Endoscopic Gastroduodenal Polypectomy

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During a 6-year period from 1976 to 1982, 7346 gastrointestinal endoscopy procedures were performed in the Surgical Endoscopy Unit of Beth Israel Medical Center. This report summarizes our experience with 443 gastroduodenal polyps excised in 257 patients. Of these, 123 were male and 134 female, ranging in age from 19 to 92. The vast majority were between the ages of 60 and 80. With one exception, polyps varied from 0.3 cm to 6 cm in diameter (one patient had a 12-cm hyperplastic polyp). There were 399 gastric polyps in 238 patients and 44 duodenal polyps in 19 patients. Of the polyps excised, 282 (63.1%) were sessile and 161 (36.9%) were pedunculated. The majority of the patients (185) had a single polyp and 72 patients had two or more polyps. Seven patients with multiple polyps had Peutz-Jeghers Syndrome and two patients had Gardner's Syndrome. Hyperplastic polyps constituted the majority (62%) of the polyps. These polyps have minimal, if any, tendency to degenerate into carcinoma. In contrast, adenomatous gastroduodenal polyps (21%) have a definite propensity to degenerate into carcinoma. This occurred in 9.6% of the patients in this series. There were no deaths and only two complications (bleeding) in this series.

HISTORICALLY, patients with gastroduodenal polyps were managed by surgical excision of these tumors. Poor risk patients were not operated upon unless there was radiographic evidence of increasing size or suspicion of malignant change. The surgical procedures employed in these patients varied in extent from gastrotomy and polypectomy to gastric resection. King et al.[4] advocated subtotal gastrectomy for all sessile polyps larger than 2 cm.

Tsuneoka and Watanabe[13] published the first report of endoscopic gastric polypectomy in 1968. This was followed by similar successful reports by Aper,[1] Minzuno,[7] and Seifert.[12] Our experience reported herein also supports the conclusion that fiberoptic endoscopic polypectomy is an efficient, safe, and cost-effective treatment for gastroduodenal polyps.

Clinical Material

Even though our experience with gastroduodenal polypectomy began in 1973, this report only includes the last 6 years, starting with 1976 and ending in 1982. During this period, 7346 esophago-gastro-duodenoscopies were performed by members of the Surgical Endoscopy Division of Beth Israel Medical Center. Included within this experience are 257 patients with gastroduodenal polyps, 123 males and 134 females whose ages ranged from 19 to 92 years. In 238 patients there were 399 gastric polyps and in 19 patients there were 44 duodenal polyps. The majority of these patients, 185 or 72.3%, had a single polyp and 72 (27.7%) had two or more polyps. The polyps ranged in size from 0.3 to 6 cm in diameter with one exception, a 12-cm hyperplastic polyp (Table 1). Grossly, 282 (63.1%) of the polyps were sessile and 161 (36.9%) pedunculated. There were seven patients with Peutz-Jeghers Syndrome and two with Gardner's Syndrome.

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Symptoms

One hundred seventy-six (68.7%) of the patients complained of epigastric pain with the intensity varying from minimal discomfort to severe ulcer-type pain. In many patients, the pain could be attributed to associated conditions such as hiatal hernia, esophagitis, gastroduodenitis, and superficial gastroduodenal erosions. In some of the patients with polyps, the epigastric pain could have resulted from pyloric or duodenal bulb obstruction due to prolapse of a large pedunculated polyp.[10,11] Marshak[5] has suggested that polyp ulceration and/or pedicle traction can cause anemia in addition to pain.

Anemia due to chronic blood loss from the intestinal tract was found in 33 patients (12.8%), with only two patients presenting with acute massive gastrointestinal bleeding. Six patients (2.2%) presented with melena. Nausea was reported by 36 patients (14.04) and vomiting by three patients (1.1%). Twenty-three patients (8.9%) were asymptomatic. One patient with a 12-cm polyp complained of early satiety.

Histologic Classification

The 443 polyps were classified histologically according to the World Health Organization (WHO) classification described by Oota and Sobin[9] (Table 2).

