

A prospective comparison of the operative outcome of D1 and modified D2 gastrectomy in adenocarcinoma of the stomach



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ABSTRACT

Background: Gastric adenocarcinoma is a leading cause of cancer and cancer related death among Asian countries. Although there is considerable improvement in chemoradiation, surgery still remains the primary curative modality with special emphasis on lymphadenectomy. **Aims and Objectives:** The aim of the study was to assess and compare post-operative morbidity and mortality, anastomotic dehiscence, and length of hospital stay between D1 and modified D2 gastrectomy in adenocarcinoma of the stomach. **Materials and Methods:** A prospective, open labeled, and comparative analysis was done in patients with adenocarcinoma of stomach at a tertiary care hospital in Eastern India for 15 months. Total (n = 50) patients were divided into two groups and undergone D1 (n = 24) and modified D2 gastrectomy (n = 26) operation, respectively. Post-operative assessment was done for 6 months following the operations. **Results:** In the study, (n = 35) patients presented with antral growth of which 18 (51.4%) patients underwent D1 and 17 (48.6%) patients modified D2 gastrectomy. Most of the Stage III cases were dealt by modified D2 surgery (62.5%) whereas Stage I by D1 surgery (68.2%). Incidences of hematemesis noted around 9 (34.6%) in D1 group patients and lesser in modified D2 group 6 (25%) with P = 0.545. However, the incidences of melena were observed that more 11 (45.8%) in modified D2 group in the study patients was compared to D1 group 6 (23.0%) which was statistically insignificant (P = 0.130). Post-operative complication (mainly wound dehiscence) was more in D1 surgery group 12 (46.1%) as compared to modified D2 group 8 (33.3%) and the finding was statistically insignificant (P = 0.399). There were 4 (33.3%) cases of mortality in modified D2 group as compared to 8 (66.7%) cases in D1 group. The duration of hospital stays, that is, > 14 days was observed longer in the modified D2 surgery cases as compared to the other group (< 8 days) and this difference was statistically very significant (P < 0.001). **Conclusion:** Outcome of modified D2 operation in adenocarcinoma of stomach is better than D1 gastrectomy with lesser post-operative morbidity and mortality with longer duration of hospital stays and possibly a better chance of survival.

Key words: Gastric cancer; Radical operation; Post-operative evaluation

INTRODUCTION

Although the incidence of gastric cancer has declined over the past 30 years worldwide, it is the second leading cause of cancer related death in Asia and the fourth most common malignancy in the world.^{1,2} The most common cause is infection by the bacterium *Helicobacter pylori*, which accounts for more than 60% of cases.³ Stomach cancers are

overwhelmingly adenocarcinomas (90%)⁴ and are difficult to cure unless it is found at an early stage. Unfortunately, because early stomach cancer causes few symptoms, the disease is usually advanced when the diagnosis is made.⁵

The treatment for stomach cancer may include surgery chemotherapy and/or radiation therapy.⁶ New treatment approaches such as biological therapy and improved ways

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of using current methods are being studied in clinical trials.⁷ To date, surgery is the best form of treatment for carcinoma stomach. On the basis of extensive lymph node dissection, it can be classified as D1 gastrectomy and modified D2 gastrectomy. With regard to surgical procedures, dissection of the regional lymph node is regarded as an important part of *en bloc* resection for gastric cancer.⁸ Historically, there has been controversy regarding the extent of lymph node dissection performed between Eastern and Western countries.⁹ The lymph node status in gastric cancer is a key prognostic factor in patient survival^{10,11} opinion over the optimum resection for patients with gastric cancer remains divided. The two largest randomized studies both report significantly greater operative morbidity and mortality associated with an extended D2 lymphadenectomy when compared with the less aggressive D1 lymphadenectomy and have failed to demonstrate any survival advantage for a D2 resection.¹²

However, there are a significant differences in the extent of lymphadenectomy performed by surgeons in different countries. In Japan, D2 dissection has been recommended as standard practice since the 1960s.¹³ However, the most Western surgeons perform gastrectomy with only D1 dissection, because D1 was associated with less mortality and morbidity.^{14,15} A newer surgical therapy of modified D2 in which pancreas and spleen are preserved. In India, there is a relative lack of data on gastric cancer outcomes and more specifically on D1 and D2 lymphadenectomy. Some units have adopted selective criteria for patients undergoing D2 lymphadenectomy, with no significant difference in 5-year survival or mortality.¹⁶

Due to such contradictory results from the previous studies and paucity of Indian data, this study was planned with the objective to assess and compare post-operative morbidity and mortality, length of hospital stays, and post-operative anastomotic dehiscence between D1 and modified D2 gastrectomy in adenocarcinoma of stomach in a tertiary care hospital of eastern India.

Aims and objectives

To assess and compare postoperative morbidity and mortality, anastomotic dehiscence and length of hospital stay between D1 and modified D2 gastrectomy in adenocarcinoma of the stomach.

