Percutaneous endoscopic gastrostomy tube feeding may improve outcome of late rehabilitation following stroke

M C Allison MD MRCP[1] **A J Morris** MB MRCP[1] **R H R Park** MB MRCP[1] **P R Mills** MD FRCP[2]
[1]*Gastroenterology Unit, Royal Infirmary, Glasgow G31 2ER and*
[2]*Gartnavel General Hospital, Glasgow G12 0YN*

Keywords: gastrostomy; cerebrovascular disease; enteral feeding

Summary
We describe three stroke patients with prolonged swallowing difficulty whose rehabilitation had been unsuccessful due to recurrent aspiration pneumonia and/or nasogastric tube dislodgement. Percutaneous endoscopic gastrostomy tube feeding, initiated 4-6 months following the onset of stroke, was associated with nutritional improvement, marked functional recovery and eventual discharge from hospital. This form of nutritional support may find an important role in the rehabilitation of stroke patients with persisting difficulty with swallowing.

Introduction
Patients with dysphagia of neurological origin often require long-term nutritional support using nasogastric feeding tubes, surgically placed gastrostomy tubes or even intravenous nutrition. An alternative approach is the use of a simple endoscopic technique for the placement of a percutaneous gastrostomy tube (PEG). Since its first description in 1980[1], PEG has become the preferred technique in the United States for the feeding of patients with persistent swallowing difficulty due to neurological or oropharyngeal disorders[2,3]. Our experience from an ongoing prospective comparison of PEG with nasogastric feeding suggests that patients randomized to receive PEG obtain a higher proportion of their prescribed feed because there are fewer instances of tube dislodgement or blockage. During the course of this study we have observed three stroke patients whose rehabilitation had been hampered for several months by persistent swallowing difficulty, recurrent aspiration pneumonia and frequent nasogastric tube dislodgement. In each case intensive PEG feeding and physiotherapy led to marked functional recovery and eventual discharge from hospital.

Patients and methods
Case 1
A 53-year-old woman was admitted in March 1989 with a left hemiparesis and swallowing difficulty. She had been taking digoxin and warfarin following mechanical mitral valve replacement in 1982 and had suffered three previous cerebrovascular incidents between 1986 and 1988. On examination she was alert and in controlled atrial fibrillation. Neurological examination revealed receptive and expressive dysphasia and features of a pseudobulbar palsy. There was bilateral limb weakness with absent power in the left arm. Tone and tendon reflexes were globally increased and both plantar responses were extensor. Computerized tomographic brain scanning demonstrated very large focal infarcts affecting both cerebral hemispheres.

After 2 months of rehabilitation she was able to transfer and walk with the aid of one person, but her sitting balance remained poor and she required constant supervision. In view of persistent swallowing difficulty several attempts were made to pass a fine-bore nasogastric feeding tube. The patient extubated herself on at least 12 occasions. Videofluoroscopic examination of swallowing was considered to be impractical due to comprehension difficulties. She required treatment for aspiration pneumonia in June 1989. Informed consent for insertion of a PEG tube was obtained from the patient's husband in July 1989. After conversion of anticoagulation to heparin and antibiotic cover a Ponsky-Gauderer 20 French gauge silicone PEG tube (Bard International Products) was inserted uneventfully. She received feeding with Ensure (Abbott Laboratories) 2500 ml daily by continuous pump infusion. After discharge home in August 1989 the feeding regimen was changed to bolus administration of Ensure Plus. During the 6 months following the institution of PEG feeding her weight increased from 43 kg to 59 kg and serum albumin increased from 23 g/l to 43 g/l (normal range 35-55 g/l). These nutritional improvements were accompanied by a global improvement in muscle power and function. She continues to receive PEG feeding at home and is able to transfer and walk short distances without assistance. Two endoscopic gastrostomy tube replacements have been required during the 28 months since the first tube was inserted.

Case 2
A 64-year-old woman was admitted in February 1989 after the sudden onset of aphasia and a complete right hemiparesis. She was noted to have swallowing difficulty but was continued on oral fluids and a liquid diet. Nutritional support was not considered because of moderate obesity. During the course of the following 5 months there was only slight improvement in power in the right leg. She was treated for aspiration pneumonia on four occasions. Swallowing difficulty remained a major problem which necessitated frequent suction. In June 1989 she was transferred to the Ear, Nose and Throat wards as an emergency after choking on a meal of fish and apple sauce. A contrast swallow demonstrated pharyngeal incoordination and slight overspill into the trachea.

