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## Polyps of the colon and rectum

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**POLYPS OF THE COLON AND RECTUM**

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**Submitted in Partial Fulfillment for the Degree of  
Doctor of Medicine**

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## I. Introduction

The problem of adenomatous polyps of the colon and rectum has been the subject of considerable controversy for many years. These simple tumors have presented not only problems in management, but also in pathological diagnosis.

It is indeed difficult to decide how best to deal with a simple tumor, no matter how innocent it may appear. Before instituting treatment, one must ask himself several important questions:

Is the tumor benign?

Is the tumor malignant?

Is the tumor likely to become malignant?

Is the tumor single or multiple?

If multiple, how will this affect the management of the  
problem?

If the tumor recurs, how will it be managed?

Another major problem encountered is the extent of surgery necessary. The proper management of these problems, both prophylactic and surgical must be taken into consideration.

Due to the increased number of patients being examined with the proctoscope, increasing numbers of patients with mucosal polyps are being seen each year.

Polyps of the colon and rectum have been recognized for many years. Holms, a British pathologist, was the first to originate the term "villous adenoma", thus dividing benign epithelial tumors of the colon and rectum into two distinct groups: (1) the papillary or villous adenoma, and (2) the adenomatous polyp. Because the villous adenoma has certain differences in incidence, clinical course, pathology, and management from the ordinary adenoma, this paper will attempt to present the important features of these benign tumors, particularly pointing out the similarities and the differences between the two groups.

## II. Clinical Classification

The most common type of tumors found in the colon and rectum are those which take their origin from the mucosal glands. They are classified as adenomatous tumors. There are three clinical types of benign adenomata:

1. Areas of hyperplasia
2. Adenomatous polyps
3. Papillary or villous adenomas

Areas of hyperplasia are small, slightly elevated tumors which occur most frequently in the mucosa in the immediate vicinity of cancer, and also on mucosal surfaces exposed to chronic irritation over a comparatively long period of time. These small hyperplastic areas may indeed be the forerunner of the more mature polyps, although leading clinicians such as Warren, Swinton, Ewing, and Dukes feel that adenomas are true neoplasms and do not arise from some pre-neoplastic state.

The adenomatous polyps are the most common of the three benign varieties of mucosal polyps. They vary in size from a few millimeters in diameter to 4 - 5 centimeters in diameter. They may be either single or multiple, smooth or ulcerated, pedunculated or sessile. These tumors are composed of aborescent masses of large glandular epithelium upon a framework of connective tissue

radiating from a central fibrous stalk. The stalk is often elongated to form a pedicle in which case it is covered by normal appearing mucosa.

The third and least common variety is the papillary or villous adenoma. These tumors occur usually in the older age group. They most often are single and sessile. A pedicle if present may be almost equal in diameter to the tumor itself. The villous adenoma is papillary or lobulated in appearance and has a soft spongy consistency. Binkley & Sunderland (7).

### III. Etiology and Pathogenesis

Many lesions of the colon have been termed polyps, and many classifications have been made to describe them. It is of the utmost importance to distinguish between inflammatory or pseudopolyps, and the true neoplastic polyp.

The exact etiology of the true neoplastic polyp is not exactly known. Many factors such as inflammation, chronic irritation, epithelial disorders, embryonal rests, and hereditary disposition have been implicated in their genesis. Most authors now believe that the villous adenoma and the adenomatous polyp are true neoplasms, some of which are congenital, and some of which are hereditarily acquired due to some defect in cellular growth. Swinton & Shields (13), Helwig (26). Unlike the adenomatous polyp, the villous adenoma does not have a hereditary component. However, quite recently, several cases of villous adenomas have been traced in one family.

Helwig (18) at one time believed that these polyps took their origin from lymph follicles which would become hyperplastic. He now feels that hyperplastic lymph follicles in the neighborhood of a polyp are merely a coincidental finding.

Dukes (4) has presented an interesting theory in the genesis of intestinal polyps. Along with Helwig, he believes that both



the villous adenoma and the adenomatous polyp have a common origin, and are merely variants of the same process. Dukes states that the lobulated polyp or adenomatous polyp arises from the deep epithelial lining of the intestinal glands at the bottom of the crypts of Lieberkuhn (Fig. 1). A nidus or nodule forms with growth in the lamina propria layer of the mucosa. This nodule elevates and expands the mucosa protruding into the lumen, forming a small, tiny pedunculated or sessile adenoma with an imperceptible pedicle. This stalk lengthens due to peristaltic action of the intestines and/or traction exerted by the passage of fecal material over it.

The villous adenoma, in comparison, originates in the superficial cells of the glandular epithelium with the villi ramifying through a papillary-like overgrowth. (Fig. 1).

GENESIS OF THE LOBULATED ADENOMA

Dukes (4)

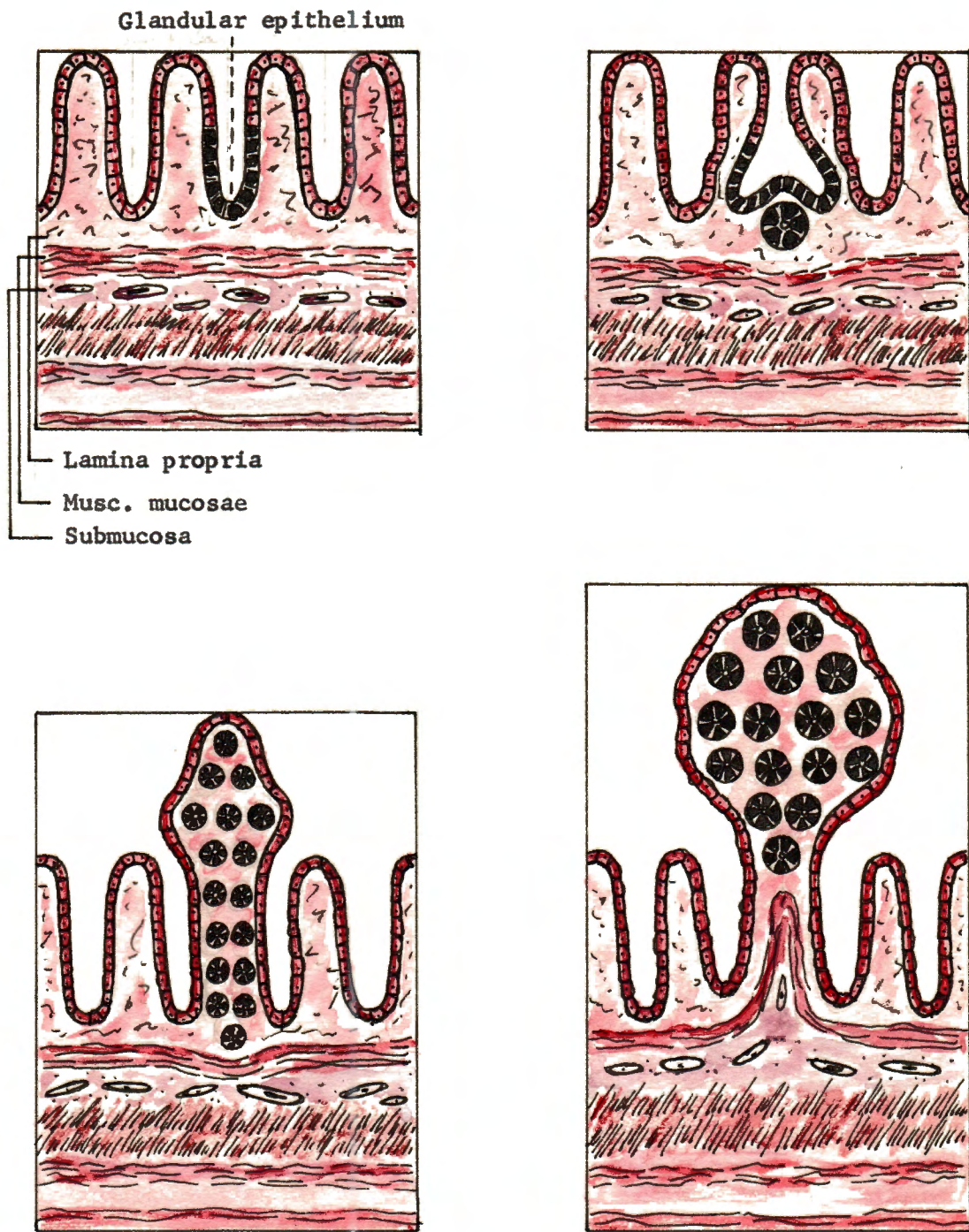


Figure 1.

