Original Article

Prevalence of Upper Gastrointestinal Tract Endoscopic Findings in Patients Undergoing Hemodialysis Who Were Candidates for Kidney Transplantation

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ABSTRACT

Background:
This research aimed to describe and analyze the endoscopic findings of the upper gastrointestinal tract in renal transplant candidates with a high prevalence of gastrointestinal system disorders.

Materials and Methods:
This cross-sectional research was conducted at Golestan Hospital in Ahvaz, Iran, from April 2022 to April 2023. It focused on patients undergoing hemodialysis over the age of 18 who were candidates for kidney transplantations. The study prospectively analyzed the pre-transplantation upper gastrointestinal endoscopic results of these patients.

Results:
There were a total of 96 patients involved. The mean age of the participants was 43.46 ± 12.61 years. The male population constituted the majority of individuals included in the research (68.8%). In general, 88% of patients had abnormal results in their endoscopy. The common discovery was gastritis, which was observed in 72.9% of cases. This was followed by esophagitis, which was found in 24% of cases, and duodenitis, which was present in 19.8% of cases.

Conclusion:
Given that most patients undergoing hemodialysis in the present research had at least one abnormality during their upper gastrointestinal endoscopy, it may be inferred that endoscopy is a suitable approach for assessing patients before transplantation to mitigate difficulties and postoperative issues.

Keywords: Chronic kidney disease, End-stage renal disease, kidney transplantation, endoscopy, gastrointestinal disorders

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INTRODUCTION

Chronic kidney disease (CKD) is a degenerative and irreversible condition marked by a reduction in the quantity of nephrons and renal function, typically leading to end-stage renal failure (1). It is a complex condition that affects >10% of the general population worldwide (2). Uremia is a condition resulting from renal failure. The condition results in dysfunction of the gastrointestinal (GI) system and other organs, accompanied by observable clinical and biochemical evidence (3).

End-stage renal disease (ESRD) is the final stage of CKD, requiring kidney replacement therapy for the patient. Comparing patients with ESRD to the general population, they have a poorer life expectancy and quality of life. Two common options for kidney replacement therapy are dialysis and kidney transplantation (4). Globally, the prevalence of ESRD is rising, and kidney transplantation is now the recommended treatment for these individuals. Compared with any kind of dialysis, a successful kidney transplantation results in a reduced mortality rate and a higher quality of life for the patient (5).

GI disorders are common chronic conditions observed in individuals diagnosed with ESRD (6). GI problems have been seen in over 80% of individuals undergoing dialysis (7). The severity of these symptoms may intensify as kidney disease advances (8). Esophagitis, gastritis, Helicobacter pylori (*H. pylori*) infections, peptic ulcer, erosive duodenitis, and bleeding are the most prevalent upper GI disorders observed in individuals with CKD, as indicated by numerous studies. GI tract damage can be caused by metabolic problems, drugs, gastroesophageal reflux disease (GERD), gastrin, and infection with H. pylori (6).

Patients undergoing renal transplantation are highly susceptible to GI tract problems due to the administration of high-dose corticosteroid therapy and other immunosuppressive treatments. Numerous studies conducted on individuals awaiting kidney transplantations have consistently reported elevated rates of GI tract disorders (8). The diagnosis of upper GI tract disorders is essential for proper kidney transplant candidate management because they must endure significant surgery as well as psychological and metabolic stress (9,10). GI disorders are frequently undetectable through clinical observations and diagnostic examinations (11). Consequently, it is suggested that endoscopic screening in individuals with CKD be conducted to identify GI disorders. However, several previous studies have failed to reach a consensus on the necessity of upper GI tract endoscopy before renal transplantation (12,13,14).

This study aimed to determine the importance of upper GI tract screening in patients under high metabolic and psychological stress after kidney transplantation and to address potential complications from treatment plan changes.

MATERIALS AND METHODS

Study population

The research included patients with CKD who were candidates for renal transplantation at Golestan Hospital's endoscopy center for routine pre-transplantation examinations in Ahvaz. The study period was from April 2022 to April 2023, and only patients undergoing hemodialysis aged over 18 were included.

All candidates for kidney transplantation were referred to the endoscopy center. The study objectives, the researchers' perspective, and prior research indicate that 96 individuals were included, as noted in the study by Neto and colleagues .(15)

The study's inclusion criteria comprised kidney transplantation candidates aged over 18 who had completed the requisite preparation for endoscopy, with the procedure conducted without complications. The exclusion criteria were kidney transplantation candidates who were disqualified due to insufficient preparation for endoscopy. Individuals who received treatment with proton pump inhibitors (PPIs) or H2 blockers before endoscopy were excluded from the study.