TABLE 1. *Gastric and Duodenal Polyps*

Size	Stomach	Duodenum
0.3 cm to 1 cm	278	28
1 cm to 2 cm	96	15
2 cm to 3 cm	17	1
3 cm to 4 cm	3	
4 cm to 5 cm	2	
5 cm to 6 cm	2	
6 cm	1	
Total	399	44

Gastric Polyps

Hyperplastic polyps were the most common histologic type. In this series, 272 (61.6%) of the polyps were in this category, and only two of these polyps were located in the duodenum; the vast majority (270) were found in the stomach (Table 3). Grossly, these polyps are round or oval and their surface is smooth or slightly lobulated. They have the same color as adjacent gastric mucosa and are mostly composed of hyperplastic mucous cells. It is generally agreed that malignant degeneration of hyperplastic polyps is exceedingly rare. Papp[10] reported one patient with carcinomatous transformation of a hyperplastic polyp. In this present series, one patient had a 6-cm hyperplastic polyp with areas of adenomatous tissue and two foci of carcinoma *in situ* in the adenomatous component. The remainder of these hyperplastic polyps were free of neoplastic elements. The following case report illustrates the benign character of these lesions.

Patient 1. A 67-year-old man was admitted to Beth Israel Medical Center in 1977 with a complaint of intermittent melena of 2 months duration. Twelve years prior to admission, he had a subtotal gastrectomy for peptic ulcer disease. A barium roentgenographic study disclosed a subtotal gastrectomy and gastrojejunostomy with a polypoid mass at the anastomosis. Endoscopy revealed a wide-based, friable polyp in the gastric remnant close to the gastrojejunostomy. There was no evidence of marginal ulcer or gastric erosions. The polyp was excised with the cautery and snare. Histologically, the lesion was a 2.5 × 2.2 cm hyperplastic polyp with extensive ulceration (Fig. 1). The patient's postpolypectomy course was uneventful and he was discharged on the fourth postoperative day. Follow-up with interval gastroscopies over the ensuing 5-year period revealed no evidence of recurrent polyp, and the patient has been free of melena.

TABLE 2. *Histological Classification of Gastric Tumor (WHO)*

I Epithelial tumors
  A—Benign (adenoma)
  B—Malignant (carcinoma)
II Carcinoid tumors
III Nonepithelial tumors
IV Haemataopoietic and lymploid neoplasma
V Miscellaneous tumors
VI Secondary tumors
VII Unclassified tumors
VIII Tumor-like lesions
  A—Hyperplastic polyps
  B—Inflammatory fibroid polyps
  C—Lymphoid hyperplasia
  D—Heterotopia
  E—Hamartoma
    (1) Peutz-Jeghers polyp
    (2) Others
  F—Juvenile polyp
  G—Giant rugal hypertrophy
  H—Others

TABLE 3. *Gastric Polyps*

Hyperplastic		270
Epithelial tumors		73
Adenoma	60	
Adenoma with severe dysplasia	4	
Adenoma with carcinoma *in situ*	8	
Adenocarcinoma	1	
Inflammatory fibroid		30
Hamartoma		9
Lipoma		9
Leiomyoma		6
Benign	4	
Sarcoma	2	
Juvenile		2
Total		399

Adenomatous polyps, on the other hand, are not as common as hyperplastic polyps. The term "adenomas" should only be applied to those polyps with a distinct neoplastic component. They generally are sessile but may be pedunculated and are rarely long. When located near the pylorous, they often develop a long pedicle and prolapse into the bulb. Ulceration often accompanies prolapse. In addition, there is often associated atrophic gastritis or gastric mucosal atrophy. Adenomatous polyps contain intestinal-type epithelium that may exhibit varying degrees of atypia, dysplasia, and sometimes carcinoma *in situ.* Occasionally an invasive carcinoma is found in an adenoma. In the present series, there were 67 patients with 95 (21.4%) adenomatous polyps; 72 were located in the stomach and 23 were in the duodenum. Six (6.4%) of these polyps had severe dysplasia and nine (9.6%) carcinoma *in situ.* The size of these 15 polyps ranged from 1.8 cm to 6 cm with a mean size of 3.7 cm. The following case history illustrates the management of a patient with gastric adenoma.

Patient 2. A 71-year-old woman was admitted to Beth Israel Medical Center in 1976 with the chief complaint of rectal bleeding. About 3 months prior to admission, she had swelling and tenderness of the left calf and a diagnosis of "phlebitis" was made. After treatment with coumadin, she developed melena. The coumadin dose was reduced but melena persisted.