GENESIS OF THE VILLOUS ADENOMA

Dukes (4)

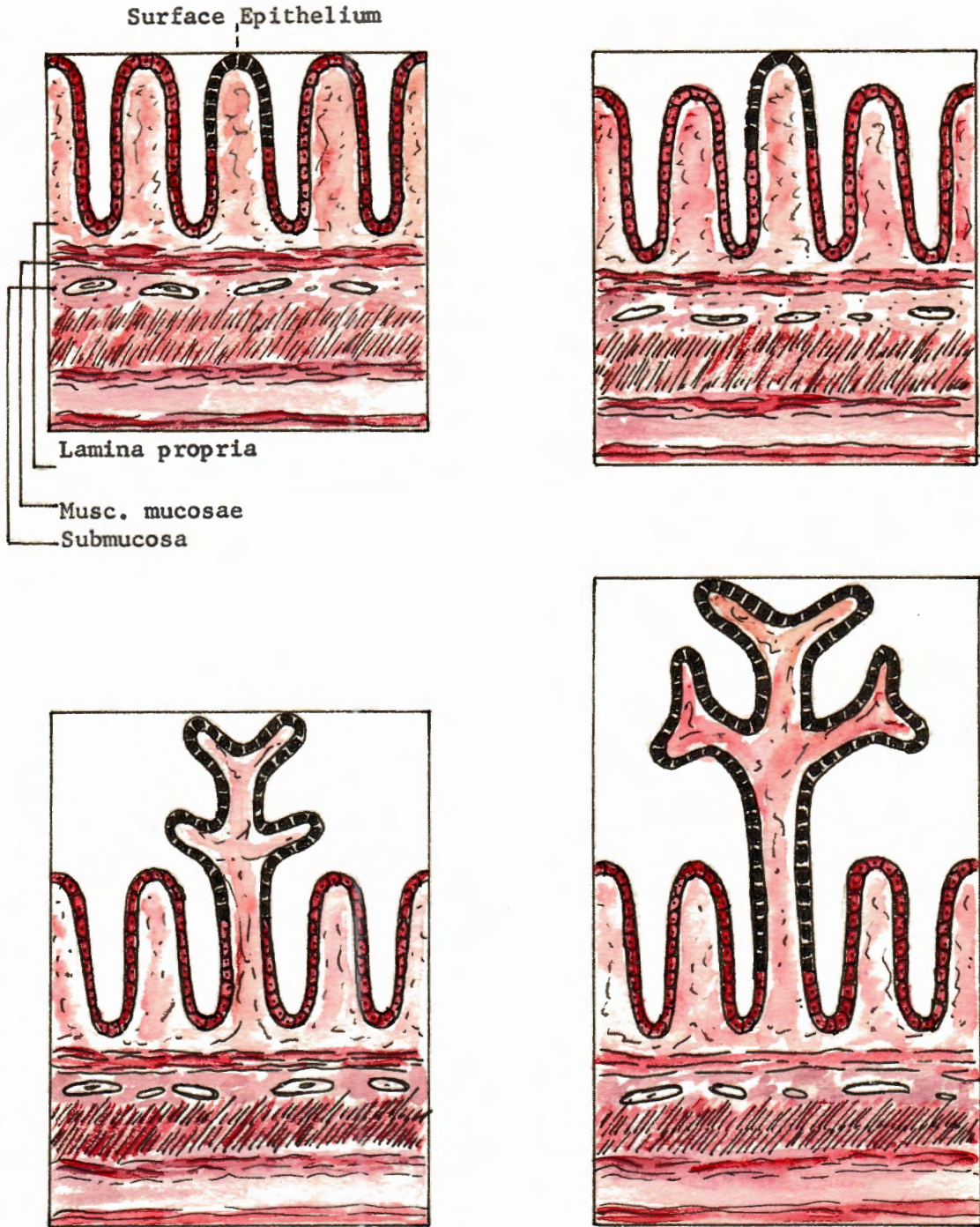


Figure 1.

#### IV. Pathological Classification

There have been many unwieldy complex pathological classifications of adenomas of the colon and rectum. Much of the confusion has resulted from the use of a multiplicity of terminology which has been unsatisfactory to both the surgeon and pathologist. The use of such terms as malignant adenoma, carcinoma grade I, carcinoma in situ, has led to some confusion. Malignant adenoma and carcinoma grade I have been used to suggest a benign process. Carcinoma in situ, by definition, is a new growth in which malignant cells are situated in the area of epithelium of origin. Unfortunately, this term may mean that the tumor might remain localized and quiescent for years instead of for a variable period of time. Turell (3)

Swinton (1, 13) has suggested a simple classification which is approved by many of the leading authors in this field:

- I. Benign mucosal polyps
- II. Mucosal polyps with atypical epithelial hyperplasia
- III. Mucosal polyps with foci of carcinoma
- IV. Frank carcinoma

Gross descriptive terms are also of value in describing these tumors:

- I. Single or multiple

II. Pedunculated or sessile

III. Smooth or villous

IV. Benign or malignant

The gross appearance of both groups varies widely. As was stated, both the adenomatous polyp and the villous adenoma may either be single or multiple, pedunculated or sessile, benign or malignant.

The papillary or villous adenoma, the less frequent of these two tumors, vary in size from those only 1 - 2 centimeters in diameter to those which may be 2 - 3 inches in diameter and which may completely fill and encircle the entire rectum. Swinton (1), and Ewing (3). They are subdivided into two main groups, the sessile and pedunculated varieties.

The sessile variety, the most common type, is an irregular flat surface growth projecting into the lumen of the bowel. They tend to be largest toward the center of the growth and flatten towards the periphery. The outer border usually overhangs the normal bowel mucosa. Occasionally, what might appear to be a typical sessile growth will be found on closer examination to have a short pedicle which has been hidden by the overhanging periphery of the tumor. Characteristically, the surface of the tumor has a wrinkled, folded, and convoluted appearance which suggests that the surface layer has proliferated so fast that it has overgrown its attachment.

Therefore, it must find space by piling up into the lumen of the bowel. In other cases, the surface of the tumor may be made up of lobules which on closer examination is found to consist of a continuous layer of small fingerlike projections, the fronds or tentacles. These projections are similar to those of a bladder papilloma. The villi are usually no longer than several millimeters, and are closely packed together. This villous structure is often so delicate and fine that it often cannot be seen with the naked eye. Its exact structure is most readily studied by examination with a hand lens. The true nature of its structure cannot often be seen because of a thick adherent layer of tenacious mucous covering the villi. An accurate study can be made only by submerging the specimen in water and gently teasing the mucous away.

The pedunculated variety differs from the sessile variety only in that it has a short pedicle which is most often inconspicuous. This variety is rare. When present, the pedicle is found to be almost equal in diameter to the body of the tumor. On closer examination, the tumor will be found to consist of small groups of irregular lobulations which are separated by deep fissures. Each of these primary divisions is each made up of even smaller secondary units of a similar type but not of the same distinctiveness one from another as the primary groups. Ewing (2).

