Turkish Journal of Medical Sciences

Volume 39 | Number 5 Article 13

1-1-2009

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TÜBİTAK

ORIGINAL ARTICLE

Turk J Med Sci
2009; 39 (5): 747-753
© TÜBİTAK
E-mail: medsci@tubitak.gov.tr
doi:10.3906/sag-0901-2

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Endoscopic polypectomy: outcomes of 467 cases in 20 years

Aim: Endoscopic polypectomy has an important place in the treatment of polyps—the preliminary lesions of colorectal cancers. This study aimed to discuss the outcomes of endoscopic polypectomy in 467 patients for 692 polyps over the course of 20 years.

Materials and methods: The records of 692 endoscopic polypectomies performed in 467 patients between July 1988 and July 2008 were retrospectively evaluated.

Results: Patient age ranged from 3 to 85 years (mean: 50.6 years), and 302 of the 467 (64.7%) patients were male. Polypectomy was performed for 692 polyps (mean: 1.5; range: 1-12). The most common polyp location was the rectum (41.5%), polyp diameter ranged between 1 and 40 mm (mean: 6.1 mm), and 451 of the polyps (65.2%) were pedunculated. In 2 (0.4%) patients, major complications developed, but there was no mortality. Histopathologically, 43.8% of the polyps were hyperplastic, 22.8% were adenomatous, 17.1% were mixed, 9.4% were hamartomas, 6.2% were serrated adenomas, and 0.7% were inflammatory polyps. The risk of malignant degeneration was significantly higher in patients with multiple polyps ($P < 0.01$), right colon polyps ($P < 0.01$), polyps larger than 10 mm ($P < 0.01$), sessile polyps ($P < 0.01$), and adenomatous polyps, mixed polyps, and serrated adenomas ($P < 0.05$). Of the 26 (5.6%) patients with malignant polyps, 6 in whom in situ and early carcinomas were detected were treated with polypectomy and followed-up with regular examinations. Another 20 patients with invasive carcinomas or familial polyposis were treated with surgery.

Conclusion: Flexible endoscopic polypectomy is a simple and reliable method for removing colorectal polyps, and for treating in situ and early colorectal polypoid cancers.

Key words: Endoscopy, polypectomy

Endoskopik polipektomi: 20 yılda 467 olgunun sonuçları

Amaç: Endoskopik polipektomi, kolorektal kanserlerin öncü lezyonları olan poliplerin tedavisinde önemli bir yere sahiptir. Bu çalışmanın amacı, 20 yılda 467 hastada 692 polip için uygulanan endoskopik polipektominin sonuçlarını tartışmaktır.

Yöntem ve gereçler: Temmuz 1988-Temmuz 2008 arasında 467 hastada yapılan 692 endoskopik polipektomiye ait kayıtlar retrospektif olarak değerlendirildi.

Bulgular: Hastalar 3-85 yaş arasındaydı (ortalama 50,6 yıl) ve 302'si (% 64,7) erkekti. Polipektomi 692 polip için uygulandı (ortalama 1,5, 1-12 arası). Polipler % 41,5 ile en fazla rektumdaydı, çapları 1-40 mm arasındaydı (ortalama 6.1 mm) ve 451'i (% 65,2) saplıydı. Major komplikasyon 2 hastada (% 0,4) görüldü, çalışmada hasta kaybedilmedi. Histopatolojik olarak poliplerin % 43,8'i hiperplastik, % 22,8'i adenomatöz, % 17,1'i mikst, % 9,4'ü hamartom, % 6,2'si serrated adenom ve % 0,7'si inflamatuar polipti. Malign dejenerasyon riski çok poliplerde ($P < 0,01$), sağ kolondakilerde ($P < 0,01$), çapı 10 mm.'den büyüklerde ($P < 0,01$), sapsızlarda ($P < 0,01$), adenomatöz polip, miks polip ve serrated adenomlarda ($P < 0,05$) daha yüksekti. Malign polibi olan 26 hastadan (% 5,6) insitu ve erken karsinomu olan 6'sı polipektomi ile tedavi edildi ve düzenli kontroller ile takip edildi. İnvaziv karsinom veya familyal polipozisi olan diğer 20 hasta ise cerrahi ile tedavi edildi.

