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Surgical Management of Benign Gastric Tumors: A Review

Hashem Bark Awadh Abood [a#*], Amani Nasser D. Albalawi [b], Haifa Obedullah AlEnazi [c], Mousa Mutlaq Almuhanna [d], Norah Othman Busaad [e], Rafa Ghazi Ali Jarad [f], Mahdi Saleh Alkhamis [g], Shahad Majed Alsharif [h], Mutaz Abdulrahman S. Alahdal [i], Deena ahmed alqahtani [j], Abdulmajeed ramzy Alhakamy [k] and Sulaiman Abdullah Alraqibah [d]

[a] Dr Samir Abbas Hospital, Jeddah King Fahad hospital, Albaha, Saudi Arabia.
[b] RCSI (University of Medicine and Health Science) - KSU (internship), Saudi Arabia.
[c] Buraidah central Hospital, Saudi Arabia.
[d] Qassim University, Saudi Arabia.
[e] King Faisal University, Saudi Arabia.
[f] Prince Mohammed Bin Nasser Hospital, Saudi Arabia.
[g] King Faisal General Hospital, Saudi Arabia.
[h] Taif University, Saudi Arabia.
[i] King Abdulaziz University, Saudi Arabia.
[j] Dammam central hospital, Saudi Arabia.
[k] Huraymala General Hospital, Saudi Arabia.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Benign stomach and duodenal tumors are uncommon. Any component of the stomach epithelium, whether glandular, endocrine, or mesenchymal, can develop benign neoplastic tumors. The majority of people with benign stomach and duodenal tumors are asymptomatic for a long time.

[#] Consultant General Surgery;
**Corresponding author*

When symptoms do appear, they are determined by the tumor's size, location, and comorbidities. Endoscopy, computed tomography, and especially endoscopic ultrasonography results are used diagnose. Clinically, it's difficult to tell the difference between benign and malignant stomach tumors. Even benign tumors can undergo malignant transformation, severe obstructive problems, and bleeding. As a result, aggressive surgical resection of the tumors should be undertaken. Laparoscopic resection has become the first option of many surgeons since the development of minimally invasive surgery. According to previous literature, laparoscopic excision of GIST is safe and effective. In this review we'll be looking at benign gastric tumors, gastrointestinal stromal tumors (GISTs) and their diagnosis.

Keywords: Duodenal tumours; stomach tumors; computed tomography; gastrointestinal stromal tumors.

1. INTRODUCTION

Benign stomach and duodenal tumors are uncommon, accounting for just 5–10% of all stomach tumors and 10–20% of all duodenal tumors. Although most of these lesions are benign, some of them have the potential to become cancerous. As a result, early detection, adequate treatment, and long-term follow-up are critical. The prevalence of these lesions has increased in recent years as a result of doctors' increased suspicion and the availability and widespread use of diagnostic technologies such as gastrointestinal endoscopy [1].

Gastrointestinal stromal tumors (GISTs) are an uncommon but unique histologic subclass of mesenchymal-derived intestinal neoplasms. It barely accounts for 0.2 percent of all gastrointestinal cancers. These tumors were previously categorised as leimyomas, leimyoblastomas, and leimyosarcomas because they were thought to develop from smooth muscle. The interstitial cell of Cajal, a pleuro-potential intestinal pacemaker cell, was discovered as the origin of GISTs with the advent of electron microscopy and immunohistochemistry.This cell is located in the myentric plexus, submucosa, and muscularis propria of the gastrointestinal (GI) tract and exhibits myogenic and neurogenic architecture. GISTs are most typically detected in the stomach (40-70%), although they can develop in any portion of the GI tract, with 20 to 40% of GISTs developing in the small intestine and 5 to 15% in the colon and rectum. They develop endophytically, parallel to the gut lumen, and are frequently associated with mucosal necrosis and ulceration. They also come in a variety of sizes, ranging from a few millimetres to 40 centimetres in diameter.A thin pseudocapsule is well characterised in many GISTs. Over 95% of patients have a single primary tumor, and 10 to 40% of these instances have tumors that directly infiltrate surrounding organs [2-8].

