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Increased prevalence of gastric pathologies in patients with total hip and total knee prostheses: a retrospective endoscopic study

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ABSTRACT

Aims: The objective of this retrospective study was to evaluate the prevalence of *Helicobacter pylori* (*H. pylori*) positivity, gastric atrophy, and intestinal metaplasia in patients with dyspeptic complaints who had undergone total hip and knee replacement surgeries, compared to a control group without prosthesis.

Methods: The study group consisted of 51 patients with dyspeptic complaints and total knee and hip prosthesis, while the control group comprised 75 patients with similar complaints but without prosthesis. Endoscopic gastric biopsies were obtained from all participants, and the presence of *H. pylori*, gastric atrophy, and intestinal metaplasia were evaluated.

Results: The prevalence of *H. pylori* positivity, gastric atrophy, and intestinal metaplasia were significantly higher in patients who underwent total knee and hip replacement compared to the control group without prosthesis.

Conclusion: The results of this study suggest that patients who undergo total hip and knee replacement surgeries may be at higher risk for developing gastric pathologies, such as *H. pylori* infection, gastric atrophy, and intestinal metaplasia. Therefore, it is recommended that physicians who care for these patients monitor them closely for these conditions and consider endoscopic surveillance as part of their management plan.

Keywords: Total knee arthroplasty, total hip arthroplasty, *H. pylori*, atrophy, intestinal metaplasia

INTRODUCTION

Total hip and total knee replacements are common orthopedic surgeries performed to relieve pain and improve mobility in patients suffering from joint diseases such as osteoarthritis, rheumatoid arthritis, or post-traumatic arthritis.[1-3] Despite the successful outcomes of these surgeries, they may be associated with certain complications such as infections, implant loosening, dislocation, or fractures. Moreover, these procedures may also have systemic effects on other organs in the body, including the gastrointestinal tract.[4,5]

Dyspepsia is a common gastrointestinal complaint characterized by pain or discomfort in the upper abdomen, bloating, nausea, and early satiety.[6] It may result from various causes, such as gastroesophageal reflux disease (GERD), peptic ulcer disease (PUD), functional dyspepsia, or gastric malignancies.[7] *H. pylori* is a gram-negative bacterium implicated in the pathogenesis of several gastrointestinal diseases, such as gastritis, PUD, and gastric cancer.[8] Moreover, chronic *H. pylori* infection may lead to gastric atrophy and intestinal metaplasia, precursors of gastric malignancies.[9,10]

Recent studies have suggested that patients who undergo total hip or total knee replacements may be at an increased risk of developing dyspeptic symptoms and gastric pathologies.[11,12] However, the evidence is still limited, and further research is needed to explore the potential association between these surgeries and gastrointestinal disorders. Therefore, in this retrospective study, we aimed to evaluate the prevalence of *H. pylori* positivity, gastric atrophy, and intestinal metaplasia in patients who underwent total hip and total knee replacements and compare it to a control group with similar dyspeptic complaints but without prosthesis.

The findings of this study may shed light on the possible systemic effects of joint replacements on the gastrointestinal tract and highlight the importance of early detection and management of gastric pathologies in these patients.

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METHODS

The study was carried out with the permission of the Giresun Training and Research Hospital Clinical Researches Ethics Committee (Date: 13.02.2023, Decision No: 03). Informed consent from the patients was not needed as the study was designed as retrospectively. The study was conducted in line with the ethical principles of the Declaration of Helsinki and its later amendments.

A total of 51 patients with total knee arthroplasty (TKA) and total hip arthroplasty (THA) and 75 patients without prosthesis who presented to our general surgery clinic due to the complaint of abdominal pain were included in this study. The patients were divided into two groups the TKA/THA group and the control group. Following a physical examination and laboratory investigations, all patients underwent gastric endoscopy, and endoscopic specimens were then sent to the pathology laboratory for biopsy examinations. Patients with known gastrointestinal disorders, malignancies and those with missing data were excluded from the study.

Patients' demographics, such as age and gender, laboratory parameters and biopsy findings, were recorded and compared between the groups.

Statistical Analysis

Data obtained in this study was statistically analyzed using the SPSS version 24.0 (SPSS, Statistical Package for Social Sciences, IBM Inc., Armonk, NY, USA) package software. The normality of the variables was tested using the Kolmogorov-Smirnov method. An Independent t-test among the parametric tests was used to compare the variables between the two groups. Continuous variables are expressed as mean±standard deviation, while categorical variables are expressed as frequency and percentage (n, %). $p<0.05$ values were considered statistically significant.

RESULTS

A total of 51 patients with TKA/THA and 75 prosthesis-free patients who presented to our clinic with abdominal pain were included in the study. The mean age was 64.4±13.2 years in the TKA/THA group and 62.4±12.8 years in the control group. There was no statistically significant difference between the two groups in terms of age (p=0.322).