Sonuç: Fleksibl endoskopik polipektomi, kolorektal poliplerin çıkarılmasında, insitu ve erken kolorektal polipoid kanserlerin tedavisinde basit ve güvenilir bir yöntemdir.

Anahtar sözcükler: Endoskopi, polipektomi

Received: January 07, 2009
Accepted: April 02, 2009

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Introduction

Colorectal cancers are the third most common cancer (1) and the third most common cause of cancer-related death (2). The lifetime risk of colorectal cancer development is 6% (3). Approximately 1 million people worldwide develop this cancer each year, and 630,000 of them die as a result (2).

Colorectal polyps are the most common preliminary lesions of colorectal cancers (4). Flexible endoscopy detects colorectal polyps early and facilitates their removal before they become cancerous, thus reducing the risk of colorectal cancer development. Moreover, it facilitates non-surgical treatment of in situ and early polypoid cancers, thus reducing the risk of morbidity and mortality (5,6). The present study aimed to discuss the outcomes of 692 polypectomy procedures performed on 467 patients over the course of 20 years.

Materials and methods

Five hundred sixty patients underwent polypectomy via flexible sigmoidoscopy and colonoscopy at Atatürk University Medical School General Surgery Department between July 1988 and July 2008. The records of 467 patients whose paraffin blocks of polypectomy material were available were retrospectively evaluated. Patient age, type and number of polyps, polypectomy counts, location of polyps, the presence or absence of polyp peduncles, complications, and histopathological and clinical diagnoses were evaluated.

Rectal enema was applied before sigmoidoscopy and standard mechanical bowel preparations were used for colonoscopy. No premedications were needed before sigmoidoscopy, while 2-3 mg of midazolam (Dormicum) and 30-40 mg of pethidine (Aldolan) were administered intravenously before colonoscopy. All patients were monitored with pulse oximetry during the procedures.

For endoscopic procedures we used Olympus CF 10 S and CF 30 S flexible sigmoidoscopes, Olympus CF 10 L, CF 30 L, and CF 240 AL, and Storz 139 05 PKS colonoscopes, and Olympus UES-10 and Storz Autocon 50 electrocauters, with various forceps, snares, and coagulation electrodes.

The number and location of the polyps were recorded, and the polyps to be removed were determined for each patient. Sessile polyps smaller than 5 mm in diameter were removed using diathermic biopsy forceps. For larger sessile polyps and pedunculated polyps we used polypectomy via a diathermic snare, using an electrocautery system at 50 W with cutting-coagulation mixed current. Sessile polyps larger than 2 cm were raised with saline and then resected with a diathermic snare in one or more fragments. Following polypectomy, a coagulation current of 50 W with halter or a coagulation electrode was used to control bleeding polyps from the peduncle or the base. Polypectomy sites were not marked. Resected polyps were removed with basket forceps if possible, or we looked for them in defecation material.

The patients that underwent sigmoidoscopy were discharged upon completion of the procedure and the patients that underwent colonoscopy were discharged after a 30-min follow-up. All the patients were contacted and their histopathological results were evaluated.

Polypectomy materials were embedded in 10% formaldehyde and sent for pathological evaluation. After 24 h samples of the materials were obtained and after 12 h paraffin blocks were obtained. Sections 5 μm in thickness were obtained from the blocks that best represented each polyp and were stained with hematoxylin-eosin for histopathological evaluation. The preparations were evaluated by 2 pathologists using an Olympus BX 51 microscope at 100× and 200× magnification.

Statistical analysis of the data was conducted with SPSS for Windows and the chi-square (X^2) test was used. $P < 0.01$ was considered highly statistically significant and $P < 0.05$ was considered statistically significant.

Results

Age range of the patients was 3-85 years (mean: 50.6 years). Of the 467 patients, 302 (64.7%) were male and 165 (35.3%) were female.

Polypectomy was performed via flexible sigmoidoscopy in 187 (40.0%) patients and with

colonoscopy in the other 280 (60.0%). In 346 (74.1%) of the patients a solitary polyp was observed and in the other 121 (25.9%) more than 1 polyp was observed (Table 1). In 357 (76.4%) patients 1 polypectomy was performed and in 110 (23.6%) patients more than 1 polypectomy procedure (n = 2-12). Thus, in 467 patients a mean of 1.5 polypectomies were performed.

