

A critical appraisal of indications for endoscopic placement of nasojejunal feeding tubes

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ABSTRACT

Background: Postpyloric feeding is indicated whenever nutritional intake is compromised because of impaired gastric emptying. Although guidelines concerning this feeding modality are available it remains unclear whether these are applied in clinical practice. We therefore evaluated the indications provided by applicants for endoscopic placement of nasojejunal feeding tubes at our centre.

Methods: A prospective study was conducted in patients who were referred for endoscopic nasojejunal-feeding tube placement in a 950-bed Dutch university hospital. State-of-the-art criteria for nasojejunal tube placement comprised severe gastro-oesophageal reflux, gastroparesis leading to aspiration, gastric stasis not responding to prokinetics, gastroduodenal obstruction or proximal enteric fistulae. The study endpoint was met if the feeding tube was no longer needed or had to be replaced, or if the patient was discharged from the hospital or died.

Results: During a four-month observation period, 131 patients were enrolled, of whom 57% came from intensive care units. Tube placement only met at least one of the mentioned criteria in the hospital protocol in 59% of all cases, while in intensive care patients a lower proportion was observed (50%, $p < 0.05$). In the latter group, in 35% of all cases no increased gastric residues had been measured at all.

Conclusion: Although directives are at hand that provide clear indications for endoscopic placement of nasojejunal feeding tubes, our data show that these guidelines are frequently not followed in clinical practice. These findings suggest that supervised implementation of established guidelines might reduce the strain on both patients and the hospital's resources.

KEYWORDS

Artificial nutrition, endoscopy, feeding tube, intensive care, postpyloric feeding

INTRODUCTION

Postpyloric feeding is indicated when the digestive tract functions normally, but patients cannot meet their nutritional or fluid requirements due to a passage problem at the gastric level. This situation is most frequently encountered in the (early) postoperative setting.¹⁻⁷

In general, there is consensus on the indications to initiate artificial nutrition, be it by the enteral or by the parenteral route.¹⁻¹² Especially the European Society for Parenteral and Enteral Nutrition, the American Society for Parenteral and Enteral Nutrition, the American Gastroenterological Association and the British Society for Gastroenterologists have provided comprehensive guidelines on enteral and parenteral nutrition that represent the current state of the art.^{7,8,10-12}

Several studies have compared gastric and postpyloric feeding with regard to indications and complications.¹⁻¹² However, none of these focused on endoscopically placed nasojejunal feeding tubes (ENFTs). Although a few studies¹³⁻²² have described tube survival rates, placement- and tube-associated complications, as well as the logistics regarding ENFTs, most of these investigations were too small to provide adequately assessable data from the statistical point of view.

This lack of information urged us to perform the present study. A small pilot survey in ten ICU patients who had ENFTs inserted because of supposedly impaired gastric emptying revealed only one patient with significant gastric retention according to our local protocol (>100 ml residue

twice within four hours). The reason for the discrepancies in the registration of gastric residues remained unclear and provided another indication for the present investigation. Here, we critically evaluated relevant issues concerning ENFT placement, with special emphasis on such critical issues as the correctness of the indications for tube placement, placement success and complications. For practical purposes, radiographically inserted nasojejunal feeding tubes were not included in this evaluation due to significant logistic differences between the endoscopic and radiological procedures.

MATERIALS AND METHODS

Study population

In total 131 consecutive patients who were referred for ENFT placement were enrolled in the study protocol. The local Committee on Research Involving Human Subjects approved the study. Because this work concerns a strictly observational study, informed consent was not mandatory. Adult patients (≥ 16 years) in whom endoscopic placement of an ENFT was requested were eligible for enrolment. The study was conducted at the Radboud University Nijmegen Medical Centre in Nijmegen, the Netherlands, a university hospital where approximately 300 nasojejunal feeding tubes are inserted on an annual basis, 220 by means of endoscopy and 80 via radiological procedures.

Procedure

All requested ENFTs were made by means of an application form or by phone. The mobile endoscopy team inserted ENFTs on the ICU wards. All the other ENFTs were inserted on the Endoscopy ward. Following cannulation of the horizontal part of the duodenum, a Vygon Charriere 10 polyurethane feeding tube was inserted under direct vision through the biopsy channel and passed for at least 50 cm beyond the pylorus. All procedures were performed by gastroenterologists and fellows (94) or by a nurse practitioner (10).

