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ANATOMICAL PATHOLOGY

The pathological findings seen in laparoscopic sleeve gastrectomies for weight loss

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Summary

Sleeve gastrectomy specimens are increasingly common surgical specimens received for examination following bariatric surgery for weight loss. The spectrum of pathological changes seen in these cases is not well documented. Retrospective examination was undertaken of 1463 consecutive sleeve gastrectomy specimens received at Envoi Specialist Pathologists. Most cases showed no pathological changes (80.2%). The most common changes seen were non-specific, non-*Helicobacter* associated chronic gastritis (7.2%), *Helicobacter* associated gastritis (6.8%) and benign fundic gland polyps (4.0%). Other, rarer changes were lymphocytic gastritis, autoimmune atrophic gastritis, chronic gastritis with intestinal metaplasia, hyperplastic polyps, pancreatic heterotopia, gastrointestinal stromal tumours (GISTs) and a leiomyoma. A wide range of pathological changes are seen in resection specimens following sleeve gastrectomies for weight loss. Many cases will require further treatment or ongoing investigation and surveillance.

Key words: Sleeve gastrectomy; stomach; gastritis; obesity; pathology.

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INTRODUCTION

The morbidity and mortality associated with obesity is an increasing problem throughout the developed world, including Australia. According to the Australian Bureau of Statistics (ABS), as of 2011–2012, 62.8% of the Australian population over the age of 18 is classified as overweight (BMI of greater than 25) with 27.5% classified as obese (BMI greater than 30).[1] The ABS also states that over time, the prevalence of overweight and obese individuals has been steadily increasing.[1]

Currently, the most effective clinical measure in the management of morbid obesity is bariatric surgery.[2] In the last 5 years there has been a dramatic rise in the use of bariatric surgery and, in particular, the use of gastric sleeve resection as the primary surgical intervention in the management of morbid obesity.[3] In a sleeve gastrectomy, the stomach is divided vertically, removing most of the body of the stomach and leaving a thin channel from the cardia to the pylorus. It is hypothesised to cause weight loss by reducing the volume of the stomach, which leads to earlier satiety and allows smaller meal size and hence weight loss. Excess weight loss of around 60% is usually achieved in the first year and most patients continue to lose and maintain the lost weight in the long term.[4]

The main relative contraindication to sleeve gastrectomy is the presence of oesophageal pathology such as reflux oesophagitis, Barrett oesophagus or a large hiatal hernia, all of which have been shown to become more severe following the procedure.[5,6] As a result, when there is clinical suspicion of oesophageal disease, patients may undergo preoperative upper endoscopy to identify any pathological changes present in the oesophagus, allowing for the consideration of an alternative procedure such as gastric bypass. There is currently no evidence to suggest that any gastric pathology is associated with worse outcomes or exacerbation of symptoms following a sleeve gastrectomy and hence the stomach is not routinely biopsied for histopathological examination prior to the operation.[7,8] As a consequence, there is a need for pathological examination of the resected portion of stomach to detect any incidental gastric pathology that may be amenable to treatment or require further investigation.

There is little information on pathological findings seen in the resected portion of the stomach from a sleeve gastrectomy with only a few large published studies to date, from Kuwait and the USA.[9,10] The purpose of this study is to determine the spectrum of pathology seen in sleeve gastrectomy specimens from a cohort of obese Australian patients.

MATERIALS AND METHODS

A retrospective review was performed of all sleeve gastrectomy specimens received at Envoi Specialist Pathologists, a pathology provider in a large Australian city, between January 2008 and March 2015. Throughout this time period, the standardised protocol for examination of each sleeve gastrectomy specimen was as follows: measure the gastric resection in three dimensions, open along the greater curvature and inspect for the presence of serosal, mural or mucosal abnormalities. Three representative sections from each specimen were taken, one from the centre and one from near each end of the specimen. Additional blocks were taken as necessary, as determined by the pathologist at time of specimen dissection.

All blocks were formalin fixed and paraffin embedded. Sections were cut at 3 μm and stained with haematoxylin and eosin (H&E). Special stains and immunohistochemistry were performed where required.

Cases were categorised into the following groups:

1. No significant abnormality: cases without significant inflammation, with isolated basally located lymphoid follicles or with mild non-specific parietal cell hyperplasia.

