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Analysis of Factors Related to Throat Soreness After Painless Gastroscopy: A Single-Center Study

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Introduction: Throat soreness is a frequently encountered yet often underappreciated complication in patients undergoing gastroscopy. Few studies have explicitly explored the relationship between gastroscopy and throat soreness. This study aimed to review demographic data, summarize the characteristics, and investigate the influencing factors of throat soreness following gastroscopy.

Methods: This cross-sectional descriptive study included inpatients who underwent painless gastroscopy at The First Affiliated Hospital of Shandong First Medical University between December 2023 and January 2024. The analysis focused on patient demographics, duration of fasting before gastroscopy, the procedure's duration, the occurrence of vomiting post-gastroscopy, sore severity, and recovery time.

Results: A total of 254 patients underwent painless gastroscopy during the study period, and 123 patients experienced postoperative throat soreness (71 males, 52 females) with an average age of 57.2 years. When comparing the throat soreness and non-soreness groups, significant differences were noted in the duration of gastroscopy and fasting time before the examination. No statistically significant differences were observed in age, BMI, comorbidities, history of smoking, alcohol consumption, previous gastroesophageal surgery, reflux esophagitis, or post- procedure vomiting. Logistic regression analysis identified the duration of gastroscopy as a predictor of throat soreness post-procedure. Most of the patients reported resolution of throat soreness within 3 days.

Discussion: The findings of this study confirm that throat soreness is a common issue (the incidence was 48.4%) following gastroscopy, particularly associated with longer duration of gastroscopy. Fortunately, all instances of throat soreness resolved within a few days without the need for significant medical intervention.

Keywords: throat soreness, painless gastroscopy, duration of gastroscopy, soreness resolution

Background

The global burden of gastrointestinal cancers continues to rise, Stomach, colorectal and liver cancers rank among the top five most prevalent cancers in both men and women worldwide, representing 26% of the global cancer incidence and 35% of all cancer-related deaths. Gastrointestinal cancers severe impact individual health, escalate the economic and healthcare burdens on families, society, and nations, and pose substantial challenges public health.[1,2]

Early intervention and treatment are crucial in improving the prognosis of gastrointestinal cancers, and gastroenteroscopy is a critical diagnostic tool.[3,4] However, gastrointestinal endoscopy is an invasive procedure that often causes mechanical friction in the throat during the procedure. This frequently results in varying degrees of throat discomfort after examination, which can diminish patient satisfaction and quality of life, and heighten anxiety regarding future medical consultations.[5,6] Few studies have explored on the relationship between throat soreness and gastroscopy. Previous studies on sore throat after gastroscopy have mostly been retrospective studies, and with fewer prospective studies that often include data from other procedures such as endoscopic retrograde cholangiopancreatography (ERCP), which may involve nasobiliary drainage tubes that could mechanically irritate the throat, which may have biased data.[7–9]

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This study aims to review the demographic data of throat soreness after painless gastroscopy, summarize and analyze the characteristics and explore the influencing factors of throat soreness after gastroscopy.

Materials and Methods

This cross-sectional descriptive study involved. Inpatients who underwent painless gastroscopy at The First Affiliated Hospital of Shandong First Medical University between December 2023 and January 2024 were involved in this study. The study was approved by the Medical Ethical Committee of the authors' institution which adheres to the Declaration of Helsinki. All patients involved gave informed consent and all data were anonymized before the analysis to safeguard patient privacy.

The inclusion criteria were: Informed and agree to voluntarily participate in this study, had no mental illness, were capable of understanding and self-rating pain and were under general anesthesia using only intravenous drugs. None of the patients in this study were intubated during the procedure. The gastroscopy was performed using a standard endoscope without the need for endotracheal intubation, ensuring a minimally invasive approach. The exclusion criteria included repeat hospitalization examination, those with a nasogastric tube post-endoscopic surgery for early gastric cancer, those with pre-existing throat diseases or throat pain combined with respiratory symptoms before gastroscopy and patients with a nasobiliary tube following ERCP.

