



# Gastric polyps and polypoid lesions: Retrospective analysis of 36650 endoscopic procedures in 29940 patients

## STOMACH

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### ABSTRACT

**Background/Aims:** The frequency of gastric polyps increases with the widespread use of endoscopy for diagnosis and treatment. As gastric polyps can be malignant or premalignant, histopathological evaluation is needed. The aim of this study is to determine the prevalence and characteristics of gastric polyps in patients undergoing endoscopy.

**Materials and Methods:** This study consisted of a retrospective analysis of 36650 consecutive endoscopy and associated pathology reports of 29940 patients between December 2005 and February 2012 in a tertiary-referral center.

**Results:** Gastric polypoid lesions were detected in 666 (2.22%) patients. Hyperplastic polyps were the most common type of polyps (36.2%), followed by fundic gland polyps (8.3%), inflammatory fibroid polyps (2.4%) and adenomatous polyps (1.9%). Foveolar hyperplasia, neuroendocrine tumor, xanthoma, gastrointestinal stromal tumor, adenocarcinoma and lymphoma were less commonly seen. Malignant transformation was seen in 0.42% of hyperplastic polyps and in 23.1% of adenomatous polyps.

**Conclusion:** Endoscopic appearance of gastric polyps can be variable, distinguishing macroscopically can be misleading. Because of their malignant potential histopathological evaluation is mandatory and polypectomy should be performed whenever possible.

**Keywords:** Polyp, stomach, histopathology, endoscopy

### INTRODUCTION

Gastric polyps, broadly defined as luminal lesions projecting above the plane of the mucosal surface, are usually small and asymptomatic, discovered incidentally on endoscopic examination or during evaluation of gastric hemorrhage, anemia, or symptoms of gastric outlet obstruction (1). With the widespread use of endoscopy for diagnosis and treatment, the frequency of gastric polyps increases. In upper endoscopy polyps are detected in 2-5% (2,3) and 1-4% of patients who undergo gastric biopsy have gastric polyps (4). Various entities may appear endoscopically as a polyp or polypoid lesion. Epithelial polyps (hyperplastic, fundic gland, and adenomatous) are the classic gastric polyps, but clusters of endocrine cells (carcinoids), infiltrates (xanthomas, lymphoid proliferations) or mesenchymal proliferations [gastrointestinal stromal tumors (GISTs),

leiomyoma and inflammatory fibroid polyps (IFPs)] may create a mucosal protrusion (4).

As gastric polyps can be associated with familial polyposis syndromes and can be malignant or premalignant, histopathological evaluation either by biopsy or polypectomy is needed especially for adenomatous polyps (APs).

The aim of this study was to evaluate the frequency and features of gastric polyps in our region in a large series.

### MATERIALS AND METHODS

#### Patients

The hospital database of İzmir Katip Çelebi University Atatürk Training and Research Hospital, which is one

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**Received:** May 07, 2014

**Accepted:** October 19, 2014

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of the biggest tertiary-referral centers in Aegean region, was searched for upper gastrointestinal endoscopic records and analyzed retrospectively. Between December 2005 and February 2012, 36650 consecutive endoscopic procedures had been performed to 29940 patients for any reason. Patients with a previous history of gastric operation were excluded. Among the 29940 patients gastric polyps were detected endoscopically in 666 patients. Patients were analyzed for age and gender, and the polyps were analyzed for their features; location, size, number and histopathological classification.

**Endoscopic procedures:**

All gastroscopies were performed either only with topical pharyngeal anesthesia using 10% lidocaine spray (Xylocain %10 spray; Astra Zeneca, Sweden), or under sedation as required with midazolam (Dormicum; Roche, Switzerland) or propofol (Propofol 1% fresenius; Fresenius Kabi, Austria). Before the endoscopic procedure written informed consent was obtained from all patients. Polypectomy was done to all polyps. Polyps less than 5 mm in size were removed with forceps and those larger than 5 mm were removed with snare. No major complications were seen after polypectomy.

**Histologic procedures**

Samples were fixed in 10% formalin and embedded in paraffin. For histopathological evaluation, sections obtained from the specimens were stained with hematoxylin and eosin, and with other stains as required.

Written informed consent has been taken from all patients before the endoscopic procedures and the current research was approved by the ethics committee of the Izmir Katip Çelebi University.

