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EVALUATION OF THE SURVIVAL AND PROGNOSTIC FACTORS IN PATIENTS UNDERGOINIG D1 AND D2 RESECTION IN GASTRIC CANCER

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ABSTRACT

BACKGROUND: The incidence of gastric cancer is continuing to fall with the reduction exclusively affecting carcinoma arising in the body of the stomach and distal stomach. In contrast, the incidence in the proximal stomach, particularly the oesophago-gastric junction, appears to be increasing. Carcinoma of the distal stomach and body of the stomach is most common in low-socioeconomic groups, whereas the increase in proximal gastric cancer seems to affect principally higher socio-economic groups. This clinical study is undertaken to find the survival and prognostic factors in patients undergoing D1 resection and D2 resection.

AIM AND OBJECTIVE:

1. To find out the survival rate of D1 and D2 resection.
2. To determine the operative morbidity in D1 and D2 resection.
3. To determine the operative mortality in D1 and D2 resection.
4. To study the possible prognostic factors of D1 and D2 resection.
5. To study relationship between age, sex, location of tumour, size, stage and survival rate in D1 and D2 resection.
6. To compare the data with other data found in the literatures

PATIENTS AND METHODS: A total of 220 patients with histologically proven gastric adenocarcinoma were admitted to various surgical wards of M.K.C.G. Medical College and Hospital, Berhampur, Odisha during the study period (June 2022 – June 2024). Out of these 220 patients 130 patients were ineligible by

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staging laparotomy because of advanced disease and 90 patients were included randomly into the study group. All patients were admitted to the surgery indoor of M.K.C.G. Medical College Hospital. After a detail history, proper consent and thorough laboratory investigation, cardiological and pre-anaesthetic check-up as mentioned under CASE REPORT FORM (CRF) were operated.

INCLUSION CRITERIA

- Patients enrolled in the study were to have histologically proven admitted to Surgical wards of M.K.C.G. Medical College & Hospital, Berhampur, Odisha.
- Who fell within the UICC TNM cancer stages I to III after laparoscopy.

EXCLUSION CRITERIA

- Young (< 20 years) patients
- Co-existing cancer
- Serious co-morbid cardiorespiratory disease
- Distant metastasis
- Previous gastric surgery
- Patients not willing for the operation.

RESULTS: Out of 45 patients undergoing D1 resection shows 25 patients (56%) had gastric cancer at antrum, 10 patients (22%) at cardiac, 8 patients (18%) at body and 2 patients (4%) at CMA. Out of 45 patients undergoing D2 resection shows 28 patients (62%) had gastric cancer at antrum, 8 patients (18%) at cardiac, 6 patients (13%) at body and 3 patients (7%) at CMA. There is not significant increase in the survival after D2 resection as compared to D1 resection (89% vs. 87%; x2 = 0.1036). The survival rate after D1 resection is better in lesion of size <2 cm and >5 cm but reverse in lesion of size 2-5 cm. There is not much difference between the mortality rate after D1 resection (11%) and D2 resection (13%) i.e. the mortality rate following D1 resection and D2 resection are similar ($x^2 = 0.1036$; $p = 0.05$).

CONCLUSION: The incidence of distal gastric is decreasing and proximal gastric cancer is increasing. This trend is not evident in the Asian population. Most patients present in late stage of disease in our study. The mortality rate following D1 resection and D2 resection are similar. Overall morbidity following D1 resection is less than D2 resection. There is no difference in survival rate between D1 and D2 resection. Extent of lymphadenectomy is controversy and need not always go for D2 resection.

INTRODUCTION:

Gastric cancer has been one of the leading causes of cancer - related mortality in the world for the past century and is currently the second most common cancer worldwide after lung cancer.[1]The incidence of gastric cancer is continuing to fall with the reduction exclusively affecting carcinoma arising in the body of the stomach and distal stomach. In contrast, the incidence in the proximal stomach, particularly the oesophago-gastric junction, appears to be increasing.[2] Carcinoma of the distal stomach and

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body of the stomach is most common in low-socioeconomic groups, whereas the increase in proximal gastric cancer seems to affect principally higher socio-economic groups.[2,3]