MATERIALS AND METHODS

A prospective, open labeled, and comparative study was conducted on (n=50) patients of either sex diagnosed of adenocarcinoma stomach by endoscopic biopsy who underwent gastrectomy operation between January 2017

and April 2018 including a 6-month post-operative follow-up (total 15 months) at tertiary care hospital in the Eastern part of India with prior approval from the Institutional Ethics Committee. After obtaining written informed consent from patients who are eligible for curative resection of adenocarcinoma, stomach divided into two groups and undergone D1(n=24) and modified D2 gastrectomy (n=26), respectively. Patients unfit for surgery due to pre-operative anesthetic failure, refused to undergo surgery, developed metastasis at the time of diagnosis, advanced stage of gastric carcinoma, immunocompromised having evidence of HIV infection, diabetes, receiving other modalities of cancer therapies, and those having serum albumin <3.0 g/dl were excluded from the study.

D1 and modified D2 dissections were defined according to the guidelines of the Japanese Research Society for the study of gastric cancer. Choice on type of operation conducted on the selected patients was solely left on surgeon's consideration as it was a non-randomized, unblinded study. The post-operative course including all complications was documented. Adjuvant chemoradiotherapy was given to both D1 and modified D2 group with Stages II, III, and IV disease by the physicians of radiotherapy department. Patients undergoing both D1 and modified D2 resections were reviewed every 2 months for the first 6 months within the study period. Incidences of post-operative complications, length of hospital stay, post-operative anastomotic dehiscence, and mortality were assessed.

Statistical software SPSS 16.0 was used to carry out the statistical analysis of data. Data were analyzed by means of descriptive statistics, that is, pie, bar diagrams, and percentages. $P < 0.05$ was considered statistically significant.

RESULTS

Distribution of various stages of adenocarcinoma found in the study patients and the type of operation done is displayed in Figure 1. Most of the Stage III cases were dealt by modified D2 surgery (62.5%) whereas Stage I by D1 surgery (68.2%). The finding was statistically insignificant ($P=0.124$). Based on histopathological examination report, 7 (26.9%) of the tumors in D1 and 8 (33.3%) in modified D2 group were poorly differentiated statistically which was insignificant ($P=0.760$).

Post-operative nausea/vomiting was found to be more in the D1 group 20 (76.9%) as compared to modified D2 group 10 (41.6%) with insignificant statistical value ($P=0.201$). Again, incidences of hematemesis noted around 9 (34.6%) in D1 group patients and lesser in modified D2 group 6 (25%) although statistically insignificant ($P=0.545$).

However, the incidences of melena were observed that more 11 (45.8%) in modified D2 group in the study patients was compared to D1 group 6 (23.0%) which was also statistically insignificant ($P=0.130$) (Figure 2).

Although overall post-operative complication (mainly wound dehiscence) were more in D1 surgery group 12 (46.1%) as compared to modified D2 gastrectomy 8 (33.3%), the finding was statistically insignificant ($P=0.399$) (Figure 2).

The duration of hospital stay, that is, >14 days (Figure 3) was observed longer in the modified D2 surgery cases as compared to the other group (<8 days) and the difference was statistically very significant ($P<0.001$).

There were 4 (33.3%) cases of mortality in modified D2 group as compared to 8 (66.7%) cases in D1 group during the 6-month post-operative follow-up which was again statistically insignificant ($P=0.327$) in this study (Figure 4).

DISCUSSION

Views over the optimum resection for patients with gastric cancer remain debatable for many years. The impressive outcomes after modified D2 gastrectomy concluded

to be better option than D1 surgery published in large retrospective series from Japan Soga et al.,¹⁷ and Maruyama et al.,¹⁸ have not much been reproduced in Indian studies. The present study made an attempt to draw some inference by conducting an open labeled and prospective comparative study in a tertiary care hospital of Eastern India. The most common age group suffering from adenocarcinoma in this study was found between 40 and 50 years with more preponderance of male subjects unlike the study of Degiuli et al., and Danielson et al., where the common age group was 61–70 years.^{19,20} However, the gender variation in our study has a similarity with that found in the study of Edwards et al.¹² The selection of the type of surgery according to the age group or gender in both the group was statistically insignificant. The advanced stage of the carcinoma, that is, Stage III was mainly dealt with modified D2 gastrectomy whereas most of the Stage I cases were operated by D1 method. A total gastrectomy with Billroth II approach was undertaken in this study similar to the study of M. Degiuli et al.,¹² and Edwards et al.¹⁹ More than half of patients with

