FREQUENCY OF COMPLICATIONS FOLLOWING TRANS HIATAL ESOPHAGECTOMY FOR ESOPHAGEAL CARCINOMA WITH OR WITHOUT FEEDING JEJUNOSTOMY

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Date Received: February 17, 2017
Date Revised: January 15, 2018
Date Accepted: January 26, 2018

ABSTRACT

Objective: To determine the benefit of feeding jejunostomy in patients undergoing transhiatal esophagectomy in terms of complications.

Methodology: This prospective comparative (interventional) study was conducted in the Department of Surgery, Lady Reading Hospital, Peshawar, from 21st May, 2010 to 20th May, 2016. All patients with stage II and III esophageal carcinomas were included in the study. All patients were subjected to trans-hiatal esophagectomy. Patients were placed into Group A (with a feeding jejunostomy) and B (without a feeding jejunostomy) by consecutive non-probability sampling technique. Anastomotic leak, hoarseness, chylothorax, fundal necrosis; fistulation, abdominal pain, bloating, vomiting, pulmonary complications; and mortality over a period of 28 days was documented for each patient. With SPSS version 16.0, continuous data was subjected to student t test and Man Whitney U test whereas all the categorical data was compared using chi-square test and kruskal-Wallis test. A p value of <0.05 was considered significant.

Results: The total number of patients was 328 patients. These patients were equally divided resulting in 164 patients in each group. Patients from Group A were marginally older than patients from group B (p =0.89) and a non-significant male predominance was observed between the 02 groups (p =0.911). Significant differences were observed between the 02 groups regarding pulmonary complications, bloating and vomiting (p= 0.046). Mortality was significantly higher in the feeding jejunostomy group (7.4% Vs. 2.45%).

Conclusion: A significantly higher frequency of complications were observed in patients with feeding jejunostomies after transhiatal esophagectomy for esophageal cancer in terms of pulmonary complications and mortality.

Key Words: Trans hiatal esophagectomy, Esophageal carcinoma, Feeding jeju-nostomy

INTRODUCTION

The number of cases diagnosed with esophageal carcinoma has increased over the last decade with influx from neighboring areas such as Afghanistan. This increase is also observed with growing numbers of diagnosed cases for other tumours. The histo-pathological variant of esophageal cancer observed in western society (adenocarcinoma) versus the squamous cell variant from our belt, defines a new role of treatment modalities required to meet the needs of individual patients[1].

The most common procedures performed are either through trans-hiatal approach or trans-thoracic approach[2,3]. Esophagectomy through the video assisted thoracoscopic surgery (VATS) is still not routinely performed in our region. The trans-hiatal esophagectomy has widely been practiced; yet, many variants are different to the original technique described by the pioneer surgeon Orringer. The procedure was first performed for benign strictures rather than tumors. Documented complications of transhiatal esophagectomy include anastomotic leak, hoarseness, chylothorax, fundal necrosis; fistulation, abdominal pain, bloating, vomiting, pulmonary complications; and mortality over a period of 28 days[4]. The argument of achieving a sub-total clearance beyond the primary tumor is the reason why many thoracic surgeons differ in opinion as to its role in the management of esophageal tumors. The nutritional

management of patients presenting late with overt dysphagia is of prime importance. Literature has also questioned the benefit of providing the parenteral nutrition in the pre-operative period[5]. Reasons and influences yet not ascertained many surgeons document benefit of weight loss before surgery rendering easier exposure and better anatomy during esophagectomy[6].

The post-operative period is the matter of concern in cachexic patients. Many surgeons prefer a feeding jejunostomy to aid the improving/deteriorating nutritional status[7,8]. The option of using the less expensive Foley's catheter makes this part of the procedure the most important. The management of the feeding tube demands more care and monitoring, thus culminating on more complications. Many modifications at technique with improvement in technology (using vessel sealing devices and better anesthesia) prelude the need for intensive care in the early post-operative period. Similar is the case of nutritional management with intravenous fluids9. Various modifications are described since the original classic transhiatal esophagectomy describe by Orringer[4].