Physical examination revealed a pale, alert, and oriented elderly woman in no acute distress. Examination of the abdomen did not disclose any mass or organomegaly. Laboratory data revealed a hemoglobin of 9.8 g, hematocrit 28% volume, with a normal white blood count. Coagulation studies did not disclose any abnormal findings. An upper gastrointestinal roentgenographic study showed a mass in the body of the stomach.

Endoscopy revealed a 4-cm in diameter sessile polyp located on the posterior wall of the body of the stomach; endoscopic polypectomy was

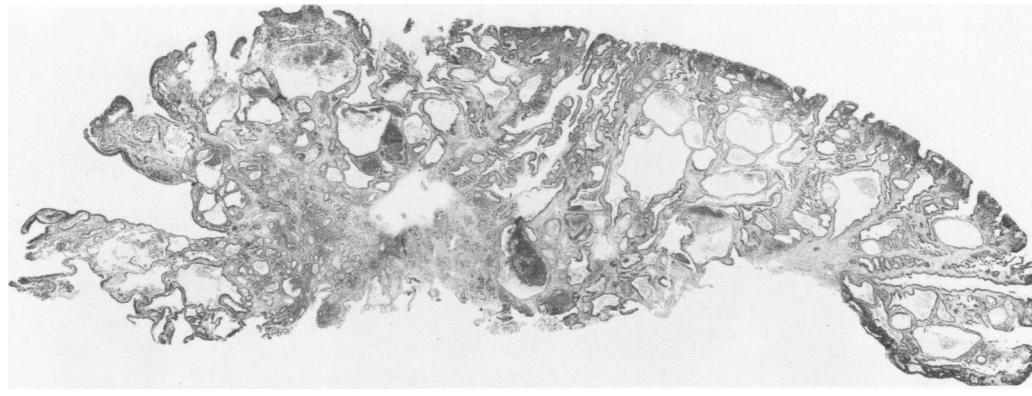

FIG. 1. Photomicrograph of a 2.5 × 2.2 cm sessile, hyperplastic gastric polyp (Case 1). It is composed of hyperplastic faveolar mucous cells with focal cyst formation and chronic inflammatory cell aggregates, ×8.

performed. During the first sitting, 70% of the polyp was removed with the remainder excised 5 days later. Histologic examination disclosed an adenoma with multiple erosions (Fig. 2). The patient was discharged on antacids and a bland diet. She has remained asymptomatic. Follow-up upper endoscopy up to 6 years has shown no recurrence at the previous polypectomy site, nor any additional gastric polyps.

There were 30 (6.8%) patients in this series with inflammatory or fibroid polyps. It is hypothesized that inflammatory lesions may cause thickening of the mucosa or the submucosa to such a degree that a polyp is formed. Generally, these small polypoid masses are 1 cm or less and they are all sessile with a firm rubbery consistency, and dark reddish-blue in color. They are rarely multiple. The following case history illustrates the management and follow-up of a patient with an inflammatory fibroid polyp.

Patient 3. This 64-year-old man was admitted complaining of epigastric pain and fullness. Physical examination and laboratory data were normal, but an upper gastrointestinal series revealed a small gastric polyp. Subsequent fiberoptic gastroscopy disclosed a firm, reddish sessile polyp located in the distal body of the stomach. The polyp was excised in one piece and measured 1.2 × 0.8 × 0.8 cm. On histological examination it was found to be an inflammatory fibroid polyp (Fig. 3). Since endoscopic removal of the polyp, the patient has been completely asymptomatic and follow-up gastroscopy has not revealed recurrence of the polyp.

Duodenal Polyps

A total of 44 duodenal polyps were excised from 19 patients. There were 24 (54.5%) adenomas. The other lesions consisted of 11 hamartomas, three Brunner's gland hyperplasia, two hyperplastic polyps, and one each of lipoma and carcinoid (Table 4). The following case report illustrates a patient with an unusual and difficult problem related to multiple duodenal adenomata.

Patient 4. A 24-year-old man underwent a subtotal colectomy for colonic polyposis associated with Gardner's Syndrome 10 years prior to his admission in 1967. Several rectal polyps had been endoscopically excised and the patient was referred for evaluation of duodenal polyps recently found on a barium gastrointestinal series. The patient was otherwise well, asymptomatic, and both physical examination and laboratory data were normal. Esophagogastroduodenoscopy revealed 13 small polyps ranging in size from 0.1 to 1.2 cm and located in all segments of the duodenum. The largest polyp, located at the proximal third duodenal segment, was excised and histologically described as a villotubular adenoma (Fig. 4). The patient was discharged on the third postpolypectomy day. He has been followed regularly since then and he has had most of the other polyps resected as they increased in size.

