



## ORIGINAL ARTICLE

# Gastric polyps: Retrospective analysis of 41,253 upper endoscopies<sup>☆</sup>



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### KEYWORDS

Gastric polyps;  
Gastroscopy;  
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### Abstract

**Introduction:** Gastric polyps are usually asymptomatic lesions incidentally discovered during endoscopy.

**Objective:** To study the frequency of different types of gastric polyps in our population and their possible association with other factors.

**Patients and methods:** Retrospective study of gastroscopies performed in a tertiary hospital over a ten-year period. Demographics, medical history, indication for gastroscopy and morphological and histological characteristics of polyps were collected.

**Results:** Gastric polyps were found in 827 out of 41253 (2%) reviewed gastroscopies, corresponding to 709 patients. Mean age was 65.6 years, and 62% were female. 53.9% of patients had multiple polyps. The most common location was the fundus and 83.3% were smaller than 1 cm. Histopathology was obtained in 607 patients: hyperplastic polyps were the most common (42.8%), followed by fundic gland polyps (37.7%). Factors independently associated with hyperplastic polyps were age and single polyp, size  $\geq 6$  mm and location other than fundus. In contrast, fundic gland polyps were associated with reflux and multiple polyps, size  $< 6$  mm and located in fundus. Adenomas were independently associated with single polyp.

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**PALABRAS CLAVE**

Pólipos gástricos;  
Gastroscoopia;  
Endoscopia

**Conclusions:** Fundic gland and hyperplastic polyps are the most common in our population and have characteristic features that can guide histological diagnosis. With single polyps it is advisable to take biopsies to rule out adenoma.

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## Pólipos gástricos: análisis retrospectivo de 41.253 endoscopias digestivas altas

### Resumen

**Introducción:** Los pólipos gástricos son lesiones habitualmente asintomáticas y constituyen un hallazgo durante la realización de una endoscopia.

**Objetivo:** Estudiar la frecuencia de los diferentes tipos de pólipos gástricos en nuestro medio y su posible asociación con otros factores.

**Pacientes y métodos:** Estudio retrospectivo de las gastroscopias realizadas durante 10 años en un hospital de tercer nivel. Se recogieron datos demográficos, antecedentes patológicos, indicación de la gastroscoopia y características morfológicas e histológicas de los pólipos.

**Resultados:** Se incluyeron 41.253 gastroscopias, identificándose 827 (2%) con pólipos gástricos correspondientes a 709 pacientes. La edad media fue 65,6 años y un 62% fueron mujeres. El 53,9% tenían múltiples pólipos. La localización más frecuente fue fundus y la mayoría fueron menores de 1 cm (83,3%). Se obtuvo muestra para anatomía patológica en 607 pacientes, siendo los más frecuentes los pólipos hiperplásicos (42,8%), seguidos de los pólipos de glándula fúndica (37,7%).

Los factores que se asociaron de forma independiente a los pólipos hiperplásicos fueron la edad y el ser pólipo único, de tamaño  $\geq 6$  mm y localización no fúndica. Contrariamente, los de glándula fúndica se asociaron a la indicación por reflujo y el ser múltiples,  $< 6$  mm y localizados en fundus. Los pólipos adenomatosos se asociaron a ser un pólipo único.

**Conclusiones:** Los pólipos de glándula fúndica e hiperplásicos son los más frecuentes en nuestro medio, y tienen rasgos contrarios que pueden orientar al diagnóstico histológico. En el caso de pólipos únicos es recomendable la toma de biopsias para descartar el diagnóstico de adenoma.

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## Introduction

Gastric polyps are usually asymptomatic lesions that tend to be diagnosed during an upper gastrointestinal tract endoscopy. Their prevalence is variable, from 0.3 to 6% in different studies,<sup>1,2</sup> and they have been associated with various factors, such as *H. pylori* infection, proton-pump inhibitor (PPI) use and chronic atrophic gastritis.<sup>3,4</sup>

The classification of gastric polyps is based on their histological characteristics. The most prevalent are epithelial polyps, and the most common among them are hyperplastic and fundic gland polyps, with adenomatous polyps being much less common, representing only 1–12%.<sup>1,2,5,6</sup> However, this distribution varies widely based on the population studied.

