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Percutaneous Endoscopic Gastrostomy in the Intensive Care Unit: Benefits and Complications - A Series of 10 Cases

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A B S T R A C T

Background: Adequate caloric intake is a cornerstone of intensive-care management. When prolonged enteral nutrition (>4 weeks) is required, percutaneous endoscopic gastrostomy (PEG) is the access of choice, offering a simple, direct route to the stomach under endoscopic guidance. We aimed to evaluate the contribution and the complications of PEG in long-stay intensive care unit (ICU) patients.

Methods: Cross-sectional study of 10 ICU patients requiring long-term enteral nutrition who underwent PEG in the surgical intensive care unit of Ibn Rochd University Hospital Centre (CHU Ibn Rochd), Casablanca, Morocco. Demographic, clinical, biological, procedural and outcome data were collected before and after PEG placement.

Results: Ten patients were included (mean age 41.1 years, range 17–70; male-to-female ratio 4:1). The main indication was a swallowing disorder secondary to severe traumatic brain injury in 90% of cases (n=9); one patient had a brainstem ischaemic stroke. All patients were mechanically ventilated and tracheostomised; the mean interval between tracheostomy and PEG was 25.8 days. The placement success rate was 100%, with no intra-procedural complications. No late complications occurred. Early complications affected 50% of patients: localised pain (30%) and peristomal infection (40%) with a benign course; one patient (10%) developed acute peritonitis with septic shock and died on day 8. After PEG, biological markers improved-serum albumin rose in 70% and white-cell counts fell in 70% of patients. Six patients (60%) were discharged with the tube, and the tube was later removed without incident in 6 of 7 eligible patients (85.7%) following recovery of swallowing. Overall, 60% were discharged and 40% died during hospitalisation, with a single death directly attributable to PEG.

Conclusion: In ICU patients requiring prolonged enteral nutrition, PEG is an easy, safe and comfortable technique with a high success rate and predominantly benign complications. Careful patient selection and peri-procedural care remain essential to minimise the rare but serious risk of peritonitis.

Keywords: Enteral nutrition; Percutaneous endoscopic gastrostomy; Intensive care; Traumatic brain injury; Dysphagia; Critical illness

Introduction

Sufficient caloric intake, in both quality and quantity, is a cornerstone of the management of intensive-care patients, who most often suffer from conditions that increase their energy requirements. For this reason, nutrition must be started as early as possible and delivered by the most accessible and appropriate route. Enteral nutrition is preferred over parenteral nutrition whenever oral intake is insufficient, impossible or contraindicated but intestinal function is at least partially preserved, because it is easy to administer, safe and more physiological[1,2].

Enteral nutrition was long provided through a nasogastric tube. Since its introduction in 1980 by Gauderer and Ponsky, percutaneous endoscopic gastrostomy (PEG) has become the method of choice for any enteral nutrition lasting more than four weeks. PEG creates a direct access to the stomach under endoscopic guidance; the simplicity and speed of the technique, together with advances in equipment, make it accessible to any endoscopist. It is a reliable, low-cost, well-tolerated method with a relatively low morbidity and mortality. The aim of this study was to demonstrate the contribution and complications of this enteral-nutrition technique in patients requiring long-term enteral feeding.

Patients and Methods

This was a cross-sectional study of 10 patients who required long-term enteral nutrition and underwent PEG in the surgical intensive care unit of Ibn Rochd University Hospital Centre (CHU Ibn Rochd), Casablanca. Data were collected from medical records. For each patient the following were recorded: age, sex, clinical and biological data before and after PEG, complications, and outcome. All information collected was handled confidentially.

PEG was performed using the standard “pull” technique after pre-procedural evaluation. Abdominal ultrasonography was performed to exclude contraindications, followed by oesophago-gastric endoscopy; a positive transillumination sign was sought before puncture. Anticoagulant therapy was withheld 12 hours before the procedure and resumed the same day, 6 hours afterwards. Biological markers (serum albumin and white-blood-cell count) were monitored at days 1, 7, 14, 21 and 28 after the procedure[3,4].

Results

Demographics

The mean age was 41.1 years (range 17–70); the most represented age groups were 60–70 and 20–30 years, together accounting for 60% of cases. There was a clear male predominance, with a sex ratio of 4 (8 men, 2 women).

General clinical data

Nine of the ten patients were admitted to the ICU for trauma: polytrauma (60%), isolated severe traumatic brain injury (30%) and a brainstem ischaemic stroke in one case (10%). The mean Injury Severity Score (ISS), calculated in 9 patients, was 21.4 (range 13–29). Most patients had no relevant medical history; two had hypertension, one was diabetic and one had previously undergone abdominal surgery (open cholecystectomy). Before PEG, 60% had a Glasgow Coma Scale score below 15, skin-trophic disorders were noted in 40%, and 30% developed moderate undernutrition during the stay. All patients were receiving anticoagulation (90% prophylactic low-molecular-weight heparin, 10% fondaparinux), 30% an antiplatelet agent, and 30% curative antibiotics.

Airway management

All patients were on prolonged mechanical ventilation, which prompted tracheostomy. The mean interval between tracheostomy and PEG was 25.8 days (range 11–54); the most frequent interval was 10–19 days (40%). At the time of PEG, 40% of patients had pneumonia under treatment.

