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# The Analysis of Causes of Hospital Readmissions in The Patients Who Underwent Gastrectomy Because of Gastric Cancer in Van Province

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**ABSTRACT**

It was aimed to analyze the causes of hospital readmissions within the first 30 days after gastrectomy in the patients diagnosed with gastric cancer.

Data of 300 patients who underwent total gastrectomy or subtotal gastrectomy for gastric cancer between 01.01.2018 and 31.05.2022 were retrospectively analyzed using the hospital automation system. Patients aged 18-85 years with or without neoadjuvant treatment were included in the study. SPSS software package was used to make comparisons between patient data.

One hundred ten patients (36.7%) were female, 190 patients were (63.3%) male and the mean age of the patients was 61. Within the first 30 days after gastrectomy and discharge, 65 patients readmitted to the hospital. The rate of hospital readmissions after gastrectomy was found to be 21.6%. The analysis of readmission causes revealed that headache, chest pain and abdominal pain were the most common rationales for readmissions. In the present study, the causes of readmissions were classified under three titles as pain, gastrointestinal symptoms and surgical site complications. No statistically significant relationship was found between the causes of readmissions and patient age, patient gender, type of the performed surgery and the fact whether neoadjuvant therapy was received ($p>0.05$).

We conclude that providing a postoperative high quality healthcare for recovery in the patients who underwent gastrectomy will reduce the postoperative readmissions rates.

**Keywords:** Gastric cancer, gastrectomy, readmissions

## Introduction

Gastric cancer which is a prevalent malignancy of the gastrointestinal system accounts for 10% of all the cancer-related deaths and approximately 720,000 individuals die every year because of gastric cancer worldwide (1). According to GLOBOCAN 2020 data, part of the International Agency for Research on Cancer, stomach cancer is the fifth most common cancer worldwide and among men (2,3). Even though, geographical differences may affect its prevalence, it is more commonly seen in the Far East countries such as Japan and China. China reports 410,000 new cases of gastric cancer every year and accounts for 42% of the cases worldwide (4). The prognosis of gastric cancer is usually poor because of delayed diagnosis and advanced status of the diagnosed cases (5).

Gastrectomy combined with lymph node dissections has been accepted as the only radical treatment method for gastric cancer. Postoperative complications commonly develop in the patients that underwent gastrectomy and cause unplanned rehospitalizations in the patients. Unplanned readmissions results in physical and psychological stress and prolongs the length of hospital stay. It also increases treatment costs. It has been reported that medical expenses related with readmissions reached 17.4 billion dollars in 2004 in the United States. This outcome has set unplanned readmissions as an important indicator in the evaluation of healthcare quality worldwide (4). In the present time, numerous observational studies have researched the relationship between the postoperative complications and long-term prognosis after radical gastrectomy (6). Preoperative, peroperative and postoperative care of the patients as well as their care during discharge, patient education and post-discharge follow-ups influence the risk factors for readmissions (7). This situation also affects the quality of life and increases health costs (8).

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The present study aimed to determine the factors related with hospital readmissions after gastrectomy because of malignancy and provide information about the future interventions required to improve the patient care, decrease readmissions and reduce the healthcare costs.

## Material and Method

The present research is a retrospective study that involved the patients with an age range of 18-85 years who underwent total or distal subtotal gastrectomy in the Van Yuzuncu Yil University Dursun Odabas Medical Center General Surgery Department between the dates 01.01.2018 to 31.05.2022. The causes of the patients for hospital readmissions within the first month following discharge were analyzed regarding patient age, patient gender and the facts that whether they received neoadjuvant therapy and that total gastrectomy or distal subtotal gastrectomy was performed. The study involved the patients over 18 years of age. The sampling size of the study was determined by projecting the statistical power (power of the test) as 0.80 (80%) and type I error as 0.05 for each variable. The study sampling included 300 patients. The patients below 18 years of age were not included the study. The patients with gastric cancer who did not undergo surgery and those who underwent gastrectomy due to another reason except gastric cancer were excluded from the study.

