

# A novel technique to insert nasogastric tube for the anesthetized patients during cervical esophageal reconstruction

Ruijie Zhang, Yu Deng, Shengling Fu(✉), Yixin Cai, Ni Zhang, Xiangning Fu

Department of Thoracic Surgery, Tongji Hospital, Tongji Medical College of Huazhong University of Science and Technology, Wuhan 430030, China

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**Abstract Objective:** We are describing a novel technique to insert nasogastric tube (NGT) in the anesthetized patients during cervical esophageal reconstruction. **Methods:** Forty patients with mid and upper esophageal tumor enrolled into this study were randomly allocated into two groups (the control group, group C and the novel method group, group N). All the patients were applied mechanical anastomosis to finish the cervical esophageal reconstruction. The procedure of NGT insertion for group C use the conventional method; well, the group N use the novel technique. **Results:** All the patients in group N had been finished the NGT insertion in the first attempt, and the total time for insertion was  $(5.05 \pm 1.15)$  mins; on the contrary, for the group C, duration of insertion (min) was  $(24.45 \pm 5.23)$  mins, and the successful rate of NGT insertion in the first attempt was 40% ( $P < 0.05$ ); no one in group N had coiling/kinking, and 6/20 (30%) in group C had it ( $P = 0.020$ ). The complication rate of bleeding between the two group had no significant difference. **Conclusion:** For the patient with mid and upper esophageal tumor who need cervical esophageal reconstruction, this novel method can save the NGT insertion time, and make it easier with higher successful rate.

**Key words** nasogastric tube (NGT) insertion; esophageal reconstruction; nail groove

Nasogastric tube (NGT) insertion is almost always indicated in patients undergoing esophageal reconstruction, which is usually done before surgery when the patients are conscious. The NGT should be withdrawn upper to the anastomotic stoma before anastomosis, and then be inserted again after that. It is sometimes difficult and frustrating to insert a NGT into a anesthetized and intubated patient, with reported failure rates of nearly 50% on the first attempt with the head in neutral position<sup>[1–3]</sup>. For the patients of esophageal reconstruction, it's will be much more difficult because of the sharp angle of esophageal anastomotic stoma. After each unsuccessful insertion, incidences of mucosal bleeding and hemodynamic complication increase<sup>[4]</sup>.

It has been acknowledged that most difficulties in NGT insertions are due to anatomic reasons<sup>[5]</sup>. The most common sites of impaction are the piriform sinus, the arytenoids cartilage<sup>[5–6]</sup>, and the esophagus, which becomes compressed by the inflated cuff of an endotracheal tube and the sharp angle of anastomotic stoma. Moreover, the NGT is usually made of polyurethane, which makes the

NGT soft and less traumatic, but also makes it more easily to coil or kink when encountering an anatomic block. We described a new technique to insert NGT in such patients with higher successful rates and less time.

## Materials and methods

### Patients

Forty patients with mid and upper esophageal tumor enrolled into this study were randomly allocated into two groups (the control group, group C and the novel method group, group N). According to a computerized, random-allocation software program. All the patients were applied mechanical anastomosis to finish the cervical esophageal reconstruction. The procedure of NGT insertion for group C used the conventional method; well, the group N used the novel technique.

### Technique

Every patient with mid and upper esophageal tumor needs esophageal resection via cervical anastomosis. The NGT was inserted in the ward before the patient was wheeled into the operation room. Then the surgery was

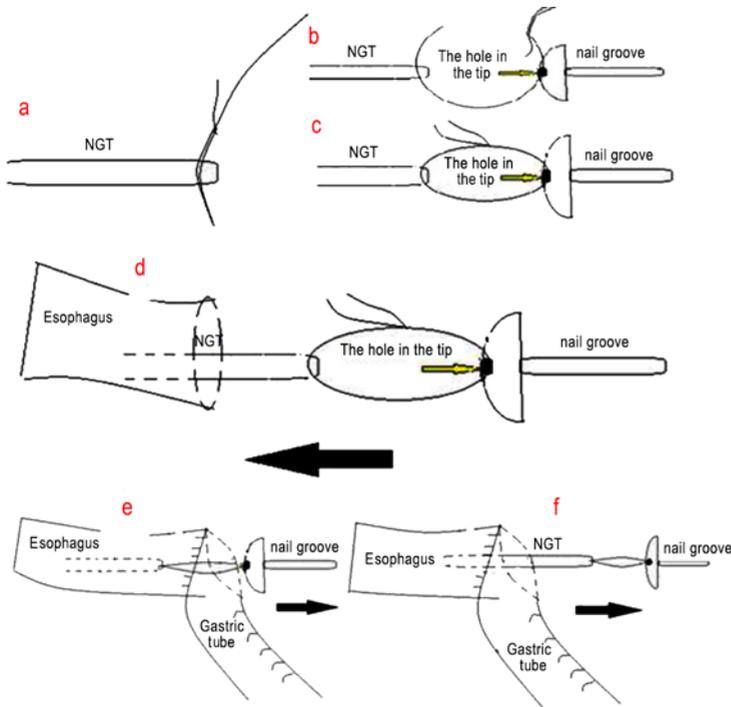


Fig. 1 The schematic plot

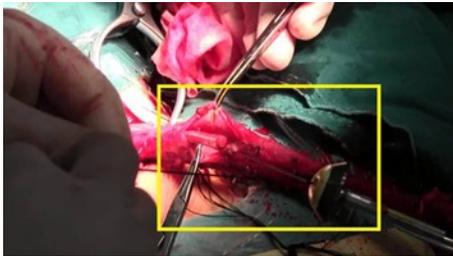


Fig. 2 A simple suture through the NGT and the hole in the tip of the nail groove; then tie it