Any component of the stomach epithelium, whether glandular, endocrine, or mesenchymal, can develop benign neoplastic tumors. The stomach epithelium, particularly the mucosa, is made up of a variety of epithelial, neuronal, and endocrine cells organised into glands that perform specific roles. Any of these cells has the potential to become cancerous. Only around 5% of stomach tumors are benign. The majority of benign stomach tumors are asymptomatic and discovered during exams for unrelated symptoms. Anemia from prolonged occult bleeding is the most common presenting symptom. Epigastric discomfort or acute GI bleeding from tumor ulceration are less prevalent [9].

GI bleeding and abdominal discomfort are common symptoms of GISTs. The majority of patients are asymptomatic, and the lesions are identified by chance during an upper endoscopy conducted for another cause. Due to the lack of evident clinical or pathological indicators of malignancy other than visible metastasis during surgery, their metastatic potential is difficult to predict. Furthermore, local recurrence or distant metastases might take years to manifest after the original diagnosis. Gastric GISTs must be surgically resected to be cured.In the past, it was assumed that a 1 to 2 cm margin was required for a satisfactory resection. (DeMatteo et al.) has established that survival is determined by tumor size rather than negative microscopic surgical margins. These findings support GISTs lesions being resected locally, including wedge and gastric resections [2,10-13].

2. DEMOGRAPHIC DATA

In most studies, the reported incidence of GISTs is 1–2 instances per 100,000 persons per year.

GISTs are diagnosed at a median age of 60–65 years, with a male to female gender ratio of about 1:1.Sreide et al. found symptomatic illness in 81.3 percent of patients with GISTs and incidental asymptomatic disease in 18.7% of patients in a systematic review of 15 studies including 2,456 patients with GISTs. Abdominal discomfort was the most prevalent symptom in 61 percent of GIST patients, followed by gastrointestinal bleeding such as hematemesis or melena in 58 percent, and an intestinal obstruction or palpable mass in a smaller percentage of cases. [14-16]

GISTs are most commonly detected in the stomach (55.6 percent), small bowel (31.8 percent), less frequently in the colon and rectum (6 percent), other diverse places (5.5 percent), and the esophagus (0.7 percent) (7). The mesentery, omentum, and retroperitoneum are all places where extra-gastrointestinal GISTs can be detected. Coe et al. used the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database to look at the mortality rates of GISTs of less than 2 cm and found that patients with regional advanced GISTs (34%) or metastatic GISTs (34.3%) had significantly higher 5-year GIST-specific mortality than those with localized GISTs (5.6 percent). Due of their persistent malignant potential danger, it is consequently difficult to describe any GISTs as "benign" at this time, particularly those with modest diameters. [14,17,18]

3. DIAGNOSIS

The majority of people with benign stomach and duodenal tumors are asymptomatic for a long time. When symptoms do appear, they are determined by the tumor's size, location, and comorbidities (eg: bleeding and ulceration). The most common presenting symptoms are bleeding (acute or chronic), abdominal pain, nausea, weight loss, intestinal obstruction, and recurrent pancreaticobiliary side effects such as jaundice, cholangitis, and pancreatitis in periampullary tumors such as adenomas in the papilla of Vater. [1]

Endoscopy, computed tomography, and especially endoscopic ultrasonography results are used to make the diagnosis. It is the only approach that can accurately determine the tumor's intramural nature with a diagnostic accuracy of 92 percent. The tumor's specific location in various layers may indicate the histological type, but the complete tumor must be inspected to provide a definitive diagnosis. Surgery is required for symptomatic tumors, however the role of surgery in asymptomatic tumors (particularly tiny tumors) is still debatable. Despite high morbidity, laparotomy was the chosen treatment until recently. However, the advent of minimally invasive surgery has sparked various investigations on laparoscopic excision of submucosal stomach cancers. Only a few cases have been recorded in the literature, and only two series with more than 30 individuals have been published so far. [9,19-22].