In general, gastric cancer is a disease of the elderly and the M: F:2:1. It is twice as common in black as in white with a similar sex ratio (M: F:2:1).[3]Gastric cancer is more common in patients with pernicious anaemia, blood group A or a family history of gastric cancer.[3]Environmental factors appear to be more related etiologically to the intestinal form of gastric cancer than the more aggressive diffuse form.[3]

The most useful classification of gastric carcinoma is the Lauren classification: Intestinal cancer and Diffuse cancer.[2,3] Japanese classification: Early gastric cancer and advanced gastric cancer.[2,3]Early gastric can be defined as cancer limited to the mucosa and submucosa with or without lymph node involvement. Advanced gastric cancer involves the muscularis propria of the stomach irrespective of lymph node involvement.[2,3,4]Tumours of the cardia and proximal stomach account for 35% to 50% of all gastric adenocarcinoma.[2] '

Early gastric cancer seldom produces symptoms, and when it does, they are usually non-specific. Consequently, nearly 80% - 90% of patients are initially seen with locally advanced or metastatic diseases.[5]

Different ways of spreading of gastric cancer like direct spread, lymphatic spread, blood born metastasis spread and transperitoneal spread. Lymphatic spread of the stomach is formed from two networks: intrinsic and extrinsic. Intrinsic network involves the submucosal lymphatic plexus. Extrinsic lymphatic vessels of the stomach follow the gastric veins.[6]

Surgery in the only treatment of gastric carcinoma. The surgical objective should be to remove the tumour, an adjacent uninvolved margin of stomach and duodenum, the regional lymph nodes, and if necessary, portion of involved adjacent organs. The proximal margin should be a minimum of 5cm from the gross tumour.

The extent of lymph node involvement dissection is indicated by the destination 'D'. [3,6]D0 dissection refers to a (typical palliative) resection in which no effort is made to resect lymphnodes.D1 (Limited lymphadenectomy) dissection includes only the peri gastric nodes usually 3 cm of the stomach (station 1 to 6) or all N1 nodes removed en bloc with the stomach.D2 (Systemic lymphadenectomy) dissection includes the lymph nodes along the common hepatic, left gastric, celiac and splenic arteries, as well as those in the splenic hilum, in addition to peri gastric nodes farther than 3 cm from the primary tumour, along with omentectomy (station 7 to 11) i.e. all N1 and N2 nodes removed enbloc with the stomach.D3 (Extended lymphadenectomy) dissection includes additional nodes within the porta hepatic and adjacent to the aorta (station 12 to 16) and a more radical en bloc resection including the third tier nodes.

This clinical study is undertaken to find the survival and prognostic factors in patients undergoing D1 resection and D2 resection.

AIM AND OBJECTIVE OF THE STUDY:

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5. To study relationship between age, sex, location of tumour, size, stage and survival rate in D1 and D2 resection.
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- Co-existing cancer
- Serious co-morbid cardiorespiratory disease
- Distant metastasis
- Previous gastric surgery
- Patients not willing for the operation.

RESULTS AND DATA ANALYSIS:

Table-1: SEX DISTRIBUTION

Sex	D1 Surgery	D2 Surgery	Total
Male	32 (71)	35 (78)	67 (74)
Female	13 (29)	10 (22)	23 (26)
Total	45 (100)	45 (100)	90(100)

Figures are number of patients; percentage are in parentheses.

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The above table shows out of 45 patients undergoing D1 resection 32 (71%) were male and 13 (29%) were female. Out of 45 patients undergoing D2 resection 35 (78%) were male and 10 (22%) were female. The ratio of male and female is 3:1.

Table-2: RELATION BETWEEN SEX AND SURVIVAL

Sex	D1 Surgery	D2 Surgery	Total
Male	29 (91)	31 (89)	60 (90)
Female	11 (85)	8(80)	19 (83)
Total	40 (89)	39 (87)	79 (88)

Figures are number of patients; percentage are in parentheses.

The above table shows survival rate in male after D1 resection is 91% and after D2 resection is 89%. In female the survival rate after D1 resection is 85% and after D2 resection is 80%. Overall, the survival rate of male is 90% and female is 83%. Though overall incidence of carcinoma stomach is 3 times greater in males than females in the study, the survival rate is also better in male than female.