Compared to the villous adenoma, the adenomatous polyp varies widely in size and is lacking in the typical villous structure. They may occur as small sessile structures not more than 0.5 centimeters in diameter or may be as large as 4 - 5 centimeters in diameter; however, variations outside of this range of size are not uncommon. Like the papillary adenoma, they are either sessile or pedunculated. In contrast to the villous adenoma which are usually large and sessile, the large adenomatous polyps are usually pedunculated. In most cases the larger the polyp the longer the pedicle, due to the increased tractive forces. The pedicle usually is covered by normal mucosa. It may become several inches in length, allowing the tumor considerable range of movement in the lumen of the bowel. The pedicle of all benign polyps is always pliable, soft, and of normal mucosal color. The larger pedunculated varieties have a granular surface and some may be nodular or lobulated. The body of the pedunculated type are deep red or rusty in color. In contrast the sessile adenomatous polyps are usually smooth and of normal pink mucosal color. The secretion of large amounts of tenacious mucous is not usually seen. David (22).

The outstanding microscopic feature of the villous adenoma is the accentuation of surface epithelium with the progressive replacement of normal adjacent epithelium, rather than the formation

of multiple glandular elements with rather little change in the overlying epithelium as is seen in the adenomatous polyp. Swinton (1). Microscopically, the typical villous polyp consists of an overgrowth of epithelium which is grouped in a single or pseudostratified layer over a fine connective tissue framework.

The connective tissue of the submucosa at the point of attachment is thickened similar to the formation of a stalk which branches and re-branches. This forms the basis of the primary and secondary lobulations previously described. From this framework, the villi project outward from the mucosal surface, each individual frond seeming to arise from a mucosal base rather than from a common stalk. The fronds are covered with a well differentiated epithelium, although the cells may be more crowded than usual and have more hyperchromatic nuclei. There is little or no glandular formation within a typical villous polyp. Mucus secretion varies and is in direct proportion to the number of goblet cells which are usually increased in number. The junction of the tumor with the normal mucosa is sharp and superficial.

Although a few of the villous varieties are pedunculated in type, in the majority, the frond-like arrangement of connective tissue and epithelium is present only at the periphery. Deep below the epithelium in the supporting stroma, there may be typical gland formation of the intestinal type. In this type, the pathologist is



hard pressed to determine to which group it belongs, adenoma or villous. Swinton, Ewing, Binkley (1, 2, 5).

In contrast to the villous adenoma, the histologic structure of the adenomatous polyp consists typically of epithelial covered stalk of connective tissue which is moderately vascularized and usually provided with a muscularis mucosa continuous with that of the intestinal wall. In the deeper part of the stalk, it may even contain scattered smooth muscle fibers. The stalk on section may be single or multiple; the multiple type consisting of closely packed adjacent stalks. This type may make up a single sessile adenomatous polyp.

The epithelial covering of the adenomatous polyp ranges from normal mucosa of the colon and rectum to irregular gland formation which is variable in size and shape and lined with tall columnar epithelium with large vesicular nuclei, prominent nucleoli, and frequent mitotic figures. Many have normal mucosa which may be present or absent along only the base of the stalk. Swinton (13). In either type, there is usually no evidence of inflammation other than a slight lymphocytic infiltration at the base.

Although adenomatous polyps are usually benign in 85-90 percent of cases and the villous adenoma in 70 percent of cases, evaluation of benignity or malignancy cannot be adequately made without repeated microscopic studies. According to Swinton (1,9) malignant

change in both the villous adenoma and the adenomatous polyp depends on the following criteria:

- I. Anaplasia
- II. Irregularity of architecture
- III. Invasion

Adequate studies consist of identification of whether there is any evidence of abnormal changes in the epithelium covering the surface of the tumor. The epithelium most often shows changes at the tip of the tumor and this is the area of choice in attempting to find the most severe involvement. In this area, atypical changes are most often found. Atypical or anaplastic areas on section show very hyperplastic cells associated with basophilism and increased mitotic activity.

Sections should also be taken through the base or stalk of the tumor. This section has a two-fold purpose. It will identify any abnormality in the epithelium which may persist at this level, and in addition will also identify any malignant invasion through lymph channels down through the stalk and thereby indicate future management of the lesion. Hunter (10).

It should be pointed out that many transitional forms exist between benign and malignant polyps. Some of these transitional forms show atypical hyperplasia which is demonstrated by individual epithelial cells becoming irregular and pleomorphic with increased

hyperchromia of nuclei and increased number of mitotic cells. The epithelium may become progressively piled up as if growth is too rapid. With these atypical changes, the suspicion of carcinoma is increased. The diagnosis of carcinoma is difficult to make from the atypical changes alone. The only reliable criterion for carcinomatous change is invasion of the stroma or blood vessels. Turell and Swinton (1,3).

Histologic variants are usually absent or minor in the very small tumors. As they increase in size, atypical changes increase. When the base is not invaded and the pedicle is narrow, the tumor is usually clinically benign. However, when there is cellular atypia, breaking of the basement membrane, infiltration of lymphatic or vascular channels, then clinical cancer has intervened. Helwig (26).

## V. Clinical Features

From a clinical standpoint, differences exist between the villous adenoma and the adenomatous polyp. Because of certain peculiarities of location, incidence, clinical course, they must be considered separately. Binkley, Bacon et al, (5,6,8). Sunderland and Binkley, because of the large number of villous adenomas which undergo malignant change, believe it occupies a position between the non-villous adenoma and carcinoma.

Figures show a tremendous increase in incidence of these benign tumors. The percentage in 1950 was found by DeMuth (23) to be at least five times greater than in 1943. He believes that this increase is due to improvement in diagnosis rather than an increase in incidence. See Fig. 2.

As a whole, the villous adenoma and the adenomatous polyp constitute a group which varies from 2 - 20 percent of the adult population. Cattell (25). Bacon (17), however, states that Bargen has found that some form of polypoid hyperplasia of the colonic mucosa exists in 50 percent of the population over 30 years of age. In a study of 241 autopsy specimens he was able to demonstrate 166 cases or 69 percent which represented polyps. Both groups are extremely rare in the negro race.

PATIENTS WITH POLYPS OF THE COLON AND RECTUM

AS A PERCENTAGE OF TOTAL PATIENTS

ADMITTED TO SURGERY SERVICE, 1942-1949.

DeMuth (23).