State-of-the-art criteria

The state-of-the-art criteria for ENFT placement, according to various sources^{1-7,10,14,15} are:

- I. Proven severe gastro-oesophageal reflux, atonic stomach or gastroparesis leading to aspiration.
- II. Delayed gastric emptying with residues >100 ml twice within four hours and not responding to propulsion improving measures.
- III. Intolerance of oral feeding due to gastroduodenal inflammation, postprandial pain or passage disorder due to swelling or outside pressure onto the duodenum (pancreatitis or tumour).
- IV. Proximal (duodenum and first part jejunum) enteric fistula.

Data

The study endpoint was met whenever the presence of an ENFT was no longer indicated, the ENFT had to be replaced, whenever the study period exceeded the observation period of four months, or if the patient was discharged from the hospital or died. All relevant data concerning indications and placement of the ENFT, hospital stay, complications and length of survival of the ENFT were recorded from the patients' medical files.

Statistical analyses

The primary endpoint of the study was the percentage of ENFTs that were correctly placed according to the state-of-the-art criteria. Given the lack of available data, and based on expert opinions, we assumed with an accuracy of 10% that about 60% of the requests for an ENFT would fulfil these criteria. Based on power analysis, an inclusion of 102 ENFTs was thus expected to permit adequate statistical analysis.

Descriptive statistics and comparisons of categorical variables between groups were evaluated using the Statistical Program for Social Sciences (SPSS) version 12.1 (SPSS Corporation, Chicago, IL, USA). Tube survival was assessed by means of Kaplan-Meier's analysis and log-rank testing.

RESULTS

Between February and June 2005, 131 adult patients who completed the study were enrolled, with a male-female ratio of 84:47 and a mean age of 60 years (range 17-87, SD = 14.9).

Outpatients ($n=13$) and patients with an observation period of less than one week ($n=7$) were excluded from the ENFT survival analysis. Most patients suffered from gastroenterological (41%) and cardiac (24%) problems. Overall, 57% of all patients had been admitted to the intensive care unit (ICU) at the moment the ENFT was requested.

State-of-the-art criteria

In 59% of all patients ENFT placement was found to fulfil one of the state-of-the-art criteria (*figure 1*). At ICUs this proportion was significantly lower (50%, $p=0.01$). Of note, in ICU patients, in 35% of all cases ($n=74$) no valid indication for ENFT placement was present since increased gastric residues had not been measured.

Withdrawn requests for ENFTs placement

Of the initially requested ENFTs, 27% originating from the ICUs ($n=74$) and 5% from other wards ($n=57$) were cancelled before actual placement (*tables 1 and 2*). A significantly higher number of withdrawals were observed for ICU requests ($p\leq 0.001$).

Figure 1. Numbers of requested ENFTs that did or did not fulfil state-of-the-art criteria (I-IV)

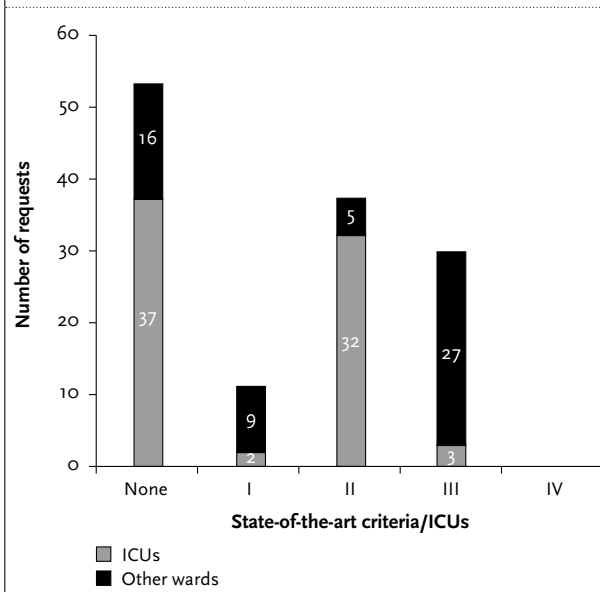


Table 1. Details on ENFT placements in relation to state-of-the-art criteria

ENFTs	Fulfilled criteria	Did not fulfil criteria	Total
Actual placement	75	28	103
Withdrawn placement	2	25	27
Failed placement	1	0	1
Total	78	53	131

Table 2. Departments requesting ENFTs

Department	Number	% of total
ICU Cardiothoracic	30	23
ICU Neurology/trauma	19	14
ICU General	25	19
Gastroenterology	18	13
Endoscopy centre	11	8
Surgery	8	6
Haematology	8	6
Internal medicine	4	3
Cardiology	2	2
Nephrology	2	2
Medium care (surgery)	1	1
Oncology	1	1
Ear, nose and throat	1	1
Radiotherapy	1	1
Total	131	100

ICU = intensive care unit. Underlying diseases comprised gastrointestinal (41%), heart (24%), trauma (10%) and neurological disorders (9%). Gastrointestinal disorders were mainly (47%) acute and chronic pancreatitis.