A PEG tube was placed without difficulty in July 1989. During the next 7 weeks she received 1800 ml Ensure daily by continuous infusion and her weight increased by 3 kg. There were no further episodes of aspiration pneumonia during her hospital stay. Intensive physiotherapy led to some return in power in her right arm to the extent that she was able to transfer with minimal assistance. She was discharged home in September 1989 but required a further brief hospital admission for the treatment of aspiration pneumonia in December 1989. Unfortunately she sustained a pathological fracture of her right femur due to a breast carcinoma in September 1990 and she died one month later. She had received home PEG feeding for one year and had not required a gastrostomy tube change during this period.

0141-0768/92/
030147-03/$02.00/0

Case 3

A 63-year-old woman became unconscious over a 24 h period in October 1988. Computerized tomography demonstrated a midbrain haemorrhage. Her level of consciousness improved with dexamethasone therapy but she had evidence of complete expressive aphasia, a complete left-sided ptosis, paralysis of left lateral gaze, a left facial weakness, absent gag reflex and a complete right hemiparesis. There was clonus of the right ankle and both plantar responses were extensor.

There was a poor response to physiotherapy during the following 6 months. She received intermittent nasogastric feeding because of swallowing difficulty but repeatedly extubated herself. She required frequent oropharyngeal suction but despite this she developed two episodes of aspiration pneumonia. After obtaining informed consent from relatives we introduced a 20FG PEG tube without difficulty in May 1989. She received 2000 ml Ensure daily by continuous infusion and on this regimen her weight increased from 42 kg to 53 kg at the time of her discharge in August 1989. Trunk and head control had improved considerably and she was able to transfer with the aid of one assistant. She was no longer dependent on oropharyngeal suction and was able to expectorate spontaneously. No changes in PEG tube were required up to the time of her death in December 1989. The cause of death was presumed to be aspiration pneumonia but no postmortem was performed.

Discussion

Each of the three patients presented here had severe disability resulting from cerebrovascular disease and exhibited features indicative of a poor long-term prognosis[4]. They had, however, survived for 4-6 months with little neurological improvement despite intensive physiotherapy, nursing care and intermittent nasogastric feeding. Long-term hospital placement for continuing care was being considered in each case. PEG feeding allowed these patients with swallowing difficulty to receive a higher proportion of their prescribed feed and was associated with weight gain and an improved response to physiotherapy between 5 and 10 months after the onset of stroke. This delayed response to rehabilitation is encouraging because significant functional recovery is considered to be uncommon after the first 6 months[5].

Problems associated with PEG placement are uncommon. The endoscopic technique is easily done using standard intravenous benzodiazepine sedation and local anaesthesia although two operators are required. Major early complications occur in about 3% of patients[2,3]. The main causes of late morbidity are aspiration pneumonia, wound infection, stomal leakage, tube migration or tube blockage. One or more of these complications may be encountered in up to a third of patients during the early months of PEG feeding[2,6]. Aspiration pneumonia usually responds to treatment with antibiotics and physiotherapy. In order to prevent recurrent aspiration, patients should be fed in the seated position or the head of the bed should be elevated to at least 30°. The other complications are usually managed by simple conservative measures or by a change of PEG tube[2].

The traditional method for the placement of a gastrostomy feeding tube is the open surgical approach, which is usually performed under general anaesthesia. Reported advantages of PEG over surgical gastrostomy are avoidance of general anaesthesia, a shorter procedure time and a lower complication rate[7]. Surgical gastrostomy tubes can be fashioned under local anaesthesia with results equivalent to those obtained using the endoscopic technique[8]. PEG is less expensive and easier to perform than surgical gastrostomy, and the smaller skin incision may be more acceptable to stroke patients.