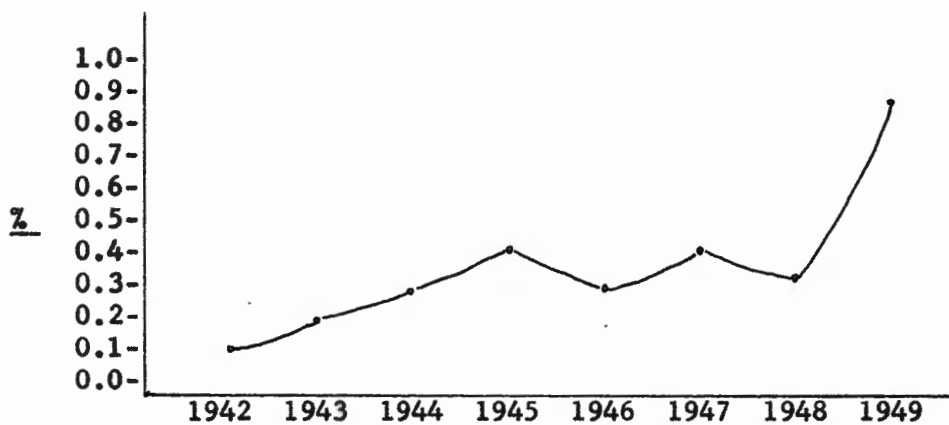


Fig. 2

Fig. 3, Reported Incidence of Adenomas

<u>Authors</u>	<u>Total Px</u>	<u>No</u>	<u>%</u>
Bacon, H. E.; Laurens, J.; Peale, A. R.; Histopathology of Adenomatous Polyps of Colon and Rectum; Surg., 29:663, (May), 1951.	162	26	16
Fansler, W. A.; Adenomas of the Colon and Rectum; So. Dak. J. Med. & Pharm.; 1:268, (July), 1948.	256	38	14.9
Young, V. T.; Routine Examination of the Lower Bowel; Am. J. Surg., 81:18, (Jan.), 1951.	500	44	8.8
Jackman, R. J.; Mayo, C. W.; The Adenoma Carcinoma Sequence in Cancer of the Colon; S. G. & O.; 93:327, (Sept.), 1951.	1,000	120	12
Hauch, E. W.; Buie, L. A.; Bargaen, J. A.; Smith, L. A.; Adenoma of Rectum and Sigmoid Colon; Gastroenterol.; 16:669, (Dec.), 1950.	2,161	172	8
Christenson, H. W.; Tener, R. J.; Results of Sigmoidoscopic Examination at Cancer Detecting Center; Am. J. Surg.; 81:14, (Jan.), 1951.	2,226	263	12.3
Diamond, M.; Adenoma of the Rectum and Sigmoid in Alcoholics; Am. J. Digest. Dist., 19:47, (Feb.), 1952.	5,980	348	5.8
Steele, H. H.; Brown, C. H.; Analysis of 1500 Routine Proctoscopic Examinations; Gastroenterol.; 12:419, (March), 1949.	1,500	78	5.2
Enquist, I. F.; State, D.; Rectal and Colonic Polyps; Surg.; 32:696, (Oct.), 1952.	3,364	576	17.1
TOTAL	17,149	1,665	9.5

**Table 4, Incidence of Adenomas Reported at Autopsy**

<b>Authors</b>	<b>Autopsies</b>	<b>%</b>
Boyd, C. E.; Polyps of the Colon; New Orleans M. & Sc. J.; 104:92, (Sept.), 1951.	21,793	6
Helwig, E. B.; The Evolution of Adenomas of Rectum and Their Relation to Carcinoma; S. G. & O.; 84:36, (Jan.), 1947.	1,460	10
Atwater, J. S.; Borgen, J. A.; The Pathogenesis of Internal Polyps; Gastroenterol; 4:395, (May), 1945.	241	69
Lawrence, J. C.; Gastrointestinal Polyps; Am. J. Surg.; 31:499, (March), 1936.	<u>7,000</u>	<u>19.6</u>
<b>TOTAL</b>	<b>30,494</b>	

**Table 5, Reported Incidence of Malignancy in Polyps**

Author	Polyp	Malig. Change	%
Castro, A. F. et al.; Adenomatous Polyps of Colon and Rectum; S. G. & O.; 92:164, (Feb.), 1951.	352	53	15
Welch, C. E. et al; Polyps of the Rectum and Colon and Their Relation to Cancer; N. Eng. J. Med.; 247:959, (Dec.), 1952.	322	60	18
Sandusky, et al; Adenomatous Polyps of the Colon and Rectum; Am. J. Surg.; 1935:189, (June), 1952.	202	18	8.9
Turnbull, R. B. Jr.; Carcinoma in Rectal Polyps; Postgrad. Med.; 12:303, (Oct.), 1952.	350	35	10
Klein, R. R., et al; Diagnosis and Treatment of Adenomatous Polyps of Colon; Arch. Surg.; 65:65, (July), 1952.	100	23	23
DeMuth, W. E., et al; Adenomatous Polyps of the Colon and Rectum; S. G. & O.; 94:195, (Feb.), 1952	234	36	15
Binkley, G. E., et al; Carcinoma Arising in Adenoma of Colon and Rectum; J. A. M. A.; 194:1465, (April), 1952.	265	39	14.4
Green, W. W.; Polyps of Lower Sigmoid and Rectum; Ohio State M. J.; 37:37, (Jan.), 1941.	70	10	14
TOTAL	1,895	274	14.4



According to Swinton (27) in a study of 827 cases of cancer of the colon and rectum, about 14 percent developed from an adenoma as shown by proctoscopic examination. Cattell (25) on the other hand has found as high as 25 percent of patients with malignant disease have benign polyps.

Malignant degeneration is more common in those patients with villous adenomas. Scarborough (24) and Swinton (1) have found that at least 30 percent of patients with villous adenomas will eventually undergo low grade malignant degeneration. Between 10 and 15 percent of adenomatous polyps will show carcinomatous degeneration.

Of all the polyps of the colon and rectum, approximately 90 percent can be visualized with the sigmoidoscope. About 30 percent are multiple and scattered; almost 100 percent of these belong to the adenomatous polyp group. Of the total number, only 8 - 10 percent are villous adenomas. Turell (3).

Over 70 percent of adenomatous polyps occur between the fifth and seventh decades. Scarborough (24) in a study of 458 patients compiled the following chart illustrating the age incidence by decades of the adenomatous polyp:

<u>Decade</u>	<u>Percent</u>
1	10
2	1

Scarborough's Chart continued:

<u>Decade</u>	<u>Percent</u>
3	10
4	12
5	24
6	22
7	21

It should be mentioned here that polyps occurring in children are usually single and rarely undergo malignant change. Ackerman (28). This excludes familial polyposis.

In contrast to the adenomatous polyp, the villous adenoma is rarely found in early adult life, most being found in the sixth and seventh decades. Ewing (2). Swinton (1) reports an average age of 59 years.

The adenomatous polyp is seen slightly more frequently in males than females. Enquist (11) reports a 3/2 preponderance in males, although most authors feel that this ratio is slightly high. The papillary adenoma shows no significant preponderance in either sex.

Unlike the adenomatous polyp, the villous adenoma is rarely multiple.

About 90 percent of benign tumors of the colon and rectum are found in the recto-sigmoid area. Helwig (18) places this fig-

ure at about 60 percent. The distribution of polyps of the colon and rectum is illustrated in Fig. 10. Almost all of the villous adenomas are located within the rectosigmoid --- usually within 8 centimeters of the rectum.

Clinically, a large number of both groups may be wholly without symptoms. This is usually the case when the tumors are small and flat. However, when pedunculated, they are more subject to bleeding and other symptoms. This is especially true of the adenomatous polyp. It has been suggested by Cattell (25), that only one-third of patients with polyps have symptoms. The majority of cases are discovered by routine sigmoidoscopic and radiographic studies. When symptoms are present, they are variable and indistinguishable from those of carcinoma. Areas of hyperplasia present no symptoms.

The symptoms of adenomatous polyps are bleeding, protrusion from the rectum, cramp-like pain, obstruction.

The most common symptom noticed by the patient is rectal bleeding, which on occasion may be quite copious, sometimes from 4 - 6 ounces may be lost; however, the bleeding is usually minor in amount. In childhood, the adenomatous polyp is the most frequent source of recurrent bleeding from the large bowel. When the polyp is located on the left side of the colon, the blood is usually located on the outside of the stool and is bright red in color.

