Single-balloon enteroscopy-assisted direct percutaneous endoscopic jejunostomy

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submitted 03. May 2011
accepted after revision 22. September 2011

Bibliography
DOI http://dx.doi.org/10.1055/s-0031-1291442
Endoscopy 2012; 44: 210–212

ISSN 0013-726X

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Direct percutaneous endoscopic jejunostomy (DPEJ) has emerged as a viable alternative for percutaneous endoscopic gastrostomy with jejunal extension (PEG-J) in patients who cannot tolerate gastric feeding. Reportedly, DPEJ placement with regular endoscopes fails in up to one-third of cases. The aim of the current study was to assess the efficacy and safety of single-balloon enteroscopy (SBE)-assisted DPEJ. The DPEJ placement technique was comparable to conventional PEG placement. A total of 12 DPEJ procedures were performed in 11 patients (mean age 55 years [range 24 – 83 years]; seven males). SBE-assisted DPEJ was successful in 11 of the 12 procedures (92 %). Post-procedural complications included gastroparesis and aspiration pneumonia in one case each. We conclude that SBE-assisted DPEJ placement seems a safe and successful approach for patients requiring jejunal enteral feeding.

Introduction

Percutaneous endoscopic gastrostomy (PEG) is a well-known, safe, and effective procedure for individuals requiring long term tube feeding [1]. However, in some cases a jejunal route is necessary for functional reasons (such as gastroparesis) or due to morphology (such as stomach or duodenal cancer and previous gastric surgery). Jejunal access using a jejunal tube through a PEG (PEG-J) was first described in 1984 [2]. However, these smaller-diameter tubes are more prone to clogging and in addition frequently become displaced into the stomach. Both events require renewed endoscopy with repositioning or replacement [3]. Direct percutaneous endoscopic jejunostomy (DPEJ) is a push enteroscopy technique that was first described by Shike et al., and offers another approach to provide direct postpyloric enteral nutritional support [4]. DPEJ tubes have a wide caliber, which are unlikely to clog. Furthermore, they cannot migrate due to their intrinsic jejunal fixation. In patients with aspiration pneumonia, DPEJ has been reported to decrease the risk of recurrences [5]. The limitation of DPEJ is the difficulty of the technique. In contrast to the stomach, the jejunum is relatively narrow, making it more difficult to advance a needle directly into the lumen [6]. In addition, identifying a superficial jejunal loop with adequate transillumination may be particularly problematic with conventional push techniques considering the often limited extent of jejunal intubation [7]. Balloon-assisted enteroscopy (BAE) may allow controlled deep intubation of the small intestine [8 – 10], which may result in easy identification of a superficial jejunal loop. Recently Despott et al. showed that the placement of DPEJ using the double-balloon enteroscopy (DBE) technique is an effective method [11]. Until now there are no published reports on SBE-assisted DPEJ placement. We report here our early experience with this technique at a single, tertiary referral university hospital center in patients requiring direct proximal small-bowel access.

Case series

Consecutive patients referred for DPEJ placement between December 2009 and December 2010 were eligible for participation in the study. All patients were given prophylactic antibiotics. Conscious sedation was used in the majority of procedures. SBE was performed using the Olympus SIF-Q160Y enteroscope (Olympus, Tokyo, Japan), ST-SB-1 overtube with balloon, and balloon control unit. The insertion process followed the method used for DBE, except that straightening of the endoscope required angulation of the tip instead of inflation of an endoscope balloon. The enteroscope was inserted into the proximal jejunum where, using transillumination and fingertip in-

dentation, a superficial jejunal loop was identified. After a suitable insertion site had been located, the access area was sterilized. The abdominal wall and peritoneum were anesthetized by insertion of a percutaneous needle and simultaneous injection of 1% lidocaine until the needle emerged into the jejunum. In order to reduce gut motility, hyoscine-N-butylbromide was administered intravenously in doses of 20 mg after identification of an appropriate insertion site. The DPEJ placement technique was largely comparable to a conventional PEG placement (**Fig. 1**, **Fig. 2** and **Fig. 3**; **Video 1**). In all cases a 15-Fr Freka (3.6 mm internal diameter, 35 cm length) PEG feeding tube (Fresenius Kabi AG, Germany) was used. Fluoroscopy was not used in any case.

The primary endpoint of the study was the rate of successful placement of DPEJ. Secondary outcomes were the rate of complications, including recurrent aspiration after DPEJ placement.

Results

Between December 2009 and December 2010, 12 SBE-assisted DPEJ procedures were performed in 11 patients (mean age 55 years [range 24 – 83 years]; seven males). The indications for DPEJ procedures were recurrent aspiration pneumonia (n = 5; 42%), gastric dysmotility ((n = 4; 33%), duodenal cancer (n = 2; 17%), and gastric cancer (n = 1; 8%). Four patients had previously been treated with a PEG or PEG-J. A total of 11 procedures (92%) were performed under conscious sedation using midazolam (mean dose 6 mg) and fentanyl (mean dose 0.06 mg). Propofol sedation was used in one patient. The mean total procedure time was 47 minutes (range 20 – 120 minutes). The DPEJ placement was successful in 11 of the 12 procedures (92%; **Table 1**). In one patient with duodenal cancer, who had persistent inability to tolerate oral intake despite previous palliative gastrojejunostomy surgery, a DPEJ was first placed, unintentionally, in the afferent loop. When this did not lead to improved oral intake, a second procedure was required for DPEJ placement in the efferent loop, which was also not successful due to inadequate insertion of the enteroscope into the jejunum. This patient went on to have a percutaneuous radiologic jejunostomy.