Eight (15.7%) patients were male, and 43 (84.3%) were female in the TKA/THA group, while 11 (14.67%) patients were male and 64 (85.33%) patients were female in the control group. No statistically significant difference was found between the groups in terms of gender (p=0.887).

When laboratory parameters were examined, the mean hematocrit value was statistically significantly lower in the TKA/THA group compared to the controls (p=0.026). Similarly, the mean creatinine, alanine transaminase (ALT) and albumin levels were statistically significantly lower in the TKA/THA group compared to the control group (p=0.005, p=0.037, p=0.001; respectively). No statistically significant difference was found between the two groups in terms of the other laboratory parameters (for all, p>0.05) (**Table 1**).

Table 1. Laboratory values of the groups

	TKA/THA		Control		p†
	Mean	±SD	Mean	±SD	
Hemoglobin	12.5	1.7	13	1.9	0.054
Hematocrit	37.9	4.7	19.7	5.3	0.026
MCV	84.5	6.6	86.3	5.4	0.101
WBC	6.9	2.4	7.4	2.4	0.105
Lymphocyte	2.1	0.7	2.2	0.7	0.619
Platelet	269.8	80.2	250.5	67.6	0.284
Glucose	123.3	43.4	113.6	35	0.144
Urea	35.4	15	38.8	25.6	0.907
Creatinine	0.8	0.2	0.9	0.4	0.005
AST	18.9	6.4	20.6	8.6	0.130
ALT	16.2	8.1	19.7	13.3	0.037
Albumin	4.3	0.5	4.5	0.5	0.001

Descriptive statistics were shown as * mean ±SD or ** median (25th - 75th) percentiles. † Mann Whitney U test, MCV: mean corpuscular volüme, WBC: white blood cell, AST: Aspartate transaminase, ALT: alanine transaminase

When the results of the gastric biopsy were examined, the incidence of *H. pylori*, atrophy and intestinal metaplasia were statistically significantly higher in the TKA/THA group compared to the control group (p=0.030, p=0.024, p=0.035; respectively) (**Table 2**).

Table 2. Biopsy results according to the groups

Parameter	TKA/THA		Control		p†
	n	%	n	%	
H. pylori					0.030
No	16	31.4	37	49.33	
Yes	35	68.6	38	50.67	
Atrophy					0.024
No	30	58.8	57	76.00	
Yes	21	41.2	18	24.00	
Intestinal metaplasia					0.035
No	32	62.7	59	78.67	
Yes	19	37.3	16	21.33	

† Mann Whitney U test

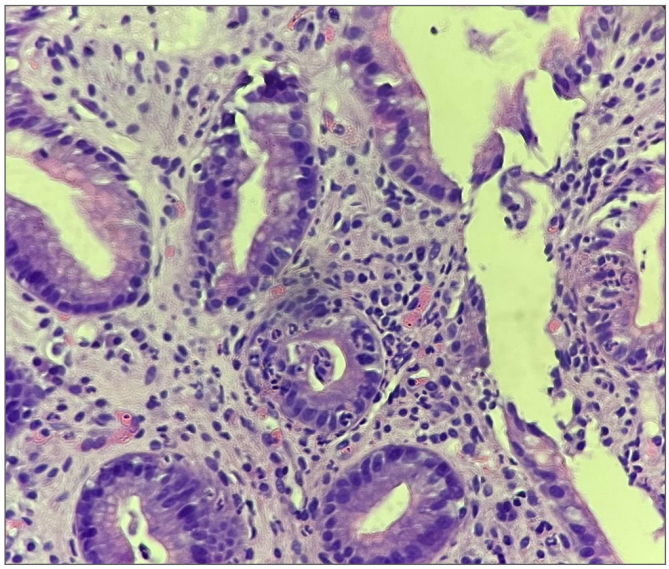

Figure 1. Gastric biopsy showing intraepithelial neutrophils. Magnification 400×

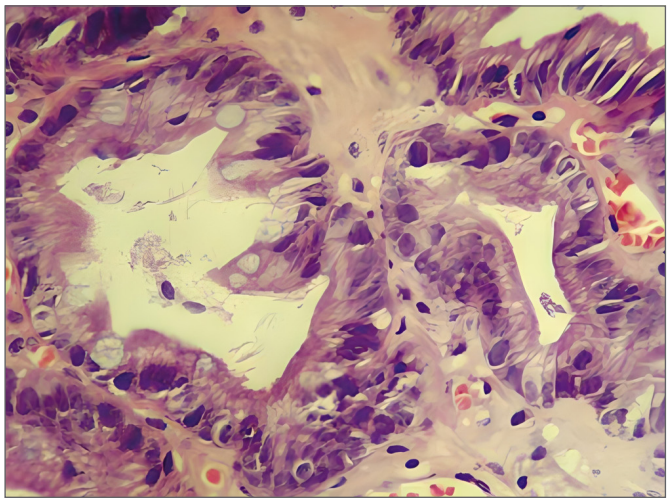

Figure 2. Gastric biopsy showing intestinal metaplasia. Magnification 400×

DISCUSSION

Our retrospective endoscopic study demonstrated that patients with total hip and knee prostheses had a significantly higher prevalence of *H. pylori* positivity, gastric atrophy, and intestinal metaplasia than those without prostheses. These findings suggest a potential association between joint replacements and gastric pathologies, which may have important clinical implications.

