Study Documents

Cover Page

Official Title of the study: An Exploratory Study on the Impact of Prolonged Postoperative Endotracheal Extubation Time on Postoperative Complications in Gastric Cancer Patients with Severe Obstructive Sleep Apnea

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Clinical Study Protocol

Project Title: An Exploratory Study on the Impact of Prolonged Postoperative Endotracheal Extubation Time on Postoperative Complications in Gastric Cancer Patients with Severe Obstructive Sleep Apnea

Research Unit: <u>Department of General Surgery, Qilu Hospital of Shandong University</u>

Principal Investigator: <u>Yu Wenbin</u>

Sponsor: <u>Qilu Hospital of Shandong University</u>

Study Abstract

Item	Content
Project Title	An Exploratory Study on the Impact of Prolonged Postoperative Endotracheal Extubation Time on Postoperative Complications in Gastric Cancer Patients with Severe Obstructive Sleep Apnea
Study Objective	To investigate the impact of prolonging the time to postoperative endotracheal extubation on the incidence of postoperative complications in gastric cancer patients with severe obstructive sleep apnea.
Research Hypothesis	Prolonging the time to endotracheal extubation in gastric cancer patients with severe obstructive sleep apnea can reduce the incidence of postoperative complications.
Study Design	☐ Case-Control Study ☑ Cohort Study ☐

Item	Content
Study Subjects	Cross-Sectional Study ☐ Case Report / Case Series **Inclusion Criteria:** 1. Patients preoperatively diagnosed with resectable gastric cancer. 2. Patients without distant organ metastasis. 3. Patients with preoperative OCST or PSG results showing AHI >30 events/hour and SaO_2 <80%. 4. Patients with cardiopulmonary function deemed suitable for surgery. 5. Patients aged 18-85 years. 6. Patients who voluntarily joined this study and provided written informed consent. **Exclusion Criteria:** 1. Patients with a history of or concurrent other malignant tumors. 2. Patients who underwent palliative resection. 3. Subjects who experienced acute cardiovascular or cerebrovascular events (e.g., acute cerebral infarction, acute coronary syndrome) within the past 3 months, or whose cardiovascular clinical symptoms/diseases are not well-controlled. 4. Patients with a history of psychotropic drug abuse that cannot be abstained, or those with psychiatric disorders. 5. Patients with concomitant diseases that, in the investigator’s judgment, seriously endanger the patient’s safety or affect the completion of the study.
Diagnostic Criteria	Meet either (A + B) or C below. A: Presence of at least 1 of the following: (1) Patient complaints of sleepiness, non-restorative sleep, fatigue, or insomnia; (2) Waking from sleep due to choking or gasping; (3) Bed partner or other observer reports of habitual snoring, breathing interruptions, or both during sleep; (4) Diagnosed hypertension, mood disorder, cognitive dysfunction, coronary artery disease, cerebrovascular disease, congestive heart failure, atrial fibrillation, or type 2 diabetes. B: PSG or OCST confirms ⩾5 respiratory events/hour during monitoring, including obstructive apneas,

Item	Content
	mixed apneas, hypopneas, and respiratory effort-related arousals (RERAs). C: PSG or OCST confirms ⩾15 respiratory events/hour during monitoring, including obstructive apneas, mixed apneas, hypopneas, and RERAs.
Sample Size & Justification	The incidence of postoperative complications in gastric cancer patients with severe sleep apnea is the primary endpoint of this study. Based on previous large-scale literature reports, the incidence of perioperative cardiovascular complications in patients with severe sleep apnea undergoing non-cardiac surgery is 15% higher than in the normal population [8]. Using a power of 90% and a significance level of 5%, sample size estimation was performed using PASS, version 11 (NCSS, LLC). We need to recruit 93 patients per group. Accounting for loss to follow-up, dropouts, and other factors, we plan to include at least 120 patients per group.
Primary Exposure Factor	Time to endotracheal extubation
Outcome Variables	Incidence of short-term postoperative complications, graded using the Clavien-Dindo classification.
Follow-up Plan (For Cohort Studies)	Routine follow-up examinations at 1, 3, 6, 9, and 12 months postoperatively. Collect routine follow-up indicators and assess the occurrence of postoperative complications.
Sample Collection	☑ No ☐ Yes Brief description of tissue type and quantity: N/A
Non-Medical Purpose Examinations	☑ No ☐ Yes e.g., unnecessary CT scans, contrast studies, lab tests, etc.: N/A
Statistical Methods	Chi-square test or Fisher's exact test will be used to compare categorical variables. Continuous variables will be expressed as median and IQR if non-normally distributed and analyzed using the Mann-Whitney U test, or as mean (SD) if normally distributed and analyzed using the t-test.
Study Risk Self-Assessment	☐ High-Risk Study ☐ Medium-Risk Study ☑ Low-Risk Study Brief explanation: This is an observational study.