Gastric polyps, like those in other locations, can become malignant. The risk of malignant transformation depends on the histological type: hyperplastic polyps have a low risk of malignant transformation (2%),<sup>7</sup> while adenomas have a higher risk (up to 30%).<sup>8–10</sup> The importance of the histological exam stems from the fact that the macroscopic appearance and pathological anatomy study results do not always match.<sup>11,12</sup> Biopsies may also not be representative of the entire polyp.<sup>13,14</sup> Therefore, the existence of factors

associated with the different histological types of gastric polyps can be useful when making clinical decisions.

The objective of our work was to study the frequency of the different types of gastric polyps in our area and to identify the factors associated with the most common histological types.

## Patients and methods

A retrospective study in which all gastroscopies (scheduled and emergency) performed at a tertiary-level hospital (Hospital Clínic de Barcelona [Hospital Clínic of Barcelona]) from January 2002 to September 2012 were reviewed. Gastroscopies were identified manually based on the reports stored in the endoscopy unit file. Follow-up gastroscopies performed on the same patient were not excluded. Endoscopic reports were prepared with the Endobase system (Olympus, Germany).

All data regarding patients and the characteristics of the polyps were obtained from the electronic medical record and the endoscopy reports, respectively. Demographic data were collected (sex, age), relevant pathological history (cirrhosis, colon polyps, colorectal cancer or hereditary polyposis syndrome) as well as data related to the endoscopy

(indication included in the report, number and size of the polyps, location and histological type, and the presence of chronic gastritis or *H. pylori* infection using the urease test). Taking of proton-pump inhibitors (PPIs) could not be collected. In patients with gastric polyps who had an endoscopic follow-up, only the data from the initial endoscopy were considered.

The size of the polyp was calculated by comparing it with the size of the open biopsy forceps or by measuring the polyp after removal and recovery for an anatomical pathology study. In the case of multiple polyps, the largest was considered.

## Statistical analysis

In the descriptive analysis, the continuous variables that followed a normal distribution were presented in the form of the mean  $\pm$  standard deviation and range, while those that did not follow a normal distribution were presented in the form of the median and the interquartile range. For comparisons, Student's *t*-test was used for quantitative variables that followed a normal distribution, the Mann-Whitney *U* test for those that did not follow a normal distribution and chi-squared for qualitative variables. A univariate analysis was conducted to identify the possible factors associated with the different types of polyps. Then a multivariate analysis was carried out with variables that achieved statistical significance and those deemed clinically relevant. The level of statistical significance was established with a *p* of less than 0.05. All calculations were done using the SPSS programme for Windows, version 19.0.

**Table 1** Characteristics of the 709 patients with gastric polyps.

Age (years), mean $\pm$ SD (range)	65.6 $\pm$ 15.1 (12–94 years)
Sex: M/F, n (%)	270/439 (38.1%/61.9%)
<b>Personal history, n (%)</b>	
Cirrhosis	98 (13.8%)
Colon polyps	30 (4.2%)
Hereditary polyposis syndromes	29 (4%)
Colorectal cancer	8 (1.1%)
LT	6 (0.8%)
Gastrectomy	3 (0.4%)
Other	147 (20.7%)
<b>Indication, n (%):</b>	
Anaemia/UGIB	262 (37%)
Dyspepsia/GORD	219 (30.9%)
Bariatric surgery	17 (2.4%)
Monitoring of PHT	69 (9.7%)
Monitoring of polyps	36 (5.1%)
FAP	25 (3.5%)
Other	81 (11.4%)

FAP: familial adenomatous polyposis; GORD: gastro-oesophageal reflux disease; LT: liver transplant; PHT: portal hypertension; UGIB: upper gastrointestinal bleeding.