In this study, "painless gastroscopy" refers to upper gastrointestinal endoscopy performed under sedation or anesthesia to minimize discomfort and eliminate patient awareness during the procedure. The sedation was achieved using intravenous propofol administered by trained anesthesiologists. The dosage was individualized based on patient weight, age, and health status. Continuous monitoring of vital signs, including oxygen saturation, heart rate, and blood pressure, was conducted throughout the procedure to ensure patient safety. The procedure was performed without the use of intubation, and all patients were fully conscious and able to report symptoms within two hours post-procedure.

Information was collected on age, sex, Body Mass Index (BMI), history of smoking, drinking, gastroesophageal surgery and reflux esophagitis, complications prior to gastroscopy, duration of fasting before gastroscopy, duration of gastroscopy operation and occurrence of vomiting after gastroscopy.

The data collection was carried out by two nurses from our department who had undergone standardized training to ensure data validity and prevent bias. All data entries were double-checked by two individuals. Throat soreness scores were collected 2 hours post-gastroscopy using the Numeric Rating Scale (NRS) for pain assessment.[10] This scale has demonstrated good reliability and validity in assessing throat pain in patients undergoing gastroscopy, which is a validated tool that rates pain on a scale from 0 to 10, with 0 indicating no pain and 10 representing the worst possible pain. For additional analysis, pain severity was categorized as mild (1–3), moderate (4–6), or severe (7–10), as referenced in the manuscript.

Statistical Analysis

Measurement data are presented as mean ± standard deviation, while count data are shown as rates or composition ratios. Normally distributed data were analyzed using Fisher's exact test and the chi-square test. Non-normally distributed data were analyzed using the rank sum test. The presence of throat soreness after gastroscopy was used as the dependent variable. Variables that achieved a P-value of <0.05 in univariate analyses were subsequently included in a multivariate logistic regression model. All statistical analyses were conducted using SPSS software version 24.0 (IBM Corp., Armonk, NY, USA). A P-value of <0.05 was considered statistically significant.

Result

General Information

This cross-sectional descriptive study using a rough sample size estimation method, where the sample size was calculated to be 5–10 times the number of variables. The study involved 12 variables and collected data from 254 questionnaires.

Among the participants, 144 were males (56.7%) and 110 were females (43.3%), yielding a male-to-female ratio of 1:0.76. The mean age was 57.8 ± 12.8 years, ranging from 20 to 91 years. The average BMI was recorded at 24.7 ± 3.7.

Table 1 General Information

Characteristics	Number	Percentage or Mean (±SD)
Sex		
Male	144	56.7%
Female	110	43.3%
Age	254	57.8±12.8
BMI	254	24.7±3.7
Duration of gastroscopy operation	254	59.4±37.1
Duration of fasting before gastroscopy	254	8.7±7.2
Complications		
None	73	28.7%
Combined with 1 disease	92	36.2%
Combined with 2 diseases	55	21.7%
Combined with 3 diseases or more	34	13.4%
History of smoking	51	43.3%
History of drinking	65	25.6%
History of gastroesophageal surgery	18	7.1%
History of reflux esophagitis	44	17.3%
Vomiting after gastroscopy	3	1.2%

The mean duration of gastroscopy was 59.4 ± 37.1 minutes, with an average pre-procedure fasting time of 8.7 ± 7.2 hours. Comorbidity distribution was as follows: 73 participants (28.7%) had no comorbidities, 92 (36.2%) had one, 55 (21.7%) had two, and 34 (13.4%) had three or more. There were 51 smokers and 65 alcohol consumers. Additionally, 18 individuals reported a history of gastroesophageal surgery, and 3 experienced vomiting post-examination (Table 1).

Comparison of General Data Between Throat Soreness and Non-Soreness Groups

Among the 254 participants, 123 experienced postoperative throat soreness. The comparison of general data between the soreness and non-soreness groups revealed the differences in the duration of gastroscopy and pre-examination fasting times were associated with a p-value of <0.05. No significant differences were found in age, BMI, comorbidities, smoking, alcohol consumption, history of gastroesophageal surgery, reflux esophagitis, and post-examination vomiting (P>0.05) (Table 2).