**Statistical analysis**

Statistical analysis was done using SPSS 15.0 (Chicago,USA) for MS Windows. Data were expressed as mean±SD. Anova test was used to compare age, gender and type of polyps. Chi square test was used to test for differences between subgroups of patients. p values <0.05 were considered statistically significant.

**RESULTS**

We studied 36650 consecutive endoscopic procedures performed to 29940 patients. In 666 (2.22%) patients, polypoid lesions were encountered during endoscopic examination were. Of these 666 patients [408 (61.3%) female, 258 (38.7%) male; age 18-90 years (mean 60±14,8)], histopathological evaluation could not be done in 50 patients for one of the following reasons; the patient was on anti-aggregants or had a coagulation disorder, biopsy could not be taken because the localization of the lesion was not suitable or the biopsy material was inadequate for evaluation. In 192 (28.8%) patients pathological reports of lesions endoscopically presumed as polyps revealed gastritis or normal gastric mucosa.

In 325 (48.8%, 325/666) patients lesions were classic gastric epithelial polyps. Hyperplastic polyps (HPs) (Figure 1) were the most common type of polyps [241patients (36.2%)], followed by fundic gland polyps (FGPs) [(55 patients (8.3%)], IFPs [16 patients (2.4%)] and APs [13 patients (1.9%)]. In the rest 15.1% (126) of the patients with polypoid lesion pathology results were as follows; foveolar hyperplasia, neuroendocrine tumor, xanthoma, gastrointestinal stromal tumor, adenocarcinoma and lymphoma. Histopathological type, size and location of the gastric polypoid lesions are given in Table 1.

Neuroendocrine tumors were found in younger patients (mean age 49.9±14.5 years, p<0.05). No statistically significant difference could be found regarding age, gender and type of lesions in the rest of the polyps. Age and gender distribution of histopathological type of polyps is given in Table 2.

Foveolar hyperplasia, IFPs and HPs were mostly seen in the antrum whereas neuroendocrine tumors, APs, adenocarcinoma and GISTs were seen predominantly in the corpus (Table 1).

The majority of the polypoid lesions were less than 10 mm in size but APs were mostly larger than 10 mm, and GIST and adenocarcinoma were exclusively larger than 10 mm in size (Table 1).

In 534 patients (80.2%) lesions were single and the remaining 132 patients (19.8%) had more than one polypoid lesion of the same histopathological type. In 27 (4%) patients, different histopathological types of polyps were seen at the same time elsewhere in the stomach.

Adenomatous changes were seen in 9 (3.75%) patients with HPs (Figure 2). Malignant transformation was seen in one (0.42%) of these HPs whereas 3 (23.1%) of the APs had malignant transformation (Figure 3).

**DISCUSSION**

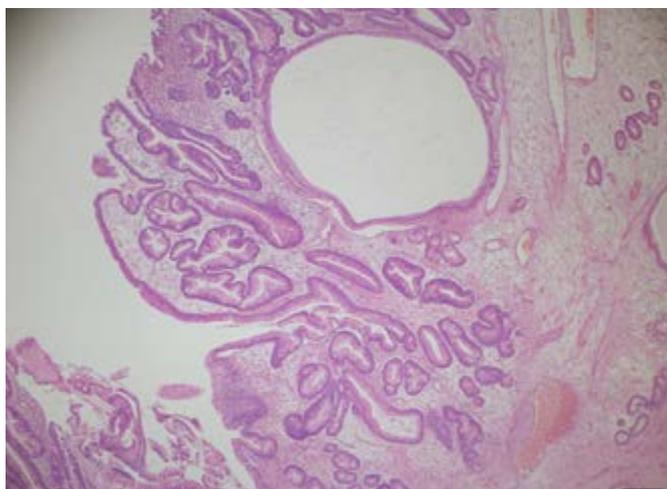
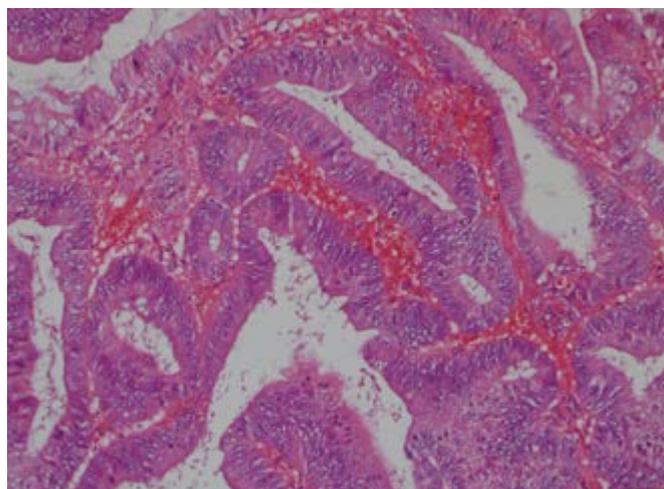
Gastric polyps are usually small and asymptomatic lesions that are incidentally discovered while performing endoscopic



Figure 1. Endoscopic appearance of a hyperplastic polyp.