## Results

Between January 2002 and September 2012, 41,253 gastroscopies were performed, detecting 827 (2%) with gastric polyps corresponding to 709 patients. Table 1 shows the characteristics of patients with gastric polyps. The mean age was 65 years and the majority were female (62%). Some 24% of patients had relevant pathological gastrointestinal history, including colon polyps (4.2%) and hereditary syndromes (4%). The most common indications for the UGIE were dyspepsia or gastro-oesophageal reflux disease (GORD) (30.9%) and anaemia or upper gastrointestinal bleeding (UGIB) (37%). 20.7% of patients were asymptomatic. Regarding the characteristics of the polyps, more than half of the patients had multiple polyps and the most common location was in the fundus (36.7%), either alone or associated with other locations. Regarding the size of the polyps, the majority were less than 10 mm (83.3%), with a median of 5 mm (interquartile range 3–8 mm) (Table 2).

Samples were obtained for pathological anatomy in 607 patients (85.6%). The histological study showed epithelial polyps in 512 patients (84.3%), with hyperplastic polyps being the most common (*n* = 260; 42.8%), followed by fundic

**Table 2** Morphological and histological characteristics of the polyps.

<b>Patients with polyps, n (%)</b>	
Single	327 (46.1%)
Multiple	382 (53.9%)
<b>Size (mm), median and IQR range</b>	
Size, n (%)	5 (3–8)
1–5 mm	410 (57.8%)
6–10 mm	181 (25.5%)
>10 mm	100 (14.1%)
Not available	18
<b>Location, n (%)</b>	
Fundus	165 (23.3%)
Body	234 (33%)
Antrum	189 (26.7%)
Various locations	121 (17%)
<b>Histological type,<sup>a</sup> n (%)</b>	
<b>Epithelial polyps</b>	
Hyperplastic	260 (42.83%)
Fundic gland	229 (37.73%)
Adenoma	22 (3.62%)
Adenocarcinoma	8 (1.32%)
<b>Non-epithelial polyps</b>	
Carcinoid tumour	11 (1.81%)
PHT gastropathy	13 (2.14%)
Inflammatory pseudopolyp	23 (3.8%)
Other non-epithelial polyps <sup>b</sup>	7 (1.15%)
<b>Normal mucosa</b>	34 (5.6%)

PHT: portal hypertension.

<sup>a</sup> In 607 patients.

<sup>b</sup> One hamartoma, 2 xanthelasma, 4 fibroid polyps.

**Table 3** Types of gastric polyps in patients with a more relevant history of gastrointestinal disease.

	Hyperplastic	Fundic gland	Adenoma	Carcinoids	Inflammatory pseudopolyp
Cirrhosis, n (%)	32 (32.7)	10 (10.2)	1 (1)	3 (3.1)	7 (7.1)
Neoplastic lesions of the colon, n (%)	21 (31.3)	31 (46.3)	3 (4.5)	0	2 (3)
LT, n (%)	4 (66.6)	1 (16.6)	0	0	0

LT: liver transplant.

gland polyps (n = 229; 37.7%) (Table 2). In 8 cases the diagnosis was adenocarcinoma, 7 (24%) in adenomatous polyps and one in a hyperplastic polyp (0.4%). Table 3 describes the frequency of the different types of polyps in patients with a history of gastrointestinal diseases. In 34 patients (5.6%) with endoscopically-identified polyps, the biopsies described normal mucosa. All lesions with normal mucosa were small (less than 1 cm) and most were smaller than 5 mm (71%).

An H. pylori study was carried out with the urease test in 144 patients (20.3%). It was positive in 40 (27.8%). H. pylori was positive in 18 of the 54 (33.3%) hyperplastic polyps and in 8 of the 44 (18.2%) fundic gland polyps. Samples were

also taken of the body and antral mucosa to test for chronic gastritis in 137 patients (19.4%), showing chronic gastritis in 94 (68.6%), of which 36 had hyperplastic polyps and 29 had fundic gland polyps.