Confidentiality Statement:

The information contained in this study protocol is provided solely to the investigators of this project, the clinical research management committee, and relevant regulatory bodies for review. Disclosing any information to third parties unrelated to this study is strictly prohibited without the approval of the Principal Investigator.

1. Research Background (State the rationale and significance of this study based on current domestic and international research)

As one of the most common malignant tumors worldwide, gastric cancer ranks fifth in global cancer incidence and fourth in cancer mortality [1]. Current treatment for gastric cancer is comprehensive, primarily based on surgical treatment, with standard radical gastrectomy being the main procedure [2]. This process is complex, technically demanding, and carries relatively high surgical risks. Obstructive Sleep Apnea (OSA) is a sleep-related breathing disorder characterized by periodic partial or complete upper airway obstruction during sleep, manifesting as apneas and hypopneas [3]. Preliminary statistics indicate the overall prevalence of OSA among adults in China is 3.93% [4], yet the clinical diagnosis rate remains low. OSA is widely recognized as an independent risk factor for hypertension and metabolic syndrome [5, 6]. Reported prevalence of OSA among surgical patients is approximately 7%-10%, but can reach 68%-70% in high-risk populations (bariatric surgery or other major non-cardiac surgery). These patients have significantly increased perioperative complications and mortality [7, 8], especially severe sleep apnea. One cohort study reported the incidence of cardiovascular complications within 30 days after surgery in patients with severe sleep apnea was as high as 30.1% [8]. General anesthesia, sedatives, and postoperative analgesics are potent respiratory depressants; they can relax the upper airway dilator muscles and impair the ventilatory response to hypoxemia and hypercapnia. These effects exacerbate OSA. Concurrently, the hypoxemia caused by OSA can increase the incidence of postoperative complications in gastric cancer patients and may predispose them to postoperative cardiovascular complications [9]. Therefore, for gastric cancer patients with severe sleep apnea, strategies to reduce postoperative complications and adverse events are particularly important.

2. Research Question & Objectives (Elucidate the scientific question and research objectives)

To investigate the impact of prolonging the time to postoperative endotracheal extubation on the incidence of postoperative complications in gastric cancer patients with severe obstructive sleep apnea.

3. Research Methods (This section should be elaborated in detail)

Study Design

This is a single-center, prospective cohort study. Starting June 2025, the study plans to enroll patients undergoing radical gastrectomy for gastric cancer in the Department of General Surgery of our hospital who also have severe obstructive sleep apnea. Based on the anesthesiologist's assessment during the perioperative period regarding sufficient metabolism of anesthetic agents and full patient awakening, patients will be divided into two groups regarding whether extubation time is prolonged (by 1-2 days): Exposure Group: Prolonged extubation time group; Non-Exposure Group: Non-prolonged extubation time group (extubation on the day of surgery group). Clinical data, intraoperative details, postoperative pathology, lymph node status, and postoperative complications will be recorded for all patients.

Study Site and Subjects (Source, Inclusion, and Exclusion Criteria)

All patients in this study will be inpatients from the Department of Gastrointestinal Surgery, Qilu Hospital.