There are many potential advantages of PEG over nasogastric feeding in the management of stroke patients with persistent swallowing difficulty. Attempted dislodgement of nasogastric feeding tubes is common because they are inconvenient and may cause nasopharyngeal discomfort. PEG tubes are less prone to displacement because they are securely anchored in the stomach. PEG tubes are at lower risk of blockage because their diameters are considerably larger than those of nasogastric feeding tubes. Patients may safely receive bolus feeding rather than continuous infusions and tablets can be crushed and infused with water via the gastrostomy tube. PEG tubes are less likely to interfere with rehabilitation and have cosmetic advantages over nasogastric tubes. Furthermore the presence of a nasogastric tube in the pharynx and across the upper and lower oesophageal sphincters may disrupt the normal cough and swallowing mechanisms and predispose to gastro-oesophageal reflux. There may therefore be a lower risk of aspiration pneumonia with PEG feeding but a prospective trial will be required to confirm this.

It is now recognized that swallowing difficulty commonly complicates single hemisphere strokes[9,10]. Dysphagia in acute stroke is associated with a substantially increased early mortality[9] but swallowing usually improves within one month in those who survive[10]. Small-bore nasogastric or nasoenteric tubes are suitable for short-term feeding of stroke patients. PEG feeding should be reserved for patients with persistent difficulty with swallowing of over 3-4 weeks duration. Patients most at risk of continuing swallowing problems are those with multiple cerebral infarcts, pseudobulbar palsy or brainstem damage. Depression and lack of desire for food are further factors which may compromise the nutritional status in these subgroups of patients. A vicious cycle may become established if muscle strength begins to deteriorate in these circumstances. We therefore believe that nutritional support through PEG feeding could have an important role to play in the rehabilitation of stroke patients with long-term swallowing difficulty.

Acknowledgment: We are grateful for the assistance of Ms Joyce Lang of the Department of Dietetics at Gartnavel General Hospital.

References

1 Gauderer MWL, Ponsky JL, Izant RJ. Gastrostomy without laparotomy; a percutaneous endoscopic technique. *J Paediatr Surg* 1980;**15**:872-5

2 Larson DE, Burton DD, Schroeder KW, DiMango EP. Percutaneous endoscopic gastrostomy. Indications, success, complications and mortality in 314 consecutive patients. *Gastroenterology* 1987;**93**:48-52

3 Mamel JJ. Percutaneous endoscopic gastrostomy. *Am J Gastroenterol* 1989;**84**:703-10

4 Allen CMC. Predicting the outcome of acute stroke: a prognostic score. *J Neurol Neurosurg Psychiatr* 1984; **47**:475-85

5 Allen CMC, Harrison MJG, Wade DT. Management of physical disability. In: *The management of acute stroke.* Tunbridge Wells: Castle House Publications, 1988: 172-84

6 Kirby DF, Craig RM, Tsang T, Plotnick BH. Percutaneous endoscopic gastrostomies: a prospective evaluation and review of the literature. *J Parenter Enteral Nutr* 1986; **10**:156-9
7 Ruge J, Vazquez RM. An analysis of the advantages of Stamm and percutaneous endoscopic gastrostomy. *Surg Gynecol Obstet* 1986;**162**:13-16
8 Stiegmann GV, Goff JS, Silas D, Pearlman N, Sun J, Norton L. Endoscopic versus operative gastrostomy: final results of a prospective randomized trial. *Gastrointest Endosc* 1990;**36**:1-5
9 Barer DH. Dysphagia in acute stroke. *BMJ* 1987; **295**:1137-8
10 Gordon C, Langton Hewer R, Wade DT. Dysphagia in acute stroke. *BMJ* 1987;**295**:411-14

(Accepted 18 June 1991)

Forthcoming events

Validation Therapy Conference: Breaking Through Dementia
10 March 1992, Queen Elizabeth II Conference Centre, London
Further details from: Angela Crowley, Age Concern England, 1268 London Road, London SW16 4ER (Tel: 081 679 8000; Fax: 081 679 6069)

Nutrition and Ageing: Improving the Quality of Life
13 March 1992, Royal College of Physicians, London
Further details from: Sue Elcock, Research into Ageing Conferences, c/o Profile Productions Ltd, Northumberland House, 11 The Pavement, Popes Lane, London W5 4NG (Tel: 081 566 1902; Fax: 081 566 1903)

Colposcopy
17-18 March 1992, RCOG, London
Further details from: Postgraduate Education Department, The Royal College of Obstetricians and Gynaecologists, 27 Sussex Place, Regent's Park, London NW1 4RG (Tel: 071-262 5425, ext 207)

