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Research Article

Modalities of enteral feeding practices in patients with head injury: a prospective, non-randomized study

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ABSTRACT

Background: Traumatic brain injury (TBI) is associated with increased energy expenditure. Enteral feeding is preferred in such patients and various modes of enteral feeding have been practiced.
Methods: A prospective non-comparative study was counducted on the outcome measures of the following enteral feeding practices: feeding gastrostomy, feeding jejunostomy, nasojejunal tube feeding and nasogastric tube feeding.
Results: A total of 120 patients with TBI were enrolled. Any significant difference in the laboratory parameters (hemoglobin and serum albumin) was not observed between the study groups. A higher incidence of pulmonary aspiration in patients undergoing nasogastric tube feeding (45%) was found. Diarrhea was observed in 20/120 (16.7%) patients, tubal block in 18/120 (15%) patients, infection of the wound site in 18/120 (15%), burst abdomen in 3/120 (2.5%) and abdominal distension in 21/120 (17.5%) patients. None of the above mentioned complications were significantly different between various modes of enteral feeding.
Conclusions: The present study provides the baseline data regarding the different enteral feeding practices and their outcome measures from a developing country. However, large randomized controlled trials are the need of the hour in finding out the best mode of enteral feeding practice.

Keywords: Feeding gastrostomy, Feeding jejunostomy, Nasojejunal tube feeding, Nasogastric tube feeding

INTRODUCTION

Traumatic brain injury (TBI) is a serious worldwide public health and socio-economic problem. Recent estimates arrive at a figure of nearly 50,000 Americans dying because of TBI in United States of America.[1] Also, nearly 3.8% of Finland population had experienced at least 1 hospitalization due to TBI by 35 years of age and 31.6% of the population in New Zealand had experienced at least 1 TBI requiring medical attention.[1]

Regarding the initiation of nutrition in patients with TBI, although controversies surround the following areas such as time of initiation of nutrition, optimal form of nutrition and quantity of nutrition, there is no doubt that nutrition has to be initiated early in such patients. Clifton et al assessed the energy expenditure amongst patients with TBI and found out that these patients had a metabolic rate similar to patients with 20 to 40% burns on their body surface.[2] Various other studies have even estimated energy expenditure to an extent of 130-180%.[3,4] Nutrition to patients with TBI can be administered either in the form of total parenteral nutrition (TPN) or enteral feeding. Nomograms are available to assess the amount of energy expenditure in patients with TBI and accordingly can be replaced through external support.[5]

Both TPN and enteral nutrition supplies similar amounts of glucose and nitrogen.[6] TPN has been associated with a significantly higher risk of systemic infections.[7] Enteral feeding has to be initiated as soon as possible in patients with TBI as a relative risk for mortality of 0.67 (0.41-1.07) was obtained for early feeding compared to not feeding and of 0.75 (0.50-1.11) for death and disability.[8]

Various modes of enteral feeding have been reported to exist. Nasogastric feeding, nasoduodenal feeding and nasojejunal feeding for short term and, gastrostomy and jejunostomy for long term purpose. Considering the scarcity of literature on the outcomes of various modes of enteral feeding especially from a developing country, this study was carried out.

METHODS

Study ethics

The study was carried out in a tertiary care level one trauma centre in a metropolitan city of India after obtaining approval from institutional ethics committee and written informed consent from the legally accepted representative of study participants. The study was carried out between 2006 and 2008 in accordance with the ethical principles laid down in declaration of Helsinki guidelines.

Study participants

The eligibility criteria of the study participants were as follows: Patients with age above 10 years, of either sex with glasgow coma scale (GCS) score of above 6 and functional gastrointestinal tract that have undergone one of the four enteral feeding procedures were included. Those with injury to bowel or chest injury were excluded.

Study procedure

Patients with head injury and comatose usually will be fed through one of the following modes of enteral feeding, feeding gastrostomy, feeding jejunostomy, nasojejunal tube feeding and nasogastric tube feeding. The following details were collected from each study participant: demographic details (age and sex); diagnosis and associated disease conditions; GCS score; type of anesthesia; type and duration of procedure carried out; laboratory investigations (hemoglobin, serum albumin and chest X-ray); any complications such as diarrhea, pulmonary aspiration, tube block, wound infection, burst abdomen and abdominal distension. After obtaining informed consent from the study participants, they were initiated an intermediate type of feeding method and milk formula was used. Patients intolerant to milk formula were shifted to butter milk formula. Feeding was performed every four hours and just before every feed, nasogastric aspiration was performed. When the quantity of aspirate was more than one-half of the previously fed quantity, feeding was kept on hold and the procedure was carried out after four hours later. In case of persistent high aspiration, injection metoclopramide 10 mg was administered intravenously. All the patients were kept in propped up position during the feed and for 30 minutes after. Abdominal girth was measured every two hours. Consistency and frequency of stools were also noted.

