Effectiveness Study of Gastric Tube and Duodenal Feeding Tube Fixation Methods

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Abstract

Objective To compare the differences between fixation using 3M adhesive tape alone versus a combination of 3M adhesive tape and cotton tape double-loop knot for gastric and duodenal feeding tubes, and to identify an effective and safe fixation method that reduces tube displacement, detachment, and skin damage, thereby alleviating both patient discomfort and psychological stress.

Methods One hundred patients who underwent radical resection for esophageal, gastric, or cardiac cancer and had duodenal feeding tubes and gastric tubes placed postoperatively were enrolled and divided into groups for different fixation methods. The experimental group received combined fixation with 3M adhesive tape and cotton tape double-loop knot, while the control group received conventional 3M adhesive tape fixation. Psychological stress, tube displacement, tube detachment incidence, and local skin damage were observed and compared between the two groups.

Results The combined method of 3M adhesive tape and cotton tape double-loop knot for fixing gastric and duodenal feeding tubes demonstrated superior safety and stability compared with traditional adhesive tape fixation. The difference between the two groups was statistically significant ($P < 0.05$).

Conclusion The combined use of 3M adhesive tape and cotton tape double-loop knot method for fixing gastric and duodenal feeding tubes is more secure and effective, effectively preventing tube displacement and detachment while alleviating patient suffering.

Full Text

A Study on the Effectiveness of Fixation Methods for Gastric Tubes and Duodenal Nutrition Tubes

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Abstract

Objective: To compare the difference between fixation using 3M tape alone versus a combination of 3M tape and cotton tape double-knot method for gastric and duodenal nutrition tubes, and to identify an effective and safe fixation approach that reduces tube displacement, accidental removal, and skin damage while alleviating patient discomfort and psychological stress.

Methods: A total of 100 patients who underwent radical surgery for esophageal, gastric, or cardiac cancer and received postoperative duodenal nutrition tubes and gastric tubes were enrolled. Patients were divided into two groups with different fixation methods: the experimental group used a combination of 3M tape and cotton tape double-knot fixation, while the control group used conventional 3M tape fixation. Psychological stress, tube displacement, accidental tube removal, and local skin damage were observed and compared between the two groups.

Results: The combined 3M tape and cotton tape double-knot method for fixing gastric and duodenal nutrition tubes demonstrated superior safety and stability compared to traditional tape fixation, with statistically significant differences between groups ($P < 0.05$).

Conclusion: The combined use of 3M tape and cotton tape double-knot method for fixing gastric and duodenal nutrition tubes is safer and more secure, effectively preventing tube displacement and accidental removal while reducing patient suffering.

Keywords: Gastric tube; Duodenal nutrition tube; Fixation method

Introduction

Gastric and duodenal nutrition tubes are routinely placed after esophageal, gastric, and cardiac cancer surgery and play a critical role in patient recovery. Gastric tubes facilitate gastrointestinal decompression by draining gastric fluid, which reduces anastomotic tension and prevents anastomotic leakage [1]. Since patients must remain fasting postoperatively, duodenal nutrition tubes enable enteral nutrition delivery, ensuring nutritional support during the fasting period, promoting gastrointestinal function recovery, and facilitating earlier oral intake. Therefore, proper fixation of gastric and duodenal nutrition tubes is essential for postoperative treatment and nursing care. The conventional fixation method uses 3M tape alone. This study compares this traditional approach with a

combined method using both 3M tape and cotton tape double-knot fixation, evaluating the effectiveness of both techniques.

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1. Materials and Methods

1.1 Basic Information We selected 100 patients who underwent radical surgery for esophageal, gastric, or cardiac cancer in our hospital's thoracic surgery department from January 2023 to July 2023. The cohort included 79 males and 21 females, aged 43–68 years (mean age 55.25 years). Patients were assigned to groups based on their postoperative bed numbers: the control group (beds 1–24) and the study group (beds 25–47). The control group comprised 38 males and 12 females, with educational backgrounds of 41 cases below junior high school level, 6 cases with high school education, and 3 cases with college education or above. The study group included 41 males and 9 females, with 37 cases below junior high school level, 9 cases with high school education, and 4 cases with college education or above. Comparisons between the two groups showed no statistically significant differences in age, gender, or educational level ($P > 0.05$).

1.2 Methods All 100 patients who underwent radical surgery for esophageal, gastric, or cardiac cancer in our thoracic surgery department from January 2023 to July 2023 were included. The control group (50 cases, beds 1–24) received conventional 3M tape fixation: a 5 cm × 2 cm piece of 3M tape was used to bind the gastric and duodenal nutrition tubes and fix them crosswise to the nasal ala, while another 6 cm × 3 cm piece of 3M tape was used to bind both tubes and fix them crosswise to the ipsilateral cheek. Black marker was used to mark the exit points of both tubes at the nasal cavity. The tape was replaced immediately when soiled by sweat or nasal secretions, when there was risk of detachment, or when adhesion and facial aesthetics were compromised [Figure 1: see original paper].

