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Colonic adenomas—a colonoscopy survey

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SUMMARY A colonoscopy survey of 620 patients with 1049 colon adenomas showed a predominantly left-sided distribution (77%). Of these lesions 97% were amenable to endoscopic removal or ablation. Sixty per cent of patients presented with rectal bleeding as their major symptom. There was agreement between radiology and colonoscopy in only 62% of patients, as many of the studies were single contrast barium enemas, performed before referral. Forty-eight per cent of adenomas in our series were less than 1·0 cm in diameter. Of the larger adenomas (> 2·0 cm in diameter) 66% were situated in the sigmoid colon, and of those containing invasive carcinoma (4·8% of the total) an even higher percentage (94%) were in the sigmoid and low descending colon. With increasing polyp size, there was a greater predominance of villous elements and this was associated with a higher risk of malignant change than the more frequent and generally smaller tubular adenoma. Local colonoscopic excision alone is sufficient treatment for adenomas with malignant change unless they are poorly differentiated histologically and providing adequate resection is demonstrated. Twenty-eight patients treated in this way are alive without recurrence at periods from six to 62 months. Although 65% of patients had only one adenoma, and 90% three or less, there is a risk of developing other benign and malignant colon neoplasms and careful follow-up is required.

It is now widely accepted that adenomas of the colorectum are premalignant (Grinnell and Lane, 1958; Kalus, 1972; Morson, 1974; Muto *et al.*, 1975; Enterline, 1976), although only a small minority will develop into invasive carcinoma, and the risk for an individual adenoma is difficult to assess. Acceptance of the concept of the 'adenoma-cancer' sequence (Morson, 1974) means that removal of all colonic adenomas is desirable. Since the advent of fibreoptic colonoscopy polypectomy is now possible without the need to resort to abdominal surgery in the majority of patients except those with familial polyposis coli. Removal and histological examination allow for a clear separation between adenomas and other types of polyp, and enable the histopathologist to exclude the presence of malignancy and to assess the cancer risk factors for a particular adenoma and perhaps for the particular patient. The risk factors used are size (especially in excess of 1·0 cm in diameter), histological type (particularly where there is a villous pattern), and the presence of cellular atypia (Muto *et al.*, 1975).

Previous reports of adenoma distribution, size, and histopathology have largely been based on resected colon specimens obtained at necropsy or at surgery (Grinnell and Lane, 1958; Blatt, 1961; Chapman, 1963; Arminski and McLean, 1964; Hughes, 1968). The purpose of this study is to present the clinical and pathological features of 1049 adenomas observed at colonoscopy in a symptomatic population of 620 patients over a five year period, and to outline the role of colonoscopy in their management.

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Methods

PATIENTS

Between the years 1972-77, a total of 620 patients underwent fibreoptic colonoscopy at St Mark's Hospital for 1049 adenomas.

ENDOSCOPIC TECHNIQUE

ACMI, Fujinon, and Olympus instruments were used. Seven hundred and nine adenomas were removed by snare polypectomy, while 34 were biopsied either by conventional biopsy technique or snare loop biopsy (Martin *et al.*, 1976), as they were unsuitable for total endoscopic removal. In another 323 adenomas less than 0·7 cm in diameter, tissue was obtained using the 'hot-biopsy' fulguration method (Williams, 1973). In the patients examined, a total of 83 polyps (65 lost and 18 left *in situ*) were not

obtained for histological examination. An additional 136 polyps (>0·7 cm in diameter) were destroyed by fulguration but no histology obtained. The majority of polyps (94%) lost, left, or destroyed were less than 1·0 cm in size and 70% were sited distal to the splenic flexure.

HISTOLOGICAL EXAMINATION

The polyps were prepared for histology as previously described (Morson *et al.*, 1977). Adenomas were classified into those with a predominantly tubular pattern, those with a predominantly villous pattern, and those with a variable proportion of both elements. In those adenomas showing areas of carcinomatous invasion across the line of muscularis mucosae an assessment was made as to completeness of excision, based on depth of invasion into the submucosa or polyp stalk as judged by multiple histological sections.