**Table 1.** Histopathology, size and location of polypoid lesions endoscopically detected in stomach

Histopathology/ type of polyps	Number of patients			Size					Location		
	Total	With single polyp	With multiple polyps	<5 mm %	5-9 mm %	10-14 mm %	15-19 mm %	>20 mm %	Antrum %	Corpus %	Fundus %
Hyperplastic polyp	241	188	53	30.3	43.7	14.5	5.9	5.6	44.2	28.5	27.3
Fundic gland polyp	55	44	11	55.6	34.9	5.7	1.9	1.9	1.7	41.7	56.6
Inflammatory fibroid polyp	16	15	1	28.1	34.3	12.5	18.8	6.3	68.8	25.0	6.2
Adenomatous polyp	13	11	2	-	7.7	38.4	23.1	30.8	17.8	53.6	28.6
Neuroendocrine tumor	23	15	8	41.3	43.9	5.2	2.6	4.0	7.5	74.5	18.0
Xanthoma	6	6	-	33.3	66.7	-	-	-	100	-	-
Hamartomatous polyp	1	1	-	-	100	-	-	-	-	100	-
Adenocarcinoma	3	3	-	-	-	33.3	33.3	33.3	33.3	66.7	-
Lymphoma	2	2	-	-	50	-	-	50	50	50	-
Foveolar hyperplasia	87	66	21	41.3	45.7	8.7	4.3	-	79.5	15.1	5.4
Gastrointestinal stromal tumor	4	4	-	-	-	25.0	25.0	50.0	25.0	50.0	25.0
Gastritis/stomach mucosa	192	156	36	35.3	53.5	6.6	2.6	2.0	64.7	15.5	19.8
Polyps with no biopsy	50	42	8	32.0	46.0	14.0	4.0	4.0	36.0	32.0	32.0

**Figure 2.** Adenomatous changes in a hyperplastic polyp (haematoxylin and eosin, x20).**Figure 3.** High-grade dysplasia in an adenomatous polyp (haematoxylin and eosin, x40).

examinations (5). Polyps may cause iron deficiency anemia, bleeding may occur if ulcerated or obstructive symptoms may be seen with larger polyps (1,2,5). The prevalence rates of polyps differ according to the study population and to the underlying causes (gastric diseases, *Helicobacter pylori* (*H. pylori*) or usage of proton pump inhibitors (PPIs) etc. It is reported that gastric polyps are found in less than 1% of general population, in autopsy series the prevalence is 0.12%-0.8% (6) and in upper endoscopy polyps are detected in 2% to 5% (2,3). With the extended indications for endoscopy and widely performed endoscopic procedures, the frequency of gastric polyps increases. Gastric polyps themselves may cause symptoms which could be one reason why the incidence is higher in patients under-

going endoscopic examination compared to general population. Besides, factors like *H. pylori* causing the symptoms may also predispose to polyp formation.

Various entities may appear endoscopically as a polyp or polypoid lesion. HP, FGP, and APs are epithelial polyps which form the classic gastric polyps. In addition, mucosal protrusions may be formed with gathered endocrine cells like in carcinoids or infiltrates like xanthomas, lymphoid proliferations or sometimes with mesenchymal proliferations like in GISTs, leiomyomas and inflammatory fibroid polyps (4). On the other hand small lesions which are less than 5 mm in size can be easily missed during endoscopic examination. In our patient population gastric

**Table 2.** Age and gender distribution of histopathological type of polyps

Type of polyps	Age	Sex	
		Female	Male
Hyperplastic polyp	63+13.9	151	90
Fundic gland polyp	57.3+13.5	39	16
Inflammatory fibroid polyp	63.7+13.6	10	6
Adenomatous polyp	66.2+17	3	10
Neuroendocrine tumor	49.9+14.5	16	7
Xanthoma	57.5+9.4	4	2
Hamartomatous polyp	41	1	-
Adenocarcinoma	58.8+13.2	1	2
Lymphoma	72	-	2
Foveolar hyperplasia	60.2+14.8	54	33
Gastrointestinal stromal tumor	72+14.9	2	2

polypoid lesions were seen in 666 (2.2%) patients, the majority [431/693 (62.2%)] of which were greater than 5 mm in size and 48% (325/666) were pathologically classic gastric polyps.