Endoscopic ultrasonography (EUS) is helpful in broad-based lesions, where the relation of the tumor to the layers of the stomach is important. Disruption of the normal appearance of five layers on EUS may signify invasion. Contrast enhancement of EUS may prove useful for differentiating various submucosal lesions of the stomach [21].

Spiral CT Scan and Electro Beam CT Scan with 3-D reconstruction are two new high-tech imaging techniques that may be employed for diagnosis right now. Polyps (epithelial tumors) are the most frequent benign lesions in the stomach, accounting for 75 percent of all benign stomach tumors. Leiomyomas are another type of benign stomach tumor. Adenoma, including Brunner's gland adenomas, is the most prevalent benign lesion in the duodenum, followed by leiomyomas and lipomas [1].

4. MANAGEMENT

Clinically, it's difficult to tell the difference between benign and malignant stomach tumors. Malignant change, severe obstructive problems, and bleeding can occur even in benign tumors. As a result, aggressive steps to surgically resect the tumors should be implemented. Surgical resection should be conducted if the nature of the tumor is still unknown. It's still up in the air as to whether surgical procedure is best. Only cancers affecting the stomach orifices, tumors measuring 5 cm or larger, and tumors with a broad implantation base that prevent wedge resection are candidates for gastrectomy [9].

Every GIST is now considered to be cancerous. Most recommendations strongly advise resecting a stomach submucosal tumor if it cannot be identified with high certainty, especially if it is larger than 2 cm (although Eckardt's editorial supported 3 cm as a reason for surgery). Because of the low risk of malignancy, smaller

tumors may be noticed; nonetheless, patients should be advised of the risk of malignancy regardless of tumor size. Small GISTs smaller than 2 cm should be surgically removed if they have high-risk EUS symptoms such an uneven border, cystic gaps, ulceration, echogenic foci, or heterogeneity, according to NCCN recommendations.However, as previously stated, there is no agreement on the criterion for doing EUS for GISTs less than 2 cm on endoscopy [23].

In terms of resection depth, the general trend is to remove the whole stomach wall layer. Several laparoscopic techniques for benign stomach tumors have been published in the literature. A totally laparoscopic approach (wedge resection, intragastric resection, transgastric endoluminal resection, distal gastrectomy, and gastrojejunostomy) and a coupled laparoscopic-endoscopic approach (Endo-organ intragastric resection, DEILO), transgastric tumor-everting excision, and enucleation) are the two options. [9,24-28]

When the tumor is very big and there is a risk of rupture, haemorrhage, or substantial combined resection, imatinib can be used as a neoadjuvant therapy. With the National Comprehensive Cancer Network (NCCN) and ESMO standards, the surgeon's discretion is crucial when choosing on neoadjuvant therapy. Pathologic confirmation by endoscopy, EUS, or percutaneous access is required when neoadjuvant imatinib is chosen. Because of the unproven risk of peritoneal dispersion, percutaneous entry is usually the last resort.Mutational analysis should be used whenever feasible to establish a baseline mutation and the existence of the PDGFRA D842V mutation, which is known to be resistant to imatinib. [23]

Resection of certain tumors is more challenging due to their location. The entire top section of the stomach may have to be mobilised if the tumor is in or near the fundus. If the tumor is located posteriorly, after opening the omental bursa, a posterior approach to the tumor may be necessary. Otherwise, an anterior gastrotomy can be used to get access. To minimise constriction of the gastric lumen, tumors near the cardia or pylorus must be excised with as little good tissue as necessary. Because the lesions cannot be palpated, small stomach leiomyomas can be removed completely laparoscopically with the use of intraoperative laparoscopic ultrasonography.For pylorus tumors, a laparoscopic distal gastrectomy with gastrojejunostomy is performed. Direct viewing enables for accurate localisation of the lesion using a combination laparoscopic-endoscopic technique. According to published statistics, laparoscopic excision of benign stomach cancers is a reliable and safe procedure. The conversion rate has fluctuated between 0% and 22%. The operation takes about the same amount of time as a laparotomy, and there are benefits such as reduced postoperative discomfort, earlier oral feeding, and a shorter hospital stay. In our patients, the average postoperative hospital stay was 5 days (range, 4 to 6), which is consistent with many other studies.The usage of drains on a regular basis might be linked to paranoia and is most likely unnecessary. [9,29,30]