CLINICAL PRESENTATION

The patients were a select group referred for investigation because of colonic symptoms (not necessarily related to the presence of polyps) or because of previous colonic surgery. The predominant symptom in 60% of patients was rectal bleeding. In another 24% the symptoms were a varying combination of altered or alternating bowel habit, abdominal pain, flatulence, and mucus discharge. Fifteen per cent of patients were examined because of previously treated adenoma or large bowel carcinoma. There were five patients with idiopathic ulcerative colitis in whom the adenomas were single and benign.

AGE/SEX DISTRIBUTION

There were 360 males and 260 females. The mean age of males was 55·3 years and females 56·2 years. Of the 46 adenomas in which areas of invasive malignancy were seen, 26 were in women (mean age 61·7 years) and 20 were in men (mean age 67 years).

BARIUM ENEMA FINDINGS

Twenty patients were not examined by barium enema in the six months preceding colonoscopy; these included patients with known diverticular disease, idiopathic ulcerative colitis, and previous adenoma or carcinoma. In the remainder, the barium enema agreed with the colonoscopic findings in 62% of patients examined. Sixteen malignant 'adenomas' were not seen on barium enema. Not all patients had a double contrast (Malmö) enema, as often the radiological examination was performed before referral to St Mark's.

SITE AND SIZE OF ADENOMAS

Most adenomas (77·3%) were in the left colon (from the splenic flexure to the rectum), with 47·5% located in the sigmoid colon. Almost one half of the lesions were less than 1·0 cm in size and relatively more (37·6%) of these small adenomas were proximal to the splenic flexure (Fig. 1).

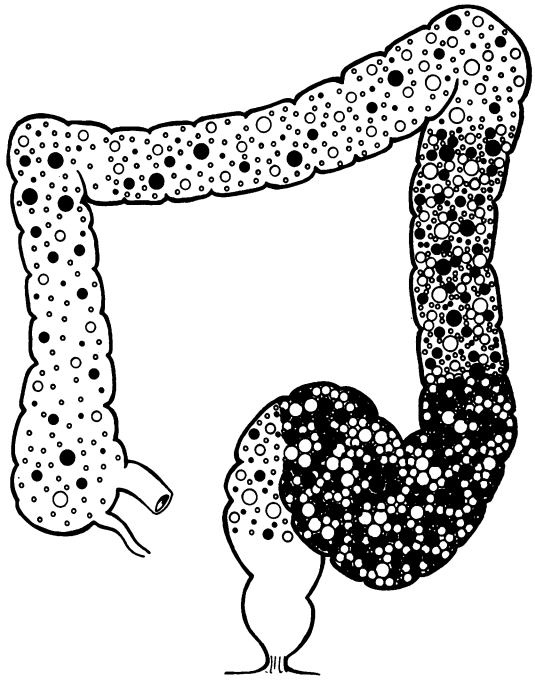

Fig. 1 *Sites and sizes of 1049 adenomas at colonoscopy. Small circles: < 1 cm. Medium circles: 1 cm <. Large circles: 2 cm <. (Black symbols—single; white symbols—multiple).*

The largest adenomas (more than 2·0 cm in diameter) (66%) were situated in the sigmoid and recto-sigmoid area (Table 1). A comparison between the distribution of adenomas in the patient group overall, and in those in whom total colonoscopy was performed to the caecum (351 patients) is shown in Table 2. Of the 673 adenomatous polyps in the total colonoscopy group, the distribution is again left-sided (70·3%) and this does not differ significantly from the group overall. Sixty-five per cent of patients had only a single adenoma, and this held true both in the patient group overall and in those who had colonoscopy to the caecum. Ninety per cent of those examined had three or less tumours and 2% more than five lesions (Table 3).

