

A Prospective Study of Early Postoperative Course and Pathological Outcome of Modified D2 Gastrectomy.

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Abstract: Surgery still today remains an important modality of management for resectable cancer stomach, recent NCCN guideline recommends gastrectomy with D1 or modified D2 lymphnode dissection with a goal of examining 15 or more lymph nodes for localised resectable gastric cancer. Modified D2 dissection remains a widely practised surgical procedure for cancer stomach. In our institution we spare routine removal of lymphnodes around distal splenic artery, splenic hilum as well as pancreaticosplenectomy as a modification over standard D2 dissection. However the question remains whether the goal of examining the required number of lymph nodes is met irrespective of variables like age obesity, stage of disease, grade of tumour in this form of modified D2 lymphadenectomy. Secondly how the variables affect the yield of lymph nodes in pathological specimen of cancer stomach remains to be seen. Study group includes 40 cases of carcinoma stomach undergone modified D2 gastrectomy. Various parameters like age, sex, BMI, stage of disease, grade of tumour, site of tumour, patients' physiological profile, no. of lymph nodes yield were noted down. During postop period mostly complications like paralytic ileus, prolonged drainage, bile leak, chest infection, wound infection, thrombophlebitis, fever, pneumothorax were encountered. Among these prolong paralytic ileus, prolonged drainage, bile leak, chest infections were found to be most important morbidity factors. There was no mortality in the study because of better patient physiologic profile, proper postop management by providing enteral nutrition as early as possible as well as complete avoidance of pancreaticosplenectomy in most cases. The mean number of lymph nodes retrieved was 23.52 ± 6.95 . Though lymph node dissection is less extensive in this modified method in comparison to classical D2 dissection the average lymph node yield is well above 16 which is set minimum by NCCN panel for proper surgical staging. Modified D2 gastrectomy is recommended as a procedure in cancer stomach where there is a need for lymphnode dissection apart from early gastric cancer. Proper D2 gastrectomy with pancreaticosplenectomy should be done when there is direct involvement of the organs by the tumour or gross disease at splenic hilum. Properly performed modified D2 gastrectomy should have more than 16 lymphnodes on subsequent pathological examination of the surgical specimen.

Keywords: Modified D2 gastrectomy, 30 days morbidity and mortality, Lymphnode retrivals.

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I. Introduction

Stomach cancer was the leading cause of cancer related death worldwide hence known as CAPTAIN OF MENS DEATH. As per updated epidemiology of cancer stomach it ranks fourth after lung, breast and colorectal cancer. The overall prognosis is not very encouraging. However surgery in the form of gastrectomy is the only treatment modality which offers a chance of long term survival as well as hope for cure. So as obvious world literature is replete with discussions regarding the optimum extent of surgery.

Gastric resections remain standard treatment for carcinoma stomach in the western part of the world. The overall survival rate was of the order of 10-30% which was much less in comparison to the of Japanese series [1,2] which is around 50-60%. This was mainly due to two factors, one active screening leading to early diagnosis and the other one extensive lymphadenectomy along with gastric resection. As per the Japanese literature if no lymph node is dissected the 5yr overall survival is merely 20.3%. Survival with D1 dissection is 41% and with D2 dissection is 50-62%. Hence the Japanese literature recommended D2 lymphadenectomy for cancer stomach [3,4] But the results of Japanese literature could not be reproduced in the western part of the world moreover D2 lymphadenectomy was associated with high postoperative morbidity and mortality. The Dutch trial after 15yr follow up confirmed that D2 gastrectomy has got survival advantages, low cancer specific death rate and low locoregional recurrence in comparison to D1 gastrectomy. But the question of high post op morbidity and mortality remained. It was found on subgroup analysis that the excess mortality was due to

resection of pancreatic tail and splenectomy associated with D2 gastrectomy[5,6].Hence the modified D2 gastrectomy came into picture. The British study confirmed that modified D2 gastrectomy preserving spleen and pancreas is feasible and it carries much lower mortality and morbidity[7,8].

Secondly D2 gastrectomy is considered to be choice of procedure so far as pathological staging of the disease is concerned. This staging data is very important for planning of adjuvant treatment as cancer management has become multimodal nowadays. The average node retrieval is 15 in D1 gastrectomy,27 in D2 gastrectomy and 43 in D3 gastrectomy(wegner et al) from autopsy findings. So NCCN 2010 has laid down the principle of examining at least 16 lymph nodes for proper pathological staging of stomach cancer,which has prognostic implication in stomach cancer. So whether modified D2 gastrectomy retrieves adequate no. of lymph nodes for proper staging must be answered.