Statistical analysis

Demographic details were represented using descriptive statistics. Proportions were analyzed by Chi-square test for association. SPSS version 17.0 software was used for statistical analysis and a P-value of <0.05 was considered significant.

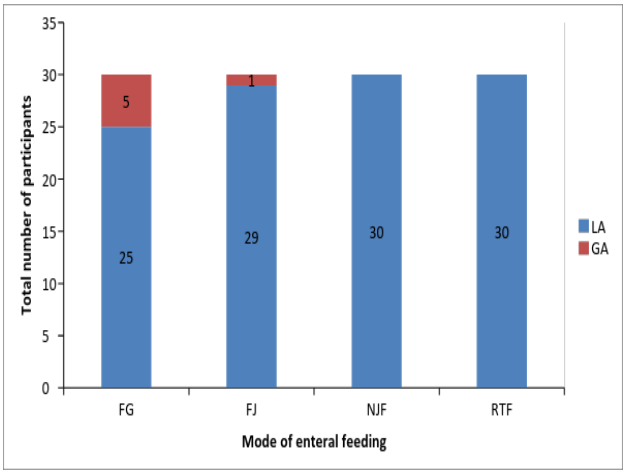
RESULTS

Demographic details

A total of 120 study participants were recruited with 30 in each group: feeding gastrostomy (FG), feeding jejunostomy (FJ), nasojejunal tube feeding (NJF) and Ryle's tube feeding (RTF). No significant differences were observed either in the distribution of age or gender (92 males and 28 females in total) between the study groups. Similarly, a total of 93 study participants had GCS score between 6 and 8 (26-FG, 23-FJ, 21-NJF and 23-RTF) and 27 had either 9 or 10 (4- FG, 7- FJ, 9- NJF and 7- RTF). The distribution of GCS score was not statistically significant. Also, a large majority of the study participants (87/120, 72.50%) had hemoglobin more than 10 g/dl and the distribution of hemoglobin values was also not statistically significant between the study groups. Similarly, 80.8% (97/120) had serum albumin levels >2.5 and the remaining (19.2%) less than 2.5 g/L and the distribution was not statistically significant. No major disease conditions were found to be present in large majority (91/120, 75.8%) of the study participants. A statistically significant (P<0.0001) difference was observed in the distribution of duration of surgery between the study groups. RTF took the least time and in all the cases, the procedure was completed within 20 minutes. Similarly, both the RTF and NJF were carried out under local anesthesia. Also, only 3% of patients with FJ and 17% with FG required general anesthesia. The distribution of type of anesthesia was statistically significant (P=0.004) (Figure 1) between the groups.

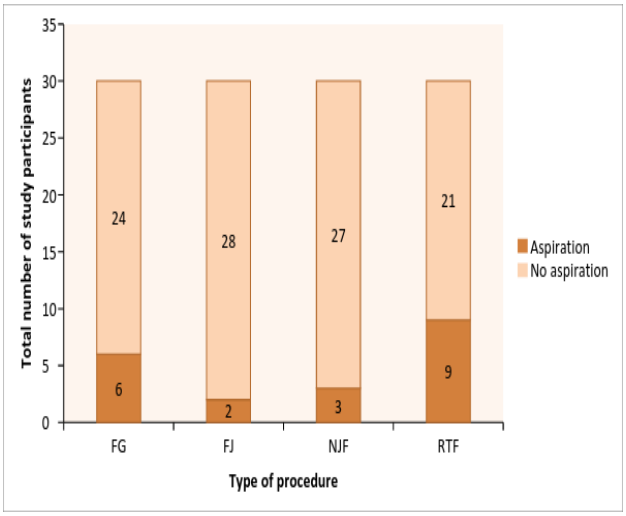
Outcome measures

Pulmonary aspiration was observed in 20 study participants of which 6 (30%) had FG, 2 (10%) had FJ, 3 (15%) had NJF and 9 (45%) had RTF as modes of enteral feeding. The incidence of pulmonary aspiration was not statistically significant between the groups (P=0.07) (Figure 2). When the groups were collated either to gastric or jejunal feeding and the incidence of pulmonary aspiration was compared, a significantly (P=0.014) higher risk was observed with gastric (15/60, 25%) than jejunal (5/60, 8.3%) group.