Study design

Following the acquisition of the ethics code from the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.HGOLETAN.REC.1402.015), patients with CKD eligible for kidney transplantation were incorporated into the study. The study was conducted over one year (from April 2022 to April 2023) on the results of upper GI endoscopy in patients undergoing hemodialysis eligible for kidney transplantation who were referred to Golestan Hospital in Ahvaz for routine pre-transplantation examination. Two expert gastroenterologists conducted the endoscopy under general anesthesia. The presence or absence of findings related to reflux esophagitis, gastritis, duodenitis, gastric ulcer, duodenal ulcer, esophageal mass, gastric mass, esophageal and gastric submucosal lesions, and gastric and duodenal polyps was systematically examined and documented for each patient with ESRD using a pre-prepared form. Findings were validated by pathology reports when biopsy samples were taken.

The research was planned and executed following the principles outlined in the Declaration of Helsinki. All the included individuals provided informed consent. The principle of confidentiality was upheld in the management of collected data, particularly concerning the variables related to the subjects' personal and social characteristics.

Statistical analysis

Data were initially entered into SPSS software version 22. Descriptive statistical methods, including frequency distribution tables and graphs, were employed to describe the variables under study. The Chi-square test was used to compare categorical variables. The relationship between continuous variables was analyzed using the t test for normally distributed data and the Mann-Whitney test for non-normally distributed data. The Pearson correlation coefficient was employed to assess the relationship between quantitative variables. Statistical significance was defined as tests with a P value <0.05.

RESULTS

The study included 96 patients undergoing hemodialysis. 66 (68.8%) patients were male, and 30 (31.3%) were female. The mean age was 43.46±12.61 years, and there was a statistically significant difference in age between men and women (P=0.019, Table 1).

Table 1. Demographic characteristics of the patients

Variable		P value
Sex, n (%)		
Male	66 (68.7%)	
Female	30 (31.3%)	
		0.019
Age, Mean ± SD (years)	43.46 ± 12.61	
Male	47.9 ± 10.79	
Female	41.44 ± 12.93	

Table 2 presents the prevalence of abnormal findings from the evaluation of data obtained from the endoscopic reports of kidney transplantation candidates. Among the 96 individuals examined, nine (9.3%) had normal upper GI endoscopic results, including six women and three men. Among the remaining 87, everyone had at least one upper GI pathology. The predominant endoscopic lesion in these individuals was gastritis, seen in 70 (72.9%) of the research cohort.

Subsequently, reflux esophagitis was identified in 23 patients (24%), duodenitis in 19 patients (19.8%), duodenal ulcer in 10 patients (10.4%), gastric ulcer in six patients (6.3%), gastric polyp in five patients (5.2%), duodenal polyp in two patients (2.1%), and esophageal submucosal lesions along with a gastric mass in one patient (1.04%) among those undergoing upper endoscopy. No esophageal mass or gastric submucosal lesions were identified in the endoscopic reports of any patients.

Among 70 patients with gastritis, 42 were classified as having erosive gastritis and 28 as non-erosive gastritis. Additionally, within this total, 33 instances of gastritis were seen in the gastric antrum; two cases were classified as pangastritis (involvement of the whole stomach mucosa), while the remainder were identified in the fundus and gastric canal.

Among the 19 individuals diagnosed with duodenitis, nine had erosive characteristics, whereas 10 were classified as non-erosive.

In accordance with the Los Angeles classification of reflux esophagitis, among 23 cases, 21 were classified as grade A and two as grade B. No instances of grade C or D reflux were identified.

Table 2. Prevalence of abnormal endoscopic findings in patients

variable	n (%)
Reflux esophagitis	23 (24)
LA grade A	21 (21.9)
LA grade B	2 (2.1)
Gastritis	70 (72.9)
Duodenitis	19 (19.8)
Peptic ulcer	6 (6.3)
Duodenal ulcer	10 (10.4)
Esophageal mass	0
Gastric mass	1 (1.04)
Esophageal submucosal lesion	1 (1.04)
Gastric submucosal lesion	0
Gastric polyp	5 (5.2)
Duodenal polyp	2 (2.1)

*LA: Los Angeles

Table 3 highlights the prevalence of both erosive and non-erosive lesions in gastritis and duodenitis in kidney transplantation candidates.