PEG procedure

The indication for PEG in all patients was the need for long-term enteral nutrition due to a swallowing disorder

—secondary to severe traumatic brain injury in 90% (n=9) and to a brainstem ischaemic stroke in one patient. PEG was performed between days 18 and 30 of hospitalisation in 60% of patients and between days 30 and 64 in 40%. Antibiotic prophylaxis was given to 70% (amoxicillin–clavulanic acid 2 g in 60%, ceftriaxone 1 g in 10%), while the remaining 30% were already receiving therapeutic antibiotics. Pre-procedural abdominal ultrasonography was performed in 80% of patients; endoscopy revealed no oesophageal stenosis in any case, and the transillumination sign was positive in 90%. The placement success rate was 100%, with no intra-procedural complications (no haemorrhage, perforation or aspiration).

Figure 1: Key procedural and outcome metrics (% of patients, n=10).

Complications

Early complications were noted in 50% of patients. Peristomal infection occurred in 40%, diagnosed within the first two weeks (mean 6 days after PEG), with a favourable course under local care and topical antibiotics. One patient (10%) developed acute peritonitis, with symptom onset on day 2; the course was unfavourable, progressing to septic shock, and the patient died on day 8 after PEG. No late complications were observed during follow-up.

Outcomes and biological course

The mean length of hospital stay was 61.1 days (range 29–170). After PEG, serum albumin improved in 70% of patients, remained stable in 20% and decreased in one patient (10%); mean white-blood-cell counts fell in 70% (n=7), rose in two patients and were stable in one. The mean duration of gastrostomy was 50.4 days (range 5-166). Four patients (40%) died during hospitalisation and six (60%) were discharged with the tube in place. Among eligible patients, the tube was removed without incident in 6 of 7 (85.7%) following recovery of swallowing, achieved spontaneously over time and with swallowing-reflex rehabilitation. Overall, 60% of patients were discharged and 40% died during hospitalisation, including one death directly related to PEG placement (post-procedural acute peritonitis) **(Table 1)**.

Table 1: Summary of the case series (n=10)

Variable	Value
Mean age, years (range)	41.1 (17–70)
Male: female	8 : 2
Mean ISS (n=9)	21.4 (13–29)
Indication: dysphagia after severe TBI	9 (90%)
Indication: brainstem ischaemic stroke	1 (10%)
Mechanically ventilated / tracheostomised	10 (100%)
Mean tracheostomy–PEG interval, days	25.8 (11–54)
Antibiotic prophylaxis	7 (70%)
Placement success	10 (100%)
Early complications (any)	5 (50%)
• Peristomal infection	4 (40%)
• Localised pain	3 (30%)
• Acute peritonitis	1 (10%)
Late complications	0 (0%)
Albumin improved after PEG	7 (70%)
Mean hospital stay, days	61.1 (29–170)
Mean gastrostomy duration, days	50.4 (5–166)
Discharged	6 (60%)
Died (in-hospital)	4 (40%)
Death directly related to PEG	1 (10%)

Discussion

In critically ill patients, malnutrition impairs immune and respiratory-muscle function, prolongs ventilator dependence and increases infectious morbidity and mortality. Conversely, adequate nutritional support improves wound healing, attenuates the catabolic consequences of injury, reduces bacterial translocation and shortens the length of stay. When the gut is functional, enteral nutrition is preferred ("if the gut works, use it"): it better preserves the structural and functional integrity of the digestive tract and its flora, is associated with fewer infections, is easier to deliver, and costs three-to-five times less than parenteral nutrition[5,6].

For enteral feeding expected to last more than four weeks, PEG is superior to the nasogastric tube, which can cause swallowing pain, nasopharyngeal irritation and sinusitis and is prone to displacement, obstruction or accidental removal-frequent interruptions that compromise weight gain. In our series, the dominant indication was dysphagia following severe traumatic brain injury, in keeping with the neurological and traumatic indications that predominate in the ICU.

The 100% placement success rate and absence of intra-procedural complications confirm the technical reliability of PEG in experienced hands, consistent with the literature. Early complications were frequent (50%) but predominantly minor: peristomal infection, the most common, resolved with local care and topical antibiotics, supporting the role of peri-procedural antibiotic prophylaxis, which 70% of our patients received. The single case of post-procedural peritonitis-the only death directly attributable to PEG-illustrates the rare but potentially fatal nature of this complication and the importance of careful technique and early recognition. The improvement in serum albumin (70%) and the fall in white-cell counts (70%) after PEG suggest a favourable nutritional and inflammatory trajectory, although these markers are influenced by the underlying critical illness and cannot be attributed to PEG alone.

The principal limitations of this work are its small sample size (n=10), its single-centre and cross-sectional design, and the absence of a comparison group (e.g. nasogastric feeding). The biological changes observed are descriptive and uncontrolled. Larger, prospective and ideally comparative studies are needed to confirm the nutritional benefit and to refine patient selection and complication-prevention strategies[7,8].

Conclusion

In ICU patients requiring prolonged enteral nutrition, percutaneous endoscopic gastrostomy is an easy, safe and comfortable technique, with a 100% placement success rate and complications that are mostly benign and manageable with local care. The rare risk of peritonitis, which carries a serious prognosis, justifies rigorous patient selection, meticulous technique and close post-procedural monitoring. PEG can be recommended as the enteral access of choice for long-term feeding in critically ill patients with persistent swallowing disorders.

Declarations

Ethics approval

This was a retrospective study based on existing medical records. Given its retrospective design and the use of anonymised data, formal ethics-committee approval was not required; the study was conducted in accordance with the Declaration of Helsinki, and all patient data were handled confidentially.

Consent

Owing to the retrospective design and the use of de-identified data, the requirement for individual informed consent was waived.

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Conflicts of interest

The authors declare that they have no competing interests.

Author contributions

All named authors contributed to the conceptualisation, data collection, analysis and interpretation, and to drafting and critically revising the manuscript. All authors read and approved the final version.

Data availability

The data supporting the findings of this study are available from the corresponding author on reasonable request.

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