Despite the fact that complete surgical removal of tumors offers the highest chance of cure, the high rates of metastasis and recurrence in GISTs with a high malignant potential underline the need for effective non-surgical therapies. Patients with unresectable or metastasized malignant GISTs had no active therapy options prior to the introduction of imatinib mesylate. It prevents the growth factor receptor c-KIT from transmitting signals, which limits cell proliferation and metabolism. As a result, it may help patients with incompletely resected, metastatic, or recurrent gastric GIST improve their clinical results [2]

5. LAPAROSCOPIC TECHNIQUE BASED ON TUMOR LOCATION

Trocar placement varies depending on the tumors' and operators' positions, but it's not dissimilar to the places utilised in laparoscopic procedures for early gastric cancer or Nissen fundoplication. Depending on the patient's wishes, the operator can stand between the patient's legs or on the right side of the patient. The position of the trocar for the linear stapler and the needle holder should be chosen with the stapling or suturing direction in mind.Staplers may be inserted from the left side to create a stapler line perpendicular to the long axis of the stomach to avoid stenosis, and the use of roculating staplers may give further assistance. When a lesion is found in the upper stomach, the trocars are moved to the left and proximally, and when a lesion is found in the lower stomach, the trocars are moved distally. Depending on the situation, one or two assistants' trocars and an epigastric trocar for liver retraction can be introduced. During the laparoscopic technique,

intra-operative endoscopy or laparoscopic ultrasonography may be utilised to find tiny lesions or help in excision. [23]

6. RECURRENCES

In a published series, the recurrence rate following surgery varied from 17 percent to 24 percent. The recurrence rate in a study was 8.5 percent, with a median time of 14.3 months (range, 7 to 28 months). Three individuals reported in that study with recurrence all had tumors larger than 10 cm, suggesting that tumors larger than 10 cm are more likely to return. In comparison to the literature, that study had a higher five-year survival rate of 84 percent (45 percent to 76 percent). The lower percentage of patients with tumors larger than 10cm (20%) and the philosophy of careful surgical method to which it was adhered to may have contributed to these improved patient outcomes. Another possibility is that just one patient experienced tumor rupture during surgery, which has previously been linked to early recurrence and poor prognosis.The hypothesis that by the time a tumor grows to a significant size, it becomes more predisposed to peritoneal seeding by spreading out of the tumor via higher intratumor pressure or loosened tumor cellular adhesion, whereas smaller tumors are more likely to remain intact in the submucosal layer may account for the predominant recurrence pattern of peritoneal seeding and the higher recurrence risk in patients with large tumors. [2]

From 2001 to 2003, the American College of Surgeons Oncology Group performed research that looked at the long-term outcomes of 106 patients with high-risk GISTs who had total gross GISTs resection followed by adjuvant imatinib at 400 mg/d for a year. The 1-, 3-, and 5-year OS rates were 99 percent, 97 percent, and 83 percent, respectively, after a median follow-up of 7.7 years. The RFS rates after one, three, and five years were 96 percent, 60 percent, and 40 percent, respectively. Lower RFS rates were linked to bigger tumor size, KIT exon 9 mutation, high mitotic rate, and older age, whereas lower OS rates were linked to older age and a high mitotic rate. [14]

7. CONCLUSION

Laparoscopic resection has become the first option of many surgeons since the development of minimally invasive surgery. Laparoscopic excision of GIST is safe and effective, according to multiple researches. While patient characteristics (older age and male gender) and tumor factors (size and mitotic index) might help predict prognosis. Surgeons must focus on surgical factors (incomplete resection margin, tumor rupture, or spillage) when choosing surgical resection approaches. All of these parameters have an impact on the final oncological outcome, including RFS and OS. However, when compared to the open procedure, laparoscopic procedure has equivalent Tumor size, operating duration, and predicted blood loss, while having statistically shorter hospital stay.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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