HISTOLOGY OF ADENOMAS

The majority of adenomas showed a tubular pattern, and this was especially so in the smaller polyps (Table 4). As size increased, so did the likelihood of seeing a predominantly villous pattern. Areas of invasion

Table 1 *Site and size of adenomas and polypoid carcinomas at colonoscopy*

Site of adenoma	*Size (cm)*			*Total*	*%*
	<1·0	*>1·0<2·0*	*>2·0*		
Caecum	25	0	9	34	3·3
Ascending colon	21	18	8	47	4·5
Hepatic flexure	23	1	6	30	2·9
Transverse colon	100	20	8	128	12·0
Splenic flexure	36	11	5	52	5·0
Descending colon	115	79	32	226	21·5
Sigmoid colon	163	227	110	498	47·5
Rectosigmoid colon	21	8	5	34	3·3
Total	504	364	181	1049	
%	48%	34·6%	17·3%		

Table 2 *Adenoma distribution in patients with colonoscopy to the caecum (351 patients)*

C	*AC*	*HF*	*TC*	*SF*	*DC*	*SC*	*RS*	*Total*
34	47	25	109	39	130	267	22	673
5·0%	6·9%	3·7%	16·1%	5·8%	19·2%	40·0%	3·2%	

C: caecum. AC: ascending colon. HF: hepatic flexure. TC: transverse colon. SF: splenic flexure. DC: descending colon. SC: sigmoid colon. RS: rectosigmoid colon.

Table 3 *Number of adenomas per patient (total 620 patients)*

No. of adenomas	*No. of patients*	*%*
More than 5	16	2·6
5	10	1·7
4	30	4·9
3	47	7·6
2	114	18·2
1	403	65·0

through the muscularis mucosae were seen in 49 adenomas (46 patients), an incidence of 4·8% of all the adenomas. Their distribution is shown in Table 5 and Fig. 2. Those adenomas with a predominantly villous pattern showed the highest incidence of malignancy, followed by those with a mixed tubulovillous pattern (Table 6). Only one adenoma less than 1·0 cm in diameter showed invasion, while 5·5% of adenomas between 1 and 2 cm, and 16·3% of those larger than 2 cm contained invasive areas. Ninety-eight per cent of malignant polyps were over 1 cm in diameter (Table 7). This observed relationship between adenoma size, villous pattern, and the likelihood of malignancy conforms with the results of previous studies (Muto *et al.*, 1975; Morson *et al.*, 1977). The malignant polyps in this series were all well or moderately well differentiated adenocarcinomas.

The presence of epithelial elements beneath the muscularis propria does not necessarily signify malignancy. 'Pseudo invasion' (Muto *et al.*, 1973) with cytologically benign epithelium, often cystic in appearance and often with surrounding haemosiderin desposition, was seen in the submucosa of 30 adenomas in 26 patients. Twenty-nine of these adenomas were in the descending and sigmoid colon and one was in the transverse part.

MANAGEMENT OF MALIGNANT POLYPS

Of the 46 patients with malignant polyps, 16 underwent subsequent surgical resection. In 10 of these, the tumour was either considered not suitable for endoscopic removal because of size and sessile configuration, or there was histological evidence of incomplete local excision. Of the remaining six patients who had abdominal surgery and colon resection, endoscopic removal was considered incomplete by the endoscopist—in two patients despite apparent histological adequacy of excision; in three other patients it was difficult to determine the completeness of excision, and in the remaining patient, in spite of complete endoscopic and histological excision, the patient underwent abdominal surgery. In none of these six operated patients was there any evidence of residual tumour, either macroscopically or histopathologically in the resected specimen.

The remaining 30 malignant polyps were removed by colonoscopic snare polypectomy without subsequent surgical resection. Local excision was deemed adequate on histopathological examination in 28 of these. In the remaining two patients, although local excision was incomplete, surgery was not performed for reasons of general debility or age. One of these patients died two years after colonoscopy, but no necropsy was performed. The other is alive, aged 89 years, one year after polypectomy. Of the 11 patients with polypoid carcinoma, there were two with complete histological and endoscopic excision, who underwent subsequent surgery, which confirmed the adequacy of local excision. Both patients are alive

Table 4 *Histopathology according to size of 1049 adenomas*

Histopathology	*Size (cm)*						*Total*	*%*
	<1·0		*>1 <2*		*>2*			
	No	*%*	*No*	*%*	*No*	*%*		
Tubular adenoma	461	91·5	231	63·5	87	47·5	779	74·3
Tubulovillous adenoma	36	7·2	103	28·3	70	38·2	209	19·9
Villous adenoma	7	1·3	22	6·0	21	11·5	50	4·8
Polypoid carcinoma	0	0	8	2·2	3	2·8	11	1·0

