colonoscopy indications and eligibility criterias, unnecessary colonoscopy requests can be reduced (15). Given the clinical indications and normal colonoscopy results in our study we also recommend that this training should be given in all open-access endoscopy centers. Wichers CD et al showed in their different work that unnecessary colonoscopy procedures could be reduced with an average of 7.5 minutes of gastroenterology consultation (22).

CONCLUSIONS

Colonoscopy is the most prevalent method currently used to diagnose lower gastrointestinal system diseases, which is performed with increasing frequency around the world. Improvement of the procedure conditions for both patients and physicians increases the unnecessary requests for colonoscopy and also increases the workload of unites and healthcare expenses. Our study has shown that improper requests and the number of negative colonoscopies associated with this improper requests increases. Eligibility criterias should be used to minimize these inappropriate requests and training should be provided for experts about colonoscopy criterias, or a gastroenterologist should be consulted before colonoscopy procedure, especially for open-access endoscopy units.

Table 3. Comparison of indications of colonoscopy requests and colonoscopy diagnoses

	Endoscopic Diagnoses [n (%)]															
	Colorectal Tumor	Normal	Hemorrhoid	Polyp	Ulcerative Colitis	Crohn Disease	Solitary Rectal Ulcer	Nonspecific	Anal fissure	Anal fistula	Colon Diverticula	Operated Colon	Ischemic Colitis	Radiation Colitis	Other	Total
Rectal Bleeding	(4.7)	(9.70)	(63.0)	(7.6)	(3.2)	(0.1)	(0.1)	(1.1)	(0.5)	(0.4)	(7.8)	(0.3)	(1.1)	(0.1)	(0.1)	(100)
Constipation	(2.1)	(60.5)	(22.6)	(11.1)	(0.5)	(0.0)	(0.0)	(0.0)	(0.5)	(0.0)	2.10%	(0.0)	(0.5)	(0.0)	(0.0)	(100)
Abdominal Pain	(5.0)	(43.8)	(11.9)	(12.2)	(7.5)	(2.0)	(0.2)	(4.0)	(0.2)	(0.0)	(10.9)	(1.5)	(0.7)	(0.0)	(0.0)	(100)
Radiologic Finding	4.20%	57.40%	10.60%	14.20%	1.40%	0.80%	0.30%	0.60%	0.80%	0.60%	8.60%	0.60%	0.00%	0.00%	(0.0)	(100)
Anemia	8.00%	43.70%	23.90%	11.10%	0.20%	0.20%	(0.0)	(0.0)	(0.0)	(0.0)	12.50%	0.20%	(0.0)	0.20%	0.20%	(100)
Weight Loss	14.00%	50.90%	15.80%	8.80%	7.00%	1.80%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	1.80%	(100)
Chronic Diarrhea	3.80%	55.70%	16.80%	6.10%	2.30%	1.50%	(0.0)	5.30%	(0.0)	(0.0)	6.90%	0.80%	0.80%	(0.0)	(0.0)	(100)
Family Screening	1.20%	61.00%	15.90%	17.10%	(0.0)	(0.0)	1.20%	(0.0)	(0.0)	(0.0)	2.40%	1.20%	(0.0)	(0.0)	(0.0)	(100)
Rectal Pain	1.20%	12.30%	45.70%	9.90%	2.50%	(0.0)	3.70%	(0.0)	13.60%	7.40%	2.50%	(0.0)	(0.0)	(0.0)	1.20%	(100)
Malignancy	12.90%	44.40%	17.70%	12.10%	1.30%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	7.80%	1.30%	(0.0)	1.30%	1.30%	(100)
Operated Colon	3.80%	28.80%	22.50%	8.80%	(0.0)	1.30%	5.00%	(0.0)	(0.0)	1.30%	1.30%	25.00%	(0.0)	(0.0)	2.50%	(100)
Mucous Stool	(0.0)	50.00%	40.00%	10.00%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100)
IBD	3.40%	37.50%	18.20%	3.40%	26.10%	2.30%	1.10%	1.10%	(0.0)	(0.0)	5.70%	(0.0)	1.10%	(0.0)	(0.0)	(100)
OBT (+)	4.70%	48.40%	21.90%	12.50%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	12.50%	(0.0)	(0.0)	(0.0)	(0.0)	(100)
Colon Polyp (control)	0.70%	29.60%	16.90%	41.50%	1.40%	(0.0)	(0.0)	(0.0)	0.70%	(0.0)	8.50%	0.70%	(0.0)	(0.0)	(0.0)	(100)
Frequent Defecation	(0.0)	53.80%	23.10%	(0.0)	23.10%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100)
Ileus	4.00%	44.00%	16.00%	16.00%	(0.0)	(0.0)	(0.0)	4.00%	(0.0)	(0.0)	4.00%	(0.0)	4.00%	4.00%	4.00%	(100)
Other	(0.0)	40.00%	20.00%	6.70%	(0.0)	(0.0)	13.30%	6.70%	(0.0)	(0.0)	6.70%	(0.0)	(0.0)	(0.0)	6.70%	(100)
Total	5.30%	37.80%	28.70%	11.80%	3.10%	0.60%	0.40%	1.10%	0.60%	0.40%	8.10%	1.10%	0.50%	0.20%	0.30%	(100)

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: The study was approved by the institute's ethics committee, and all patients were given a written confirmation form before the procedure.

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