**Table 6, Incidence of Carcinoma Originating  
in Polyps**

<u>Author</u>	<u>No. Cases</u>	<u>%</u>
Swinton	827	14
Bacon	800	15

**Table 7, Private Patients**

<u>Examinations</u>	<u>No. Adenomas</u>	<u>%</u>	<u>Malignant Adenoma</u>	<u>%</u>
6,142	504	8.2	45	9

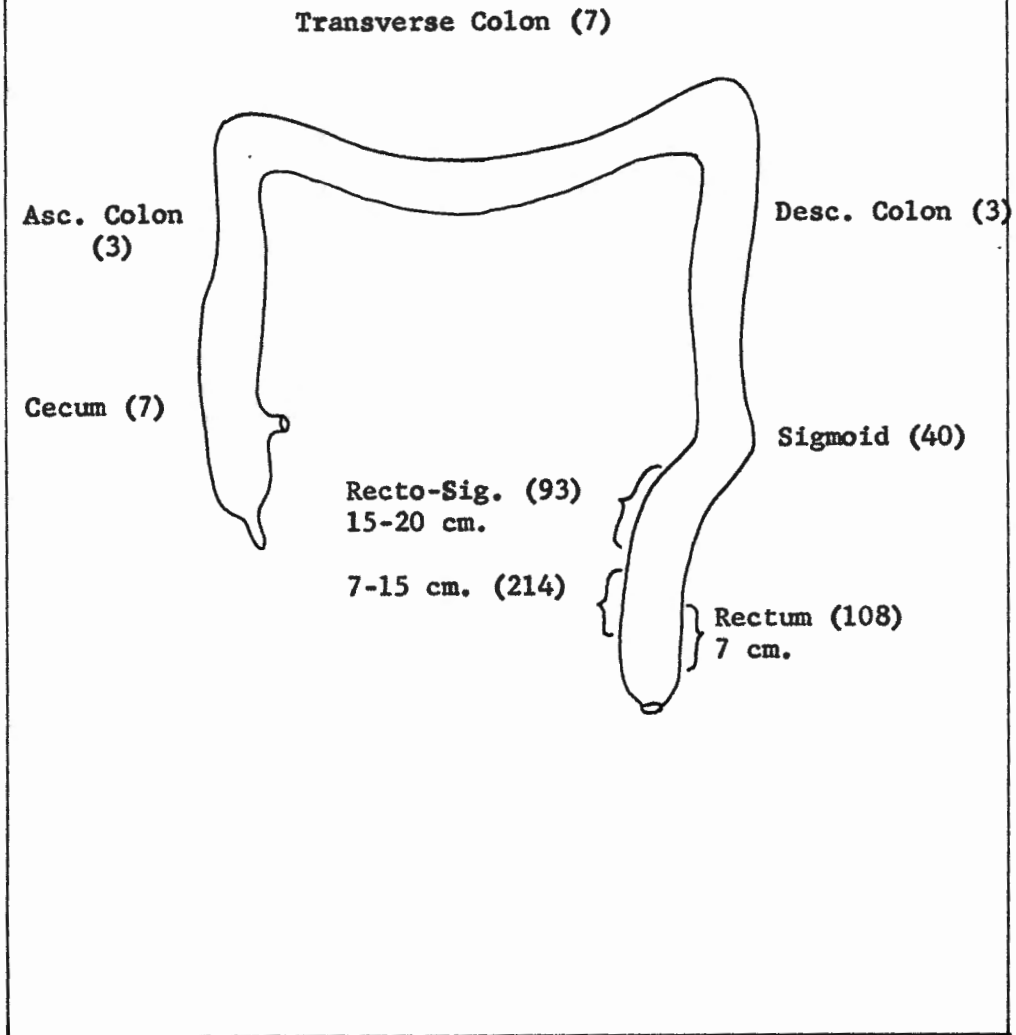
**Table 8, Malignant Polyps**

	<u>No. Cases</u>	<u>Malignant</u>	<u>%</u>
Rectal	442	33	7.5
Colon	62	12	19.3

**Table 9, Size of Polyps in a Study of 564 Cases**  
**Rider (19)**

<u>Size</u>	<u>No. of Polyps</u>	<u>%</u>
Less than 3 mm.	93	16.7
3 - 5 mm.	242	42.7
6 - 9 mm.	50	8.9
1 - 2 cm.	145	25.7
3 - 4 cm.	27	4.8
Greater than 4 cm.	7	1.2

Fig. 10, DISTRIBUTION OF POLYPS OF COLON AND RECTUM  
Swinton (9)



When it is located in the transverse or ascending colon, the blood is partially digested and intimately mixed with the stool. When the polyp is located low in the rectosigmoid area, the passage of a stool may be followed by the discharge of bright red blood.

Protrusion from the rectum is seen in those cases where the polyp is located low in the rectum, and is of large enough size to have a long pedicle. This is not an uncommon symptom in children.

Cramp-like abdominal pain may be caused by an attempt of the bowel to push the polyp along, causing tension and torsion on the pedicle.

Obstructive symptoms are rather uncommon. Occasionally, an adenomatous polyp will act as the apex of an intussusception. Polyps may cause constipation or diarrhea. Swinton, David, et al. (8,9,13,22,24,25).

The symptoms of the villous adenoma are rectal bleeding, diarrhea (all types), alternating constipation and diarrhea, rectal prolapse, low abdominal pressure or rectal pain, and the passage of tissue.

Compared to the adenomatous polyp, the outstanding symptom of the villous adenoma is a mucoid discharge often combined with some mild bleeding. It is often confused with mucous colitis. The discharge resembles a diarrhea and may be bloody, jelly-like, watery, brown, or mucoid. It varies from the simple passage of

mucous to a watery diarrhea with 12 - 15 stools per day.

Hemorrhage is usually inconsiderable and seldom alarming.

Alteration in bowel habit is usually manifested as a diarrhea. Constipation is rare and seldom complete. When the tumor is located low in the rectum, the patient will complain bitterly of incomplete evacuation, and that almost always is the presenting symptom.

Prolapse, especially if the growth is large, may be present at the end of a pedicle or may be the apex of an intussusception and lead to obstruction.

Cramping pain is rare and indicates prolapse or that the tumor is acting similarly to a foreign body in the rectum.

The passage of tissue occurs infrequently although the incidence is probably greater than the statistics indicate. Swinton & Ewing (1,2,6).

Patients who present rectal bleeding as a symptom should have a thorough GI study. This is especially true of patients over 40 years of age. According to Byrne (29) in a recent series, 17% of patients in the upper age bracket who presented no symptom but who had roentgenogram of the colon, had polyps. Of all patients who had routine sigmoidoscopic examination, 5.8% presented one or more polyps in the rectum. It should be unnecessary to stress the importance of digital examination of the rectum. Bordin (30)



states that at least 60 percent of these benign tumors can be diagnosed by sigmoidoscopic examination. Swinton (8) places this figure at greater than 85 percent. DeMuth studied 234 cases, listing methods of diagnosis. See Fig. 11.

Blood in the rectum or the presence of a sentinal polyp are the two most important findings on sigmoidoscopic examination. In either instance, roentgenogram examination of the colon is indicated. Byrne (29). Similarly, when the search for the cause of bleeding is negative on proctoscopic examination, barium studies are indicated.

Barium study of the rectum and colon is one of the most difficult of roentgen procedures. There are two conditions which interfere with proper visualization of the colon; improper cleansing of the bowel prior to examination and distortion of the sigmoid area by diverticula. It is of paramount importance to the search for polypi to make lateral views of the hepatic, splenic, and sigmoid flexures because of overlapping of the bowel in these areas. Many polyps are such that they can be demonstrated by the use of the double contrast enema and making stereoscopic films. Often, 5 or 6 examinations must be done before the polyp is visualized. Byrne, David (23,29).

The majority of the villous adenomas are within reach of the examining finger. Of the remainder, almost all can be visual-

ized with the sigmoidoscope. In contrast to carcinoma and adenomatous polyps which are hard in consistency, the villous adenoma is soft and easy to overlook. They may or may not be noted on palpation. Others are identified as a soft slippery growth, feeling like redundant mucosa. It is difficult to estimate their size on digital examination. When they are benign, the tumors are mobile on the deeper structures and are clearly a surface growth. The pedunculated villous adenoma is less soft and compressible and more easily detected and localized. Ewing (2).

On sigmoidoscopic examination, the villous adenoma is pale and grayish red in color and often covered by a layer of tenacious mucus. Often a gushing forth of mucus through the sigmoidoscope when the obturator is removed will give the clinician a hint that a villous adenoma is present. Bacon (6).