The study was carried out after receiving the ethics committee approval from the Non-Invasive Clinical Research Ethics Committee of Van Yuzuncu Yil University Dated 19.08.2022 and Numbered 2022/08-01.

The Institutional Approval dated 21.07.2022 and Numbered 233863 for the use of the hospital automation system was obtained from the Chief Medical Officer Directorate of Van Dursun Odabas Medical Center for using the hospital automation system.

**Statistical Analysis:** Descriptive statistics for continuous variables in our study were calculated as Mean and Standard Deviation. It was expressed as Number and Percentage for categorical variables. The normality distributions of continuous variables were examined with the Kolmogorov Smirnov test (n>50). Chi-square test was used to determine the relationship between categorical variables. The statistical significance level was taken as 5% in the calculations and the SPSS (ver.24) statistical package program was used for the calculations.

## Results

Of the patients included in the study; 63.3% (190) were male while 36.7% (110) patients were female and mean age of the patients was found to be 61.0 years. Of the patients; 29.3% (n=88) underwent distal subtotal gastrectomy while total gastrectomy was performed in 70.7%. Neoadjuvant therapy was administered in 51.3% (n=154) patients whereas 48.7% (n=146) patients received no neoadjuvant therapy. The causes of early readmissions were constituted by headache, abdominal abscess, diarrhea, chest pain, ileus, constipation, abdominal pain, nausea and wound dehiscence in 2.7% (n=8), 0.3% (n=1), 0.3% (n=1), 1.7% (n=5), 0.7% (n=2), 0.7% (n=2), 11.7% (n=35), 0.7% (n=2) and 1.0% (n=3) patients, respectively (Table 1). The causes of early readmissions were distributed into three groups as pain by 16.0% (n=48), surgical site complications (SSC) by 2.0% (n=6) and gastrointestional symptoms (GIS) by 3.0% (n=9) (Table 2).

The analysis of the relationship between the age groups and readmission causes revealed that 9.1%, 9.1% and 9.1% of the patients in the age range of 24-40 years readmitted due to pain, SSC and GIS respectively. Pain, SSC and GIS were reported as the causes of early readmissions in 14.7%, 1.3% and 0.0% of the patients in the age range of 41-55 years respectively. Out of the patients in the age range of 56-65 years; 16.2%, 1.8% and 1.8% of the patients readmitted due to pain, SSC and GIS respectively. Pain, SSC and GIS were the causes of readmissions for 17.5%, 1.9% and 5.8% of the patients in the age range of 66-90 years respectively (Table 1).

Of the male patients, 18.4%, 2.6% and 1.6% readmitted due to pain, SSC and GIS respectively whereas 11.8%, 0.9% and 5.5% of the femal patients readmitted due to the complaints of pain, SSC and GIS respectively (Table 2).

Of the patients who underwent distal subtotal gastrectomy, 21.6% were readmitted due to pain, 1.1% due to SSC and 4.5% due to GIS. Among patients who underwent total gastrectomy, 13.7% were readmitted due to pain, 2.4% due to SSC and 2.4% due to GIS (Table 2).

Among the patients who received neoadjuvant therapy; 19.5%, 1.9% and 1.9% readmitted due to pain, SSC and GIS respectively. Pain, SSC and GIS were the causes for readmissions to the hospital in 12.3%, 2.1% and 4.1% of the patients who received no neoadjuvant therapy, respectively (Table 2). Although, pain was more commonly found in the patients who underwent distal subtotal gastrectomy and those who received neoadjuvant therapy