The most common site for polyps was the rectum (41.5%) (Table 2). Polyp diameter ranged between 1 and 40 mm (mean: 6.1 mm) (Table 3). Of the 692 polyps treated with polypectomy, 451 (65.2%) were pedunculated and 241 (34.8%) were sessile (Table 4).

After the procedure 1 patient (0.2%) required a blood transfusion due to polypectomy site hemorrhage and another patient (0.2%) had polypectomy site perforation that required surgical intervention. There was no mortality.

The histopathological evaluation of 692 polyps showed that 303 (43.8%) polyps were hyperplastic, 158 (22.8%) were adenomatous, 118 (17.1%) were mixed type, 65 (9.4%) were hamartomas, 43 (6.2%) were serrated adenomas, and 5 (0.7%) were inflammatory. Carcinoma was detected in 26 polyps (3.8%) in 26 patients (5.6%) (Table 5). Six of the malignant polyps were pedunculated; 1 was level 0, while 5 polyps were level 1 according to Haggitt's classification (7). The other 20 sessile malignant polyps had either base involvement or were diagnosed as familial polyposis.

Statistical evaluations indicated that there was no correlation between age (X^2: 4.5; $P > 0.05$) or gender

Table 1. The number of polyps and its association with malignancy.

Number of polyps	Patient	%	Malignancy	%
1	346	74.1	9	2.6
2	69	14.8	17*	14.0*
3	8	1.7		
4	5	1.1		
5	7	1.5		
6-9	3	0.6		
≥ 10	29	6.2		
Total	467	100.0	26	3.8

*For multiple polyps

Table 2. Polyp location and its association with malignancy.

Polyp location	Number	%	Malignancy	%
Rectum	287	41.5	6	2.1
Rectosigmoid region	89	12.9	2	2.2
Sigmoid colon	185	26.7	8	4.3
Descending colon	70	10.1	1	1.4
Transverse colon	30	4.3	4	13.3
Ascending colon	21	3.0	4	19.0
Cecum	10	1.4	1	10.0
Total	692	100.0	26	3.8

Table 3. Polyp diameter and its association with malignancy.

Polyp diameter (mm)	Number	%	Malignancy	%
0-5	439	63.4	4	0.9
6-10	172	24.9	10	7.0
11-20	62	9.0	9	14.5
21-30	14	2.0	2	14.3
≥ 31	5	0.7	1	20.0
Total	692	100.0	26	3.8

Table 4. The polyp stem and its association with malignancy.

Polyp peduncle	Number	%	Malignancy	%
Pedunculated	451	65.2	6	1.3
Sessile	241	34.8	20	8.3
Total	692	100.0	26	3.8

Table 5. Histopathological characteristics of polyps and their association with malignancy.

Polyp histopathology	Number	%	Malignancy	%
Hyperplastic polyp	303	43.8	6	2
Goblet-celled type	228			
Microvesicular type	62			
The type lacking in mucin	13			
Adenomatous polyp	158	22.8	12	7.6
Tubular adenoma	78			
Tubulovillous adenoma	67			
Villous adenoma	13			
Mixed polyp	118	17.1	6	5.1
Hamartoma	65	9.4	0	0
Serrated adenoma	43	6.2	2	4.7
Cecil serrated adenoma	30			
Classic serrated adenoma	13			
Inflammatory polyp	5	0.7	0	0
Total	692	100	26	3.8

(X^2: 0.2; P > 0.05) of the patients, and malignancy. The risk of malignancy was more significant for multiple polyps (X^2: 33.9; P < 0.01), for right colon polyps (X^2: 26.2; P < 0.01), for polyps larger than 10 mm (X^2: 35.3; P < 0.01), for sessile polyps (X^2: 19.2; P < 0.01), and for adenomatous polyps, mixed polyps, and serrated adenomas (X^2: 12.5; P < 0.05).

Clinically, juvenile polyps were suspected in 35 (7.5%) patients, familial polyposis coli in 14 (3.0%) patients, and Peutz-Jeghers syndrome in 4 (0.9%) patients.

Of the 26 patients with malignant polyps, 6 patients without peduncle invasion, lymphovascular invasion, or poor differentiation were treated with polypectomy only and were enrolled in the periodic control program. In these patients, no recurrence was observed during 2-10 years (mean: 4.2 years) of follow-up. The other 20 patients did not meet these criteria or were diagnosed with familial polyposis coli and treated surgically.