FG – Feeding gastrostomy; FJ-Feeding jejunostomy; NJF-Nasojejunal feeding; RTF- Ryle's tube feeding; GA-General anesthesia and LA- local anesthesia

Figure 1: Distribution of type of anesthesia required between the procedures.



FG – Feeding gastrostomy; FJ – Feeding jejunostomy; NJF-Nasojejunal feeding; RTF – Ryle's tube feeding.

Figure 2: Incidence of pulmonary aspiration amongst the study participants.

Diarrhea was observed in 27 study participants of which 4 (14.8%) had FG, 10 (37.1%) had FJ, 8 (29.6%) had NJF and 5 (18.5%) had RTF. The incidence of diarrhea was also not statistically significant between the study groups. Even when the groups were collated to either gastric or jejunal, the distribution of the risk of diarrhea was not statistically significant (9/60 (15%) in gastric and 18/60 (30%) in the jejunal groups).

Tubal block was observed in 18 study participants of which 2 (11.1%) had FG, 6 (33.3%) had FJ, 4 (22.3%) had NJF and 6 (33.3%) had RTF. The distribution of incidence of tubal block was not statistically significant between the study groups. Collation of the groups into gastric and jejunal did not yield any significant difference in the distribution of the groups with respect to incidence of tubal block [8/60 (13.3%) in the gastric and 10/60 (16.7%) in the jejunal groups).

Infection of the wound site was observed only in patients who have undergone feeding with either FG or FJ. A total of 10/30 (33.3%) participants in the FG group and 8/30 (26.7%) in the FJ group had wound infection and were not statistically significant. Also, no significant difference was observed in the distribution of incidence of wound infection between the gastric (10/60, 16.7%) and jejunal (8/60, 13.3%) groups. Similarly burst abdomen were also observed only in these two groups of study participants [2/30 (6.7%) in FG and 1/30 (3.3%) in FJ) and was not statistically significant. Collation of the groups into gastric (2/60, 3.3%) and jejunal (1/60, 1.7%) also did not result in any significant difference in the distribution.

Abdominal distension was observed 21 study participants of which 8 (38.1%) had FG, 4 (19%) gad FJ, 3 (14.3%) had NJG and 6 (28.6%) had RTF. The distribution of the groups was not statistically significant. Collation of the groups into gastric (14/60, 23.3%) and jejunal (7/60, 11.7%) also did not result in any significant difference in the distribution of the incidence of abdominal distension.

DISCUSSION

The present study was carried to find out the modes of enteral feeding practices and their outcomes in 120 patients with traumatic brain injury. Any significant difference in the laboratory parameters (hemoglobin and serum albumin) was not observed between the study groups. A higher incidence of pulmonary aspiration in patients undergoing RTF (45%) was found. Diarrhea was observed in 20/120 (16.7%) patients, tubal block in 18/120 (15%) patients, infection of the wound site in 18/120 (15%), burst abdomen in 3/120 (2.5%) and abdominal distension in 21/120 (17.5%) patients. None of the above mentioned complications were significantly different between various modes of enteral feeding.

TBI is associated with widespread autonomic dysfunction, systemic inflammation and dysfunction of various organs including gastrointestinal tract.[9] Due to the autonomic dysfunction of the gastrointestinal tract, intestinal and gastric motility is affected and if not provided with adequate nutrition, severe malnutrition sets in that delays the recovery of patients from illness and also increase the chances of infections. Enteral nutrition is preferred method of nutritional support during critical illness including in patients with TBI as major benefits include preservation of intestinal mucosal barrier function, inexpensive and associated with fewer infective complications as compared to total parenteral nutrition. 10 Some patients may not tolerate the initial enteral feeding that may be attributed to the prolongation of gastric emptying time. Kao et al has shown that nearly 80% of moderate to severe head injury patients have significantly prolonged gastric emptying time than normal individuals (normal -29.4±3.7 min versus TBI

patients - 57.2± 20.8 min).[11] Similar to the adults, nearly 50% of children with TBI have been documented to have prolonged head injury that increases the chances of pulmonary aspiration, ventilator-associated pneumonia and improper absorption of drugs administered orally.[12] A high incidence of pulmonary aspiration was also observed that can probably attributed to decreased gastric motility especially with the tube lying in stomach. Placing the tube in jejunum although reduces the risk of pulmonary aspiration, is cumbersome and time-consuming.[13] Intestinal intolerance gradually evades over a period of time and in case of persistent intolerance, pro-kinetic drugs such as metoclopramide and erythromycin have been shown to be effective.[14] Insertion of tube through nasal route has been debated to be better than through oral route although nasal insertion has been shown to increase the risk of sinusitis.[15] Any incidence of sinusitis was not observed in the present study. However, the second most common complication in the present study was diarrhea similar to earlier reports.[16] Although any significant difference in the incidence of diarrhea between the gastric and jejunal groups were not observed, other researchers have observed less incidence with jejunal tubing as jejunum has been noted to possess higher absorptive capacity and less susceptible to decreased motility.[17] Till date, it is not clear whether gastric or post-pyloric tube placement is better as inconclusive results have emerged from various randomized controlled trials as well as meta-analysis.[18]