AIMS AND OBJECTIVES :

To study various parameters of early postoperative complications.

To study 30 day mortality and morbidity following modified D2 gastrectomy.

To find out whether the procedure is yielding the required no. of lymph nodes as per the NCCN guidelines .

II. Material & Methods

STUDY DESIGN-Cross Sectional Study in which prospective observations were made .

STUDY PERIOD-2yrs

STUDY POPULATION

All the patients with proven diagnosis of adenocarcinoma of stomach admitted for surgery.

SAMPLE SIZE

The required sample size was 39.66 with power 80% which has been calculated with help of Epi Info (TM) 3.5.3 software. The sample size however collected for this study was 40.

INCLUSION & EXCLUSION CRITERIA

All biopsy proven & operable cases of adenocarcinoma of stomach during the aforementioned period were considered for the study. Patients with enlarged supraclavicular lymph nodes with FNAC positivity for metastatic adenocarcinoma and patient with image proven lung/liver mets, diagnostic lap positive for gross tumour in peritoneal cavity,Tumour involving esophagus or extending to duodenum or omentum,Pt requiring emergency surgery for gastric outlet obstruction/bleeding,Patient not fit for general anesthesia ,Past History of peripheral vascular disease, cerebrovascular accident or MI,Patient with poor performance status,Patient having recurrent surgery for cancer stomach,Pt having coexisting cancer,Pt having cardio respiratory compromise,Pt having previous abdominal surgery are excluded from the study.

III. Methodology

All the datas were collected after taking informed consent from patient and patient relatives.Detailed Patient clinical data, oncologic data, surgical details and complication data,pathological staging were collected for each case. Patient data like presentation, addiction, performance status, physiological status as per laboratory data, co morbidities and history of previous surgery were all collected .Surgery was planned after exclusion of metastatic disease, endoscopy determining the site of tumour ,biopsy proving presence of adenocarcinoma and contrast enhanced CT scan showing operability of tumour.EUS and PETscan were not done as they are costly and facility of minimal invasive procedures like EMR not available at our centre. All patients were planned either for distal modified D2 gastrectomy or total modified D2 gastrectomy. The thing was mentioned in the patient file on front page..Intraoperative data regarding difficulties during the procedure, blood loss, perioperative blood transfusion, site of the disease, and operative time taken for each individual patients were noted. In the postoperative period we have followed patients directly till they are hospitalized and by contacting them over telephone or asking them to come weekly till 30 days post op .The data were written on the respective files which were compiled after accrual of 40 patients are completed. The biopsy report used to stage the disease and determine number of lymph nodes retrieved no. of positive nodes, grade of the tumour, presence of lymphovascular or perineural invasion. The histopathological data's were collected from our pathology department. Patients were sent to respective radiation oncology or medical oncology department basing on final histopathology report. Default patients are excluded from the list. Hence data collection started after a patient is admitted in our department for surgery, Other patient were not included.

STATISTICAL ANALYSIS

Sample Size

Average proportion of patients underwent gastrectomy for stomach cancer was 71.5% Thus for this study $p=0.52$. The number of patients required for this study was $39.66 \sim 40$ with power 80%. The formula used for sample size calculation was as follows:-

$$n = 4 pq / (L^2)$$

Where

n = Required sample size

$p=0.715$ (as per the report of HBCR, CNCI)

$q = 1 - p$

$L =$ Loss % (Loss of information)=20%

Statistical Analysis was performed with help of Epi Info (TM) 3.5.3. EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC). Descriptive statistical analysis was performed to calculate the means with corresponding standard deviations (s.d.). Test of proportion was used to find the Standard Normal Deviate (Z) to compare the difference proportions and chi-square (χ^2) test was performed to find the associations.

Corrected chi-square (χ^2) test was used where any one of the cell frequencies was less than zero. t-test was used to compare the means. Pearson correlation co-efficient (r) was calculated to find the correlation between two variables. Odds Ratio (OR) with 95% confidence interval (CI) had been calculated to find the risk factors. Fisher Exact test was used where one of cell frequency was 0. $p<0.05$ was taken to be statistically significant.