Health in Buildings: Safe Living and Productive Working
23-24 March 1992, British Postgraduate Medical Federation, London
Further details from: Education Department, BPMF, 33 Millman Street, London WC1N 3EJ (Tel: 071 831 6222, ext 155; Fax: 071 831 7599)

Controlled Release Using Polymers: Characterization of Solid Drugs and Excipients
24-25 March 1992, Atlanta, GA, USA
Further details from: Pharmaceutical Division, Technomic Publishing Company, Inc, 851 New Holland Avenue, Box 3535, Lancaster, PA 17604, USA (Tel: 800 233 9936; Fax: 717 295 4538)

International Symposium on Recent Advances in Diagnostic Imaging and Radiation Oncology
24-27 March 1992, Kathmandu, Nepal
Further details from: Dr Naresh Prasad, Department of Radiology, Baylor College of Medicine, Houston, Texas 77030, USA (Tel: 713 798-4415; Fax 713 798-5556)

Update in Cardiopulmonary Pathology I - Cardiology
26-27 March 1992, National Heart & Lung Institute, London
Further details from: Postgraduate Education Centre, National Heart & Lung Institute, Dovehouse Street, London SW3 6LY (Tel: 071 351 8172; Fax: 071 376 3442)

Allergy and Asthma: Recent Advances
30 March-3 April 1992, National Heart & Lung Institute, London
Further details from: (see entry for 26-27 March 1992)

Postgraduate Course in General Surgery
2-4 April 1992, San Francisco, California
Further details from: University of California, Extended Programs in Medical Education, Room LS-105, San Francisco, CA 94143 0742, USA (Tel: 415 476 4251)

Tinnitus and its Management
5-9 April 1992, Nottingham University
Further details from: Mrs J P Willoughby, Course Administrator, c/o Institute of Hearing Research, University of Nottingham, University Park, Nottingham NG7 2RD

Update in Cardiopulmonary Pathology II - Lung Tumours
6-7 April 1992, National Heart & Lung Institute, London
Further details from: (see entry for 26-27 March 1992)

Diabetes: Current Perspectives and New Medicines
6-7 April 1992, London
Further details from: Lucinda Middleton, IBC Technical Services, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD (Tel: 071 637 4383; Fax: 071 631 3214)

Mathematical Modeling of Pharmaceutical Data
7-8 April 1992, Atlanta, GA, USA
Further details from: (see entry for 24-25 March 1992)

Oral Controlled-Release Dosage Forms: Research and Development, Evaluation, Scale-Up, Manufacture, Approval and Marketing
7-9 April 1992, Bristol Hotel Kempinski, Berlin
Further details from: Pharmaceutical Division, Technomic Publishing AG, Missionstrasse 44, CH-4055 Basel, Switzerland (Tel: 061 43 52 26; Fax: 061 43 52 59)

Techniques & Applications of Molecular Biology: A Course for Medical Practitioners
7-10 April 1992, University of Warwick
Further details from: Dr Stephen Hicks, Department of Biological Sciences, University of Warwick, Coventry CV4 7AL (Tel: 0203 52340; Fax: 0203 523701)

Packaging of Healthcare Devices and Products
13-14 April 1992, Baltimore, USA
Further details from: (see entry for 24-25 March 1992)

3rd International Conference on SLE
13-15 April 1992, Queen Elizabeth II Conference Centre, London
Further details from: Dr Graham Hughes or Mrs Denzil Fletcher, Rheumatology Department, St Thomas's Hospital, London SE1 7EH (Tel and Fax: 071-633 9422)

Registration of Pharmaceuticals in Europe
20-21 April 1992, Nagoya
Further details from: Hilary Pendell, IBC Technical Services, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD (Tel: 071 637 4383; Fax: 071 631 3214)

Advances in Medical Plastics
21-24 April 1992, Boston, Mass
Further details from: (see entry for 24-25 March 1992)

British Association of Oral and Maxillofacial Surgeons: Spring Meeting
25-26 April 1992, Hospitality Inn, Glasgow
Further details from: Mr John Lowry, Honorary Secretary, British Association of Oral & Maxillofacial Surgeons, Royal College of Surgeons of England, 35/43 Lincoln's Inn Fields, London WC2A 3PN (Tel: 071 405 8074; Fax: 071 430 9997)

continued on p 155