Cancellation in 89% of all cases (n=23) took place within 48 hours after the request. Except for one ICU patient, all withdrawals were reported to be the consequence of recovered gastric motility. Remarkably, 21 out of these 23 were initially requested because of reported significant gastric retention volumes.

Accidental findings during ENFT placement

During all endoscopic procedures (n=104) only one significant finding was reported in the form of a suspected peri-papillary lesion in the duodenum for which an appropriate analysis was initiated. Biopsies taken during this procedure were consistent with a duodenal adenoma. Small mucosal erosions, most likely due to the presence of feeding tubes, were seen on a regular basis in the gastric corpus and antrum. None of these gave rise to significant bleeding or required endoscopic intervention during the study period.

Time interval between request and ENFT placement

Most (30%) of the ENFTs (n=103) were inserted on a Friday. Probably because of the upcoming weekend (no ENFT placements are planned on a regular basis during the weekends in our hospital) there was probably an increase in requests on this day. It proved that 51% of all requests were carried out the same day and 79% within 48 hours.

Procedure-related complications

During endoscopic ENFT placement (n=104) no significant complications occurred. One procedure was aborted due to excessive vomiting. This patient developed no clinical symptoms related to aspiration.

Complications and survival of ENFTs in the clinical setting

Of all clinically inserted ENFTs 26% became nonfunctional within the first week after placement (n=83). Overall, almost 29% of the clinically inserted ENFTs eventually no longer functioned due to dislocation (either iatrogenic, or related to vomiting or agitation) and about 4% due to tube clogging. No statistically different (p=0.1124) survival rates were observed for ENFTs from ICUs when compared with other wards.

DISCUSSION

The most striking finding in the present study is that in a large university institution in a very high proportion (41%) of patients, despite the presence of well-established guidelines, ENFTs are not inserted in accordance with these directives. On the ICUs this proportion seems to be even higher (50%). Although this is a single-centre

investigation, we have no indications why our facility would not be representative for other teaching centres in the Netherlands.

ENFTs that were inserted according to the guidelines (59%) mainly concerned ICU patients (approximately 25%) who fulfilled criterion II (delayed gastric emptying with residues >100 ml twice within four hours and not responding to propulsion improving measures). For the other wards (surgical and internal medicine) criterion III (intolerance of oral feeding due to gastroduodenal inflammation, postprandial pain or passage disorder due to swelling or outside pressure onto the duodenum (pancreatitis or tumour)) was seen most frequently (21%). The indication for nearly all of these last requests was (chronic) pancreatitis.

The criteria for ENFT placement were clearly described by the physician and confirmed by checking the medical records immediately before actual insertion of the ENFT. It remains unclear from our study why many (41%) ENFTs were not inserted according to the available guidelines. Our impression was that while these directives were known by heart by most physicians and nurses, they tend to rather act on their 'clinical instinct'. However, since only the state-of-the-art criteria are evidence based, it appears prudent that we should strongly adhere to their implementation.

The state-of-the-art criteria are based on expert reviews and guidelines. Although according to many surgeons peroperative nutritional support is an indication for the placement of a duodenal feeding tube in major bowel surgery^{2-4,17,18,20} not one single ENFT was requested for this indication. This might be explained by the fact that in our hospital a (needle) jejunostomy is most frequently placed in this situation (on 37 occasions over the year 2006).

Another remarkable finding in this study was the high percentage (27%) of requested ENFTs by ICUs that were withdrawn within 48 hours. Although this in part probably reflects the clinical course of patients with recovered gastric emptying within this time frame, another explanation is that in a number of cases the judgement of gastric residues may have been incorrect.

The low number of coincidental findings during ENFT placements in this study has to be related to the fact that endoscopic visibility during the procedure is limited because tube feeding is only briefly interrupted before the procedure.

Some 26% of all ENFTs became non-functional within the first week after placement, mostly due to dislocation and clogging. This finding corroborates previous findings in the literature.^{8,23}

We conclude that, at least in our institution, the guidelines that are at hand for ENFT placement are frequently not followed in clinical practice. Increased and persistent attention for practical nutrition-related issues in teaching programmes might well provide a solution in this regard.

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