The prevalence of endoscopic findings was also compared between men and women, as shown in Figure 1. We compared the prevalence of endoscopic findings between sexes. Among the 23 cases of reflux esophagitis, four were identified as female and 19 as male.

The reported figures for gastritis were 20 and 50; for duodenitis, 5 and 14; for gastric ulcer, 5 and 1; for duodenal ulcer, 4 and 6; and for gastric polyp, 1 and 4, respectively. All instances of gastric mass, esophageal submucosal lesions, and duodenal polyps were identified exclusively in the male population.

Table 3. Prevalence of erosive and non-erosive lesions in gastritis and duodenitis

variable	Erosive Lesions (%)	Non-Erosive Lesions (%)
Gastritis	43 (61.4)	27 (39.6)
Duodenitis	9 (47.3)	10 (52.7)

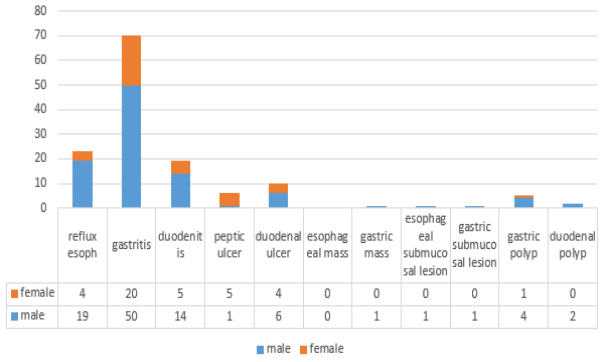

Figure 1. Sex-based prevalence of endoscopic findings in kidney transplantation candidates

DISCUSSION

Over the last decade, there has been a consistent rise in the occurrence of CKD and ESRD (16). Consequently, a much more significant proportion of these patients are undergoing either long-term hemodialysis or kidney transplantation. Several consequences associated with this illness may be avoided or postponed. Patients with CKD often have comorbidities such as diabetes and coronary artery disease. However, among these patients, GI disorders are the most frequent chronic non-renal illnesses (17,18). Our study shows that endoscopy is an exceptionally sensitive tool for detecting these abnormalities and accurately determining their exact position (19,20). Endoscopy in renal transplant recipients may result in side effects like discomfort, bleeding, and perforation, particularly when the upper GI tract is affected. Symptoms might include discomfort, bloating, throat irritation, a small amount of bleeding, and other things related to pre-existing medical conditions such as ulcers, esophagitis, or infections. This is especially important in people with problems with the immune system after they have had kidney transplantation because these drugs can make them more prone to getting infections. Gastritis, erosive esophagitis, and similar problems were usually the result of the post-procedure discoveries. However, there is an increase in the number of cases associated with diverticulitis, though the real reasons for this connection remain under research. Renal transplant candidates are obliged to discuss possible adverse events with the medical staff to carry out the preoperative assessments correctly (21,22). Endoscopy is generally safe, but, like any medical procedure, it carries potential risks and side effects. The most common complications include mucosal injury, bleeding, infection, and perforation of the GI tract. Minor side effects such as bloating, nausea, or sore throat can occur after the procedure but are typically temporary and resolve without intervention (23). This is particularly important for patients with pre-existing conditions. In patients with kidney transplantation, endoscopy poses additional risks due to underlying chronic kidney disease, which can increase the likelihood of complications from sedation or contrast agents. These patients are often on immunosuppressive medications, which can increase their susceptibility to infections. Bowel preparation can also lead to electrolyte imbalances, and bleeding risks are increased in those with platelet dysfunction or on anticoagulants. Therefore, careful evaluation and proper preparation are essential to reduce potential complications (24, 25).

Endoscopy in patients receiving renal transplants is very helpful in the early detection of GI diseases that could become a problem for kidney transplant recipients. It enables the whole upper GI tract to be checked, which eventually leads to the diagnosis of conditions like esophagitis or gastritis, which may complicate the post-transplant state. Besides, the endoscopic assessment can also reveal pathological stages of CKD in the patient, which will help lead to proper management before operation and consequently minimize postoperative complications (26).