Inclusion Criteria:

Patients preoperatively diagnosed with resectable gastric cancer.

Patients without distant organ metastasis.

Patients with preoperative OCST or PSG results showing AHI >30 events/hour and SaO_2 <80%.

Patients with cardiopulmonary function deemed suitable for surgery.

Patients aged 18-85 years.

Patients who voluntarily joined this study and provided written informed consent.

Exclusion Criteria:

Patients with a history of or concurrent other malignant tumors.

Patients who underwent palliative resection.

Subjects who experienced acute cardiovascular or cerebrovascular events (e.g., acute cerebral infarction, acute coronary syndrome) within the past 3 months, or whose cardiovascular clinical symptoms/diseases are not well-controlled.

Patients with a history of psychotropic drug abuse that cannot be abstained, or those with psychiatric disorders.

Patients with concomitant diseases that, in the investigator’s judgment, seriously endanger the patient’s safety or affect the completion of the study.

Study Variables (Factors) and Measurement
Study Variable: Whether endotracheal extubation time is prolonged.

Study Outcomes
Incidence of short-term postoperative complications, graded using the Clavien-Dindo classification.

Follow-up (For Cohort Studies)
Routine follow-up examinations at 1, 3, 6, 9, and 12 months postoperatively. Collect routine follow-up indicators and assess the occurrence of postoperative complications.

Sample Size
The incidence of postoperative complications in gastric cancer patients with severe sleep apnea is the primary endpoint of this study. Based on previous large-scale literature reports, the incidence of perioperative cardiovascular complications in patients with severe sleep apnea undergoing non-cardiac surgery is 15% higher than in the normal population [8]. Using a power of 90% and a significance level of 5%, sample size estimation was performed using PASS, version 11 (NCSS, LLC). We need to recruit 93 patients per group. Accounting for loss to follow-up, dropouts, and other factors, we plan to include 120 patients per group, totaling an estimated 240 patients for both groups.

Study Flowchart

Gastric cancer patients with severe sleep apnea

-> Apply Inclusion/Exclusion Criteria

-> Undergo surgical treatment

-> Decision on prolonging extubation time?

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text
Yes -> Exposure Group: Prolonged extubation time
text
No -> Non-Exposure Group: Non-prolonged extubation time
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Compare complication rates between the two groups

-> Follow-up for 1 year

-> Compare complication rates between the two groups

Data Collection and Management
Preoperative patient status: General information (name, gender, age, BMI),

preoperative nutritional status, preoperative tumor marker levels, preoperative comorbidities, etc.
Postoperative recovery: Time to recovery of bowel function (first flatus, first oral water/fluid intake), postoperative complications (pulmonary infection, postoperative gastroparesis, postoperative reflux, inflammatory bowel obstruction, bleeding, perforation, anastomosis-related complications such as anastomotic leak, anastomotic stenosis, anastomotic bleeding, etc.), cardiovascular and cerebrovascular complications, etc.
Postoperative follow-up information: Patient review at 1, 3, 6, 9, and 12 months postoperatively, CT and gastroscopy results.

Statistical Analysis Methods
Chi-square test or Fisher's exact test will be used to compare categorical variables. Continuous variables will be expressed as median and IQR if non-normally distributed and analyzed using the Mann-Whitney U test, or as mean (SD) if normally distributed and analyzed using the t-test. Survival data will be analyzed using Kaplan-Meier curves. Enrollment is expected to be completed between June 2025 and June 2026. Follow-up is expected to be completed between June 2026 and June 2027.

Quality Control
During the clinical research process, strictly adhere to the procedures specified in the clinical study protocol. Collect and enter data completely and accurately. Manage data using a standardized database.

4. Feasibility Analysis
This is an observational study requiring no additional medical procedures or expenses, making it technically and economically feasible.

5. Timeline
Enrollment is expected from June 2025 to June 2026.
Follow-up is expected from June 2026 to June 2027.
Data analysis and manuscript writing are expected to be completed by December 2027.

6. References

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