IV. Results And Discussion

Total number of cases undergone modified D2 gastrectomy in 2yrs were 40. The mean age group was 49.10. The most common age group affected was 45-54. The male :female ratio is 3:1 . So far BMI is concerned hardly any patient is underweight. Majority have a BMI above 25. Among the symptoms the most common are in the order of frequency are dyspepsia, GOO, malaena or bleeding, pain abdomen, anorexia. So far co morbidities are concerned majority 70.5% don't have any co morbidities. The mean hemoglobin level was 11.15 ± 2.30 gm%, mean level of albumin of the patients was 3.44 ± 0.65 mg/dl. During postop period mostly complications like paralytic ileus, prolonged drainage, bile leak, chest infection, wound infection, thrombophlebitis, fever, pneumothorax were encountered. Among these prolong paralytic ileus, prolonged drainage, bile leak, chest infections were found to be most important morbidity factors.

There was no mortality in the study because of better patient physiologic profile(lower age, BMI, serum albumin, absence of cardiopulmonary co morbidities, performance status), proper postop management by providing enteral nutrition as early as possible as well as complete avoidance of pancreaticosplenectomy in most cases . The most important factors affecting 30 day morbidity were paralytic ileus ,bile leak ,prolonged drainage, chest infections. The mean hospital stay with these complications was 13.58 ± 3.63 Where as those without these complications 7.93 ± 1.65 . The difference is statistically significant. 35% have paralytic ileus more than 5days(Table-1),55% have duration of drainage more than 5days(Table-2),10% have bile leak(Table-3).

Table-1

Post operative ileus (in days)	Distal gastrectomy	Total gastrectomy	TOTAL
>5	12	2	14
Row	85.7	14.3	100.0
Col %	34.3	40.0	35.0
≤5	23	3	26
Row	88.5	11.5	100.0
Col %	65.7	60.0	65.0
TOTAL	35	5	40
Row	87.5	12.5	100.0
Col %	100.0	100.0	100.0
Mean±s.d.	5.05±1.21	5.40±1.14	

Table-2

Duration of drainage (in days)	Distal gastrectomy	Total gastrectomy	TOTAL
>5	17	5	22
Row %	77.3	22.7	100.0
Col %	48.6	100.0	55.0
≤5	18	0	18
Row %	100.0	0.0	100.0
Col %	51.4	0.0	45.0
TOTAL	35	5	40
Row %	87.5	12.5	100.0
Col %	100.0	100.0	100.0
Mean±s.d.	6.51±1.19	8.40±1.86	

Table-3

Bile leak	Distal gastrectomy	Total gastrectomy	TOTAL
Present	4	0	4
Row %	100.0	0.0	100.0
Col %	11.4	0.0	10.0
Absent	31	5	36
Row %	86.1	13.9	100.0
Col %	88.6	100.0	90.0
TOTAL	35	5	40
Row %	87.5	12.5	100.0
Col %	100.0	100.0	100.0

Chest infection rate is around 15%. In 10% cases there were thrombophlebitis, pneumothorax in 2.5% and fever without identifiable source in 5% cases (Table-4) which were obviously found to affect morbidity significantly.

Table-4

Other complication	Distal gastrectomy	Total gastrectomy	TOTAL
Chest infection	4	2	6
Row %	67.0	33.0	100.0
Col %	11.6	40.0	15.0
Fever	2	0	2
Row %	100.0	0.0	100.0
Col %	5.7	0.0	5.0
Pneumothorax	1	0	1
Row %	100.0	0.0	100.0
Col %	2.9	0.0	2.5
Thrombophlebitis	3	1	4
Row %	75.0	25.0	100.0
Col %	8.6	20.0	10.0
No	25	2	27
Row %	92.6	7.4	100.0
Col %	71.4	40.0	67.5
TOTAL	35	5	40
Row %	87.5	12.5	100.0
Col %	100.0	100.0	100.0

The mean number of lymph node retrieved was 23.52 ± 6.95 . Though lymph node dissection is less extensive in this modified method in comparison to classical D2 dissection the average lymph node yield is well above 16 which is set limit by NCCN panel for proper surgical staging. The lymph node retrieval was 23.52 and avg no. of positive nodes are 3.42. Thereby prognostication and planning for adjuvant treatment can be done with confidence nullifying stage migration effect (will Rogers phenomenon). Lymph node retrieved was more in case of total gastrectomy but it was above 16 irrespective of type of gastrectomy done. So it can be fairly concluded that the extent of dissection is sufficient for postsurgical pathologic staging.

