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Correlation Between Clinical and Pathological Factors of Gastric Cancer - A Retrosoective Study in A Tertiary Care Hospital

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Abstract
Gastric cancer is a complex and heterogeneous disease, ranking as the fifth most prevalent cancer and the third leading cause of cancer-related mortality globally in 2018. A deeper understanding of the proliferative and apoptotic changes in gastric cancer, along with the identification of novel biomarkers for cancer detection and therapeutic targets, could advance diagnosis, treatment, and prevention efforts. Previous research indicates that 0.7 million individuals succumb to gastric cancer annually, with approximately 70% of cases exhibiting a significantly higher mortality rate compared to other malignancies, such as liver and breast cancers. This retrospective study was conducted from July 2023 to November 2024 at a tertiary care center in the PES Institute of Medical Sciences and Research in Andhra Pradesh. The inclusion criteria comprised patients aged = 18 years, histologically confirmed cases of gastric adenocarcinoma, patients who underwent gastrectomy (partial/total) or biopsy for unresectable tumors, and patients who provided informed consent. Of the 80 patients, 50 (62.5%) were male and 30 (37.5%) were female; 50 (62.5%) underwent distal gastrectomy, 5 (6.25%) underwent proximal gastrectomy through the abdomen, 15 (18.75%) had proximal gastrectomy via the thorax, and 10 (12.5%) underwent complete gastrectomy. Distal and complete gastrectomy demonstrated greater lymph node clearances than the other surgical techniques. Postoperative complications occurred in eight patients (10%), including gastric retention (20%), anastomotic leakage (10.5%), incision infection (9.25%), wound disruption (5.25%), and thoracic cavity effusion (5.25%). Complications were more prevalent in individuals undergoing proximal gastrectomy through the abdomen (30%). Overall, the mortality rate was 1.25% (1/80). The diameter of the neoplasm was associated with the depth of infiltration and the rate of lymphatic metastasis, although hemoglobin level was not. Twelve (15%) of 80 patients had early gastric cancer (EGC) with lymph node metastases. This retrospective investigation found that the clinicopathological characteristics of gastric cancer varied according to sex, location, and tumor diameter.

INTRODUCTION

Gastric cancer is a multifaceted and heterogeneous disease, scoring as the fifth most common cancer and the third leading cause of cancer-related deaths worldwide in 2018. Enhanced understanding of proliferative and apoptotic alterations in stomach cancer, alongside the identification of novel biomarkers for cancer detection and therapeutic targets, could facilitate progress in diagnosis, treatment, and prevention. Previous research indicate that 0.7 million individuals succumb to stomach cancer annually, with around 70% of cases exhibiting a significantly elevated death rate compared to other malignancies, including liver and breast cancers[1,2]. The incidence and mortality rates of stomach cancer vary considerably, exhibiting substantial disparities between Western and Eastern nations[3].

Despite the identification of several risk factors in the study, the demographic and clinicopathological characteristics of stomach cancer largely remain elusive. Research indicates that survival rates are diminished among smokers, individuals who consume alcohol, obese individuals, and those experiencing esophageal acid reflux symptoms, particularly when they consume pickled, salty, and smoked foods[5-6]. Research indicates that the incidence rate of stomach cancer is significantly correlated with age, especially in individuals aged 50 to 70 years. Reports indicate that gastric carcinoma is a primary contributor to cancer-related expenses; yet, the total patient count and prognosis continue to provide significant challenges for healthcare systems[7,9].

Surgery along with chemotherapy is currently the predominant treatment for gastric cancer. Surgery is the predominant treatment for stomach cancer; yet, the survival rate for patients undergoing this procedure remains quite low. Prior studies indicate that individuals with advanced gastric cancer had a mean survival duration of 12 months[10,11]. Consequently, evaluating the situation in real time, calculating the prognostic risk post-therapy, and formulating an appropriate postoperative care plan have become critical components of gastric cancer management[12,13]. Numerous clinicopathological indicators, including as clinical stage, tumour size, infiltration depth, Lauren classification, and lymph node metastasis rate, can influence the prognosis of patients with gastric cancer[14,15]. Due to the intricate interrelation of various variables, identifying the most pertinent and independent factors connected to prognosis is essential yet challenging. This research was conducted to achieve a comprehensive understanding of gastric carcinoma and to identify independent risk factors in patients with gastric cancer.

Aims and Objectives: To analyze the correlation between clinical presentation and pathological factors in patients with gastric cancer and to assess their impact on disease prognosis.

To correlate tumor location and histological subtype with lymph node involvement and depth of invasion.

MATERIALS AND METHODS

This study was a retrospective study conducted at from July 2023 to November 2024 at a tertiary care center in PES institute of medical sciences and research at Andhra Pradesh. Tudy Setting. Inclusion Criteria are Patients aged 18 years and above, Histologically confirmed cases of gastric adenocarcinoma, Patients who underwent gastrectomy (partial/total) or biopsy for unresectable tumors, Patients who provided informed consent. Exclusion Criteria are Patients with recurrent gastric cancer, Patients who received neoadjuvant chemotherapy or radiotherapy prior to surgery, Cases with incomplete clinical or pathological data, Patients unfit for surgery or lost to follow-up.