While duodenal polyps are infrequent, they are common in gastrointestinal syndromes such as Peutz-Jeghers and Gardner's Syndromes. Polyps associated with Peutz-Jeghers Syndrome are always hamartomatous and therefore benign. On the other hand, polyps found in Gardner's Syndrome are adenomas and these polyps may transform into carcinoma.[2] All polyps associated with Gardner's Syndrome must be completely excised with close patient follow-up. In our series, an invasive carcinoma in an adenoma located in the second segment of the duodenum was documented in a patient with Gardner's Syndrome.

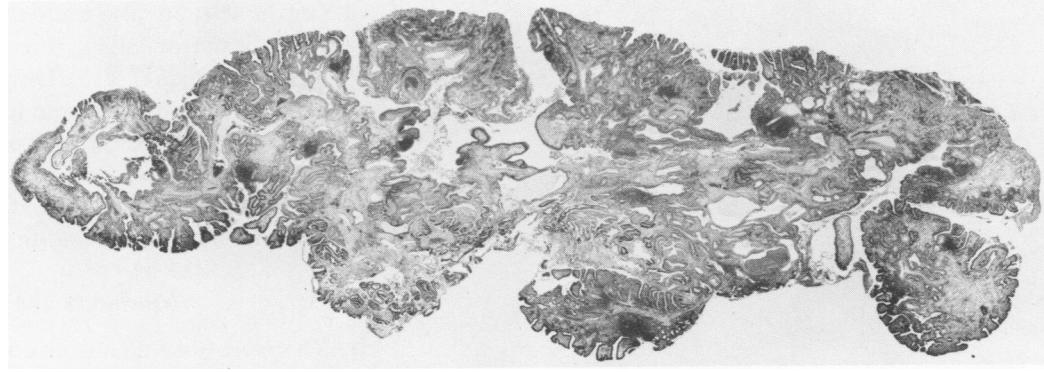

FIG. 2. Photomicrograph of a 4-cm sessile adenoma removed from the body of the stomach (Case 2). Microscopically, adenomas consist of closely packed epithelial tubules. They mostly are regular, well differentiated structures, but considerable irregularity and branching may be present, ×8.