Table-3: AGE DISTRIBUTION

Age (Yrs.)	D1 Resection	D2 Resection	Total
<40	4 (9)	5(11)	9(10)
40-50	5(11)	6(13)	11(12)
50-60	22 (49)	21 (47)	43 (48)
60-70	10 (22)	8(18)	18(20)
>70	4(9)	5(11)	9(10)
TOTAL	45 (100)	45 (100)	90 (100)

Figures are number of patients; percentage are in parentheses.

The above table shows maximum number of patients undergoing D1 and D2 resection was in the age group 50 - 60 years (48%). The age of the patients in this study undergoing D1 and D2 resection ranged between 36-86 years with median age of 57 years in D1 resection and 54 years in D2 resection. The mean age of these patients undergoing D1 and D2 resection were 62 ± 2 and 59 ± 3, respectively.

Table-4: RELATION BETWEEN AGE AND SURVIVAL

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Age (Yrs.)	D1 Resection	D2 Resection	Total
<40	4(100)	5 (100)	9(100)
40-50	5(100)	6 (100)	11 (100)
50-60	21 (95)	20 (95)	41(95)
60-70	8(80)	6(75)	14 (78)
>70	2(50)	2(40)	4(44)
Total	40 (89)	39 (87)	79 (88)

Though overall survival rate due to carcinoma stomach is greater in <50 years age group i.e. 100% as against 95% in 50 - 60 yrs., 78% in 60 - 70 yrs., 44% in >70 yrs., there is not much difference in survival rate after D1 resection and D2 resection, i.e. D2 resection does not increases the survival rate than D1 resection. The survival rate decreases with increase in age. Thus, younger the patient better is the prognosis.

Table-5: LOCATION OF GASTRIC CANCER IN STOMACH

Location Of Gastric Cancer	D1 Resection	D2 Resection	Total
CARDIAC (C)	10 (22)	8(18)	18(20)
BODY (M)	8(18)	6(13)	14 (16)
ANTRUM (A)	25 (56)	28 (62)	53 (59)
CMA	2(4)	3(7)	5(6)
TOTAL	45 (100)	45 (100)	90 (100)

Figures are number of patients. percentage are in parentheses.

The above table shows maximum number of patients present gastric cancer at antrum i.e. 53 (59%). Out of 45 patients undergoing D1 resection shows 25 patients (56%) had gastric cancer at antrum, 10 patients (22%) at cardiac, 8 patients (18%) at body and 2 patients (4%) at CMA. Out of 45 patients undergoing D2 resection shows 28 patients (62%) had gastric cancer at antrum, 8 patients (18%) at cardiac, 6 patients (13%) at body and 3 patients (7%) at CMA.

Table-6: RELATION BETWEEN LOCATION OF GASTRIC CANCER ANDSURVIVAL

Location Of Gastric Cancer	D1 Resection	D2 Resection	Total
CARDIAC (C)	8(80)	6(75)	14 (78)

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BODY (M)	7(88)	5(83)	12 (86)
ANTRUM (A)	24 (96)	26 (93)	50 (94)
CMA	1(50)	2(67)	3(60)
TOTAL	40 (89)	39 (87)	79 (88)

Figures are number of patients; percentage are in parentheses.

Overall survival rate is better in case of antral growth (94%) as against 86% in body, 78% in cardiac and 60% in CMA. There is not significant increase in the survival after D2 resection as compared to D1 resection (89% vs. 87%; x 2 = 0.1036). Thus, the distal growth has better prognosis than proximal growth.

Table-7: STAGES OF GASTRIC CANCER

Primary Tumor	D1 Surgery	D2 Surgery	Total
T1	5(11)	3(7)	8(9)
T2	11 (25)	15 (33)	26 (29)
T3	28 (62)	22 (49)	50 (56)
T4	1(2)	5(11)	6(6)

Figures are number of patients. percentage are in parentheses.

The above table shows that most common presentation is T3 i.e. 50 no. of patients (56%) as compared to T1 (8; 9%), T2 (26; 29%), and T4 (6; 6%). Most of the patients were diagnosed in T3 and least in T1 and T4 as reported in literature.