The present study is limited in sample size of the study participants and the study design being observational. However, the data from the present study would serve as baseline information available regarding the different enteral feeding practices and their outcome measures from a developing country. Large randomized controlled trials are the need of the hour in finding out the best mode of enteral feeding practice.

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REFERENCES

1. Corrigan JD, Selassie AW, Orman JA. The epidemiology of traumatic brain injury. J Head Trauma Rehabil. 2010;25:72-80.
2. Clifton GL, Robertson CS, Grossman RG, Hodge S, Foltz R, Garza C. The metabolic response to severe head injury. J Neurosurg. 1984;60:687-96.
3. Adelson PD, Bratton SL, Carney NA, Chesnut RM, Coudray HE, Goldstein B, et al. Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents. Chapter 18. Nutritional support. J Soc Critic Care Med. 2003;4:68-71.
4. Bratton SL, Chestnut RM, Ghajar J, Hammond FF, Harris OA, Hartl R, et al. Guidelines for the management of severe traumatic brain injury. Nutrition J Neurotrauma. 2007;24:77-82.
5. Clifton GL, Robertson CS, Choi SC. Assessment of nutritional requirements of head-injured patients. J Neurosurg. 1986;64:895-901.
6. Meirelles CM, Aguilar JE. Enteral or parenteral nutrition in traumatic brain injury: a prospective randomised trial. Nutr Hosp. 2011;26:1120-4.
7. Doig GS, Simpson F, Finfer S, Delaney A, Davies AR, Mitchell I, et al. Effect of evidence-based feeding guidelines on mortality of critically ill adults: a cluster randomized controlled trial. J Am Med Asso. 2008;300:2731-41.
8. Perel P, Yanagawa T, Bunn F, Roberts I, Wentz R, Pierro A. Nutritional support for head-injured patients. Cochrane Database Sys Rev. 2006;4:CD001530.
9. 9. Baguley IJ, Heriseanu RE, Cameron ID, Nott MT, Slewa-Younan S. A critical review of the pathophysiology of dysautonomia following traumatic brain injury. Neurocrit Care. 2008;8:293-300.
10. Beaux M, Fraser R, Finnis M, Keulenaer B, Liberalli D, Satanek M. Enteral nutrition in the critically ill: a prospective survey in an Australian intensive care unit. Anaesth Intensive Care. 2001;29:619-22.
11. Kao CH, Changlai SP, Chieng PU, Yen TC. Gastric emptying in head-injured patients. Am J Gastroenterol. 1998;93:1108-12.
12. Martinez EE, Douglas K, Nurko S, Mehta NM. Gastric dysmotility in critically ill children: pathophysiology, diagnosis, and management. Pediatr Crit Care Med. 2015;16:828-36.
13. Marik PE, Zaloga GP. Gastric versus post-pyloric feeding: a systematic review. Crit Care. 2003;7:46-51.
14. Nguyen NQ. Pharmacological therapy of feed intolerance in the critically ills. World J Gastrointes Pharmaco Therap. 2014;5:148-55.
15. Itkin M, DeLegge MH, Fang JC, Mcclave SA, Kundu S, d'Othee BJ, et al. Multidisciplinary practical guidelines for gastrointestinal access for enteral nutrition and decompression from the society of interventional radiology and American gastrointestinal association institute, with endorsement by Canadian interventional radiological association and cardiovascular and interventional radiological society of Europe (CIRSE). J Vasc Interv Radiol. 2011;22:1089-106.
16. Mcwhirter JP, Pennington CR. Incidence and recognition of malnutrition in hospital. British Med J. 1994;308:945-8.
17. Friedman G, Flavia C, Becker M. Randomized study to compare nasojejunal with nasogastric nutrition in critically ill patients without prior evidence of altered gastric emptying. Indian J Crit Care Med. 2015;19:71-5.
18. Krenitsky J. Gastric versus jejunal feeding: evidence or emotion? Practical Gastroentero. 2006;30:46-65.

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