The factors independently associated with hyperplastic polyps were age and being a single polyp, sized  $\geq 6$  mm and having a non-fundic location. For fundic gland polyps, the associated variables were indication of GORD and various characteristics of the polyp itself, the opposite of those associated with hyperplastic polyps (being multiple polyps,  $< 6$  mm and located in the fundus). Adenomatous polyps were independently associated with being a single polyp (Tables 4–7).

**Table 4** Univariate analysis of the possible factors associated with hyperplastic polyps (n = 607 polyps with confirmed histology).

	Hyperplastic polyps No. = 260	Non-hyperplastic polyps No. = 347	p
Age (years), mean $\pm$ SD	68 $\pm$ 13	62 $\pm$ 15	<0.001
Sex, n (%)			0.339
Male	102 (39.2)	123 (35.4)	
Female	158 (60.8)	224 (64.6)	
Cirrhosis, n (%)			0.685
Yes	32 (12.3)	39 (11.2)	
No	228 (87.7)	308 (88.8)	
Neoplastic lesions of the colon, n (%)			0.087
Yes	21 (8.1)	43 (12.4)	
No	239 (91.9)	304 (87.6)	
Anaemia/UGIB, n (%)			0.012
Yes	105 (40.4)	106 (30.5)	
No	155 (59.6)	241 (69.5)	
GORD, n (%)			0.001
Yes	65 (25)	133 (38.3)	
No	195 (75)	214 (61.7)	
Single polyp, n (%)			<0.001
Yes	156 (60)	123 (35.4)	
No	104 (40)	224 (64.6)	
Non-fundic location, n (%)			<0.001
Yes	222 (85.4)	165 (47.6)	
No	38 (14.6)	182 (52.4)	
Polyp size n (%) <sup>a</sup>			<0.001
<5 mm	116 (45)	223 (66.6)	
$\geq 5$ mm	142 (55)	112 (33.4)	

GORD: gastro-oesophageal reflux disease; UGIB: upper gastrointestinal bleeding.

<sup>a</sup> This information is not available in 14 cases with polyp histology.

**Table 5** Univariate analysis of the possible factors associated with fundic gland polyps (n = 607 polyps with confirmed histology).

	Fundic gland polyps No. = 229	Non-fundic gland polyps No. = 378	p
Age (years), mean $\pm$ SD	62 $\pm$ 15	70 $\pm$ 14	<0.001
Sex, n (%)			0.016
Male	71 (31)	154 (40.7)	
Female	158 (69)	224 (59.3)	
Cirrhosis, n (%)			<0.001
Yes	10 (4.4)	61 (16.1)	
No	219 (95.6)	317 (83.9)	
Neoplastic lesions of the colon, n (%)			0.062
Yes	31 (13.5)	33 (8.7)	
No	198 (86.5)	345 (91.3)	
Anaemia/UGIB, n (%)			<0.001
Yes	59 (25.8)	152 (40.2)	
No	170 (74.2)	226 (59.8)	
GORD, n (%)			<0.001
Yes	109 (47.6)	89 (23.5)	
No	120 (52.4)	289 (76.5)	
Multiple polyps, n (%)			<0.001
Yes	189 (82.5)	139 (36.8)	
No	40 (17.5)	239 (63.2)	
Non-fundic location, n (%)			<0.001
Yes	162 (70.7)	58 (15.3)	
No	67 (29.3)	320 (84.7)	
Polyp size, n (%) <sup>a</sup>			<0.001
<5 mm	164 (74.9)	175 (46.8)	
$\geq$ 5 mm	55 (25.1)	199 (53.2)	

GORD: gastro-oesophageal reflux disease; UGIB: upper gastrointestinal bleeding.

<sup>a</sup> This information is not available in 14 cases with polyp histology.

