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Original Research Article

Role of feeding procedures in upper gastro-intestinal malignancy patients undergoing radiotherapy

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ABSTRACT

Background: Malnutrition in cancer patients can limit their response to treatment, surgery, chemotherapy and radiotherapy. Oral supplementation is not feasible in patients with cancers of oral cavity, oropharynx, hypopharynx, oesophagus and oesophagogastric junction (OG junction) who undergo radiotherapy or chemotherapy or in the palliative setting due to the growth itself. To compare open feeding gastrostomy with feeding jejunostomy in terms of improvement in the nutritional status of the cancer patient.
Methods: This prospective comparative study was done in patients with gastro-intestinal malignancies who underwent feeding gastrostomy and jejunostomy before radiotherapy were studied.
Results: In 26 patients, 8 patients underwent FG and 18 patients FJ procedure. There was no statistical difference in the increase or decrease in BMI between the two arms. There was an increase in serum albumin level following the feeding procedures both FG and FJ. 71.4% of patients in the FJ arm expressed a feeling of satiety at three months compared to FG arm where only 28.6% of patients were satisfied.
Conclusions: In our study, patients in both FG and FJ arms were able to maintain the BMI and serum albumin levels so as to complete radiotherapy. Feeding jejunostomy as enteral nutrition access still plays a role in developing countries with limited resources to enable these patients to complete the planned treatment.

Keywords: Gastrostomy, Jejunostomy, Nutritional supplement, Radiotherapy

INTRODUCTION

Malnutrition is a hallmark of cancer. Approximately 40% of cancer patients present with weight loss and cancer cachexia syndrome (CCS) at diagnosis.[1] A loss of more than 10% of body weight at diagnosis is a poor prognostic factor for survival. Malnutrition in cancer patients can limit their response to treatment, surgery, chemotherapy and radiotherapy. Malnutrition may be due to anorexia leading to inadequate food intake and catabolic metabolic derangements.[2] The malnutrition in cancer patients differs markedly from simple starvation.

The other causes of malnutrition in cancer patients include distressing symptoms, altered taste and gastrointestinal dysfunction which may be due to the side effects of cancer therapy. The distressing symptoms may include pain, nausea and vomiting. Cancer surgery is a temporary catabolic state and is accompanied by decreased nutritional intake. Chemotherapy results in transient nausea and vomiting and gastrointestinal dysfunction like stomatitis, mucositis and diarrhea resulting in malnutrition. Radiotherapy can also cause similar gastrointestinal injury like chemotherapy.

Hence nutritional support in some form can be effective and improves clinical outcomes in patients undergoing cancer treatment, who are moderately or severely malnourished and are unable to meet their nutritional

requirements orally for a period greater than 7 to 14 days or longer.[3]

Cancer patients at risk of malnutrition need to be identified and their nutritional requirements assessed. Nutrition screening tools are designed to detect undernutrition and to predict whether undernutrition is likely to develop or worsen under the present and future conditions of the cancer patient. One such important tool is NRS-2002. The purpose of this tool is to detect the presence of undernutrition and the risk of developing undernutrition in the hospital setting.[4] This screening tool is recommended by ESPEN. A score of >3 indicates that the patient is nutritionally at risk and needs nutritional support.[5] Objective parameters like serum albumin, transferrin and body mass index (BMI) can be used to assess malnutrition and to identify an improvement in nutrition after an intervention.

Oral supplementation is not feasible in patients with cancers of oral cavity, oropharynx, hypopharynx, oesophagus and oesophagogastric junction (OG junction) who undergo radiotherapy or chemotherapy or in the palliative setting due to the growth itself. In these patients, the enteral route is preferred as it is physiological, has fewer complications and is more cost-effective compared to parenteral route.[6] Temporary access can be achieved with a nasogastric tube. But they may be inadvertently dislodged or they cannot be technically inserted due to a constrictive growth in the upper GI tract or may cause discomfort to the patient. Hence permanent enteral access can be achieved with surgery or interventional radiology. Placement of tubes by surgery can be either gastric like feeding gastrostomy or post pyloric as in feeding jejunostomy.

To compare open feeding gastrostomy with feeding jejunostomy in terms of improvement in the nutritional status of the cancer patient.

METHODS

This is a prospective comparison trial conducted at the Department of Surgical Oncology, Regional Cancer Centre, Tirunelveli Medical College Hospital, Tirunelveli from January, 2017 to December, 2018. Approval was obtained from the institutional review board and informed consent obtained from patients. The patients with cancer of oropharynx, hypopharynx, oesophagus and OG junction who were to undergo radiotherapy and could not take a sufficient diet orally were included in this study. A nasogastric tube also could not be inserted in these patients due to technical reasons. Patients undergoing feeding gastrostomy (FG) arm and feeding jejunostomy (FJ) were studied. It was not combined with any other procedure. The patients with carcinoma of the hypopharynx and who might need laryngopharyngo-oesophagectomy in future were included in the feeding jejunostomy arm.