Table 5 *Adenomas with invasive malignancy—site and size*

	Size (cm)				*Total*	*%*
	<1·0	*>1·0 < 2·0*	*>2·0 < 3·0*	*>3·0*		
Sigmoid colon	1	15	12	4	32	65·4
Descending colon	0	5	5	3	13	26·6
Rectosigmoid colon	0	0	1	0	1	2·0
Transverse colon	0	0	0	2	2	4·0
Caecum	0	0	0	1	1	2·0
Total	1	20	18	10	49	100·0

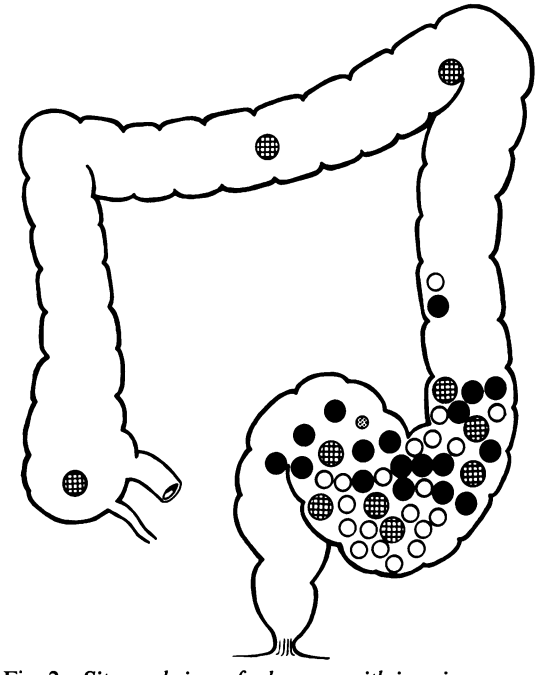

Fig. 2 *Sites and sizes of adenomas with invasive malignancy at colonoscopy. Small circle <1·0 cm. ○ <2·0 cm. ● <3·0 cm. Cross-hatched circles >3·0 cm.*

without recurrence at five years. There were seven other patients with polypoid carcinoma treated by local excision alone. Again all are alive without recurrence (two at five years, one at three years, one at two years, two at 18 months, and one at eight months).

Table 6 *Histopathology of adenomas with invasive malignancy (total 49)*

Histopathology	*Total no. of adenoma*	*Malignant adenoma*	*%*
Tubular adenoma	779	17	2·2
Tubulovillous adenoma	207	12	5·8
Villous adenoma	50	9	18·0
Polypoid carcinoma	11	11	100·0

The 28 patients treated by local excision alone are all alive and well, without apparent clinical, radiological, or endoscopic recurrence, the period of follow-up ranging from six months to 62 months (Table 8).

Discussion

The distribution of colon adenomas in this series is more in keeping with reports by other endoscopists (Wolff and Shinya, 1975) than previous reports based on necropsy or surgical findings (Blatt, 1961; Chapman, 1963; Arminski and McLean, 1964; Hughes, 1968). In those patients who were examined to the caecum, the size and distribution of adenomas was similar to those in whom only limited colonoscopy was performed. The question of whether or not to examine to the caecum in patients who present with a single adenoma detected on barium enema depends, not only upon the quality of the radiological study, but also on the technical difficulties encountered in the individual patient, and the experience and expertise of the endoscopist. We usually attempt total colonoscopy and with increasing experience and improvements in instruments this is usually possible.

Table 7 *Adenomas with invasive malignancy—histopathology according to size*

Histopathology	*Size (cm)*				*Total*
	<1·0	*>1·0 < 2·0*	*>2·0 < 3·0*	*>3·0*	
Tubular adenoma	1	7	7	2	17
Tubulovillous adenoma	0	4	6	2	12
Villous adenoma	0	1	2	6	9
Polypoid carcinoma	0	8	3	0	11
Total	1	20	18	10	49

Table 8 *Period of follow-up: local excision of colon adenomas with invasive malignancy*

Period of follow-up	*No. of patients*
4 years or more	9
2-4 years	6
1-2 years	8
6 months-1 year	5