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2. Non *Helicobacter* associated gastritis: minimum criteria for this diagnostic category was the presence of chronic inflammation in the lamina propria, based on the visual analogue scale seen in the updated Sydney Classification of Gastritis Guidelines. These cases may or may not have been associated with active inflammation. All cases of gastritis were stained with a polyclonal *Helicobacter* immunohistochemical stain (Dako, Denmark) to exclude the presence of the bacteria.
3. *Helicobacter* associated gastritis: Cases with *Helicobacter*-like organisms identified on H&E or with the aid of an immunohistochemical stain.
4. Gastritis of specific type: these cases included those with morphological features allowing classification as a gastritis of specific type (e.g., lymphocytic or autoimmune atrophic gastritis). Cases of lymphocytic gastritis where *Helicobacter* organisms were identified were classified as *Helicobacter* associated gastritis.
5. Polyps: the presence or absence of polyps was noted and these were then classified according to subtype.
6. Other: cases showing any other abnormal microscopic features.

The age and sex of each patient was recorded and any prior upper gastrointestinal tract biopsies, if performed within the 12 months prior to operation, were reviewed.

Statistics were performed using Graphpad Quickcalcs software. Categorical data was analysed using Chi squared test. A p value of <0.05 was considered significant.

RESULTS

Clinical features

In total there were 1463 consecutive specimens reviewed. The median age of the patients was 43 years (range 14–78) and there were more females (76%) than males (24%). None of the patients had an oesophago-gastro-duodenoscopy with biopsy in the 12 months prior to the operation.

Pathological features (Table 1)

1. No significant abnormality: there were no pathologic changes identified in 1173 of the 1463 sleeve gastrectomy specimens (80.2%).
2. Non-*Helicobacter* associated gastritis: non-*Helicobacter* associated gastritis (both active and chronic) was the most common abnormal finding, seen in 105 cases (7.2%) (Fig. 1).
3. *Helicobacter* associated gastritis: whether seen by H&E alone or by immunohistochemistry, *Helicobacter* associated gastritis was present in 100 cases (6.8%) (Fig. 2).
4. Gastritis of specific type:
   a) Lymphocytic gastritis pattern, without identifiable *Helicobacter* on immunohistochemistry, was present in seven cases (Fig. 3).
   b) Autoimmune atrophic gastritis was present in eight cases (Fig. 4).
   c) Chronic gastritis with intestinal metaplasia was seen in two cases. No *Helicobacter* were identified in these specimens by immunohistochemistry.
5. Polyps:
   a) Benign fundic gland polyps were present in 58 cases (4.0%).
   b) Early hyperplastic polyps were seen in two cases.
6. Other
   a) Nodules of pancreatic heterotopia were present in two cases (Fig. 5).
   b) Gastrointestinal stromal tumours were seen in four cases (Fig. 6). These GISTs were 2, 3, 5 and 11 mm in size, showed no mitotic activity and all stained with CD117 (Dako). They were assessed as having no risk for progressive disease.
   c) A leiomyoma was seen in one case (Fig. 7).

When comparing the pathological changes seen between females and males, females were more likely to show changes of non-specific, non-*Helicobacter* associated chronic gastritis ($p = 0.017$). Otherwise the groups showed no differences in the profile of pathological changes present.

DISCUSSION

The use of sleeve gastrectomy as an effective primary treatment for morbid obesity is increasingly common in Australia and throughout the world. Unless significant oesophageal or gastric pathology is suspected clinically, an endoscopy with gastric biopsy is not routinely performed in the work-up of patients prior to the procedure. Hence, the pathological examination of sleeve gastrectomy specimens serves an important function in excluding potentially significant pathology. In this study, we retrospectively reviewed a series of 1463 consecutive sleeve gastrectomy specimens to determine the prevalence and range of abnormalities seen in these specimens. Pathological abnormalities were seen in 19.8% of the cases.

Compared with other studies that have examined the prevalence of chronic gastritis, our rates of non-specific non-

Table 1 Pathological findings in sleeve gastrectomy specimens

	Total (%)	Female	Male	p value (F vs M)
Total	1463	1115	348	
Normal	1173 (80.2)	886	287	0.2479
Non-HP gastritis	105 (7.2)	90	15	0.0171
HP gastritis	100 (6.8)	70	30	0.16
Fundic gland polyp	58 (4.0)	48	10	0.27
Lymphocytic gastritis	7 (0.5)	6	1	1.0000
Autoimmune atrophic gastritis	8 (0.5)	6	2	1.0000
Localised foveolar hyperplasia	2 (0.1)	2	0	1.0000
Pancreatic heterotopia	2 (0.1)	2	0	1.0000
Multifocal atrophic gastritis	2 (0.1)	1	1	1.0000
GIST	4 (0.2)	3	1	1.0000
Leiomyoma	1 (0.1)	0	1	1.0000

F, female; GIST, gastrointestinal stromal tumour; HP, *Helicobacter pylori*; M, male.