The study group (50 cases, beds 25–47) received combined fixation using 3M tape (same as control group) and cotton tape double-knot method. A flat cotton tape (0.5–1 cm wide, 70–90 cm long) was folded in half, and the midpoint was shifted 15–20 cm toward one side to establish the fixation point. This created one long and one short end. The first knot was tied at the nasal exit of the tubes: the predetermined midpoint of the cotton tape was knotted to fix the nutrition tube first, then the gastric tube, with tension sufficient to avoid compressing the tube lumen. The second knot: the long end of the cotton tape was passed along the contralateral nostril direction, across the cheek and above the ear, wrapped around the occiput once, then 交汇 (joined) with the short end above the ear on the tube placement side. The second knot was secured approximately 5 cm anterior to the ear on the ipsilateral side, using a tight knot to fix the duodenal nutrition tube first, then the gastric tube, with tension allowing one finger to pass through [2] [Figure 2: see original paper]. Both

methods included measuring the length from the tube ends to the nasal cavity and marking the placement length. During shift handovers and tube care, tube length was observed, and the nasal cavity was cleaned immediately when soiled [2].

1.2.2 Evaluation Criteria

Patient psychological stress and gastric/duodenal nutrition tube displacement, accidental removal, and local skin damage were assessed. Tube displacement was defined as any change in external length shorter or longer than the original marking; accidental removal was defined as complete tube exit from the nostril; skin damage was defined as erythema, swelling, blisters, or bleeding [3].

1.3 Statistical Analysis All data were analyzed using SPSS 25.0 software. Chi-square test was used for comparing incidence rates, with $P < 0.05$ considered statistically significant.

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2. Results

The displacement, accidental removal, and local skin damage of gastric and duodenal nutrition tubes in the study and control groups were compared .

Table 1 Comparison of tube displacement, accidental removal, local skin damage, and psychological stress between the two groups

Indicator	Control Group (n=50)	Study Group (n=50)
Tube displacement (yes/no)	12/38	3/47
Accidental removal (yes/no)	2/48	0/50
Local skin damage (yes/no)	13/37	8/42
Psychological stress (yes/no)	28/22	35/15

The data revealed: Among 50 cases in each group, tube displacement occurred in 12 control group cases (24%) versus 3 study group cases (6%). The study group showed significantly less displacement than the control group, with a statistically significant difference ($P = 0.026 < 0.05$). For accidental removal, 2 cases (4%) occurred in the control group while none occurred in the study group, demonstrating significantly safer and more secure fixation in the study group ($P = 0.012 < 0.05$). Regarding local skin damage, no statistically significant difference was found between the control and experimental groups ($P = 0.223 > 0.05$). Similarly, no statistically significant difference was observed in patient psychological stress between groups ($P = 0.162 > 0.05$).

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3. Discussion

Clinical data demonstrate that conventional 3M tape fixation for postoperative gastric and duodenal nutrition tubes is prone to adhesive failure due to facial sweat and sebum secretion, resulting in insecure tube fixation [4]. Therefore, proper tube fixation constitutes a critical component of postoperative patient care. Accidental tube removal necessitates reinsertion, which increases patient suffering and medical costs while adding to nursing workload and risks. Particularly for postoperative patients, accidental removal of gastric and duodenal nutrition tubes often cannot be remedied by reinsertion, potentially impairing postoperative wound healing and causing severe complications [5].

This study's findings indicate that the study group exhibited lower incidences of tube displacement and accidental removal compared to the control group, demonstrating that the combined 3M tape and cotton tape double-knot method effectively reduces displacement and removal rates, offering superior safety and stability over traditional tape fixation. These results align with similar research findings [6]. The combined method provides more secure fixation that can withstand the gravitational pull from gastric fluid drainage via the connected negative pressure drainage bag and the downward flow of nutritional solution through the duodenal tube, substantially enhancing fixation stability and facilitating nutritional infusion.

For patients undergoing gastric, cardiac, or esophageal cancer surgery, nurses should educate patients and families about the importance of tube security preoperatively. Encouraging deep breathing and effective coughing is essential, as postoperative atelectasis and pulmonary infection are associated with inadequate preoperative respiratory muscle training and ineffective postoperative coughing. However, postoperative patients with multiple tubes and incisional pain are often reluctant to mobilize actively. Early ambulation is crucial for these patients as it triggers intestinal reflexes that promote intestinal peristalsis and accelerate content evacuation. Effective coughing is typically performed in sitting positions with significant movement. The combined fixation method ensures tubes remain secure despite patient movement, coughing, sneezing, turning, or ambulation, preventing accidental removal during sleep due to discomfort and allowing patients to rest assured. In our department, the cotton tape is connected to the gastrointestinal decompression device linked to the gastric tube and secured to the patient's button, while the duodenal nutrition tube is fixed with a swallowtail clip, providing safety assurance for patient mobility. The combined method reduces tape replacement frequency, saves nursing time, and improves care quality [7].

Regarding local skin damage and patient psychological stress, the study group's method has not yet achieved satisfactory resolution. Future improvements in these aspects may provide healthcare professionals with further opportunities for research and development in fixation methods for gastric and duodenal nutrition tubes after gastric, cardiac, and esophageal cancer surgery [8].

4. References

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Note: Figure translations are in progress. See original paper for figures.