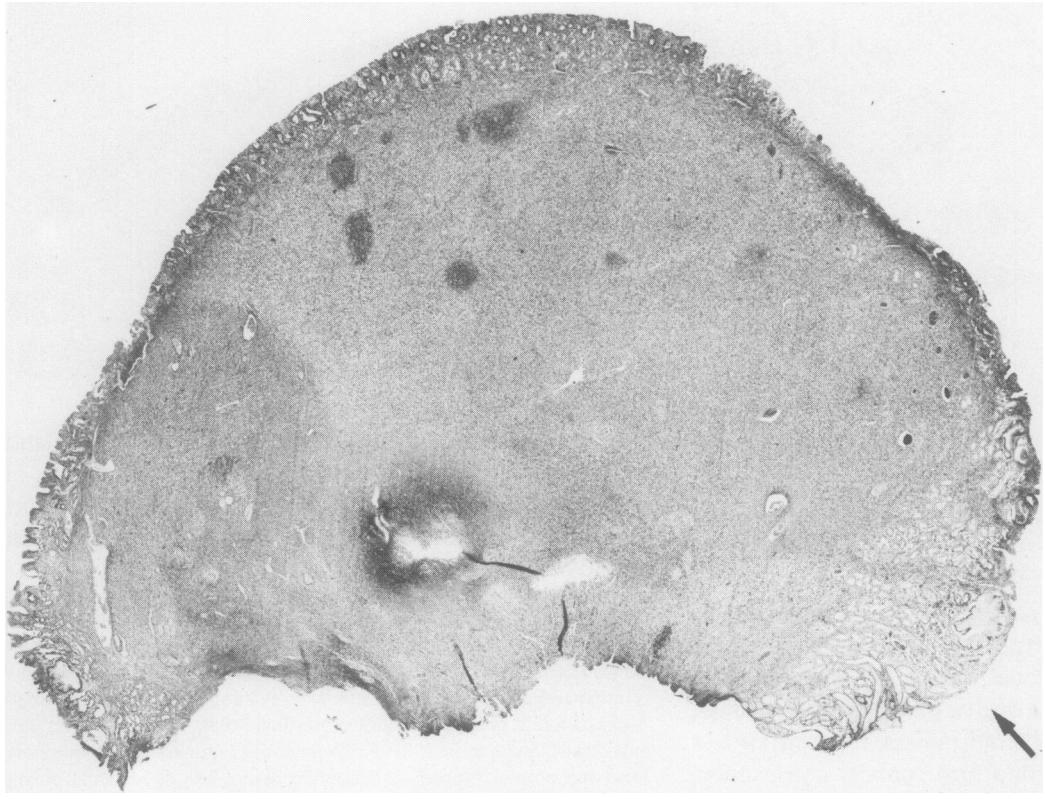

FIG. 3. A sessile gastric inflammatory fibroid polyp measuring 1.2 cm in diameter. The covering mucosa is ulcerated (arrow), ×16.

Endoscopic Technique

All patients were fasted for 8 to 10 hours prior to the procedure, and an intravenous line was inserted. A mixture of 3 cc of tetracaine hydrochloride (2%) with 3–4 drops of simethicone (Mylicon-Stewart Pharmaceuticals) was used for pharyngeal anesthesia by having the patient gargle and swallow the admixture. All patients received a combination of meperidine, 50–75 mg, and diazepam, 5–10 mg, intravenously prior to endoscopy. The quantity of medication varied according to the patient's anxiety level and medical status, with younger and more apprehensive patients requiring larger dosages. Glucagon, 1 mg, intravenously, was administered to reduce peristalsis and to facilitate snare entrapment of the polyp.

The preferred instrument for upper endoscopy and polypectomy is the end-view fiberscope. When the polyp was located past the first portion of the duodenum, the side-view fiberscope provided easier access and visualization. The cautery current was supplied by a Valley Lab Unit (SSEK or SSE 2K) with the snare made in our endoscopy unit.

With the patient in the left lateral recumbent position, the endoscope is introduced for a quick but careful examination of the esophagus, stomach, and duodenum for any additional lesions. Once the polyp is in the "en face" view, it is lassoed with a snare and the appropriate coagulation current delivered to its pedicle or base. Simultaneously, an assistant applies a pulling force on the wire to transect the pedicle. All pedunculated polyps, regardless of their size, are excised in one sitting. The majority of the sessile polyps, especially those measuring 1.5 cm or less, are also excised in one piece. If the sessile polyp is 2 cm or larger, then it is usually excised in a piecemeal fashion (Fig. 5). Only nine patients needed two to four sessions to complete their polypectomy.

Following polypectomy, all patients are fasted overnight until commencement of a full liquid diet and antacids the day after the procedure. Antacids and a soft, bland diet are advised for an additional 3 weeks.

TABLE 4. *Duodenal Polyps*

Epithelial tumors		24
Adenoma	20	
Adenoma with severe dysplasia	2	
Adenoma with carcinoma *in situ*	1	
Adenocarcinoma	1	
Hamartoma		11
Brunner gland adenoma		3
Carcinoid		2
Hyperplastic		2
Lipoma		2
Total		44

Morbidity and Mortality

There were no deaths or complications in this group of 257 patients treated from 1976 through 1982. In 1973,