Clinical Evaluation-Detailed history regarding symptoms (pain, weight loss, vomiting, dysphagia, etc.). Documentation of demographic data (age, sex, socioeconomic status). Assessment of comorbidities (e.g., diabetes, hypertension).Clinical staging with upper GI endoscopy, contrast-enhanced CT abdomen.Routine blood investigations.

Surgical Management:

- Patients underwent subtotal or total gastrectomy depending on tumor location and extent.
- Lymphadenectomy was performed according to D1/D2 dissection protocols.
- For unresectable tumors, endoscopic biopsy specimens were obtained.

Pathological Assessment:

- Gross examination of the resected specimen to note tumor size, location, and macroscopic type (Borrmann classification).
- Histopathological examination to assess:
- Tumor differentiation (well, moderately, poorly differentiated).
- Depth of invasion (T stage).
- Lymph node involvement (N stage).
- Distant metastasis if present (M stage).
- Presence of lymphovascular invasion (LVI) and perineural invasion (PNI).
- Histological subtype (intestinal or diffuse type as per Lauren classification).

Data Collection and Correlation Parameters:

- Clinical parameters: age, gender, symptoms, comorbidities.

- Pathological parameters: tumor size, histological type, grade, TNM staging, LVI, PNI.
- Correlation between clinical staging and pathological staging.
- Correlation between pathological factors and clinical outcomes (recurrence, survival if follow-up is available).

Data collected were entered into Microsoft Excel and analyzed using SPSS version 22.0. Descriptive statistics, including means and percentages, were used to summarize the data. The outcomes were compared and analyzed to determine the effectiveness of the LIFT technique.

RESULTS AND DISCUSSIONS

80 patients, 50 (62.5%) were male and 30 (37.5%) were female; 50 (62.5%) had distal gastrectomy, 5 (6.25%) had proximal gastrectomy through belly and 15 (18.75%) had proximal gastrectomy via thorax, and 10 (12.5%) had complete gastrectomy. Distal and complete gastrectomy exhibited greater lymph node clearances than the other operating techniques. Postoperative problems occurred in 8 patients (10%), including stomach retention (20%), anastomotic leakage (10.5%), incision infection (9.25%), wound disruption (5.25%), and thoracic cavity effusion (5.25%). The complication was particularly prevalent in individuals undergoing proximal gastrectomy through abdomen (30% of patients) (Table 1). Overall, the mortality rate was 1.25% (1/80).

The diameter of the neoplasm was linked to the depth of infiltration and the rate of lymphatic metastasis, although haemoglobin was not. 12 (15%) of the 80 patients had early gastric cancer (EGC) with lymph node metastases. These patients had 4%-5% fewer positive lymph nodes than advanced gastric cancer patients (Table 2). In a linear regression analysis, the tumor's age and diameter were adversely linked with preoperative haemoglobin (P0.001). The tumor's diameter associated positively with age and the number of positive lymph nodes (P0.01).

Gastric cancer is still one of the leading causes of mortality. Although the aetiology of stomach cancer is unknown, studies have revealed that numerous variables relate to its growth, metastasis, and recurrence following surgery[16-18]. Recent research suggests that Helicobacter pylori infection may play an essential role in the development of stomach cancer[19,20]. Helicobacter pylori infection has been linked to acute and chronic gastritis, intestinal metaplasia, dysplasia, and finally gastric cancer.

Some aberrant gene expression[21,22] is implicated in gastric cancer carcinogenesis, such as the matrix metalloproteinases gene, the p53 gene, and the dinucleotide repeat sequence gene.

Abnormal trace element levels may potentially be a risk factor for gastric cancer[23,24]. Because of infrequent metastases in lymph nodes, early gastric cancer (EGC) has been deemed a kind of gastric malignancy with a comparatively excellent long-term prognosis compared to advanced gastric cancer[25,26]. In Japan, EGC is detected in 30%-50% of cases, owing in part to the widespread use of endoscopy and mass screening programs[27,28]. The percentage of EGC identified in all patients in this research is 65 (16.25%), which is comparable to the rate in the United States and Europe[29,30]. Endoscopic therapy has grown in popularity as an alternative to surgical treatment for individuals with EGA with the expectation of improving quality of life (QOL)[31]. However, because of the existence of metastases in 10%-20% of cases and the absence of lymph node metastasis, the justification for a conventional resection with systematic lymphadenectomy remains debatable[32].

