

Original Research Article

Role of minimal invasive surgeries in gastric neoplastic diseases; how far we have come: an experience at tertiary centre

Pote Maroti P., Abdul Rafe*

Department of Surgery, Government Cancer Hospital, Government Medical College and Hospital, Aurangabad, Maharashtra, India

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***Correspondence:**

Dr. Abdul Rafe,

E-mail: abdulrafe786@gmail.com

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ABSTRACT

Background: Minimal invasive surgery (MIS) is a means of performing major operations through small incision, often using miniaturized, high tech imaging systems, to minimize the trauma of surgical exposure without compromising the quality of the surgical procedure. Upper gastro intestinal (GI) diseases constitute majority of gastro intestinal pathologies. With improved diagnostic and screening modalities, even in fatal diseases like carcinoma stomach (Ca stomach), MIS offers not only complete treatment but also improved quality of life by decreasing morbidity and mortality. This study attempts to explain our experience with MIS being performed at our institute.

Methods: This study is hospital based, non-randomized prospective study carried out in the Department of Surgery, Govt. Cancer Hospital, Aurangabad from August 2014 to December 2016. Total 30 patients were included in study. All gastric neoplastic diseases operated by minimal invasive surgeries in patients of all age groups were included. All patients were operated under general anaesthesia. Post-operative pain scoring was done according to VAS scale. All patients were kept in ICU in immediate post-operative period for 2-3 days. Then patients were shifted to general ward once patients were clinically stable. Patients were discharged according to recovery. Hospital stay was prolonged in cases having complications. Patients were followed up post operatively after 1, 3 and 6 months and assessed on basis of symptoms.

Results: Maximum patients belonged to the age group of 41-60 years. Mean age of patients operated for Gastrointestinal stromal tumours (GIST) was 57.5 years and Ca Stomach was 56.6 years. Mean operative time for laparoscopic gastrojejunostomy in our study was 150 min, for laparoscopic gastrectomy with gastro jejunal anastomosis was 230 min and for benign gastric tumours including GIST was 112 min. Type of anastomosis: Among 16 anastomoses, 2 oesophago - jejunal, 7 gastro - jejunal and 7 cases of gastro - gastric anastomosis were done. Jejunum - jejunal anastomoses are not included in this series. Both the oesophago - jejunal anastomoses were done by stapler method.

Conclusions: It can be concluded that, minimal invasive surgeries for gastric diseases are feasible to perform. Blood loss, post-operative analgesia and hospital stay are less in laparoscopic procedures so it decreases over all hospital cost. Early post-operative recovery, decreased post-operative morbidity and avoiding unnecessary laparotomies are some of the other advantages of MIS. So, MIS should be considered as an alternative for open procedures in gastric disorders, for betterment of patient care.

Keywords: Carcinoma Stomach, GIST, Laparoscopic gastrectomy, Minimal invasive surgery

INTRODUCTION

The term 'minimal invasive' was coined in 1986 to describe a range of procedures that involved making very small incisions or no incision at all for diseases traditionally treated by open surgery. MIS describes an area of surgery that crosses all traditional disciplines. It is not a discipline unto itself, but more a philosophy of surgery, a way of thinking. Some believe that the term MIS more accurately describes the small incisions generally necessary to gain access to surgical sites but John Wickham, father of robotic surgery, describes it better as 'small holes, big operations and "minimalness" of the access and invasiveness of the procedure.¹ MIS has moved the focus of surgery towards reducing the morbidity of patients while maintaining quality of care. Gastric neoplasm can be benign or malignant. Gastric tumours were first described by Galen about 2000 years ago.²

Benign neoplastic lesions can arise from any components of gastric epithelium - glandular, endocrine or mesenchymal. The gastric cells have potential for neoplastic transformation. Most benign tumours are asymptomatic and are found on examinations performed for unrelated symptoms. The most common presenting feature is anaemia from chronic occult bleeding. GIST accounts for 1% to 3% of all resected gastric tumors and are the most common sub mucosal tumour in the stomach.³ They can bleed, become obstructive or even degenerate into malignant neoplasm. Therefore, their surgical excision is recommended.⁴ On endoscopy it may go unnoticed unless it ulcerates the overlying mucosa.