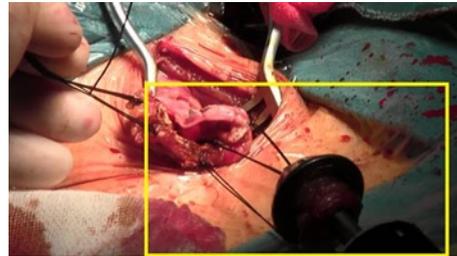


Fig. 3 Pulled the anastomat out, which would pull the NGT out together

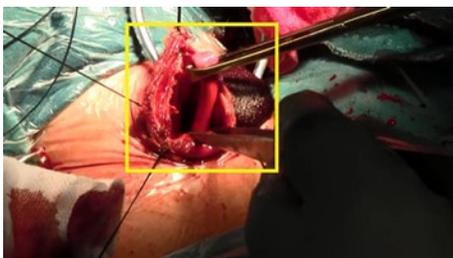


Fig. 4 Placed it into the cavity through the stoma with forceps after disinfection

done as usual. After the gastric tube has been made up and the esophagus been fully dissociated, the cervical anastomosis was needed.

The procedure of NGT insertion for group C used the conventional methods: insert blindly, guided by a tube; helped by some forceps and so on.

The procedure of NGT insertion for group N was described as Fig. 1. (1) Made a cervical incision to find out the esophagus, and pulled it out. (2) Pulled the thread tied to the gastric tube and fixed it with Kelly. (3) Made sure the cutting edge; found out the NGT in the esophagus and withdraw it above the cutting edge; when we withdrew the NGT, we touched it at the same time to prevent it out of the esophagus. (4) Did the “purse-string” suture at the cutting edge, and then fixed the two ends with Kelly. (5) Inserted the NGT for about 4 cm. (6) Made a incision below the cutting edge though the whole layers into the cavity of esophagus; exposed the incision and found out the NGT. (7) Disinfected the cavity, NGT and the nail groove of the anastomat. (8) Did a simple suture though the NGT and the hole in the tip of the nail groove; then tied it and the distance between the two was about 4 cm (Fig. 2). (9) Withdrew the NGT and put the nail groove in the cavity of esophagus. (10) After anastomosis be-

ing done, pulled the anastomat out, which would pulled the NGT out together (Fig. 3). (11) Cut and released the thread tied to the NGT and then placed it into the cavity through the stoma with forceps after disinfection (Fig. 4). (12) Finished the remaining work of the surgery.

## Results

This new method could save the NGT insertion time, made it easier with higher successful rate and lower complication rate.

All the patients in group N had been finished the NGT insertion in the first attempt, and the total time for insertion was  $(5.05 \pm 1.15)$  mins; on the contrary, for the group C, the duration of insertion (min) was  $(24.45 \pm 5.23)$  mins, and the successful rate of NGT insertion in the first attempt was 40% ( $P < 0.05$ ); no one in the new method group had coiling/kinking, and 6/20 (30%) in the control group had it ( $P = 0.020$ ). The complication rate of bleeding between the two groups had no significant differences (Table 1).

## Discussion

It has been acknowledged that most difficulties in NGT insertions are due to anatomic reasons [5]. Another issue is that the modern soft and atraumatic nasogastric tubes are made up of polyurethane which becomes more soft on exposure to patient's body temperature [7]. Additionally, several non-opposing lateral eyes like opening near the tip make the nasogastric tube more prone for kinking [8]. The memory effect also contributes to subsequent failures; once kinked, the nasogastric tube is subsequently more likely to kink at the same place. There are many methods used to facilitate nasogastric tube insertion include stiffening of nasogastric tube with iced saline, the use of a slit endotracheal tube, forward displacement of the larynx and the use of various forceps, the use of an ureteral guidewire as a stylet, head flexion, lateral neck pressure, and the use of a gloved finger to steer the nasogastric tube after impaction. But most of them need some preparation; some of these do not fit for the anesthetized patients of esophagectomy, because the sharp angle of anastomotic stoma make the NGT insertion harder. And what we usually do before was to use the position of patients and various forceps.

To compare this novel method with the conventional methods, we found there are many advantages: (1) It cost less time, compared to group C, it could save nearly 20 min per-patient. (2) The whole procedure can be done

**Table 1** Total time for insertion and complications

	Group C ( $n = 20$ )	Group N ( $n = 20$ )	$P$
Duration of insertion (min)	$24.45 \pm 5.23$	$5.05 \pm 1.15$	0.000
Successful rate of NGT insertion in the first attempt	8/20 (40)	20/20 (100)	0.003
Complication [ $n$ (%)]			
Coiling/kinking	6/20 (30)	0/20 (0)	0.020
Bleeding	8/20 (40)	2/20 (10)	0.065

in the surgical field, which may prevent some infection. (3) There was no coiling/kinking, so that, there was less bleeding of the esophageal mucous or anastomotic stoma. Note: when pulling the NGT, we should make sure there is no tension. (4) It is easier to operate. We use the characteristics of nail groove to tie the NGT to the hole of the tip. It needs no more practice, and every surgeon can master it quickly and finish it very well. So that, this novel method can save the NGT insertion time, make it easier with higher successful rate. For the patient with mid and upper esophageal tumor who need cervical esophageal reconstruction, this method will be much useful.

## Conflicts of interest

The authors indicated no potential conflicts of interest.

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