Table 2 Comparison of General Data Between Throat Soreness and Non-Soreness Groups

Characteristics	Soreness Group (n=123)	Non-Soreness Group (n=131)	Z/t/χ2	P
Sex			0.103	0.748
Male	71	73		
Female	52	58		
Age	57.2±13.0	58.4±12.7	−0.746	0.456
BMI	24.8±4.0	24.6±3.3	0.291	0.771
Duration of gastroscopy operation	60(45–85)	45(30–60)	−3.480	0.001
Duration of fasting before gastroscopy	6.5(5–12)	5.5(4–8)	−2.043	0.041
Complications			4.740	0.192
None	29	44		
Combined with 1 disease	49	43		
Combined with 2 diseases	25	30		
Combined with 3 diseases or more	20	14		

(*Continued*)

Table 2 (Continued).

Characteristics	Soreness Group (n=123)	Non-Soreness Group (n=131)	Z/t/χ2	P
History of smoking	28/95	23/108	1.702	0.301
History of drinking	37/86	28/103	2.526	0.112
History of gastroesophageal surgery	11/112	7/124	1.248	0.264
History of reflux esophagitis	17/106	27/104	<0.001	1.000
Vomiting after gastroscopy	1/122	2/129	<0.001	1.000

Table 3 Multivariate Logistic Regression Analysis of Throat Soreness in Patients

Variables	B	OR	95% CI	P
Duration of gastroscopy operation	−0.008	0.992	0.983–1.000	0.045
Duration of fasting before gastroscopy	−0.006	0.994	0.955–1.034	0.763

Multivariate Logistic Regression Analysis of Throat Soreness in Patients

The data analysis indicated that the duration of gastroscopy and pre-examination fasting times were significantly longer in the soreness group compared to the non-soreness group ($P < 0.05$). A binary logistic regression analysis, using throat soreness as the dependent variable and the aforementioned factors as independent variables, revealed that the duration of gastroscopy is an independent risk factor for throat soreness ($P < 0.05$) (Table 3). The duration of gastroscopy, but not pre-examination fasting, was significantly associated with the incidence of throat pain.

Sore Severity and Recovery Time

Among the 123 patients with throat soreness, severity was categorized using the Numeric Rating Scale (NRS) as follows: mild pain in 101 patients, moderate pain in 16, and severe pain in 6. All patients reported resolution of throat soreness at the last follow-up. Recovery times were as follows: within one day for 47 patients, two days for 29, three days for 11, and seven or more days for 5 (Figure 1).

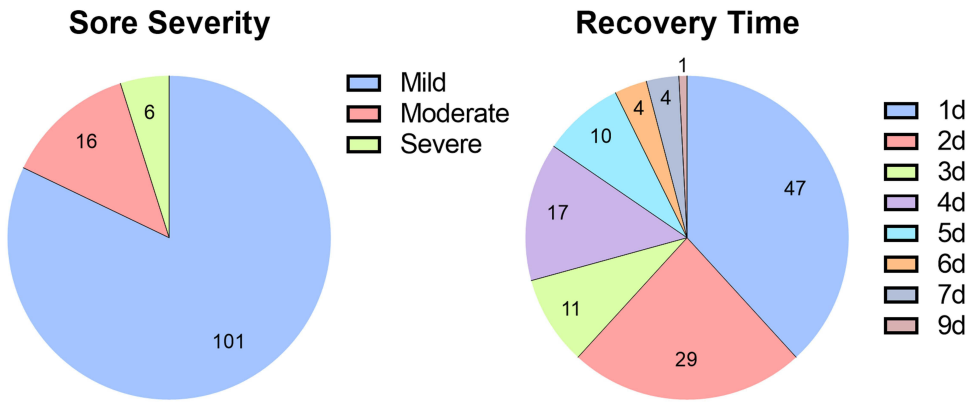

Figure 1 Sore Severity and Recovery Time.

Discussion

Painless gastroscopy is a medical innovation designed to alleviate the discomfort and pain associated with traditional gastroscopy. Painless gastroscopy, generally performed under sedation or anesthesia. This technique aims to minimize discomfort, lead to a quicker diagnosis and more accurate diagnoses of gastrointestinal issues, and reduce psychological stress for patients during the procedure.[11] However, like all medical procedures, it is not without risks. Potential complications include respiratory depression, cardiovascular issues, hypoxemia, aspiration, throat soreness, allergic reactions, and prolonged recovery times, among others. Notably, throat soreness, often resulting from the endoscope's insertion, is one of the most frequent complications of painless gastroscopy.[12]

Throat soreness is a common yet frequently underestimated issue in patients undergoing gastroscopy, significantly impacting patient satisfaction and quality of life. Literature reports vary, with incidence rates of throat soreness ranging from 9% to 18%.[5,7,8,12] In our study, which predominantly involved examinations of the stomach, esophagus, and duodenum, as well as simple polyp removal and submucosal dissection for early cancer without the use of transoral endotracheal intubation, the incidence of throat soreness was recorded at 48%. This rate is markedly higher than previously reported, potentially attributable to variations in study design, patient demographics, and procedural specifics. Prior research often employed 30-day post-procedure questionnaires, which might lead to underreporting due to recall bias, particularly for mild symptoms.