Role of MIS in benign disorders

There are several laparoscopic procedures described in literature for benign gastric tumours. Various options are laparoscopic wedge resection, laparoscopic intra gastric resection, laparoscopic transgastric resection, laparoscopic enucleation and laparoscopic gastrectomy. Ridweiski et al in Germany reported a technique for successful resection of a stromal tumour of posterior gastric wall using transgastric approach.⁵ Various comparative studies, for example that of Ridweiski et al and Palanivelu et al showed that laparoscopic resection of GIST is safe and appropriate.^{5,6} Operating time and estimated blood loss was equivalent to that with the open approach and there was a statistically shorter hospital stay in the laparoscopic group.

Role of MIS in malignant lesions

As the presentation of gastric malignancy is usually late and at diagnosis, a significant proportion of patients have inoperable tumours, it is unreasonable to offer the patient an exploratory laparotomy for diagnosis alone and find out whether the tumour is resectable. Diagnostic laparoscopy has been established as an accurate

diagnostic tool for gastric cancer. At present, it fulfils two important roles for patients with gastric cancer.

- It spares patients the experience of undergoing an exploratory laparotomy
- Identifies patients with locally advanced disease for neo adjuvant therapy.⁷

Overall sensitivity and specificity of diagnostic laparoscopy is almost twice as compared to CT scan and ultra-sonography (USG) in detecting peritoneal, hepatic and nodal metastasis.⁸ It is simple and low morbidity procedure. Surgery can be curative or palliative depending upon staging of disease. The commonly practiced curative surgeries are radical subtotal, proximal and total gastrectomies with D2 lymphadenectomy along with resection of adjacent organs like spleen, colon, distal esophagus depending upon size and location of tumour. Palliative surgeries involve anterior gastro - jejunostomy, feeding jejunostomy and palliative partial gastrectomy.

The most important issues in laparoscopic surgery for cancer were oncologic clearance, port site metastasis and benefits over open surgery. These issues have been resolved by several prospective randomized trials like by Uyama et al, Schimizu et al, Adachi et al, Huscher et al and Palanivelu et al.⁹⁻¹³ Endoscopic linear cutting and circular stapling devices are of great advantage as they significantly reduce operating time.

The use of laparoscopy for palliation is much less controversial than for curative surgery as oncologic clearance is not attempted. Patients with incurable or unresectable gastric cancer benefit from minimally invasive palliative surgery because of reduced morbidity and hospital stay. Palliative surgery can be resection, bypass or enteral feeding. Limited gastrectomy is done to palliate bleeding. Compared with open procedures, these patients benefit from shorter hospital stay, lower blood loss, less pain, satisfactory palliation and similar results.

At present, technique and equipment for MIS are available to perform most of the resections and will become more common in future due to better understanding of technical and oncological impact of MIS techniques, training and education.

METHODS

This study is hospital based, non-randomized prospective study carried out in the department of surgery, Govt. Cancer Hospital, Aurangabad from August 2014 to December 2016. Total 30 patients were included in study.

Inclusion criteria

- All gastric neoplastic diseases operated by minimal invasive surgeries
- Patients of all age groups.

Exclusion criteria

- Patients unfit for general anaesthesia
- Not giving consent for inclusion in the study.

Patients presenting to the general surgical OPD with complaints of difficulty in swallowing, heart burn, epigastric pain, malena, vomiting etc. were initially assessed by detail history and clinical examination. They were subjected to investigations like CBC, KFT, LFT, radiological studies such as USG abdomen, chest X-ray and upper GI scopy and biopsy wherever required for histo pathological proof to rule out malignancy.

Once the diagnosis of gastric neoplasm was made, patients were admitted. If required they were nutritionally built up in between investigations. Contrast enhanced computed tomography (CECT) abdomen and chest was done to assess local extent and nodal and distal metastasis. Cardiac and pulmonary assessments were done as part of pre anaesthetic evaluation. Written, informed consent regarding disease and procedures was taken from all patients. All patients were operated under general anaesthesia. Abdominal drains were kept in patients in whom anastomosis was done. All patients received injectable antibiotics and analgesics in immediate post-operative period as per requirement. Post-operative pain scoring was done according to VAS scale. All patients were kept in ICU in immediate post-operative period for 2-3 days. Then patients were shifted to general ward once patients were clinically stable. Patients were discharged according to recovery. Hospital stay was prolonged in cases having complications. Patients were followed up post operatively after 1, 3 and 6 months and assessed on basis of symptoms.