This policy of total colonoscopy has evolved for several reasons; smaller lesions (less than 1·0 cm in size) are more accurately detected by colonoscopy than by radiology (Williams *et al.*, 1974); there is evidence that many adenomatous polyps increase in size (Mayo and de Castro, 1956; Scarborough, 1960; Welin *et al.*, 1963; Figiel *et al.*, 1965; Smith *et al.*, 1970), and that the malignant potential appears to be greater as this occurs (Grinell and Lane, 1958; Morson, 1976). Unfortunately, the factors that determine which particular adenoma will increase in size, how quickly it will do so, and if an individual lesion is a greater risk than another are not known. At present, energetic colonoscopic removal of all adenomas seems advisable where technically possible; however, the effect of polyp eradication on the prevalence of colonic cancer will be answered only by long-term studies. This policy of eradication applies not only to larger polyps, but also to the smaller lesions (representing almost 50% of all adenomas in our series), which before colonoscopy were often not detected in life. The procedure of 'hot-biopsy' fulguration (Williams, 1973) is particularly effective in the management of lesions less than 0·7 cm in size, and the safety and technique of conventional snare loop polypectomy for larger polyps is established (Williams *et al.*, 1974; Shinya and Wolff, 1975).

It should be stressed that colonoscopy is primarily a therapeutic procedure and that a high quality barium enema should remain the major means of detecting the presence of larger (more than 1·0 cm in diameter) polyps. Although total colonoscopy is advisable in patients with colon adenomas, it is apparent that fibreoptic sigmoidoscopy (Bohlman *et al.*, 1977) or limited colonoscopy to the splenic flexure, both with minimal bowel preparation, can effectively deal with the majority of patients with large adenomatous polyps.

A left-sided colon predominance was also seen on our patients with adenomas showing invasive malignancy. Patients in whom frank carcinoma was apparent at endoscopy and subsequently confirmed by histopathology have been excluded, as colonoscopy currently has little or no therapeutic role in their management. We have also not included in our group of malignant polyps those polyps showing varying degrees of epithelial atypica which in its severest form is sometimes denoted as 'carcinoma *in situ*'. We prefer to speak of malignant polyps in terms of the presence or absence of invasion beyond the muscularis mucosae.

The early results of local excision for malignant adenomas (including polypoid carcinoma) are encouraging, although the numbers are relatively small and there is only a limited period of follow-up. Earlier in our experience, polypoid carcinoma was deemed sufficient reason to advocate abdominal surgery and colon resection. An analysis of the clinical course of these patients suggests that it is not always necessary. When considering further management of patients with invasive malignancy, the assessment is based on the completeness of endoscopic removal as judged by the endoscopist and histopathologist, as well as the degree of tumour differentiation. Poorly differentiated adenocarcinoma occurring in adenomatous polyps is unusual but, if diagnosed, colonoscopic polypectomy should be avoided as there is a significant risk of lymph node metastases having already occurred in such cases (Morson *et al.*, 1977). However, a careful histological assessment of the endoscopically resected polyp may circumvent further surgery if complete excision is apparent.

Colonoscopy has a part to play in follow-up of patients with adenomas, both benign and malignant. The difficulty lies in defining its importance compared with other modalities—that is, clinical course, sigmoidoscopy, or radiology. A check colonoscopy is ideally recommended for all patients who have had polypectomy for a malignant adenoma and this is usually carried out within a few months after resection and then, albeit empirically, at two yearly intervals, As yet no firm guidelines are available for the best method of follow-up for the vast majority of

patients with benign adenomas. A study comparing the various alternatives is not yet available, and the choice is largely one of logistics. The fact that 65% of our patients had a single adenoma detected at the time of colonoscopy and that also one half of the adenomas were small and therefore theoretically of 'low risk' for the development of malignancy, may prompt the question 'Is follow-up necessary?'. The evidence is that these patients too are subsequently at greater risk for the development of further benign and malignant polyps (Rider *et al.*, 1954; Kirsner *et al.*, 1960).

Colonoscopy now offers an effective and safe therapeutic means of managing patients with colon adenomas. Whether it will make any impact on the prevelance of colon carcinoma remains to be seen.

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