**Table 1:** Demographic Data and The Causes of Readmissions

| | | n | % |
|---|---|---|---|
| Gender | M | 190 | 63.3% |
| | F | 110 | 36.7% |
| The Performed Surgery | Subtotal Gastrectomy | 88 | 29.3% |
| | Total Gastrectomy | 212 | 70.7% |
| Receiving Neoadjuvant Therapy | Yes | 154 | 51.3% |
| | No | 146 | 48.7% |
| The Cause of Early Readmissions | Headache | 8 | 2.7% |
| | Abdominal Abscess | 1 | 0.3% |
| | Diarrhea | 1 | 0.3% |
| | Chest pain | 5 | 1.7% |
| | İleus | 2 | 0.7% |
| | Constipation | 2 | 0.7% |
| | Abdominal pain | 35 | 11.7% |
| | Nausea | 2 | 0.7% |
| | Reflux | 6 | 2.0% |
| | Wound dehiscence | 3 | 1.0% |
| | None | 235 | 78.3% |
| The Cause of Early Readmissions | Pain | 48 | 16.0% |
| | SSC | 6 | 2.0% |
| | GIS | 9 | 3.0% |
| | None | 237 | 79.0% |
| Age | 24-40 years | 11 | 3.7% |
| | 41-55 years | 75 | 25.0% |
| | 56-65 years | 111 | 37.0% |
| | 66-85 years | 103 | 34.3% |
| | | Mean | SD |
| Age | | 61.0 | 10.7 |

*SSC: Surgical Site Complications; GIS: Gastrointestinal Symptoms

however, this difference was not evaluated to be statistically significant ($p>0.05$). Although, SSC were more commonly found in male patients and those who underwent total gastrectomy however, this difference was not evaluated to be statistically significant ($p>0.05$). Although, GIS are more frequently seen in the patients with the age range of 24-40 years however, this difference was not evaluated to be statistically significant ($p>0.05$).

## Discussion

This study was conducted to investigate the reasons for readmission to hospital within the first 30 days after gastrectomy in patients diagnosed with gastric cancer. Reasons for readmission were compared with age, gender, type of surgery and history of neoadjuvant treatment.

It has been found out in a comprehensive retrospective cohort study that approximately 42% of the postoperative complications develop in the first 30 days after discharge and that this increases the risk for reoperation and mortality more than 3-fold in the surgery patients (7). In another study, 1929 patients were evaluated and the readmission rate was assessed to be 2.70% in the patients (7). Another study has been conducted on 6985 patients and readmission rate was found to be 16.5% (9). The readmission rate was determined to be 11.7% at the postoperative 30th day after gastrectomy in a systematic review and meta-analysis study (10). Studies have reported a re-admission rate of 11.7% after gastrectomy. (11,12). In our study, readmission rate of the patients within the first 30 days after gastrectomy was found to be 21.6%. This higher rate compared with the literature indicated that providing a better care and a closer follow-up to the patients is important as well as we should evaluate our deficiencies in patient care.

Ahmad et al. have found out that the patients who underwent total gastrectomy had the highest readmission rates nearly 2-fold higher than the patients who underwent subtotal gastrectomy or esophagogastrectomy (13). In another study, the readmission rate after total gastrectomy was found to be 8%. (14) In our study, total gastrectomy and

**Table 2.** The Classification of the Causes of Early Readmissions

| | | Pain | | SSC | | GIS | | None | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | *p. |
| Age | 24-40 years | 1 | 9.1% | 1 | 9.1% | 1 | 9.1% | 8 | 72.7% | .280 |
| | 41-55 years | 11 | 14.7% | 1 | 1.3% | 0 | 0.0% | 63 | 84.0% | |
| | 56-65 years | 18 | 16.2% | 2 | 1.8% | 2 | 1.8% | 89 | 80.2% | |
| | 66-90 years | 18 | 17.5% | 2 | 1.9% | 6 | 5.8% | 77 | 74.8% | |
| Gender | M | 35 | 18.4% | 5 | 2.6% | 3 | 1.6% | 147 | 77.4% | .086 |
| | F | 13 | 11.8% | 1 | 0.9% | 6 | 5.5% | 90 | 81.8% | |
| The Performed Surgery | Distal Subtotal Gastrectomy | 19 | 21.6% | 1 | 1.1% | 4 | 4.5% | 64 | 72.7% | .211 |
| | Total Gastrectomy | 29 | 13.7% | 5 | 2.4% | 5 | 2.4% | 173 | 81.6% | |
| Receiving Neoadjuvant Therapy | Yes | 30 | 19.5% | 3 | 1.9% | 3 | 1.9% | 118 | 76.6% | .285 |
| | No | 18 | 12.3% | 3 | 2.1% | 6 | 4.1% | 119 | 81.5% | |

distal subtotal gastrectomy constituted 70.7% and 29.3% of the hospital readmissions respectively.