RESULTS

Observations from our study can be tabulated as follows-

Table 1: Age wise distribution of patients (n=30).

Age group	No. of patients	Percentage
0-10	0	0
11-20	0	0
21-30	2	6.66
31-40	4	13.33
41-50	8	26.66
51-60	7	23.33
61-70	7	23.33
71-80	2	6.66
Total	30	100

Table 2: Gender distribution of patients.

Gender	No. of patients	Percentage
Male	18	60
Female	12	40
Total	30	100

Table 3: Symptoms.

Symptoms	No. of patients	Percentage
Dysphagia	15	50
Weight loss	13	43.33
Loss of appetite	11	36.67
Vomitting	8	26.67
Pain in abdomen	6	20
Heart burn	6	20
Lump in abdomen	4	13.33
Maleana	3	10
Hematemesis	4	13.33

Table 4: Diagnosis wise distribution of gastric neoplasm.

Diagnosis	No. of patients	Percentage
Benign solitary lesion	3	10
Benign lesion causing gastric outlet obstruction	5	16.66
Gist	8	26.66
Carcinoma stomach	14	47.66

Table 5: Mean age of patients for various diagnoses.

Diagnosis	No. of patients	Mean age (years)
Benign solitary lesion	3	45
Benign lesion causing gastric outlet obstruction	5	49.6
Gist	8	57.5
Carcinoma stomach	14	56.6

Table 6: Distribution of various minimal invasive surgeries in gastric neoplastic diseases.

Procedures	Number
Wedge resection of stomach wall	5
Partial gastrectomy	7
Gastro jejunostomy	4
Diagnostic laparoscopy with feeding procedures	9
Total/subtotal gastrectomy with lymphadenectomy	5
Total	30

In present study, 30 MIS were studied. All cases were performed laparoscopically. None of the above cases were converted to open. In present study for creating pneumo peritoneum, open method was used in all cases.

Maximum patients belonged to the age group of 41-60 years. Mean age of patients operated for Gastrointestinal stromal tumours (GIST) was 57.5 years and Ca Stomach was 56.6 years. Mean operative time for laparoscopic

gastrojejunostomy in our study was 150 min, for laparoscopic gastrectomy with gastro jejunal anastomosis was 230 min and for benign gastric tumours including GIST was 112 min. Type of anastomosis: Among 16 anastomosis, 2 oesophago - jejunal, 7 gastro - jejunal and 7 cases of gastro - gastric anastomosis were done. Jejunostomy - jejunal anastomoses are not included in this series. Both the oesophago - jejunal anastomoses were done by stapler method.

Table 7: Mean operative time in minutes for each procedure.

Procedures	Mean operative time (in minutes)
Wedge resection of stomach wall	130
Partial gastrectomy	112
Gastro jejunostomy	150
Diagnostic laparoscopy with feeding procedures	45
Total/subtotal gastrectomy with lymphadenectomy	230

Table 8: Classification of anastomosis.

Anastomosis	Extracorporeal	Intracorporeal	Total
Hand sewn	6	4	10
Stapled	4	2	6
Total	10	6	16

Table 9: Average intra operative blood loss.

Procedures	Average blood loss (in ml)
Wedge resection of stomach wall	50
Partial gastrectomy	70
Gastro jejunostomy	50
Diagnostic laparoscopy with feeding procedures	<50
Total/subtotal gastrectomy with lymphadenectomy	180

Table 10: Intra-operative complications.

Procedures	No. of patients	Intra operative complication	Percentage
Wedge resection of stomach wall	5	Nil	0
Partial gastrectomy	7	1	14.3
Gastro jejunostomy	4	Nil	0
Diagnostic laparoscopy with feeding procedures	9	Nil	0
Total/subtotal gastrectomy with lymphadenectomy	5	1	20

Table 11: Mean duration of postoperative drains and ryles tube.

Procedures	Mean duration of abdominal drain (in days)	Mean duration of ryles tube (in days)
Wedge resection of stomach wall	4	1
Partial gastrectomy	6	3
Gastro jejunostomy	Nil	2
Diagnostic laparoscopy with feeding procedures	Nil	Nil
Total/subtotal gastrectomy with lymphadenectomy	7	3

Table 12: mean ICU stays for various procedures.