Discussion

Most colorectal cancers are known to arise from polyps (8); therefore, the treatment and diagnosis of colorectal polyps are important (9). Flexible endoscopy has important advantages, such as high sensitivity in the diagnosis of colorectal polyps, providing information concerning the macroscopic appearance of polyps, facilitating biopsy and/or polypectomy for histopathological evaluation, and treatment with polypectomy (5,6,10).

The removal of polyps—the precipitators of colorectal cancer—via endoscopic polypectomy prevents them from developing into cancers (8). Brenner et al. (11) reported a 30% decrease in the incidence rate of colorectal cancers during a 5-year follow-up period in patients that underwent colonoscopic polypectomy. Likewise, Rex (12) reported a 76%-90% decrease in the incidence of colorectal cancer development in the long term and a 69%-92% decrease in cancer-related mortality. The authors recommend removal of all symptomatic and asymptomatic polyps detected during colonoscopy (8,11,12), which is in agreement with our clinical experience.

Bleeding and perforation are the major complications of flexible endoscopy (13). The risk of bleeding during colonoscopy is 0%-22%, while this rate is even higher with large and sessile polyps in older individuals, and in patients on anticoagulant therapy. The risk of perforation during colonoscopy, however, is 0%-1.3% and similar to the bleeding risk it is higher in cases of large and sessile polyps. The risk of major complications with sigmoidoscopy is 0.1%-0.8% (13,14). In addition, complications in premedicated patients, such as arrhythmia and respiratory or cardiac arrest, may develop (13). The mortality rate associated with colonoscopy is reported to be 0.01%-0.02% (15). In the present study no mortality occurred, and the rate of complications was lower than previously reported.

For pedunculated polyps, the presence of malignant cells invading the submucosa at the polyp's head, neck, or stem (Haggitt's level 1-3) results in an overall low risk of lymph node involvement. Nevertheless, Haggitt's level 4 polyps, as well as sessile polyps with invasive cancer at the submucosal layer, may exhibit lymph node involvement in up to 10% of cases (16). According to Muto et al. (17), the risk of lymph node involvement for early invasive sessile cancers with submucosal invasion is between 27% and 69%. Su et al. (18) reported sufficiently effective treatment with endoscopic polypectomy in malignly degenerated colorectal polyps when the carcinoma is located at the tip and when there is no peduncle, lymphatic, and/or vascular invasion, differentiation is good, and there is no recurrence at the polypectomy area based on colonoscopic follow-up. When these conditions are met, the rate of any risk of remnant cancer or recurrence that may develop after endoscopic resection is lower than that of the mortality rate of 2%-4% and morbidity rate of 10% with abdominal surgery in elderly patients, and in those with systemic problems in particular. In addition, considering the prolonged hospitalization and increased costs associated with other methods, endoscopic polypectomy may be the first choice of treatment (14,19). Still, in determining a treatment modality a balance between the risks and the characteristics of the patient should be considered; the decision should be made on a patient-by-patient basis, and the cooperation of the patient in the decision-

making process should be ensured (20). Currently, the indications for polypectomy with colostomy through open or laparoscopic surgery have been restricted. It has been advocated in cases with a high polyp malignancy potential that do not have the above-mentioned characteristics, large- or wide-based polyps that cannot be removed with colonoscopy, and inaccessible polyp location (21). In the present study we strictly followed these principles; endoscopic polypectomy was performed in 6 patients and no problems were noted during their follow-up.

The incidence of colorectal polyps is known to increase with age (22,23). A similar finding was observed in our series. In colorectal polyps advanced age is a known risk for high-grade dysplasia, increased risk of malignancy of colorectal adenomas, and a higher rate of malign colorectal polyps (9,22). Yamaji et al. (23) reported that 3.3% of colorectal polyps were malignant in individuals under 40 years of age versus 24.4% in individuals aged 60 years or older based on colonoscopic polypectomy. In another study Yamaji et al. (24) reported increased polyp diameter and malignancy with increasing age and in the elderly population, and the presence of a risk of malignancy even in those with polyps smaller than 10 mm in diameter. Although in the present study the risk of malignancy development in colorectal polyps increased with patient age, the correlation between age and malignancy risk was not statistically significant; however, the correlation could be more significant in a larger series.