The adenomatous polyp on palpation is firm in consistency. If the pedicle is long it may be caused to prolapse through the rectum. Occasionally, the large tumors may be palpated through the anterior abdominal wall. On endoscopic examination, these tumors have a color similar to the adjacent normal mucosa or range from light pink to deep red in color. Ulceration may or may not be present. When these polyps are large, it may be difficult to pass the scope beyond them. For polyps beyond the reach of the sigmoidoscope, barium and double contrast studies are employed to substantiate the diagnosis. Scarborough (24).

**Fig. 11, Methods of Diagnosis of Polyps**

**DeMuth (23)**

<u>Diagnosis first made by:</u>	<u>%</u>	<u>No. of Cases</u>
Finger	13	30
Sigmoidoscope	41	95
Barium enema	15	36
Path. exam. of resected specimen or post mortem examination.	31	73

## VI. Management

The problem of management of benign tumors of the colon and rectum is of importance for three reasons:

- I. The relative frequency with which they occur.
- II. Their close relationship to carcinoma.
- III. The relative ease in which the majority can be diagnosed and treatment carried out.

When malignancy is present, the problem of treatment becomes complex. The clinician is faced with the problem of whether a course of conservatism or a more radical course will be followed. Close cooperation between pathologist and surgeon must be achieved if uniformity of management is to be carried out.

Hayes (33) states that the type of treatment instituted depends on the anatomic location, size, number present, age, general condition of the patient, and the pathological diagnosis. For all practical purposes, the treatment of adenomas of the colon and rectum can be divided into two groups:

- I. Those below the peritoneal reflection.
- II. Those above the peritoneal reflection.

Treatment of villous adenomas has been quite conservative even though the literature emphasizes the high incidence of local-

ized carcinoma and high recurrence rate. Many authors have felt that radical treatment was necessary for the majority of these lesions. In contrast, Swinton (1) has found an appreciable incidence of localized carcinoma histologically, and a high incidence of local recurrence of these tumors following snare excision and fulguration. However, in none did he find any extension to lymph nodes in their resected specimens, or patients dead of metastatic carcinoma.

Benign villous adenomas when accessible from below should always be treated conservatively. Turell (3) emphasizes that fractional coagulation of large villous tumors is unwise, lest malignancy be overlooked. He suggests the use of the electrothermic snare or the double loop resector. If the tumor is large and low in the rectum, it may be prolapsed through the rectum and excised, or excised through a posterior proctotomy. Hawthorne (32).

If the specimen shows evidence of frank carcinoma, radical treatment should be instituted. If, on the other hand, the lesion is benign, the patient is observed endoscopically at monthly intervals for 3 - 6 months. The interval of observation is then lengthened to once every 4 - 6 months. Thus recurrences are detected early. Bacon (6) feels that all tumors of this type should be treated by radical removal.

For tumors located above the peritoneal reflection, seg-

mental resection is the procedure of choice. This radical procedure should be done so as not to miss the chance of curing an undetected carcinoma and also to assure complete removal of the tumor. Because of the high recurrence rate of the villous adenoma, a generous amount of normal bowel should be sacrificed on each side of the tumor to insure complete removal of the growth. Ewing (2) favors local transcolonic excision of small sessile or pedunculated villous adenomas. This, however, is not in agreement with most authors who feel that segmental resection has no greater risk than the conservative colotomy procedure.

Swinton (1) has recently presented a study of 52 patients with villous polyps of the colon and rectum, seen at the Lahey Clinic, 1937-1950. This number represented about 8% of all mucosal polyps seen. Thirty-five of the fifty-seven patients were observed for a period of at least five years. This group of 35 patients was used for analysis. The remaining 17 patients had incomplete follow-up for one reason or another. Swinton was not able to prove whether any of these 17 patients died of rectal carcinoma. If more than one diagnosis was made as the result of repeated biopsies, the diagnosis listed was based on the greatest degree of atypical changes or malignancy seen by the pathologist. Of the 35 patients observed, 5 or 14.3 percent developed adenocarcinoma. Small foci of early carcinoma was seen in 6 patients

or 17 percent. Therefore, of the 35 patients, 11 or 31.4 percent had developed some stage of carcinoma. Of the 11 patients, 8 or 72.7 percent were treated by the Miles procedure or abdominal perineal resection. Two of the remaining 3 were treated by snare excision or fulgaration. These patients are well without evidence of recurrence. The third patient was treated by local excision. He is well without evidence of recurrence after ten years. Of the total series, 7 patients or 20 percent had villous adenomas with atypical hyperplasia. Four of these patients were treated by excision and fulgaration only. One patient had a benign recurrence. The other 3 were well without evidence of recurrence in 6, 7 and 10 years respectively. Two patients had abdominal perineal resection because of scarring and stricture and the other for perforation at the time of fulgaration. The seventh patient was treated by local excision. These patients have been well without recurrence for 8, 10, and 13 years respectively. Of the 17 patients or 48.6 percent who had benign mucosal villous polyps, 11 were treated by snare excision and fulgaration, 3 by local excision, 2 by anterior resection, 1 by abdominal perineal resection. Carcinoma did not develop in any of these patients during the period of observation, 5-16 years.

Like the villous adenomas, the management of the adenomatous polyp is divided into two groups, those located below and

those above the peritoneal reflection.

Mucosal excrescences or tiny adenomas and pedunculated adenomas below the peritoneal reflection are best treated by removal in toto at the base using a cold angulated biopsy forceps. Turell (16), Rider (19). Turell suggests that following their removal, the mucosal base may be coagulated with a ball tipped electrode. The intact specimen is thus submitted to the pathologist for microscopic examination. Electro-coagulation or diathermic destruction of the lesion is unwise as it prevents evaluation of the lesion. Turell (3) states that only rarely is one justified in coagulating these small tumors, that is, when multiple scattered excrescences are present, and a preliminary total biopsy of a few has been done and have been found to be benign. Only then is one justified in destroying the remaining tumors either by means of a ball tipped electrode or by a special curved forceps.

Whenever the stalk of a pedunculated adenoma is visualized, an attempt should be made to remove these lesions at or near the base by means of a high frequency snare. Turell (3), Byrne (29). Those polyps which are located within 15 centimeters of the anal verge can be removed in the office or clinic providing they are not large in size. After the amputation of the polyp by means of the electrical snare, any residual stalk may be removed by re-



application of the snare or coagulation with the ball tipped electrode. If applying the snare is difficult, the body of the tumor may be grasped with a forceps and pulled down to facilitate application. This should be done carefully so that no mucosa is caught in the snare which might result in perforation. Turell (3) suggests that when looping of the polyp is impossible, the stalk may be clamped and crushed, the remaining stalk removed by use of the snare or coagulated with a ball tipped electrode.

Sessile adenomatous polyps of small or medium size are removed successfully by means of the electric snare. The larger sessile adenomas may be successfully removed by means of a double loop resector. By this method, most of the tumor may be submitted for histologic examination. Fulguration of these polyps is to be condemned.

One of the problems occurring in the treatment of polyps is that of biopsy. Most authors feel that the whole tumor should be removed, followed by more radical treatment if indicated by the pathologist's report. If biopsies are taken, sections from both the base or stalk and the body of the tumors should be taken. Even with biopsy of the stalk of a carcinomatous polyp, no evidence of malignancy may be found even though distant or regional metastasis has occurred. Hayes (33) feels that tumors 1-5 millimeters in diameter require no biopsy since the specimen is completely re-

moved and practically never malignant. Those tumors whose diameters are greater than 5 millimeters should be biopsied. He advises repeated biopsies of polyps with short broad pedicles before local removal is undertaken.

Polyps which are reported as benign or show non-invasive localized carcinoma or atypical hyperplasia are safely removed by excision or fulguration. If there is invasion of the base, radical treatment should be carried out. Benign polyps above the peritoneal reflection may in the opinion of some men, be removed through the sigmoidoscope if they are small. If large, they should be removed through an abdominal approach. If the polyp is large and in the upper rectal segment, it may be removed through an incision behind the anus often with removal of the coccyx. Rider, Bordin, Hawthorne, Hayes (12,30,32,33).