About 20% of biopsies taken from lesions endoscopically identified as polyps have no clearly defined pathological diagnosis (4). In the present study pathology revealed gastritis or normal gastric mucosa in 192 (28.8%) patients with mucosal elevations endoscopically appearing as polyps.

Fundic gland polyps are common benign polyps of the gastric body and fundus that are typically small (most are <1cm) and may be single or multiple (7). FGPs occur in both sporadic and syndromic forms namely with familial adenomatous polyposis (FAP) (8,9). The pathogenesis of FGPs is uncertain.

Fundic gland polyps and *H. pylori* infection have been inversely correlated; FGPs almost always develop in gastric mucosa without *H. pylori* (10,11). In patients without *H. pylori* gastritis a causal relationship between the use of PPIs and development of FGPs was suggested (12,13), but in a large cohort study Vieth et al. (11), showed that the frequency of FGPs in patients receiving PPI therapy did not differ from the ones not receiving PPI therapy.

Although FGPs are reported to be found in 1.9% of gastroscopic examinations and constitute almost half (47-50%) of the gastric polyps (9,13,14) in the present study only 8.3% of all polypoid lesions were FGPs. A subgroup analysis was done; polypoid lesions detected before 2008 and thereafter were compared. The ratio of FGPs did not differ in time (21/203 ≤2008 vs 34/463 >2008, p=0.221). We think that this may have multiple reasons; *H. pylori* has a high prevalence in Turkey, this may increase the prevalence of HPs and FGPs may remain relatively low. On the other hand PPIs are less commonly used in our patient population compared to developed countries. Genetic factors may

also have some influence. In a recent study from Turkey FGPs were found in 6.1% of patients (15).

Hyperplastic polyps are usually small (<1 cm) and smooth nodules, but may become lobulated and eroded as they get larger. Large HPs, up to 9 cm, have been reported (16). HPs are usually seen in older patients (seventh decade) with a slight female preponderance (17), which was also the case in our series. However HPs were also the commonest type of polyps seen in the study that included patients less than 21 years reported by Attard et al (18).

Although HPs are usually seen as single lesions, they can also be multiple. They are often seen in the antrum (4,5,16,19) but in the study of Han et al. (20), 64% were in the body, and in the study of Dirschmid et al. (21) 53.3% were located in the corpus/fundus. In this study 74% of HPs were smaller than 1 cm in size, mostly located in the antrum (44.2%) and single (77.9%).

Hyperplastic polyps almost never occur in normal gastric mucosa and are most commonly associated with chronic gastritis; *H. pylori* or atrophic gastritis, especially corpus predominant type (16,17,21,22). In our study HPs were the most common type of polyps seen in the stomach; this finding is consistent with many previous reports (10,16,17,22,23). In the study of Carmack et al. (3) HPs were seen in <15% of all polyps, they compared studies from different countries and stated that as HPs are associated with *H. pylori* infection, particularly atrophic gastritis the continuing decline of *H. pylori* infection and atrophic gastritis in the United States, as well as the simultaneous increase in FGPs, may have contributed to the low relative prevalence of HPs detected in their population. In the study of Borch et al. (22), despite the increased prevalence of gastritis, *H. pylori* infection was not more common in patients with hyperplastic polyp. They assumed that it was due to high prevalence (75%) of atrophy, which in advanced stages is rarely associated with *H. pylori* infection.

Hyperplastic polyps are considered as precancerous (21,24), a foci of dysplasia can be seen in 1-20% of HPs (4), but the overall prevalence of dysplasia is believed to be <2% (4). Malignant transformation is more frequently found in gastric HPs >1 cm in diameter (6,20), and is assumed to be associated with dysplasia, with p53 protein playing a crucial role in the process (25,26). Mutations of the p53 gene, chromosomal aberrations, and microsatellite instability have also been detected in these polyps (25,27,28). In our patient group, adenomatous changes were seen in 9 (3.75%) of HPs and malignant transformation was seen in 1 (0.42%).