Table-8: RELATION BETWEEN NODAL STATUS AND SURVIVAL

Regional Nodal Status	D1 Surgery	D2 Surgery	Total
N0	10(100)	12 (100)	22(100)
N1	17 (94)	13 (86)	30(91)
N2	13 (76)	14 (78)	27 (77)
N3	0	0	0

Figures are number of patients; percentage are in parentheses.

The above table shows that the survival rate of N2 is 77% against NO (100%), which clearly shows decrease in survival rate with increase in N stage. Thus, the early N stage shows the better prognostic factor.

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The survival rate in D1 is good than D2 but the values show almost similar indicating there is no difference in survival rate between D1 and D2 resection.

Table-9: RELATION BETWEEN TYPES OF SURGERY AND SURVIVAL

	D1 Resection	D2 Resection	Total
Subtotal Gastrectomy	37	35	72
Total Gastrectomy	3	4	7
Splenectomy	1	1	2
Distal Pancreatectomy + Splenectomy	0	0	0

Figures are number of patients; percentage are in parentheses.

The above table shows that the survival rate after distal pancreatectomy with splenectomy and only splenectomy is very low. Thus, it shows that different types of surgery performed indicate the prognostic factor.

Table-10: POST-OPERATIVE COMPLICATION AND MORBIDITY

	D1 Resection	D2 Resection	Total
Anastomotic Leak	4	5	9
Duodenal Blow Out	2	2	4
ARDS	2	4	6
Wound Infection	3	2	5
Pancreatic Fistula	0	2	2
Subphrenic Collection	1	1	2
Total	12 (27)	16 (36)	28(31)

Figures are number of patients. percentage are in parentheses.

The above table shows that anastomotic is the most common morbidity following both D2 resection (5/9; 56%) and D1 resection (4/9; 44%). Overall morbidity following D1 resection (12/45; 27%) is less than D2 resection (16/45; 36%). Pancreatic fistula is the only post-operative complication after D2 resection. ARDS is more common in D2 resection (4/6; 67%) than D1 resection (2/6; 33%).

Table-11: RELATION BETWEEN HISTOLOGICAL TYPES AND SURVIVAL

Histological Types	D1 Resection	D2 Resection	Total
Intestinal	37	35	72
Diffuse	3	4	7

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Total	40 (89)	39 (87)	79 (88)

Figures are number of patients; percentage are in parentheses.

The above table shows that survival rate is greater in intestinal type (91%) than Diffuse type (64%). This shows different type of histology is an important prognostic factor.

DISCUSSION: In this study maximum number of patients undergoing D1 and D2 resection are in the age group 50 - 60 years (48%), while in Cuschieri et al.[7] maximum number of patients were in the age group >70 years (40.5%). Overall survival rate due to carcinoma stomach is greater in <50 years age group i.e. 100% while in the study by P Edwards et al.[8] the 5 - year survival rate of <60 yrs. was 100%. P Edwards et al.[8] undergo either a D1 gastrectomy (North Gwent (RJ), n-36, median age 76 years, 21 m) or a modified D2 gastrectomy (South Gwent (WL), n=82, 70 years, 57 m). This disparity is probable explained by the early presentation and proper investigation.

In the present study male to female ratio is 3:1, where as in study conducted by Songun L. et al.[9] 1.3: l. The study shows survival rate in male after D1 resection is 91% and after D2 resection is 89%. In female the survival rate after D1 resection is 85% and after D2 resection is 80% whereas in Cuschieri et al.[7] study survival rate in after D1 resection is 29% (male) and 45% (female) and after D2 resection is 28% (male) and 44% (female).

In the present study maximum number of patients presenting gastric cancer are at antrum i.e. 53 (59%) whereas many studies show tumours of the cardia and proximal stomach account for 35% to 50% of all gastric adenocarcinoma. In my study overall survival rate is better in case of antral growth (94%) as against 86% in body, 78% in cardiac and 60% in CMA.

The survival rate after D1 resection is better in lesion of size <2 cm and >5 cm but reverse in lesion of size 2-5 cm. Though overall survival rate due to carcinoma stomach is greater in lesion of size <2 cm i.e. 95% as against 94% in lesion of size 2 - 5 cm and 73% in lesion of size >5 cm.