The data collected were age, sex, site of cancer, operating duration and complications specific to the feeding procedure at ten days, one month and three months postoperatively. The body mass index (BMI), Serum albumin level and NRS-2002 score were documented within one week before the procedure and again at ten days, one month and three months postoperatively. NRS-2002 was calculated using an online calculator application. It has an initial screening questionnaire with parameters like BMI, weight loss within three months and reduced dietary intake in the last week. If any of the parameters were present then a final screening questionnaire was used which has three parameters. Two parameters were nutritional impairment and severity of disease which were graded to give 0,1,2 and 3 points. Age less than 70 years denotes 0 points and ≥70 years is 1 point. Finally the total score was calculated by adding the points from these three parameters.

Both feeding procedures were done by a mini-laparotomy incision. Regional anaesthesia was used. Gastrostomy was done using Malecot's catheter of 28 Fr size by Stamm's technique and jejunostomy was done by Witzel's technique using Ryle's tube of 14 Fr size. Statistics were calculated using SPSS version 20.The BMI, serum albumin and NRS-2002 score before and after the procedure was compared by paired–t-test. Pearson's Chi-Square test was used to compare the two arms. A P value of <0.05 was considered significant.

RESULTS

In the present study, totally 26 patients underwent a feeding procedure. Among them, 8 patients underwent FG and 18 patients an FJ. The mean age was 57.92 years (range: 25-75 years).

Table 1: Number of patients by cancer site.

Feeding		Total	Oropharynx	Hypopharynx	Oesophagus and OG junction
FG	N	8	1	3	4
	%	100	12.5	37.5	50
FJ	N	18	1	7	10
	%	100	5.6	38.9	55.5

Table 2: Mean BMI in both subgroups before and after feeding procedure.

BMI	FG	P value	FJ	P value
Pre	13.7125	-	16.5667	-
10th day post-insertion	13.4000	0.177	15.7389	0.006
1-month post-insertion	13.1875	0.214	15.8389	0.037
3-month post-insertion	13.1375	0.192	15.9611	0.087

Table 3: Serum albumin level (gm/dl) before and after feeding procedure in both arms.

Serum albumin in gm/dl	FG	P value	FJ	P value
Pre	3.2875	-	3.4500	-
10th day post-insertion	3.2625	0.785	3.5444	0.506
1-month post-insertion	3.4250	0.693	3.6500	0.219
3-month post-insertion	3.5250	0.495	3.7167	0.064

Table 4: NRS-2002 score before and after feeding procedure in both arms.

NRS Score		≤3		>3	
		N	%	N	%
FG	pre	0	0	8	100
	10th day post-insertion	0	0	8	100
	1-month post-insertion	0	0	8	100
	3-month post-insertion	0	0	8	100
FJ	pre	1	5.6	17	94.4
	10th day post-insertion	12	66.7	6	33.3
	1-month post-insertion	15	83.3	3	16.7
	3-month post-insertion	15	83.3	3	16.7

Table 5: Number of patients with various complications in both arms.

Complications		Tubal patency		Peritubal leak		Excoriation of skin		Slippage of tube	
		Y	N	Y	N	Y	N	Y	N
FG	10th day post-insertion	8	0	1	7	0	8	0	8
	1-month post-insertion	8	0	4	4	3	5	0	8
	3-month post-insertion	6	1	5	2	5	2	2	6
FJ	10th day post-insertion	18	0	0	18	0	18	1	17
	1-month post-insertion	18	0	2	16	3	15	1	17
	3-month post-insertion	14	0	4	10	4	10	4	14

There was no statistical difference in increase or decrease in BMI between the two arms when comparing the pre-operative values to values on the tenth day (P=0.686), one month (P=0.524) and three months (P=0.648) post-insertion.

As seen in Table 3, there was an increase in serum albumin level following the feeding procedures both FG and FJ, but not reaching statistical significance. Moreover, the increase in serum albumin level between the two subgroups reached significance at the tenth-day post-insertion (P=0.049), but not in the first month (P=0.336) and third month (P=0.063) post-insertion.

As seen in Table 4, more number of patients in the FJ group had improved NRS-2002 score (≤3) than the FG group. In fact there was no improvement in the score in all eight patients. The improvement in NRS-2002 score achieved statistical significance in FJ arm in the first month (P=0.004) and third month (P=0.001) post-operatively.