When one is forced to do as little as possible with the aged and debilitated, it is proper to snare large polyps from the sigmoid or fulgurate large adenomas even when pathological reports are invasive carcinoma. Hayes (33).

Bordin (30) reports an interesting method of marking the site of local removal of polyps through the sigmoidoscope. This method was developed by R. D. Bush, and consists of marking the site of removal with the injection of India ink at the site. This, however, is not without the hazard of perforation or peritoneal

irritation.

To date, although many articles have appeared in the literature on the local treatment of adenomatous polyps, results and follow-ups over a five year period have been rather meagre. Turell (3) reports no recurrence in 31 cases of adenomas with either a long or short pedicle that contained foci of non-invasive carcinoma. All of these were treated by means of the electrothermic snare. These patients have been followed for a period of from 1 to 5 years. In addition to two malignancies in mucosal exerescences, he found only one instance of questionable non-invasive carcinoma in over 200 cases of smooth sessile adenomas. He concludes that at the time of survey, these tumors were either invasive cancers or totally benign.

Rider (19) reported a series of 401 cases of adenomatous polyps, 312 or 78% of which were removed with biopsy forceps or snare. 73 or 18% were removed surgically, while 16 or 4% were not removed initially. Of the group treated, recurrent polyps were noted in 8 cases treated by local excision. Seven out of eight were discovered and removed within 3 - 6 months after the first proctoscopic examination. One was removed 3 years after the initial examination. None developed carcinoma. The clinical course of the untreated sixteen cases: eleven of the sixteen returned for further study. Four out of the eleven showed no evidence of the previously described polyp. In each case, the polyp measured less than four

millimeters in diameter. In the remaining seven patients, six polyps were removed locally. One showed non-invasive carcinoma, one was not removed because of old age; the remaining five were benign adenomata.

McLanahan (31) reported a series of 38 patients, all of which were treated locally, and section had revealed definite malignant change. All patients were followed over one year and the study was limited to cases low in rectal sigmoid. 70% of cases were followed more than 4 years. 75% or 28 patients remained cured. Five developed a simple recurrence. Three out of this five had more than one recurrence. Five developed frank adenocarcinoma. Eight out of the ten which showed a recurrence of the polyp, showed it at the end of one year. All ten showed recurrence at the end of two years. See Fig. 13, 14. Fig. 15 represents a study of 210 patients by Calvert (27).

Adenomatous polyps above the peritoneal reflection are approached through the abdomen. These adenomas must be identified radiologically in two sets of films taken at different times before operative intervention. For years, simple polypectomy through a short colotomy incision has been the accepted method of treatment for polyps above the reach of the sigmoidoscope. Recently, the problem has arisen as to whether colotomy with excision of a pedunculated polyp is adequate treatment. Most authors agree

Fig. 13.

TABULATION OF FOLLOW-UP  
IN TERMS OF SIMPLE RECURRENCE AND DEVELOPMENT  
OF FRANK ADENO-CARCINOMA

McLanahan (31)

<u>Follow up</u>	<u>No. of Cases</u>	<u>Simple Recurrence</u>	<u>Frank Adeno-Carcinoma</u>
1-3 years	10	0	2
4-6 years	16	3	2
7-9 years	7	0	1
Over 10 years	5	2	0
	38	5	5

Fig. 14.

RECURRENCE IN RELATION TO INVASIVE CHARACTER  
OF ORIGINAL TUMOR

McLanahan (31)

<u>Original Tumor</u>	<u>No. of Cases Reported</u>	<u>Simple Recurrence</u>	<u>Frank Adeno-carcinoma</u>
1. Invasive	15	1	5
2. Non-Invasive	23	4	0
	38	5	5

Fig. 15, INCIDENCE OF MALIGNANCY WITH 5 YEAR FOLLOW-UP OF PATIENTS WITH  
RECTAL POLYPS, Calvert (27)

	No. of Patients	%
A. Total number biopsied on first examination	167	
1. Carcinoma present on first examination	10	5.9
2. Benign polyps removed	157	
a. Total benign polyps removed	117	8.4*
Follow-up 5 or more years		
b. Number subsequently developing carcinoma of Rectum	3	2.5
B. Total number not removed followed 5 years or more	43	
1. Number subsequently developing carcinoma	3	6.9*
C. Total number malignant polyps removed	16	
1. Number malignant polyps removed followed 5 years	14	
2. Number cases well, 5 years or more after excision	13	

\* Differ because of  
difference in  
number in series.

that the smooth sessile adenoma should be the subject of segmental resection. Simple colectomy is not without hazard. Occasionally, there will be hematoma formation. Poor healing may occur if the operation is done through the antimesenteric border where the blood supply is not as rich. Cattell (25) reports a 2.16 percent mortality rate. Segmental resection carries no higher a mortality. Welch (14). Judd (21) and Swinton (13) feel that segmental resection should be done to avoid local recurrence and because a colon in which polyps are prone to form is also prone to carcinoma formation. Welch (14) feels that if segmental resection is done, regional lymph nodes that are involved in an early unsuspected carcinoma will be removed, and also small undetected polyps will be removed in the segment. Rider (19) suggests that at the time of abdominal operation, the sigmoidoscope should be used to inspect the segments of the colon above and below the site of the polyp to be removed. Some authors such as Bordin (30) feel that transcolonic polypectomy is the method of choice followed by a frozen section. If there is evidence of carcinoma with invasion, then radical resection should be done at the time of the first operation or at a second operation, since frozen sections are often unequivocal unless most of the specimen is diffusely invaded with carcinoma. Turell (3) feels that whenever the bodies and stalks of a pedunculated adenoma is firm and impressionable but

not hard or indurated and freely moveable at the mucosal base, they can be treated by transabdominal colectomy. This operation is the one of choice in children where the polyp is always benign and where the stalk is long and fibrous. However, if there is induration or fixation of any part with or without palpable mesenteric nodes, segmental resection with the adjacent mesentery is necessary.

Relatively few studies have been made of patients with transabdominal polypectomy. Judd (21) reports a study of 246 cases. This series excludes multiple polyposis and familial polyposis, and those patients with carcinoma of the colon co-existing at the time of examination. These patients were followed a minimal of 5 years. Of the 246 cases, 98 percent of the patients returned during the first 1 - 2 years post operative. The five year follow-up was 98 percent, but the ten year follow-up rate was 40 percent. It is apparent that one cannot be certain which polyps have recurred or whether or not an entirely new tumor has formed. In the final analysis, in which additional polyps developed, after transcolonic polypectomy, it was found that adenocarcinoma developed in 50 percent of cases in which the original was reported to reveal definite evidence of microscopic invasion. Of the entire group of cases, 15 percent of the recurrent lesions were malignant. All but one of those which recurred at a level



identical with that of the original polyp presented the microscopic picture of low grade carcinoma with invasion of the stalk. The original lesion in those patients in whom further polyps occurred at an entirely different level of the colon all showed no evidence of invasion. Of interest is the high recurrence rate noted in that portion of the large intestine located within 20 centimeters of the anal opening. The time interval of recurrence varied from 10 months to 13 years, after polypectomy. Of the 15 obvious malignant recurrent lesion, 4 had reappeared within the first year. Judd also analyzed the cause of death in the follow-up period. Of the 15 cases of malignant recurrence, in 10 cases death was attributable to the original disease. In 7 of these, death was due to carcinoma of the colon; the death of 2 others was very likely due to carcinoma of the colon. In the tenth patient, death was attributed to a surgical attempt to correct a fecal fistula. Of the ten, five were alive more than five years. Only 4 deaths occurred in patients whose polyps occurred distal to the sigmoid; one due to carcinomatosis, one due to bowel obstruction, two due to unrelated causes. Death occurred in 28 patients who had no known recurrence; 2/3 of these lived more than 5 years; 1/3 more than 10 years. Fourteen died of unrelated causes entirely; 12 presumably died of unrelated causes; 2 died from carcinoma site undetermined.