MORTALITY RATE:

The present study shows that there is not much difference between the mortality rate after D1 resection (11%) and D2 resection (13%) i.e. the mortality rate following D1 resection and D2 resection are similar ($x^2 = 0.1036$; $p = 0.05$).). P Edwards et al.[8] reported operative mortality in the two groups of patients was similar (D1 8.3% vs. D2 7.3%, x 2 = 0.286, DF 1, P=0.593). The other studies also show similar pattern.

MORBIDITY RATE

Jan Kulig et al. (2005) reported the overall morbidity rates were comparable in D2 (27.7%; 95% confidence interval [Cl], 20.3-35.1). In my study anastomotic leak is the most common morbidity following both D2 resection (5/9; 56%) and D1 resection (4/9; 44%). Overall morbidity following D1 resection (12/45; 27%) is less than D2 resection (16/45; 36%). Bonenkamp J.J.[10] reported that patients in the D2

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group had a significantly higher rate of complications than did those in the D1 group (43% vs. 25%, P<0.001).

POST OPERATIVE COMPLICATION

In the present study pancreatic fistula is the only post-operative complication after D2 resection. ARDS is more common in D2 resection (4/6; 67%) than D1 resection (2/6; 33%). In the present study anastomotic is the most common morbidity following both D2 resection (5/9; 56%) and D1 resection (4/9; 44%). Overall morbidity following D1 resection (12/45; 27%) is less than D2 resection (16/45; 36%).

Bonenkamp J.J[10]. reported that patients in D2 group had a significantly higher postoperative death (10% vs. 4%, P= 0.004), and longer hospital stays (median, 16 vs. 14 days; P<0.001). Memonet al.[11] reported that 60% reduction in anastomotic breakdown (OR 0.40, Cl 0.25, 0.63, P = 0.0001) of D1 over D2 resection.

SURVIVAL

In the present study survival rate of D1 is 40/45 (89%) and D2 is 39/45 (87%), which shows similarity in survival rate.

Bonenkamp J.J[10]. reported five-year survival rates were similar in the two groups: 45% for the D1 group and 47% for the D2 group (95% confidence interval for the difference, -9.6% to +5.6%).

Cuschieriet al.[7] reported the 5-year survival rates were 35% for D1 resection and 33% for D 2 resection (difference -2%, 95% Cl = -12%-8%).

P Edwards et al.[8] reported overall cumulative survival at 5 years was 32% after D1 gastrectomy compared to 59% after D2 gastrectomy (x 2 = 4.25, DF 1, P=0.0392).

Memon et al.[11] (2011) reported that there was no significant difference in the 5-year survival (OR 0.97, Cl 0.78, 1.20, P = 0.7662) between D1 and D2 gastrectomy patients.

In the present study survival rate is better in intestinal (72%) variety than diffuse (7%). D. Roukos et al.[12] in 1995 reported that D2 total gastrectomy carried an increased overall morbidity risk and did not improve survival in patients with intestinal or diffuse type carcinoma.

CONCLUSION:

- Surgery is the only modality which offers cure.
- The incidence of distal gastric is decreasing and proximal gastric cancer is increasing. This trend is not evident in the Asian population.
- Most patients present in late stage of disease in our study.
- The extent of gastrectomy need not always be total and depends upon site of tumour.
- The mortality rate following D1 resection and D2 resection are similar.
- Overall morbidity following D1 resection is less than D2 resection.
- Routine spleen and pancreas resection for D2 dissection is not indicated. Extended organ resections are indicated only when there is direct infiltration. Gastric cancer is often asymptomatic till it is

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advanced. This results in the high disease specific mortality. This makes it imperative to subject all patients with dyspepsia and upper abdominal symptoms to an Upper GI endoscopy.

- A preoperative laparoscopy is mandatory as it can identify peritoneal metastases not picked up by other staging investigations.
- There is no difference in survival rate between D1 and D2 resection.
- Extent of lymphadenectomy is controversy and need not always go for D2 resection.
- Management of gastric cancer is a challenge and surgery offer a reasonable chance of survival in these patients.

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