3.1 SURGICAL MANAGEMENT OF CANCER STOMACH-

Surgery is one of prime modality of treatment in cancer stomach which is obvious from the above discussion. No other therapy provides immediate relief from symptoms or provides a chance for cure. From literature it is clear that gastrectomy with level 1 clearance of lymph nodes is an adequate surgical procedure. Presently minimal invasive techniques such as EMR, limited gastric resections even ablation procedures are

being evaluated for this stage of disease. But the primary concern for accuracy of diagnosing early gastric cancer preoperatively still remains. But for sure D1 gastrectomy has got curative potential for early gastric cancer.

Extent of lymphadenectomy- Lymphadenectomy is important for adequate staging of the disease and survival as well as recurrence prevention. Single institution studies have suggested that no. of pathological positive nodes is of prognostic importance[9] and analysis of atleast 16 nodes is required for adequate pathological staging[10].Therefore the current AJCC came up with similar recommendation so far as postop pathological staging is concerned. Now coming to the survival part is concerned a few trials need mentioning. The MRC trial of united kingdom is one of them. The post op morbidity and mortality rates are higher for D2 group. The most frequent complication are anastomotic leakage, cardiac complications, respiratory infection. This excessive post op complications were thought to be related to routine distal pancreaticosplenectomy. But the 5yr overall survival rates were similar. So it was presumed that D2 gastrectomy does not provide any significant survival advantage over D1 gastrectomy .Then came the Dutch gastric cancer group trial. which conducted a larger RCT with optimal surgical quality control comparing D1 and D2 lymph node dissection. At 5yr the results were same as that of MRC trial. But at 15yrs follow up OS was 21% for D1 and 29% for D2 gastrectomy which was statistically significant. More so the gastric cancer specific death rate and loco regional recurrences were significantly lower in D2 group. But as the postop morbidity mortality was significantly higher so it was not accepted as the procedure of choice, But the possibility of pancreas and spleen preserving D2 gastrectomy i.e. Modified D2 gastrectomy renewed interest in it. It offered chance of same survival advantage along with much diminished postop complications. Some surgeons have gone a bit ahead Wu et al[11] conducted a RCT comparing D1 with D3 dissection. They have shown that D3 has got survival advantages. But Roggin and Posner [12] after critically reviewing the work shown that there is no statistically significant survival advantages as many of the reported death rate were not related to the cancer recurrences. The Japanese clinical oncology group(JCOG) has similarly investigated an even aggressive surgical approach in a RCT evaluating standard D2 vs. D2 plus PAND (paraortic node dissection) in cases of advanced gastric cancer [13,14].They concluded that there is no survival advantage of PAND at the cost of increased postop morbidity. So the limit of radical surgery has been reached and the pendulum swings back to D2 dissection in clinical settings where it can be safely performed.N3 nodal clearance has shown some advantages only in ca stomach with duodenal infiltration. So in normal scenario modified D2 gastrectomy came into focus. Commonly complications arise during dissection of 10,11d lymph nodes and inadvertent pancreaticosplenectomy are commonly associated. As per Galizia G et al[15] incidence of involvement of 10,11d,12a station in cancer stomach is of order of 5% and 5yr survival associated with it is approximately 0%.So there seems to be no justification of removing them routinely.Similarly shmuel Avital and Baruch Shpitz in there treatise THE ROAD TO MODIFIED D2 GASTRECTOMY- have mentioned that routine dissection of 10 and 11d nodes can be omitted during D2 gastrectomy as a means of modification.

The modifications proposed in accordance to the above literature are

- 1.No routine dissection of level 10,11d nodes
- 2.Pancreaticosplenectomy with clearance of level 10,11d nodes are to be done only if they are directly involved by tumour or there is gross disease at these sites.
- 3.Site specific modification except dissection of 10,11d nodes.

V. Conclusion

Modified D2 gastrectomy is recommended as a procedure in cancer stomach wherethere is a need for lymphnode dissection apart from early gastric cancer. Proper D2 gastrectomy with pancreaticosplenectomy should be done when there is direct involvement of the organs by the tumour or gross disease at splenic hilum .Properly performed modified D2 gastrectomy should have more than 16 lymphnodes on subsequent pathological examination of the surgical specimen.

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