The endoscopy results indicated that gastritis, reflux esophagitis, and duodenitis were the most common endoscopic observations among individuals who were candidates for kidney transplantation. Out of all the patients, 88% had at least one anomaly during upper endoscopy, whereas just 12% had normal endoscopies. The incidence of gastritis was 72.9% among individuals who underwent endoscopy. The incidence of erosive kinds of gastritis was greater among all patients, accounting for 61.4% of the total. Almost half of these instances (43%) were also seen in the antrum. This conclusion aligns with the results of a prior investigation (27,28). The incidence of duodenitis was 19.8%, and in contrast to gastritis, non-erosive forms were somewhat more common than erosive forms (53% and 47%, respectively). Indeed, 53.12% of the patients had erosive lesions in the upper GI tract. In their study, Durak and others found that out of 105 patients, four had duodenal ulcers, 12 had stomach erosions, and six had bulbous erosions (29). Bacci and colleagues performed a cross-sectional research on a cohort of 95 individuals

with CKD. Of them, 56.84% were males, 60% were of Caucasian ethnicity, and 71.57% were receiving therapy with PPIs. Erosive gastritis was the prevailing endoscopic abnormality, with a frequency of 77%. The stomach antrum was the most frequently affected location, accounting for 21% of cases. The research conducted by Bacci and others found that patients with ESRD had a greater incidence of acute upper GI tract hemorrhage compared with the general population(28). According to Wasse and co-workers, acute upper GI tract bleeding was higher in patients with ESRD compared with the general population (30). Because of the high mortality risk, upper GI tract ulcers and erosions should be recognized and treated without bleeding in patients who will receive high-dose corticosteroid therapy after renal transplantation (29). Gastric intestinal metaplasia is a preneoplastic condition that plays a role in Correa's cascade, a conceptual framework for the progression of gastric cancer (31,32,33). Netto and others discovered that 8.3% of eligible individuals for renal transplantation had intestinal metaplasia-positive (9). The latest research found that 24.3% of kidney transplantation candidates tested positive for intestinal metaplasia (29). The rate in this research was comparable to the incidence rate of 26.8% seen in another study (34). Our investigation found a single stomach tumor during the endoscopy of a 34-year-old male, which was identified as potentially cancerous near the pylorus. Based on the endoscopy findings, the number of endoscopic lesions exceeded the number of patients. Consequently, the majority of the patients under study had many abnormalities in their upper endoscopy. The incidence of all endoscopic findings was greater in males, except for gastric ulcer, which had a higher incidence in females. Additionally, a higher occurrence of normal upper GI endoscopy was observed in females. Sotoudehmanesh and others conducted a study where they analyzed the endoscopies of 206 individuals with ESRD. It was observed that being male and having an H. pylori infection enhanced the likelihood of these lesions. In that order, the common findings in these patients were duodenal erosions, gastric erosions, diffuse erythema of the antrum, and duodenal ulcers. Given that the symptoms experienced by the patients were not directly linked to the presence of these lesions, it is suggested that this study should explore additional diagnostic methods, such as endoscopy, to minimize complications following kidney transplantation(35). However, it is worth noting that certain studies have reported contradictory results, particularly in patients with uremia (8,36). Overall, our results align with most similar studies, demonstrating a substantial occurrence of endoscopic abnormalities in individuals awaiting kidney transplantation and highlighting the necessity of regular pre-transplantation endoscopic examinations. Moreover, our research revealed that being male was associated with a greater occurrence of these abnormalities, aligning with the results of most studies (37,38,39).

Limitation

Being unable to reach people once again and insufficient data collection on individuals hindered our ability to address significant aspects, including the relationship between H. pylori infection and various GI disorders such as GERD, polyp types, and other relevant parameters for statistical analysis. Unfortunately, gathering kidney transplant data and determining the contribution of digestive issues to kidney transplantation success presented the same challenge. As there was no control group in this cross-sectional investigation, the data of the kidney transplant candidates was not compared with that of the general population. We did not exclude herbal drugs since their use is less uniform, and their effects might significantly differ, in contrast to PPIs and H2 blockers. Herbal therapies possess varying substances and doses, making their effects less predictable. While we recognize the possible effects of herbal remedies on GI diseases, we did not exclude them to avoid excessively limiting the research population.

CONCLUSION

Upper endoscopies of renal transplant candidates often reveal GI lesions. Even without GI symptoms, regular endoscopy should be done before surgery because immunosuppressive therapies may worsen these lesions and lead to transplant rejection and mortality. This allows correct lesion care and prevention of consequences.

Renal transplantation screening and treatment methods need multicenter, well-designed research. Further research is needed to determine how these lesions affect patients' symptoms and test findings such as serum gastrin and H. pylori infection.

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AUTHOR CONTRIBUTIONS:

L.GM. and Z.SE. conceived and designed the study and wrote the manuscript. D.D., L.GM., and L.S. performed the intervention and participated in clinical follow-up of the patients. E.F. analyzed and interpreted the data. A.NS., as the main corresponding author, managed the study. All authors approved the final version.

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