Impact of Nasogastric Decompression on Gastric Tube Size After McKeown Minimally Invasive Esophagectomy: a Retrospective Controlled Cohort Study

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Introduction

As surgeons omitted nasogastric tube (NGT) placement after esophagectomy, the incidence of gastric tube distention in patients increased.1–3 However, the cause of gastric tube distention induced by no NGT placement and the impact of gastric tube distention on postoperative complications following esophagectomy are unknown. The aim of the study was to evaluate the impact of nasogastric decompression (NGD) on gastric tube size and the safety and feasibility of omitting NGT placement after McKeown minimally invasive esophagectomy (MIE).

Patients and Methods

We retrospectively reviewed the clinical charts of 640 esophageal cancer patients who underwent McKeown MIE in the Affiliated Cancer Hospital of Zhengzhou University between January 2018 and March 2021. The patients were divided into the non-NGD and NGD groups based on whether an NGT was placed during the operation. The measurement method of gastric tube size is presented in Fig. 1.

We used propensity score matching to control for potential selection bias and confounding factors. A two-sided p < 0.05 was considered statistically significant.

Result

There were 208 (32.5%) patients in the non-NGD group and 432 (67.5%) patients in the NGD group. Following 1:1 propensity score matching, a total of 203 patient pairs were selected. On postoperative day (POD) 1, a significant difference was found in gastric tube size (22.2 [0–34.7] vs. 0 [0–22.5] mm, p < 0.001) and the number of patients with gastric tube distention (139 (68.5%) vs. 93 (45.8%), p < 0.001) between the non-NGD and NGD groups. However, on POD 5, no difference was found in gastric tube size (18.5 [0–31.7] vs. 18.0 [0–25.4] mm, p = 0.070) or number of patients with gastric tube distention (135 (66.5%) vs. 133 (65.5%), p = 0.834) between the two groups.

Based on chest plain radiography examination on POD 5, we selected the median diameter (24.8 mm) of gastric tube as the cutoff value for the grouping in patients with gastric tube distention (group1 = 0 mm, group 2 > 0 mm < 24.8 mm and group 3 ≥ 24.8 mm). The postoperative outcomes of patients after matching are listed in Table 1.

Discussion

The results of this study show that gastric tubes were larger in the non-NGD group than in the NGD group on POD 1. However, the proportion of gastric tube distention was similar between the two groups on POD5. Despite our attempts to manipulate the NGT to reduce distention, it did not seem to be effective.
The traditional viewpoint assumes that gastric tube distention causes anastomotic tension, anastomotic dehiscence, decreased lung function, aspiration, and reflux and thus affects the long-term quality of life of patients after esophagectomy. However, in this study, we did not observe a larger gastric tube size leading to a higher incidence of complications. Patients in group 1 had a higher incidence of pneumonia compared with the other two groups. This might be because patients with the placement of NGT in group 1 had the NGT removed on POD 1, and the absence of NGT might increase the risk of tracheal aspiration.4 However, the reasons for the occurrence of postoperative pneumonia are multifactorial.5,6 This requires further research in the future.

Our findings demonstrated that NGD during surgery can reduce the rate of gastric tube distention after McKeown MIE on POD 1, and it is safe and feasible to omit NGT after McKeown MIE. The vast majority of patients can avoid the discomfort caused by the placement of NGTs. The main limitation of this study is that this was a single-center retrospective analysis. It is necessary to design a prospective trial to verify our results and further evaluate changes in gastric tube size after NGD placement in the non-NGD group.

### Table 1 Postoperative outcomes of the study patients after matching

| Variables                             | Group 1 (n = 138) | Group 2 (n = 134) | Group 3 (n = 134) | p     |
|---------------------------------------|-------------------|-------------------|-------------------|-------|
| NGT placement                         | 70 (50.7%)        | 76 (56.7%)        | 57 (42.5%)        | 0.066 |
| Complications (CD ≥ 2)                | 37 (26.8%)        | 24 (17.9%)        | 25 (18.7%)        | 0.136 |
| Pneumonia (CD ≥ 2)                    | 28 (20.3%)        | 14 (10.4%)        | 17 (12.7%)        | 0.054 |
| Anastomotic leakage (CD ≥ 3)          | 2 (1.4%)          | 3 (2.2%)          | 4 (3.0%)          | 0.685 |
| Delayed gastric tube emptying         | 16 (11.6%)        | 16 (11.9%)        | 19 (14.2%)        | 0.785 |
| CD classification                     |                   |                   |                   | 0.604 |
| 2                                     | 18 (13.0%)        | 14 (10.4%)        | 12 (9.0%)         |       |
| 3                                     | 13 (9.4%)         | 8 (6.0%)          | 8 (6.0%)          |       |
| 4                                     | 5 (3.6%)          | 1 (0.7%)          | 4 (3.0%)          |       |
| 5                                     | 1 (0.7%)          | 1 (0.7%)          | 1 (0.7%)          |       |
| ICU readmission or length of ICU stay > 24 h | 6 (4.3%)        | 1 (0.7%)          | 6 (4.5%)          | 0.086 |
| Length of postoperative stay, days    | 8 (7–11)          | 8 (7–10)          | 8 (7–11)          | 0.551 |
| Unscheduled readmission within 30 days| 1 (0.7%)          | 1 (0.7%)          | 1 (0.7%)          | >0.99 |
| In-hospital mortality                 | 1 (0.7%)          | 1 (0.7%)          | 1 (0.7%)          | >0.99 |

NGT, nasogastric tube; ICU, intensive care unit; CD, Clavien–Dindo
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**Declarations**

**Ethics Approval** The study protocol was reviewed and approved by the Affiliated Cancer Hospital of Zhengzhou University Ethics Committee on August 13, 2021 (2021–292-001). Given the retrospective nature of the study, the need for informed consent was waived.

**Conflict of Interest** The authors declare no competing interests.

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