To address potential biases in pain reporting, our study collected pain assessments 2 hours after the procedure, reducing the impact of time on pain evaluation. Pain perception is inherently subjective, varying significantly among individuals in terms of tolerance and sensitivity, which likely contributes to the observed discrepancies in pain incidence rates. The technique of painless gastroscopy involves the use of sedatives or anesthetics to reduce discomfort during the procedure. While this approach minimizes intra-procedural distress, it may not eliminate mechanical irritation to the throat caused by the endoscope, especially during longer procedures. It is also possible that the relaxation of throat muscles due to sedation contributes to delayed recognition of discomfort, resulting in a higher perception of throat soreness post-procedure.

In this study, the majority of patients (approximately 75%) experienced mild pain (scores of 1–3), 13.0% experienced moderate pain (scores of 4–6), and 5% experienced severe pain (scores of 7–10). Interestingly, 7% of patients reported no pain 2 hours after the procedure but developed throat pain later that evening or the next morning. This delayed onset of pain might be related to the pre-procedure oral administration of dyclonine gel, which may cause throat numbness.

The follow-up on the duration of postoperative pain reveals limited literature. In our research, all patients eventually achieved pain relief, with the duration of pain ranging from 1 day to 9 days. Most patients recovered within 48 hours, indicating that this complication generally has a favorable prognosis. However, five patients experienced a recovery time of more than 7 days. This study did not include follow-up endoscopic examinations to directly assess mucosal trauma as a potential cause of throat soreness. Future studies should incorporate re-examinations to evaluate the presence and extent of mucosal trauma, which could provide additional insights into the mechanisms underlying post-procedure throat pain.

Furthermore, our findings suggest that the duration of the painless gastroscopy procedure itself is an independent risk factor for throat pain, underscoring the need for improvements in procedural techniques and diagnostic protocols to mitigate post-procedure throat discomfort. Contrarily, a study by Katherine Kim found no significant correlation between the duration of the procedure and throat pain. This discrepancy may stem from differences in study designs and patient populations. Notably, Kim's study involved patients undergoing procedures like ERCP and early gastric cancer ESD, where the use of nasobiliary or nasogastric tubes could cause mechanical irritation and influence throat soreness outcomes.[12]

The limitations of this study include its single-center design and relatively small sample size. Additionally, only hospitalized patients were included, who typically have more severe conditions and more comorbidities compared to outpatients, which could introduce bias. Throat soreness was assessed post-discharge via telephone follow-up, which may lead to inaccuracies due to patients' unfamiliarity with pain assessment scales. The study did not account for the impact of endoscope diameter on throat pain, particularly for procedures like gastroscopy, endoscopic ultrasound, and esophageal ESD. Future research should include endoscope diameter as a potential influencing factor.

Conclusions

The study highlights that throat pain following painless gastroscopy is significantly more prevalent than previously reported, with a strong association between procedure duration and pain incidence. These findings emphasize the need for optimizing procedural techniques and patient management to improve outcomes. Future research should focus on larger, multi-center studies and comparing throat soreness incidence between painless and non-painless gastroscopy techniques to further validate these results and explore effective interventions for mitigating throat pain. Additionally, exploring modifications to procedural techniques, such as endoscope design and insertion methods, could provide further insights into reducing this common complication.

Data Sharing Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Ethics Approval and Informed Consent

The experimental protocol was established according to the ethical guidelines of the Helsinki Declaration and approved by the Human Ethics Committee of The First Affiliated Hospital of Shandong First Medical University. Written informed consent was obtained from all study participants.

Consent for Publication

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

All authors warrant that they have no conflict of interest in connection with this article. They have access to all the study data and take final responsibility for the decision to submit for publication.

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