Different surgical methods were used depending on the location of the tumour. In our research, complete gastrectomy had the most lymph nodes removed, followed by distal gastrectomy, which may be connected to removal of all or most of the omentum. The number of lymph nodes removed after proximal gastrectomy by trans abdominal was comparable to that of transthorax. In proximal gastrectomy by trans thorax, there was a shorter operating time and a reduced incidence of complications, whereas in proximal gastrectomy via trans abdomen, there was a lower blood transfusion. Their postoperative hospitalisation stays and positive resection margins were the same. Complications differed depending on the operation: stomach retention was prevalent in distal gastrectomy, but thoracic effusion and lung infection were more common in whole gastrectomy.

Although the overall incidence of gastric cancer in the Western world has remained steady, there is a well-documented shift from distal to proximal lesion. The clinical significance of this change is that individuals with proximal gastric cancer have a poorer overall prognosis than those with distal tumour. This disparity in survival might be ascribed to several variables, including higher biologic aggressiveness of proximal tumours and advanced stage of presentation[33,34].

A greater frequency of positive lymph nodes was discovered in gastric cancer situated on the corpus and the fundus in the research, which might be related to the bigger diameter of the tumour in the corpus and the fundus. Larger tumours had poorer differentiation, deeper infiltration, and a greater incidence of positive lymph nodes. The prognosis seems to be worse in these people. The current findings also reveal that females had more proximal lesions, poor

Table 1: Comparison of operation manner with numbers of lymph nodes, time for operation, amount of blood transfusion during operation, hospitalization days and complications (x±s)

No of operation	lymph nodes	operation (hours)	blood transfusion (mL)	tion (days)	stays	on (%)
Distal gastrectomy	50	11.1±0.2*	3.7±0.04	402.65±14.77*	15.8±0.54	8.5
Proximal gastrectomy via abdomen	5	8.2 ±0.52	4.32±0.1*	609.36±40.39*	17.8±1.5	14*
Proximal gastrectomy via thorax	15	8.5±0.6	3.35±0.01	749.21±17.98	14.8±0.6	1.7
Total gastrectomy	10	13.2±0.2*	4.55±0.3*	747.03±44.69	19.1±1.3	12.1
P		<0.0001	<0.0001	<0.0001	>0.05	<0.001

**Compared with other operative approaches*

Table 2: Comparison of depth of infiltration with age, diameter, hemoglobin, and lymphatic metastasis rate (x±s)

Depth of invasion	N (80)	Age (yrs)	Diameter	Hemoglobin(g/L) (cm)	Lymphatic metastasis rate (%)
pT1(m)	14	52.1 ±1.7	2.38 ± 0.3	12.33 ± 0.5	3.17 ± 0.5
pT1(ms)	7	56.2±1.3*	2.58 ± 0.6	11.77± 0.4*	4.27 ± 1.0
pT2	8	56.9±1.4*	2.96 ± 0.5	11.87 ± 0.3*	8.73 ± 1.3*
pT3	9	57.6±1.3*	4.32 ± 0.4*	11.85 ± 0.3*	18.31 ± 2.5*
pT4	42	58.5±0.2*	5.42 ± 0.2*	11.64 ± 0.3*	34.52 ± 1.4*

Table 3: Comparison of differentiation with age, diameter, hemoglobin and lymphatic metastasis rate (x±s)

	N (80)	Age (yrs)	Diameter (cm)	N (80)	Age (yrs)
I	7	60.9±1.3	3.43±0.4	10.7±0.5	10.4±3.2*
II	10	59.9±0.5	3.97±0.5	11.6±0.3	24.2±2.2
III	26	60.1±0.3	4.20±0.2	11.3±0.5	20.9±1.5
IV	37	54.1±0.3*	4.82±0.1*	11.6±0.1*	30.9±1.3*
P		< 0.0001	= 0.002	= 0.01	< 0.0001

Table 4: Multi-factors analysis of lymphatic metastasis in gastric patients

Related factors	Regression coefficient	Standard error	Standard regression coefficient	P
Constant	-22.4	7.5		0.001
Age	-0.0081	0.085	-0.27	0.412
Sex	-6.642	2.051	-0.077	0.001
Tumor location	2.425	0.692	0.074	0.003
Diameter of tumor	2.465	0.528	0.152	0.0001
Depth of invasion	7.231	0.775	0.279	0.0001
Differentiation	3.695	1.136	0.087	0.001

differentiation, and a greater >35% frequency of positive lymph nodes than males. The number of metastatic lymph nodes affects the long-term prognosis following curative resection[35,36]. As a result, prolonged lymphadenectomy is recommended in advanced stomach cancer[37]. Our multivariate analysis revealed that the depth of invasion was the most significant factor determining lymph node metastasis among six clinicopathologic factors (age, sex, tumour site, tumour diameter, depth of invasion, and differentiation).

CONCLUSION

This retrospective investigation found that clinic-pathological characteristics of stomach cancer differed by gender, location, and tumour diameter. The depth of invasion is particularly essential in lymph node metastasis. Females with stomach cancer may have a poorer prognosis than men. Because lymph node metastases may develop in individuals with EGC, radical gastrectomy with lymphadenectomy may be required in all stages of gastric cancer.

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