One procedure-related complication was noted (8%): a patient with multiple sclerosis was admitted to the hospital with sudden onset of nausea and vomiting 1 day after DPEJ placement. Based on computed tomography and small-bowel contrast study, gastroparesis was diagnosed. The patient was treated conservatively with intravenous fluid resuscitation and a nasogastric tube to decompress the distended stomach. The jejunal feeding could be restarted quickly without recurrence of symptoms.

One patient (8%) had a recurrence of aspiration pneumonia 4 weeks after the DPEJ placement. A contrast study showed adequate positioning of the tube and the feeding was restarted within a few days. No further recurrences were observed.

Video 1

Placement of direct percutaneous endoscopic jejunostomy.

online content including video sequences viewable at:
www.thieme-connect.de/ejournals/abstract/endoscopy/doi/10.1055/s-0031-1291442

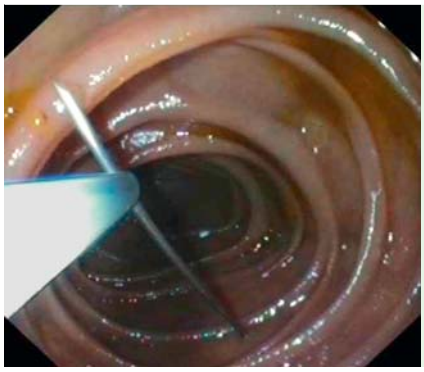

Fig. 1 A finder needle was passed into the jejunum and grasped and held in place using a snare.

Fig. 2 Insertion of a trocar and sheath alongside the snared seeker needle.

Fig. 3 The sheath was snared and a thread was passed through the sheath after removal of the trocar.

Discussion

In this prospective case study, SBE, with its ability to provide deeper small-bowel intubation, was shown to facilitate the identification of an ideal DPEJ insertion site for the placement of a direct percutaneous jejunal feeding tube. Recently, small case series have reported successful placement of DPEJ using DBE [11, 12]. The current study is the first to focus on the placement of DPEJ using the SBE technique. The results were similar to those achieved in the small DBE case series, in which successful placement was achieved in 90% of patients [11].

Technical success rates for placement of DPEJ with conventional push enteroscopy vary from 68% to 98% [4, 6,7,13]. Adequate transillumination is essential for successful DPEJ placement [7]. SBE enables deep intubation of the small bowel. This facilitates successful intubation of a suitable superficial jejunal segment resulting in adequate transillumination. The advantage of the SBE system for this indication compared with DBE is its simplified design. However, SBE may be less efficient for deep intubation of the small bowel compared with the DBE system [14]. We believe that this disadvantage is not an important factor in cases of SBE

Table 1 Individual data of patients, indications, success of the direct percutaneous endoscopic jejunostomy placement, and complications.

Procedure[1]	Sex	Age, years	Indication	Management with PEG or PEG-J before DPEJ	Total procedure time, minutes	Successful DPEJ placement	Complications
1	M	70	Gastric dysmotility	No	30	Yes	No
2	M	53	High-aspiration risk	PEG-J	40	Yes	No
3	M	58	High-aspiration risk	PEG-J	50	Yes	No
4	F	77	High-aspiration risk	No	60	Yes	No
5	M	45	Duodenal cancer	No	20	Yes	No
6	M	59	High-aspiration risk	PEG	25	Yes	No
7	M	45	Duodenal cancer	No	120	No[2]	No
8	M	83	High-aspiration risk	No	53	Yes	No
9	F	57	Gastric dysmotility	PEG-J	20	Yes	Gastroparesis
10	F	24	Gastric dysmotility	No	72	Yes	No
11	M	24	Gastric dysmotility	No	50	Yes	No
12	F	65	Gastric cancer	No	29	Yes	No

DPEJ, direct percutaneous endoscopic jejunostomy; PEG, percutaneous endoscopic gastrostomy; PEG-J, percutaneous endoscopic gastrostomy with jejunal extension.
[1] Procedures 5 and 7 were performed in the same patient.
[2] Failure due to inadequate transillumination.

used for DPEJ placement in the proximal jejunum. In one of our patients, DPEJ placement was not successful because this was done in the afferent jejunal loop after previous gastrojejunostomy. Identification of the end of this loop or of the papilla can potentially be helpful in avoiding this problem. In addition, fluoroscopy and contrast administration might aid the differentiation of the afferent and efferent loops.

DPEJ placement has become more common since it was shown to be an effective technique with acceptable safety. Most studies have reported that the complications related to DPEJ are similar in incidence and character to those of PEG tubes. In the largest study to date, DPEJ placement was associated with perforation, volvulus, major bleeding, and fistula formation in up to 10% of cases [7]. In the current study, one case of postprocedural gastroparesis was observed. Aspiration pneumonia is a particular concern regarding postprocedure complications; however, reported data for DPEJ showed a 3% incidence of aspiration compared with 3%–17% with PEG/-J [4,15–17]. This lower incidence of aspiration pneumonia with DPEJ is likely to be due to the fixed position of the tube in the jejunum compared with PEG-J. We observed aspiration in one patient (8%) following DPEJ.

One of the limitations of the present study is that it is a single-center study that observed the success rate of SBE-assisted DPEJ procedures in only a limited number of patients. Secondly, this study is not a randomized study comparing SBE-assisted DPEJ placement with other endoscopic methods such as conventional push enteroscopy or other overtube-assisted modalities. Nevertheless, the findings described are the first prospective data addressing the success rate of SBE-assisted DPEJ placement. Based on these findings, we conclude that SBE-assisted DPEJ placement appears effective and safe in patients requiring long term jejunal access for feeding.

Competing interests: None.

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