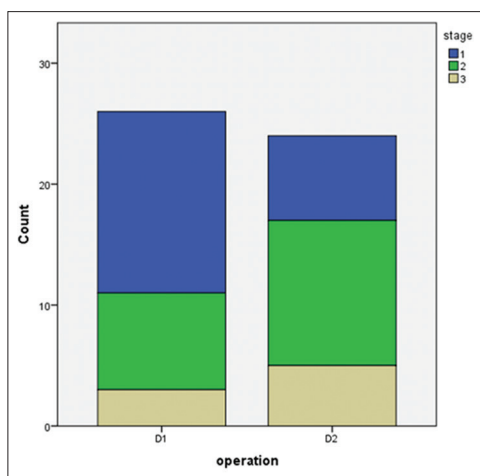


Figure 1: Distribution of staging and treatment modality

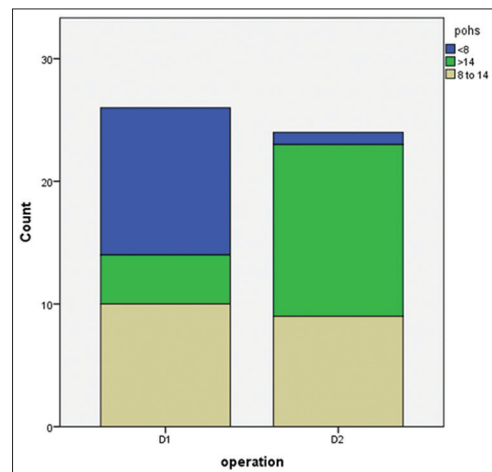


Figure 3: Distribution of treatment modality and post-operative hospital stay

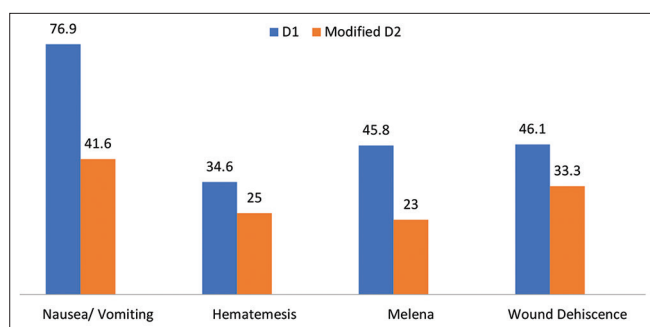


Figure 2: Distribution of post-operative complication

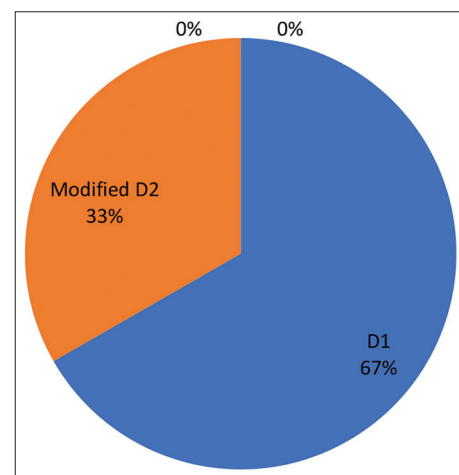


Figure 4: Distribution of mortality in 6-month follow-up

poorly differentiated tumor were managed by modified D2 surgery and the well differentiated tumors were approached with less aggressive intervention, that is, D1 surgery. Significant post-operative complications such as nausea/vomiting and hematemesis were found more in D1 study group where incidences of melena that was recorded more in D2 group and all these findings were statistically insignificant. However, a very critical and bothersome post-operative complication, that is, wound dehiscence was observed more in D1 as compare to D2 although it was statistically insignificant. The reason for such observation remained explainable. The post-operative hospital stay was much longer, that is, > 14 days in D2 group probably due to more aggressive tissue handling and more time-consuming procedures which was statistically significant ($P < 0.001$) as compared to D1 surgery. Similar results have been found by Bonenkamp et al., and Danielson et al., but the total number of days difference between those groups was much lesser than us.^{14,20} The mortality from modified D2 surgery among the study participants was found to be much lesser (16.6%) than the D1 operation (30.7%) in spite of more extensive surgery probably due to dissection of more selective lymph nodes thereby reducing the chances of metastasis and improving the survival, particularly in advanced stages. In the contrary, Bonenkamp et al., in their study have shown a mortality rate of 4% in D1 group and 10% in modified D2 patients¹⁴ Cuschieri et al., have shown a mortality rate of 6.5% in D1 gastrectomy patients and 13% for modified D2 group¹⁵ which again greatly differ our findings.

Limitations of the study

This study is limited by possible selection and information bias as it was a non-randomized, unblinded, and single tertiary care hospital centric research work done by a sole gastrointestinal surgeon. The number of patients included in this analysis was relatively small resulting in a low powered study. Role of adjuvant chemotherapy following surgery was not assessed in this study. Survival analysis and local recurrence of the disease among the study patients could not be followed up due to the short duration of the study.

CONCLUSION

This non-randomized study on a small cohort of patients concludes that the immediate outcome of modified D2 operation in adenocarcinoma of the stomach is a better option than D1 gastrectomy with lesser post-operative morbidity and mortality with probably better chances of surveillance a longer duration of hospital stays. To attain external validity and accurate and acceptable results, a large multicentric surgical trial is needed to be planned to substantiate these current findings.

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BCG Concept and design of the study, prepared first draft of manuscript; **TKS**- Interpreted the results; reviewed the literature and manuscript preparation; **JP**- Concept, coordination, statistical analysis and interpretation, **GG**- preparation of manuscript and revision of the manuscript

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