Tubal patency was maintained fairly well in the two groups. The percentage of patients with peritubal leak and hence excoriation of skin was more in the FG group compared to FJ group reaching statistical significance at the first month (P=0.05) post-insertion. There was an incidence of slippage of the tube in one patient in the FJ group within the tenth postoperative day which was refixed successfully. There was no significant difference in slippage of the tube in both subgroups.

Moreover 71.4% of patients in the FJ arm expressed a feeling of satiety at three months compared to FG arm where only 28.6% of patients were satisfied. There was no statistically significant difference in the ability to maintain function at three months among the two arms (FG 75% vs FJ 77.8%). There was no significant difference in the mean operating time between the two arms (FG 28 minutes vs FJ 34 minutes). One patient in the FJ arm expired due to aspiration pneumonitis and another patient in the FJ arm needed re-opening in the post-operative period for obstruction.

DISCUSSION

Stamm described a technique for gastrostomy in 1894 which is still used today.[7] Percutaneous endoscopic gastrostomy (PEG) is safer than surgical gastrostomy.[8] But still, there are indications for a surgical gastrostomy: 1, the impossibility to access the stomach endoscopically due to head and neck tumours and malignant strictures of oesophagus 2, technical failure of PEG 3, unavailability of the facility or funds to perform PEG or percutaneous fluoroscopic gastrostomy.[9]

The techniques used for jejunostomy are longitudinal Witzel, transverse Witzel, open gastrojejunostomy, needle catheter technique, percutaneous endoscopy and laparoscopy. It is mainly used as an additional procedure during major upper digestive tract surgery. It is also used as a sole procedure in patients with head and neck cancers, neurological and congenital illness in geriatric patients. In our study FJ was done as a sole procedure and a longitudinal Witzel technique was used. According to Tapia et al, the complication rate of longitudinal Witzel technique is 2.1% and the transverse Witzel technique is 6.6% and is lowest at 1.5% for needle catheter technique.[10]

In a study by Zhou et al, the triceps skinfold thickness and serum albumin level significantly increased at 4th, 8th and 12th week after gastrostomy.[11] In another retrospective study where gastrostomy was done in head and neck cancer patients, the nutritional parameters like weight, BMI and serum albumin did not improve at 3, 6 and 12 months after gastrostomy.[12] In our present study also the BMI, serum albumin and the nutrition score did not improve significantly after the FG procedure.

In a study published in International Journal of Surgery, 99 patients with oesophageal cancer underwent FJ for various indications, 48 had FJ done during oesophagectomy, 41 prior to neoadjuvant therapy and 10 as a palliative measure.[13] They did not note any significant change in weight or serum albumin level on day 10 and day 30 post-insertion. But the study claims that patients were able to maintain weight and serum albumin and general fitness improved and was ready to undergo neoadjuvant therapy similar to our study. Moreover 50.5% of patients expressed positive feedback whereas in our study it was 71.4% in the FJ arm.[13]

The minor complications of FG mentioned in the study by Anselmo et al, were peritubal leak (3.39%), tubal block (3.49%) and displacement of the tube (2.33%) whereas it 62.5%, 12.5% and 25% respectively.[14] Choi et al, in their study noted the tubal complications of jejunostomy as dislodgement(18.8%), block(11.1%), peritubal leak(5.13%) and excoriation of skin(11.1%), whereas in our present study there was dislodgement of tube in four patients and no blockage of tube.[15]

In our study, patients in both FG and FJ arms were able to maintain the BMI and serum albumin levels so as to complete radiotherapy. But their nutritional score also improved in the FJ group only. Moreover complications like, peritubal leak and excoriation of skin were more common in the FG group whereas more number of patients in the FJ group expressed a feeling of satiety. We were of the opinion before starting the study that feeding directly into the stomach causes satiety. But the results of our study did not confirm this hypothesis. Furthermore patients in the FG group reported that managing the Malecot's tube was cumbersome. Our study proves that FJ is better than FG in terms of patient satisfaction, improvement in nutritional status and lesser complications.

Our study is limited by the small number of patients. Moreover we did not do randomization between patients who did and did not undergo a feeding procedure before being treated with radiotherapy because a nasogastric tube is inserted routinely in these patients before starting radiotherapy.

CONCLUSION

Even though surgical gastrostomy and jejunostomy are simple procedures, they should be done meticulously to achieve good results and to avoid complications as these patients are already nutritionally compromised. Feeding jejunostomy as enteral nutrition access still plays a role in developing countries with limited resources to enable these patients to complete the planned treatment.

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