Advanced age and male gender were found to be associated with readmission in a study that investigated unplanned readmissions after gastrectomy (15), whereas, no significant difference was found between age, gender and readmission in our study ($p>0.05$). Studies have reported abdominal pain, anastomotic leak, and wound infection as the most common causes of return in patients with gastric cancer (5,8,12). It has been observed in a study that the patients most commonly readmitted to the hospital due to postoperative complications such as nausea, acid reflux, diarrhea, abdominal distension and dumping syndrome (15). In our study, the causes of hospital readmission involved headache, chest pain, abdominal abscess, diarrhea, constipation, ileus, abdominal pain, nausea, reflux and wound dehiscence. Although, the patients most commonly readmitted due to the complaint of abdominal pain in our study, this difference was found to be statistically significant ($p>0.05$).

Preoperative nutritional status is crucial in the patients who underwent gastrectomy because of gastric cancer. Specifically, it is indicated with various nutritional status indices such as albumin as well as preoperative poor nutritional status has also been used as an indicator of postoperative complications in the patients who underwent major surgery (11,16). The studies have reported that gastric emptying is the most common cause of hospital readmission (13). This situation has been attributed to experiencing nutritional difficulty due to oral intake intolerance in the patients. Honda et al. have suggested in their study that severe sequelae lead to malnutrition after gastrectomy and therefore recurrent readmissions may occur until the postoperative 6th month (15). The researches have shown that the patients were frequently readmitted due to systemic complications such as pain, nutritional difficulty, pneumonia and hepatic dysfunction (17). In the study of Eroğlu et al. carried on 204 cases, the most frequently seen cause of readmission was found to be abdominal pain by 69 patients (5). In also our study, the most common cause of readmission was abdominal pain by 35 patients.

Studies have identified gastrointestinal complications, surgical infection, malnutrition, increased comorbidity burden, longer length of stay and prolonged operative time as risk factors for readmission in general surgery patients. It has also been reported that postoperative complications are the main factor for readmission in surgical patients (8,11). In the research, the most common infectious diagnoses for readmission were found to be intraabdominal infection, wound infection and anastomotic leak or fistula. The most frequently seen gastrointestinal diagnoses were oral intake intolerance, obstruction and gastrointestinal haemorrhage (11). In another study, surgical site infection and anastomotic leak were the most commonly seen complications (5). In our study, the causes of readmission were classified under three titles as pain, GIS and SSC. Headache, chest pain and abdominal pain were reported under the title of pain, the title of GIS involved diarrhea,

constipation, nausea and reflux while ileus, abdominal abscess and wound dehiscence were identified under the title of surgical complications. We conclude that the patients most commonly admitted due to the complaint of pain with the rate of 16%. Abdominal pain constituted 11.7% of the complaint of pain.

In a study conducted on 116 patients, approximately 51.7% of the patients received chemotherapy. Among chemotherapy receivers; approximately 26.7% patients received only neoadjuvant therapy. It has been found out in the study that the likelihood of hospital readmission was 3-fold higher in the patients who received chemotherapy preoperatively compared with those who received no chemotherapy before the surgery (18). In our study, 51.3% of the patients received neoadjuvant therapy. No significant difference was detected between the causes of readmission and receiving neoadjuvant therapy by the patients. The rate of readmission was higher in those who received neoadjuvant therapy, although statistically insignificant ($p>0.05$).

Single-center design and low number of the patients are the limitation of the study. The retrospective design of the study is also a prominent limitation. Large sample size and multicenter prospective studies on this subject are needed.

Gastrointestinal symptoms such as abdominal pain, reflux and nausea were encountered to be the most frequent causes of hospital readmission. No statistically significant relationship was found between readmission and age, gender, type of the performed surgery and receiving neoadjuvant therapy. We conclude that providing a high-quality postoperative healthcare for recovery in the patients who underwent gastrectomy and a review of the healthcare services in the hospitals will reduce the rate of postoperative readmissions.

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