The exact mechanisms underlying this association have yet to be fully understood, but several hypotheses have been proposed. First, joint replacements may change the immune response and increase the susceptibility of the gastrointestinal tract to *H. pylori* infection, which may lead to chronic inflammation, mucosal damage, and the development of gastric atrophy and intestinal metaplasia.[13,14] Second, joint replacements may cause changes in the gut microbiota and disrupt the balance between useful and harmful bacteria, which may also contribute to developing dyspeptic symptoms and gastric pathologies.[15] Third, joint replacements may release metal ions and wear debris, which may have toxic effects on the gastric mucosa and aggravate existing gastric lesions.[16]

Several studies in the literature report complications after TKA/THA procedures. Adenikinju et al.[17] stated that although rare, gastrointestinal complications following TKA/THA can result in detrimental outcomes, significant morbidity, and mortality. Thus, a raised awareness of these complications is warranted. In a study by Bekeris et al.[18] gastrointestinal complications were observed in 1.03% of patients undergoing THA and 0.79% of patients undergoing TKA procedures.

In a study by Heo et al.[19] complications at six months following TKA/THA procedures were investigated. According to this study, each 1 kg/m² increase in BMI value was associated with increased odds for re-operation. In the same survey, non-procedure-related major complications following TKA/THA procedures included cardiovascular complications, stroke and pulmonary embolism, while no gastrointestinal complications were mentioned.

In a study by Hnepa et al.[20] NSAID-induced gastrointestinal lesions are a relevant internal medicine problem due to unclear pathogenic mechanisms. They should be taken into account by physicians of all specialities. The authors recommended that examination and diagnosis of the gastrointestinal tract should be regularly performed to prevent NSAID-induced complications. Patients undergoing TKA/THA procedures are known to receive NSAIDs for an extended period, and therefore, these patients tend to develop gastrointestinal complications. Moreover, prolonged use of NSAIDs further increases the risk of gastrointestinal bleeding.[21]

In a study by Massaglia et al.[22] investigating gastrointestinal complications following TKA/THA, the most common complications were constipation followed by diarrhoea, malabsorption, haemorrhage, and *Clostridium difficile*.

It has been reported that significant muscle atrophy develops after TKA/THA, resulting in decreased strength and impaired mobility.[23] Chronic *H. pylori* infection induces chronic inflammation in the gastric mucosa, resulting in atrophy and intestinal metaplasia and increasing the risk of developing gastric adenocarcinoma.[24]

Regardless of the underlying mechanisms, the implications of our findings are significant. Patients who undergo joint replacements should be aware of the potential risk of developing dyspeptic symptoms and gastric pathologies and undergo regular endoscopic screening to detect

and manage abnormalities. Furthermore, orthopedic surgeons should consider the possible systemic effects of joint replacements on other organs, including the gastrointestinal tract, and take appropriate measures to minimize the risk of complications.

The clinical management of dyspepsia in patients with joint replacements may be challenging, as the treatment options may be limited by the presence of the prosthesis and the risk of complications such as bleeding or perforation. However, a multidisciplinary approach involving gastroenterologists, orthopedic surgeons, and primary care physicians may help optimize the management of dyspeptic symptoms and prevent the progression of gastric pathologies.

Study Limitations

The main limitations of our study include its retrospective design, the relatively small sample size, and the lack of data on the duration and type of joint replacements, as well as the use of NSAIDs and other medications. In addition, other gastrointestinal complications could also be investigated. Although we compared blood parameters and found significant differences between the groups, we could not attribute these findings to a specific reason. Moreover, the study did not investigate the potential impact of joint replacements on other gastrointestinal pathologies such as GERD, PUD, or gastric cancer. However, as a strength, this is the first study in the literature investigating the results of gastric biopsy in patients undergoing TKA/THA procedures. Our results will be guiding for further studies to be conducted on this issue.

CONCLUSION

Our retrospective study suggests that patients who undergo total hip and total knee replacements may have an increased risk of developing dyspeptic symptoms and gastric pathologies such as *H. pylori* positivity, gastric atrophy, and intestinal metaplasia. Healthcare providers should be aware of these potential systemic effects of joint replacements and be prepared to screen and evaluate patients for dyspeptic symptoms and gastric pathologies. In addition, these findings highlight the importance of close monitoring and managing gastrointestinal symptoms in patients with joint replacements and the need for further research to explore the potential mechanisms and preventive measures for these complications.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of the Giresun Training and Research Hospital Clinical Researches Ethics Committee (Date: 13.02.2023, Decision No: 03).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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