Procedures	Mean duration of ICU stay (in days)
Wedge resection of stomach wall	1
Partial gastrectomy	3
Gastro jejunostomy	1
Diagnostic laparoscopy with feeding procedures	Nil
Total/subtotal gastrectomy with lymphadenectomy	5

All the 7 gastro jejunal anastomoses were done by hand sewn method out of which 6 were extra corporeal and one was intra corporeal. Among the 7-gastro gastric anastomosis, 3 were hand sewn and 4 were done by stapler method. In present study, average intra operative blood loss for gastro - jejunostomy was 50 ml and for laparoscopic gastrectomy with gastro jejunal anastomosis was 180 ml. Intra operative complications occurred in 2 cases. One case had bleeding from short gastric vessels while performing partial gastrectomy, another had bleeding from gastro epiploic vessels while doing total gastrectomy. Both cases didn't require exploration. Mean ICU stay for Ca Stomach patients undergoing total or subtotal gastrectomy with lymphadenectomy was 5 days. This shows laparoscopic procedures reduce post-operative morbidity and facilitate early recovery. Mean post-operative pain score for laparoscopic gastrectomy and partial gastrectomy was 5 and 2.5 respectively on day 3. This lesser post-operative pain score resulted in decrease of post-operative analgesia requirement and early recovery in cases of laparoscopic procedures. Mean hospital stay for laparoscopic gastro - jejunostomy in present series was 7 days.

None of the patient had late post-operative complications such as port site hernia, post anastomotic stricture or tumor recurrence during follow up.

Table 13: Procedure wise mean post-operative pain score.

Procedures	No. of patients	Post-operative pain score				
		Day 1	Day 2	Day 3	Day 7	Day 15
Wedge resection of stomach wall	5	4	3.5	3	1	1
Partial gastrectomy	7	4.5	3.5	2.5	2	1
Gastro jejunostomy	4	5.5	5	4.5	3	1.5
Diagnostic laparoscopy with feeding procedures	9	3	3	2	1	1
Total/subtotal gastrectomy with lymphadenectomy	5	5.5	5.5	5	4.5	2

Table 14: postoperative complications.

Procedures	No. of patients	Post-operative complications								
		Fever	Ssi	Ileus	Anasto- motic leak	Fistula	Respir- -atory	Septi- -cemia	Heamorrhage	Death
Wedge resection of stomach wall	5	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Partial gastrectomy	7	1	Nil	Nil	Nil	Nil	1	1	Nil	Nil
Gastro jejunostomy	4	2	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Diagnostic laparoscopy with feeding procedures	9	2	1	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Total/subtotal gastrectomy with lymphadenectomy	5	2	Nil	1	Nil	Nil	2	Nil	Nil	Nil
Total	30	7	1	1	Nil	0	3	1	0	0

Table 15: Mean post-operative hospital stay.

Procedures	No. of patients	Mean hospital stay (in days)
Wedge resection of stomach wall	5	5
Partial gastrectomy	7	8
Gastro jejunostomy	4	7
Diagnostic laparoscopy with feeding procedures	9	3
Total/subtotal gastrectomy with lymphadenectomy	5	10

DISCUSSION

Maximum patient belongs to the age group of 41-60 years. Mean age of patients operated for GIST was 57.5 years and Ca Stomach was 56.6 years. These observations are consistent with similar studies by Palanivelu et al and Carl Daigle et al.^{13,14} There was no significant gender difference amongst patients undergoing Minimal Invasive Surgeries for gastric diseases in the present study.

In the present study, dysphagia was the most common presenting complaint, seen in 50% of patients followed by weight loss in 43% and loss of appetite in 36% of patients. Carl Daigle et al, in their study of 23 cases of laparoscopic management of GIST found abdominal pain in 35% as most common presenting symptoms.¹⁴

In this study, we created pneumoperitonium by open method in all cases and close technique was used in none cases. No complication occurred while creating pneumoperitonium.