Malignant transformation in the polyp itself is rare, the reported rate of adenocarcinoma with HPs ranges from 0% to 13.5%. It is more likely to find an adenocarcinoma in the gastric mucosa outside the hyperplastic polyp than the polyp itself (16). The histological type of carcinoma found in HP is considered predomi-

nantly to be well-differentiated adenocarcinoma (26). When HP is diagnosed full biopsies should be obtained, and eradication for *H. pylori* gastritis should be given when found (4).

In the study of Orłowska et al. (24) focal carcinoma was found in 2.1% of HPs, 7.1% of patients with HPs carcinoma was found elsewhere in the stomach and in 3.5% of patients separate gastric carcinomas developed outside polyps during follow-up (24). Abraham et al. (16) showed synchronous or metachronous gastric adenocarcinoma in 6% of the patients with HPs.

APs are usually solitary lesions, located in the antrum (1,2,4) and <2 cm in diameter and like HPs, they are usually detected in pathologically abnormal gastric mucosa such as gastritis or intestinal metaplasia (1,29,30). Their incidence increases with age, the prevalence ranges from 0.5% to 3.75% in Western countries, whereas in nations with high risk of gastric cancer, they are reported to occur between 9% and 20% (1).

APs are regarded as true neoplasms with malignant transformation rates differing from 6 to 47% (6). The risk of malignant transformation of APs was shown to be related to the large size, high grade of dysplasia, and villous structure of the lesions (1,2,28,29). Malignant potential with time may be seen in up to 40%, especially in larger villous lesions (2), Nakamura and Nakano reported focal cancer in 33.3% of villous and tubulo-villous adenomas (31). Kamiya et al. (32) reported that 11% of APs progress to carcinoma in situ within 4 years of detection polyps and Orłowski et al. (24) reported focal carcinoma in 4.3% after 1 year of follow-up. In our patient group, malignant transformation was mostly seen in APs as expected, but was also found in HPs (23.1% and 0.42%, respectively).

IFPs (gastric submucosal granulomas) are rare, benign, uncommon polyps mostly seen in the stomach (1,33), especially in the antro-pyloric region (80%). They are generally <2 cm in diameter; however Shalom et al. (30) reported a case of IFP 7.5 cm in diameter. An allergic cause has been proposed but the etiology is still unknown, and they generally do not recur after resection (1).

As polyps may have malignant potential and endoscopically they cannot be distinguished accurately according to their macroscopic appearance, histological examination is mandatory for all polyps. The risk of malignancy has been reported to be 0-8.6% (mean 2.1%) for HPs, approximately 5% for tubular adenomas, and 28.5-40% for villous adenomas. A definite histological classification is essential (34). A simultaneous carcinoma anywhere in the stomach may accompany which warrants a thorough evaluation of the complete stomach (1,16).

Endoscopic forceps biopsies are very commonly used for tissue sampling but some discrepancy between forceps biopsy and polypectomy (0 to 29%) (34) or endoscopic mucosal resection have been reported (10 to 27.1%) (6). On the other hand some

## Vatansever et al. Gastric polyps; analysis of 29940 patients

important complications like hemorrhage can be seen especially after removal of large polyps. Examination of the forceps biopsy samples by an experienced pathologist can lead to correct histological diagnosis (97.3%) (34).

To our knowledge this is the largest series of gastric polyps from Turkey, but the retrospective design of this study has some limitations. As it is a cross sectional study, data regarding follow-up lacks. In 50 patients biopsy was not taken during endoscopic examination owing to small specimen or coagulation disorder. The progress of these patients is unknown. Biopsy from adjacent tissues and biopsy for *H. pylori* were not available in all of the patients. Symptom correlation with endoscopic findings could also not be analyzed.

### CONCLUSION

Endoscopic appearance of gastric polyps can be variable, distinguishing macroscopically can be misleading. Because of their malignant potential histopathological evaluation is mandatory. Malignant foci can be missed with superficial forceps biopsy, therefore polypectomy should be performed to all polyps whenever possible and the adjacent gastric mucosa should also be sampled.

**Ethics Committee Approval:** Ethics committee approval was received for this study.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author contributions: Concept -** S.V., Z.A.; **Design -** S.V.; **Supervision -** B.U., N.E.; **Resource -** E.A.; **Materials -** N.E., S.İ.; **Data Collection&/or Processing -** S.V., S.İ.; **Analysis&/or Interpretation -** S.V., Z.A., E.A.; **Literature Search -** Z.A.; **Writing -** Z.A.; **Critical Reviews -** N.Y., B.U..

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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