## Discussion

This is the first study that evaluates the frequency and histological type of gastric polyps in a provincial hospital in Barcelona, and it includes the greatest number of gastroscopies of all those conducted in Spain. In the literature, a great variability was observed in the prevalence of gastric polyps, with a polyp detection rate ranging from 0.6% to 6.35% in Brazil and the United States, respectively.<sup>1,2</sup> Our detection rate (2%) would be located between what was reported in two other studies conducted in Spain: 0.3% in a hospital in Orense<sup>6</sup> and 4.2% in a hospital in Madrid.<sup>5</sup>

Epithelial polyps are the most common in all published studies, meaning that hyperplastic and fundic gland polyps together make up 60–90%<sup>1,2,5</sup> followed by adenomas, which are much less common (0.7–12%),<sup>1,2</sup> with these rates being similar to those observed in our population (80% and 3.6%, respectively). However, there is more variability in the proportion of hyperplastic and fundic gland polyps. In the majority of series with adult patients, hyperplastic polyps are the most common (44–70%),<sup>1,15–17</sup> but in Camarck's American series,<sup>2</sup> fundic gland polyps represented 77%, with the prevalence much higher than that which is published in

the literature. Although in three Spanish series (including ours) hyperplastic polyps were the most common, they did not exceed 50% of the total.<sup>5,6</sup> It has been suggested that the differences in prevalence of these polyp subtypes could be related to factors such as *H. pylori* or taking PPIs.<sup>3,4,18–21</sup> It is notable that in the other two Spanish series, the percentage of fundic gland polyps was much lower than in ours (7.4% in one and it was not mentioned in the other), despite recording chronic PPI use in 46.5% of patients.<sup>5</sup> In our study we do not have this information, since it could not be obtained with sufficient reliability due to this being a retrospective study, but the high prevalence of fundic gland polyps in our series could result from high PPI use in our population.

In the majority of patients in our series, the polyps were detected casually during a gastroscopy performed to study gastrointestinal symptoms not attributable to polyps (for example, reflux) or asymptomatic patients examined for other reasons (for example, pre-bariatric surgery assessment), results that are similar to other publications.<sup>2,17</sup> However, it should be kept in mind that, although the majority of gastric polyps do not cause symptoms, they can be the cause of bleeding, abdominal pain and even obstruction.<sup>22,23</sup> In the literature, an association has been described between

**Table 6** Univariate analysis of the possible factors associated with gastric adenomas (n = 607 polyps with confirmed histology).

	Adenomas No. = 22	No adenomas No. = 585	<i>p</i>
Age (years), mean ± SD	67.6 ± 13.9	65.6 ± 15.2	0.528
Sex, n (%)			0.08
Male	12 (54.5%)	213 (36.4%)	
Female	10 (45.5%)	372 (63.6%)	
UGIB/anaemia, n (%)			0.87
Yes	8 (36.4%)	203 (34.7%)	
No	14 (63.6%)	382 (65.3%)	
GORD, n (%)			0.14
Yes	4 (18.2%)	194 (33.2%)	
No	18 (81.8%)	391 (66.8%)	
Cirrhosis, n (%)			0.29
Yes	1 (4.5%)	70 (12%)	
No	21 (95.5%)	515 (88%)	
Neoplastic lesions of the colon, n (%)			0.63
Yes	3 (13.6%)	61 (10.4%)	
No	19 (86.4%)	524 (89.6%)	
Single polyps, n (%)			<0.001
Yes	19 (86.4%)	260 (44.4%)	
No	3 (13.6%)	325 (55.6%)	
Non-fundic location, n (%)			0.179
Yes	17 (77.3%)	370 (63.2%)	
No	5 (22.7%)	215 (36.8%)	
Polyp size, n (%) <sup>a</sup>			0.014
<5 mm	15 (68.2%)	239 (41.9%)	
>5 mm	7 (31.8%)	332 (58.1%)	

GORD: gastro-oesophageal reflux disease; UGIB: upper gastrointestinal bleeding.

<sup>a</sup> This information is not available in 14 cases with polyp histology.