Mean operative time for laparoscopic gastrojejunostomy in our study was 150 min. This is similar to studies of Choi et al, Linda P. Zhang et al, Hidetoshi et al.¹⁵⁻¹⁷ Anastomosis in present study was done by hand sewn method. In present study mean operative time for laparoscopic gastrectomy with gastro jejunal anastomosis was 230 min. This is slightly higher than other studies of Palanivelu et al, Shimizu et al and Dulucq et al shown in below table.^{10,13,18}

In present study mean operative time for benign gastric tumours including GIST was 112 min. which was comparable with other studies of Carl Daigle et al, Cheng et al, Mathews et al.^{14,19,20}

Type of anastomosis: Among 16 anastomoses, 2 oesophago jejunal (Ca Stomach: total gastrectomy done), 7 gastro jejunal (3 cases of Ca Stomach for subtotal gastrectomy and 4 cases of gastric outlet obstruction) and 7 cases of gastro gastric anastomosis were done. Jejunio jejunal anastomoses are not included in this series. Both the oesophago jejunal anastomosis was done by stapler method. All the 7 gastro jejunal anastomosis were done by hand sewn method out of which 6 were extra corporeal and one was intra corporeal. Among the 7-gastro gastric anastomosis, 3 were hand sewn and 4 were done by stapler method.

Sang - Woong Lee et al, in their study of 449 patients on benefit of intra corporeal gastro intestinal anastomosis following laparoscopic distal gastrectomy stated that intra corporeal anastomosis has advantages over extra corporeal anastomosis.²¹

In present study, average intra operative blood loss for gastro jejunostomy was 50 ml. This is consistent with other similar studies of Linda Zang et al, (80 ml of blood loss) and Giraudo et al, reported 50 ml of blood loss.^{16,22} In present study, average intra operative blood loss for laparoscopic gastrectomy with gastro jejunal anastomosis was 180 ml which is consistent with other studies such as Palanivelu et al (150 ml of blood loss), Shimizu et al had 165 ml of blood loss, Dulucq et al had 155 ml of blood loss.^{10,13,18}

In the present study, intra operative complications occurred in 2 cases. One case had in the form of bleeding from short gastric vessels while performing partial gastrectomy, another had bleeding from gastro epiploic vessels while doing total gastrectomy. Both cases didn't require exploration.

In the present study, none of the patients who underwent laparoscopic gastric procedures required any form of ventilator support. Mean ICU stay for Ca Stomach patients undergoing total or subtotal gastrectomy with lymphadenectomy was 5 days. This shows laparoscopic procedures reduce post-operative morbidity and facilitates early recovery.

Mean post-operative pain score for laparoscopic gastrectomy was 5 and 2.5 in cases of partial gastrectomy on day 3. This lesser post-operative pain score resulted in decrease of post-operative analgesia requirement and early recovery in cases of laparoscopic procedures.

Mean hospital stay for laparoscopic gastro jejunostomy in present series was 7 days which is consistent with similar studies like Choi et al, Zhang LP et al, and Hidetoshi et al.¹⁵⁻¹⁷ Mean hospital stay for laparoscopic resection of benign gastric tumours was 5 days in present study. This is consistent with other studies such as Cheng et al, Matthews et al, Palanivelu et al.^{13,19,20} Mean hospital stay for laparoscopic gastrectomy was 10 days in present

study. Palanivelu et al, Shimizu et al and Dulucq et al reported similar results.^{10,13,18}

In the present study, most common early post-operative complication was fever seen in 23.33% cases. Post-operative respiratory complications such as broncho pneumonia, atelectasis, aspiraton pneumonia and ARDS were seen in 10% of cases. Smithers B et al reported 26% of respiratory complications.²³ Fujita et al described 32% of respiratory complications in their study.²⁴ Thus MIS decreases the respiratory complications in post-operative course. There was no incidence of anastomotic leak or duodenal blow out amongst the patients operated for carcinoma stomach. All complications were managed conservatively, none of the cases required re exploration.

All the patients were followed up for minimum 6 months. Patients of GIST were given post-operative chemotherapy. None of them showed recurrence. Upper GI endoscopy was done after 6 months for operated cases of carcinoma stomach. The endoscopy revealed healthy mucosa without any local recurrence or anastomosis stricture. However, due to limited sample size and mean duration of follow up, results in the present study could not be satisfactorily compared with other similar studies.

CONCLUSION

It can be concluded that, though sample size in the present study is less, minimal invasive surgeries for gastric diseases are feasible to perform. Blood loss, post-operative analgesia and hospital stay are less in laparoscopic procedures so it decreases over all hospital cost. Early post-operative recovery, decreased post-operative morbidity and avoiding unnecessary laparotomies are some of the other advantages of MIS. So, MIS should be considered as an alternative for open procedures in gastric disorders, for betterment of patient care.

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