Fig. 16

RELATION OF NUMBER OF POLYPS TO RECURRENCE IN 246 CASES  
Judd (21)

<u>Original Polyps</u>	<u>Cases (Total)</u>	<u>Further Polyps in Same Region, Cases</u>		<u>No Further Polyps, Cases</u>	
No.	No.	No.	%	No.	%
1	147	38	26	109	74
2	62	13	21	49	79
3	16	3	19	13	81
4	9	5	56	4	44
5	4	3	75	1	25
More than					
5	8	6	75	2	25

Fig. 17

OVERALL RESULTS OF TRANSCOLONIC EXCISION IN  
246 CASES OF POLYPS OF THE COLON  
Judd (21)

	<u>No.</u>	<u>%</u>
1. No further polyps	177	72
2. Further polyps requiring abdominal operation.	37	15
3. Further polyps requiring fulgaration	32	13

Fig. 18.

LOCATION OF FIRST POLYP AND THAT OF NEW OR RECURRENT LESION  
IN 246 CASES, Judd (21).

<u>Location of Original Lesion</u>	<u>Cases, No.</u>	Location of a new or recurrent polyp					
		<u>Abdominal Op. Required Cases</u>		<u>Treated Proctoscopically Cases</u>		<u>No Further Disease Cases</u>	
		<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Proctoscopic Region (last 20 cm.)	12	4	33	3	25	5	42
Sigmoid	145	16	11	17	12	112	77
Descending Colon	70	12	17	9	13	49	70
Transverse Colon	11	2	18	0	0	9	82
Ascending Colon	<u>8</u>	<u>3</u>	<u>37.5</u>	<u>3</u>	<u>37.5</u>	<u>2</u>	<u>25</u>
Totals	<u>246</u>	<u>37</u>		<u>32</u>		<u>177</u>	

## VII. Conclusion

Polyps of the colon and rectum are true tumors which occur frequently. They are the precursor of one of the most common types of cancer. They occur most frequently in the rectum, and are found with decreasing frequency at higher levels of the large bowel. About 85 to 90 percent can be visualized with the sigmoidoscope.

Benign epithelial tumors of the colon and rectum are divided into two groups, the adenomatous polyp and the villous adenoma. The polyp is primarily a tumor of the submucosal glands with little or no involvement of the surface epithelium. The villous adenoma is a tumor of the mucosal surface with secondary glandular changes and occur almost exclusively in the older age group.

Polyps are the most common cause of blood in the stools of children, and probably the second most common cause of recurrent melena in adults. The presence of a villous adenoma is often manifested by the presence of colitis. No symptoms are present in as high as 66 percent, the majority being discovered only during a routine proctoscopic examination. The presence of polyps may be determined by digital and endoscopic examination. After polyps have been demonstrated by these examinations, barium and air contrast studies of the colon should be done to rule out multiple polyps.

In view of the fact that villous adenomas undergo malignant degeneration in 30 percent of cases, and adenomatous polyps in 15 percent of cases, when a polyp is discovered it is important to establish the exact pathologic nature of the lesion. If the tumor is palpable, the clinician must look for induration, fixation, or ulceration which are suspicious signs of malignancy. Positive identification, however, depends on histological examination.

If at all possible, it is most desirable to remove the entire polyp for pathological examination. If it is impossible to remove the tumor in toto, multiple biopsies should be taken from both the stalk and body of the tumor. It should be emphasized that a negative pathological report in the case of multiple biopsies does not mean that carcinoma is not present. If the report is suggestive of carcinoma, repeat biopsies should be taken before treatment is instituted.

All polyps should be removed completely. Those polyps located below the peritoneal reflection are removed by means of an electrothermic snare in the case of the pedunculated adenoma, and by means of the double loop resector in the case of both the smooth sessile and villous adenomas. Coagulation of any polyp or fractional coagulation of large polyps is to be condemned unless done as a palliative procedure. Local excision and posterior procto-

tomy are of value when the tumors are large or when it is impossible to remove them by the methods previously described.

If the specimen removed is benign, then no further treatment is necessary. If a localized area of carcinoma is present in the body but not in the base of the polyp, then only careful observation is all that need be done. If carcinoma cells have invaded the base or stalk, radical treatment is indicated, consisting of wide mesenteric and colonic resection as is typically done for other carcinomatous lesions of the colon and rectum.

For polyps located above the reach of the sigmoidoscope or above the peritoneal reflection, segmental resection has been suggested as the procedure of choice. It is mandatory in all cases of villous adenomas and sessile adenomatous polyps. The pedunculated polyp may be treated by transabdominal colotomy, but the surgeon may face the possibility of local recurrence, carcinomatous degeneration, or a second more radical operation if carcinoma is found on carefully studied sections of the original tumor.

Swinton states that if increasing numbers of patients are properly examined for this condition at regular intervals, and when these pre-malignant tumors are discovered, if they are either removed or destroyed, the ideal approach to the problem of carcinoma of the colon and rectum is achieved; that is, its prevention.

COMPARISON OF ADENOMATOUS POLYPS AND VILLOUS ADENOMAS

Adenomatous Polyp

Villous Adenoma

Common Origin		
<b>Pathogenesis</b>	Heredity a factor	No hereditary factor
<b>Gross Features</b>	No villous configuration, smooth lobulated surface Narrow base Pedunculated form common Hard firm consistency	Villous configuration Broad sessile base without pedicle Pedunculated form rare Soft velvety consistency without ulceration or induration
<b>Microscopic Features</b>	Surface smooth Normal number of goblet cells May show atypicism  Stalk may contain layers of muscularis	Innumerable elongated finger-like projections Large number of goblet cells Normal staining nuclear and cytoplasmic components Limited to the superficial mucosal layer
<b>Frequency</b>	15 % of Population	
	85 - 90 % of the total	10 % of the total
<b>Racial</b>	Rare in Negroes	
<b>Age</b>	10 % in children Predominately in the 4th and 5th decade	Never seen in children Average age - 59

Chart continued on page 53.

<b>Sex Incidence</b>	<b>Males greater than females</b>	<b>Equal in both sexes</b>
<b>Location</b>	<b>Entire colon and rectum</b>	<b>Usually limited to the rectum</b>
<b>Multiplicity</b>	<b>30 % multiple</b>	<b>Almost always single</b>
<b>Recurrence Rate</b>	<b>Low</b>	<b>High</b>
<b>Cancer Potential</b>	<b>14 % undergo malignant degeneration</b>	<b>Greater than 30 % undergo malignant degeneration</b>
<b>Predominant Symptom</b>	<b>Bleeding</b>	<b>Colitis</b>
<b>Diagnosis</b>	<b>Palpation Anoscopic and sigmoidoscopic exam. Barium enema with double contrast studies</b>	<b>Often not palpable Anoscopic and sigmoidoscopic exam.</b>
<b>Treatment</b> <b>Below peritoneal reflection</b>	<b>Pedunculated - electric snare Sessile - double loop resector</b>	<b>Both varieties removed with the double loop resector</b>
<b>Above peritoneal reflection</b>	<b>Segmental Resection</b>	



## VIII Summary

Polyps of the colon and rectum are true tumors and are the precursors of one of the most common forms of carcinoma. Because of differences in incidence, clinical course, pathology, and management, they are divided into two groups, the villous adenoma and the adenomatous polyp. They are common tumors occurring in about 15 percent of the population. Between 80 and 90 percent can be diagnosed by sigmoidoscopic examination. Blood in the rectum or the presence of a sentinel polyp are the two most important findings on sigmoidoscopic examination and indicate that roentgenograms of the colon should be done. Because true polyps of the colon and rectum are premalignant tumors and because they can be removed with little risk to the patient, their early diagnosis and removal provides the ideal approach to the prevention of carcinoma of the colon and rectum.

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