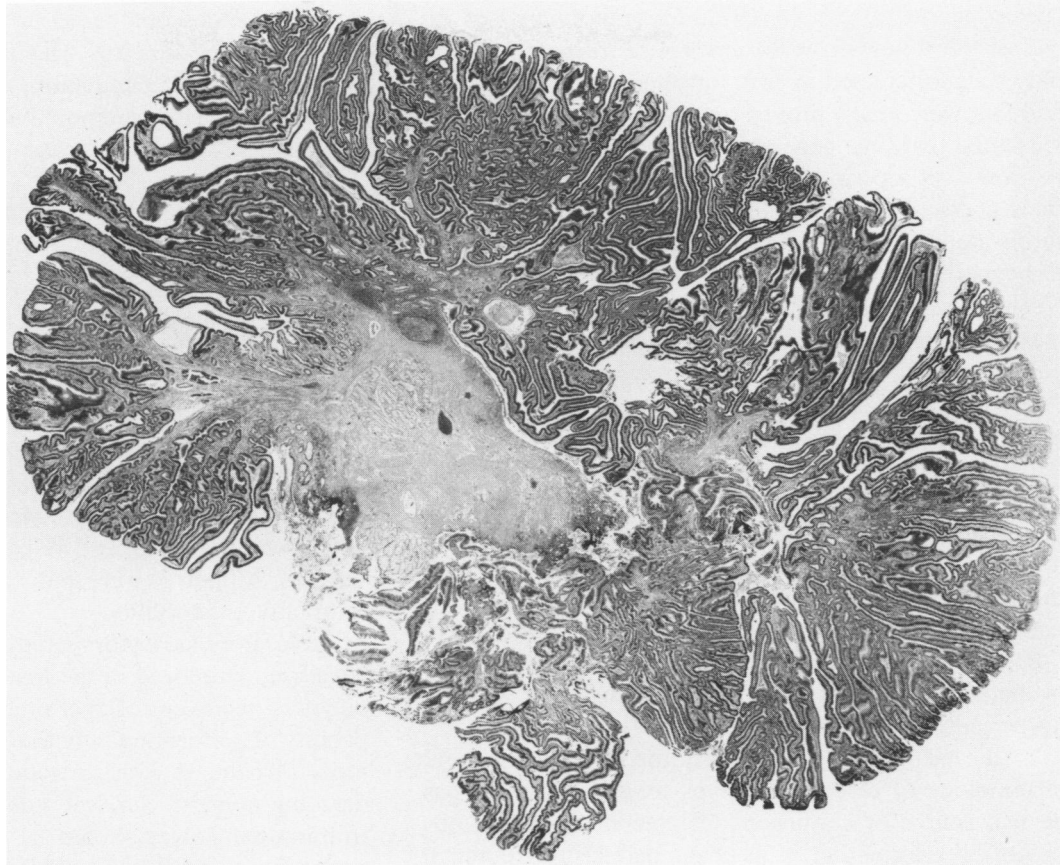

FIG. 4. A pedunculated villotubular adenoma located in the second portion of the duodenum, removed from a patient with Gardner's Syndrome. Both tubular (glandular) with villous (papillary) patterns are evident, ×10.

during the early period of endoscopic gastroduodenal polypectomy, there were two patients that bled. The bleeding stopped spontaneously in one patient. The other patient was on steroid therapy and bled from a duodenal ulcer and not from the gastric polypectomy site. This patient required a subtotal gastrectomy. She recovered from surgery and was discharged 15 days later. There have been no instances of bleeding or other complications since 1974.

Two hundred forty-nine (97%) of our polypectomy patients have been followed up with interval endoscopy. Recurrence of polyps was not observed in those patients with pedunculated polyps who were followed from 6 months to 6 years. As for those patients with sessile polyps, recurrences were not observed in cases where polypectomy had been considered complete. In larger sessile polyps where partial polypectomy was planned and considered safer, persistent growth could not be precisely differentiated from residual polyps.

Discussion

There have been significant changes in the treatment and follow-up of patients with polyps over the last 2 decades. In 1965, Marshak[5] reported minimal change in the size, configuration, and number of polyps in a radiographic follow-up of 31 patients who did not undergo surgical excision. In the same year, Ming[6] advocated the removal of all gastric polyps because of the possibility of

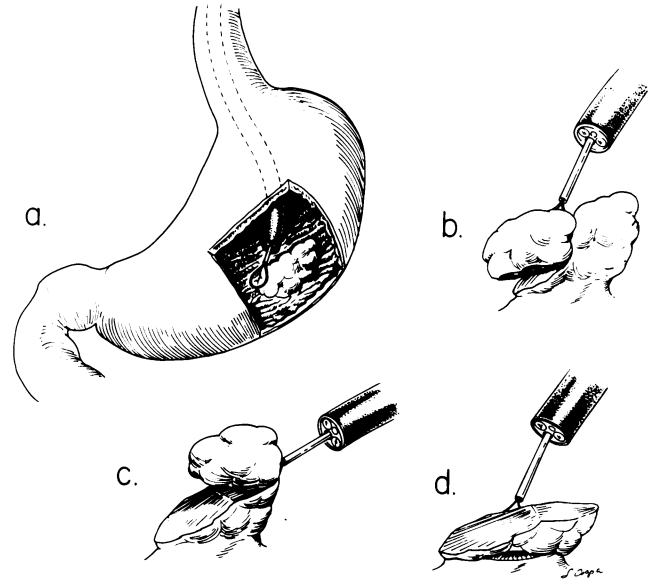

FIG. 5. Schematic illustration of piecemeal excision of a sessile gastric polyp (a, b, c, and d).