**Table 7** Risk value for the significant variables in the multivariate analysis.

Variable	Odds ratio 95% CI	<i>p</i>
<i>Hyperplastic</i>		
Non-fundic location	4.79 (3.13–7.33)	<0.001
Size >5 mm	1.85 (1.29–2.67)	0.001
Single polyp	1.51 (1.04–2.19)	0.032
Age	1.01 (1–1.03)	0.011
<i>Fundic gland</i>		
Fundus	9.73 (6.21–15.26)	<0.001
Multiple polyps	5.17 (3.22–8.31)	<0.001
GORD	2.70 (1.57–4.01)	<0.001
Size ≤ 5 mm	2.51 (1.57–4.01)	<0.001
<i>Adenoma</i>		
Single polyp	7.91 (2.32–27.05)	0.001

GORD: gastro-oesophageal reflux disease.

anaemia or UGIB and hyperplastic polyps, while the symptoms of GORD are associated with fundic gland polyps,<sup>23</sup> although in our study only the latter was found.

The literature reports that, in between 16 and 37.5% of cases, despite the endoscopic appearance of a polyp, the histological study shows normal mucosa<sup>2,6</sup> and this percentage increases in smaller lesions. In our study the percentage of biopsies with normal mucosa was significantly lower (5.6%), with the majority of lesions being smaller than 5 mm. However, it should be pointed out that there is not always concordance between macroscopic appearance and pathological anatomy.<sup>11,12</sup> Therefore, identification of characteristic features of each type of polyp may be helpful when making clinical decisions, but this does not avoid the recommendation to obtain biopsies. This would be especially relevant in cases of single polyps, since they are associated with the diagnosis of adenoma, and this type of polyp is the type with the highest risk of malignant transformation. In our study, 7 of the 8 adenocarcinomas diagnosed developed in an adenomatous polyp.

In patients with gastric polyps, the current guidelines recommend evaluating the state of *H. pylori* infection and obtaining biopsies of the surrounding gastric mucosa to rule out the coexistence of chronic gastritis.<sup>24,25</sup> In our case, both determinations were carried out in just 20% of patients, which indicates low knowledge of and/or compliance with the recommendations. Eradication of *H. pylori* is the first

link in treatment for hyperplastic polyps, since a disappearance of up to 80% of polyps has been shown.<sup>26–28</sup> Also, due to the association of hyperplastic polyps with chronic gastritis, when a neoplasm appears it rarely does so on the polyp itself, rather on the atrophic mucosa. It is therefore crucial to investigate its existence to establish adequate follow-up. In general, gastric polyps of the non-adenomatous type have a low risk of malignant transformation, therefore endoscopic resection is not necessary,<sup>25</sup> although some guidelines recommend polypectomy of hyperplastic polyps greater than 0.5 cm.<sup>29,30</sup>

Despite the fact that this is one of the studies with the greatest number of patients, the biggest limitation is the retrospective design, the fact that it was conducted at a single site, and that it did not take into account whether more than one endoscopy had been performed in each patient. Therefore, our polyp detection rate is over the total number of endoscopies performed, which underestimates the real frequency of gastric polyps in our series. The participation of different endoscopists and pathologists could be considered another limitation due to the inter-observer variability, although this would not be more than a reflection of the reality of daily clinical practice and would increase the external validity of the study. For example, the decision to biopsy the polyps or not depended on the endoscopist, which would explain why they were not biopsied in some cases. Also, due to the extensive period of study, it is reasonable to expect that changes in the technique and quality of the examinations have occurred. Finally, the factors evaluated did not include taking of PPIs, and the *H. pylori* infection tests were not carried out in all patients included.

In conclusion, fundic gland and hyperplastic polyps are the most common gastric polyps in our area and they have opposing characteristic features that can orient the histological diagnosis. Nevertheless, in the case of single polyps, biopsies are recommended to rule out a diagnosis of adenoma. Finally, good knowledge of clinical practice guidelines is essential for the correct management of these lesions.

## Conflicts of interest

The authors declare that they have no conflicts of interest.

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