In the study by Yamaji et al. (23) the male to female ratio was 1.8 for colorectal polyps. Our findings were compatible with the literature findings. On the other hand, Winawer et al. (25) did not observe a correlation between gender and cancer risk. Similarly, in the present series no correlation was observed between gender and malignancy risk.

Winawer et al. (25) reported that the risk of malignancy increased as the number of colorectal polyps increased, and higher risk of malignancy in patients with 2 or more rectosigmoid adenomas than in patients with only 1 adenoma. In line with these reports, in the present study the risk of malignancy was significantly much higher in patients with more than 1 polyp.

Su et al. (18) reported that 33% of polyps were located in the rectum and 28% were located in the sigmoid colon. Likewise, Yamaji et al. (24) reported that 63% of malign polyps were in the left colon and rectum versus 37% in the right colon. Netzer et al. (26), however, reported that 22.8% of malign colorectal polyps were in the rectum, 74.4% were in the sigmoid colon, and 2.8% were in the descending colon. In the present series the locations of the polyps were compatible with previously reported findings. Winawer et al. (25) reported a higher risk of malignancy for polyps in the right colon than for polyps in the left colon. In the present study the risk of malignancy was significantly higher for polyps in the right colon than for those in the left colon.

The majority of colorectal polyps are 5 mm or smaller in diameter, whereas Nivatvongs (22) reported that 85% of the polyps had a diameter of 10 mm or smaller. In the present series, polyp diameter was similar to that previously reported. On the other hand, as polyp size increases so does the risk of malignancy (23). Nivatvongs (22) reported that polyp size was an independent risk factor for high-grade dysplasia and that in adenomas smaller than 1 cm polyp transformation into invasive carcinoma was a rare occurrence, the incidence of which increased with size. Similarly, Erdem et al. (25) reported a higher risk of malignancy in adenomas larger than 1 cm in diameter than in smaller ones. Su et al. (18) reported that the risk of malignancy was 0.45% for polyps smaller than 5 mm in diameter, 0.67% for polyps 6-10 mm in diameter, 19.3% for polyps 11-20 mm in diameter, 70.8% for polyps 21-30 mm in diameter, and 90.5% for polyps larger than 30 mm in diameter. In the present study, a highly significant correlation was observed between polyp diameter and the risk of malignancy.

Most colorectal polyps have peduncles (20,26). Our findings on this issue are compatible with the literature. Netzer et al. (26) reported that the risk of malignancy was higher in sessile polyps than in those that were pedunculated; however, because of a higher incidence of pedunculated polyps most malign polyps in their series arose from pedunculated polyps. Nevertheless, in sessile polyps with an invasive carcinoma, the risk of lymph node metastasis is 12%-25% higher than in pedunculated polyps (20). In the

present study a highly significant correlation was observed between the presence and absence of a stem and malignancy risk.

Hyperplastic polyps are the most common type of colorectal polyps (27). Similar findings were obtained in the present study. One of the most important factors affecting cancer development in colorectal polyps is histopathological type (20,22,23-28). Hyperplastic polyps that are larger than 2 cm in diameter have the potential for malignancy (28) and those with a serrated form have even a higher risk (5%) (29,30). It has been reported that 53% of serrated adenomas had microsatellite instability, 37% had dysplastic changes, and 10% developed into carcinomas (30). The mean risk of malignancy for adenomas is 4%-10%, 5% for tubular adenomas, 23% for tubulovillous adenomas, and 30%-41% for villous adenomas (20). Adenomas in the left colon with villous formations larger than 1 cm have a higher risk of transformation into carcinoma than others (31). In 83% of mixed polyps microsatellite instability (30) as well as their potential for malignancy (22) has been reported. It is accepted that hamartomas, non-epithelial polyps, and inflammatory polyps are not associated with dysplasia or cancer (22). In the present study, similar to previously reported findings, the rate of malignancy was 7.6% for adenomatous polyps, 5.1% for mixed polyps, 4.7% for serrated adenomas, and 2.0% for hyperplastic polyps, while no malignancy developed in hamartomas or inflammatory polyps.

Familial polyp/polyposis syndromes with a neoplastic form have the highest risk of malignancy, and if patients with familial adenomatous polyposis coli are not treated colon cancer will develop (32,33). Thus, in the present study, such patients were surgically treated.

In conclusion, flexible endoscopic polypectomy is a simple and reliable method for removing colorectal polyps, and for treating in situ and early polypoid cancers.

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