coexisting carcinoma. In 1972, Minzuno[7] reported an endoscopic follow-up of 118 cases of gastric polyps. Seven polyps had increased in size, four had decreased in size, and four were finally proven to contain adenocarcinoma. He stated that "the general tendency was for the polyps to grow over a period of several years and thereafter remain at essentially the same size within 2 cm." Plachta,[11] in his study in 1957, found no cases of transformation of benign "adenomatous polyps" to carcinoma.

There is controversy over the incidence of transformation or degeneration of benign gastric polyps to adenocarcinoma. Elster[3] reported a frequency of 1.1% and Papp[10] 8–28%. This discrepancy as to the malignant potential of benign gastroduodenal polyps has been due in part to the failure to distinguish neoplastic polyps (adenomas) with definite malignant potential from non-neoplastic polyps (hyperplastic polyps) with minimal risk of malignant transformation. In this series of 443 polyps, there were 95 (21.4%) adenomas of which nine (9.6%) had areas of carcinoma *in situ* and six (6.4%), severe dysplasia. None of these patients had further surgery nor evidence of recurrent or metastatic disease in a follow-up period of 6 months to 6 years.

In the past, attempts to apply the classification and terminology of colorectal polyps to gastric polyps has been a source of confusion. Colorectal "adenomatous polyp" is a term that is used for neoplastic colorectal polyps. On the other hand, "gastric adenomatous polyp" is a term often employed as a synonym for the WHO classification of gastric hyperplastic polyp, a non-neoplastic polyp. The term "adenomatous gastric polyp" should only be applied to neoplastic gastric polyps and not to hyperplastic polyps. It should be emphasized, however, that hyperplastic gastroduodenal polyps rarely, if ever, degenerate into carcinoma as reported by Papp.[10]

The most important consideration in the management of gastroduodenal polyps is to secure sufficient tissue for histological diagnosis. Since the majority of these polyps are benign, polypectomy is both diagnostic and curative. Patients with adenomatous polyps should be followed periodically for recurrence. We recommend endoscopy at 6-month intervals for the first year, and then yearly for the next five years. Malignant neoplastic polyps (polypoid carcinoma) are infrequent and should be treated by gastric resection if the patient's condition permits.

There are no endoscopic findings that differentiate an adenomatous polyp containing microscopic *in situ* carcinoma from an otherwise benign polyp. On the other hand, the presence of ulceration or central dimpling of the head of the polyp should suggest the possibility of invasive carcinoma. There were two polyps with invasive adenocarcinoma in this series of patients. One polyp, located in the cardia of the stomach, was known to contain adenocarcinoma by previous biopsy. This patient was treated by endoscopic resection because of her advanced age and medical illnesses. The other polyp, located in the second portion of duodenum, had dimpling and ulceration and invasive carcinoma was suspected at the time of biopsy.

Summary

During the period 1976 to 1982, 7346 upper gastrointestinal endoscopies were performed with 443 gastroduodenal polyps excised in 257 patients. There were 63.7% sessile polyps and 36.3% pedunculated polyps. The majority of polyps (399) were located within the stomach and the remainder in the duodenum. Histological classification revealed a total of 272 (61.6%) hyperplastic polyps with none having any focal carcinomatous changes. The remaining 171 polyps consisted of 95 adenomas, 30 inflammatory polyps, and 46 polyps of other histological variants. All polyps were endoscopically excised without morbidity or mortality.

Exploratory laparotomy and various gastric resections have been employed in the treatment of gastroduodenal polyps. The advent of fiberoptic endoscopy with the capability of performing polypectomies has spared the majority of patients with gastroduodenal polyps from undergoing surgery. Surgical intervention for upper gastrointestinal polyps should be reserved for those cases where invasive carcinoma is histologically confirmed.

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