Variably surgeons around the world are performing the procedure even for esophageal carcinoma with comparable results. The main issue of concern to the patient is the degree of dysphagia that in many cases in our region brings the patient in contact with the health care service providers. Emaciated and having lost quite a lot of weight before diagnosis and during management (surgical), the primary desire of the patient is to be able to swallow[9-11]. Although many lesser procedures like tube placement and laser ablation in advanced cases improve the dysphagia, surgery remains the mainstay in the palliative management of cases with this grave condition[12-15]. Subjecting the patients to a feeding jejunostomy during the procedure could increase the morbidity in these patients and the benefit of improving nutritional status is questionable. The rationale of this study was to observe the benefits of feeding jejunostomy following transhiatal esophagectomy in terms of morbidity as the step during the procedure increases the operating time and increases cost during the post-operative period.

METHODOLOGY

This prospective comparative (interventional) study was conducted in the Department of Surgery, Lady Reading Hospital, Peshawar, from 21st May, 2010 to 20th May, 2016. Patients presenting with complaints of dysphagia over this period were rendered to necessary investigations including contrast studies, upper G.I. endoscopy and biopsy of any suspicious lesion. Those confirmed with diagnosis of esophageal carcinoma were enrolled. Patients at all stages were segregated and stage II and III patients were included. They were all admitted and detailed history focused to their nutritional status was obtained. These included demographic data, maximum recalled weight between diagnoses, approximated weight loss, anthropometric measurements, types of nutritional aid received since dysphagia, grading of dysphagia, weight in Kg etc. They were also subjected to general and staging investigations to ascertain albumin, transferrin, pre-albumin levels, and size of primary tumor.

The study was conducted after obtaining permission from the hospital ethical committee. Those not consenting to inclusion in the study or having comorbidities deeming patients unfit for surgery or those with unresectable tumours and/or patients with evident metastatic lesions were excluded from the study. All patients were subjected to trans-hiatal esophagectomy performed by general surgeons with a minimum experience of 50 cases. The conduit was gastrum and posterior mediastinal route was used for making an esophago-gastric anastomosis. The anastomotic technique (trans-hiatal esophago-gastric junction) was subject to surgeon preference. Patients were placed into group A and B by by consecutive non-probability sampling technique. This was instituted because there was no defined existing sampling frame from which randomization could be performed.

Group A constituted patients that underwent the procedure and also were fashioned a feeding jejunostomy that was made functional in a graduated fashion on the 1st post-operative day (POD). Group B patients underwent trans-hiatal esophajectomy but were not subjected to a feeding jejunostomy. Following the procedure patients requiring ICU care were dealt accordingly and were noted. The data was gathered and complications of surgery in both groups were compared. These included anastomotic leak, hoarseness, chylothorax, fundal necrosis; fistulation, abdominal pain, bloating, vomiting, pulmonary complications; and mortality over a period of 28 days. Chylothorax was defined as a persistent triglyceride rich fluid after third POD >10ml/kg/day. Anastamotic leak was sought after either presentation of fluid on neck wound that would not suffice to simple dressings and confirmed on gastrograffin swallow. Pulmonary complications included atelectasis and bronchopneumonia requiring intensive care and pulmonary toilet as well as ventilatory support.

The collected data was presented in tabulation format and was entered into SPSS version 16.0. Continuous data was subjected to student T test and Man Whitney U test whereas all the categorical data was compared using chi-square test and kruskal-Wallis test. A p value of <0.05 was considered significant. Tumor characteristics were considered and multi-level analysis were performed for each stage comparing complications.

RESULTS

A total of 475 patients were either diagnosed before or following admission to the Department of Surgery with esophageal carcinoma but following exclusion of those patients with unresectable or advanced stage tumors, the total number of patients included in the study was 328. These patients were equally divided into two groups resulting in 164 patients in each group. Three patients were lost to follow up and data of 325 patients was compared. The baseline characteristics of the 02 groups were comparable. Age was similar between groups although at earlier part of study as per preference of surgeons more female patients were observed but as the study progressed the numbers evened for both group and males dominating the total population of patients that were included in the study(p=0.89, Table 1).

Because the patients were presenting in the later stages, the majority of patients (92% and 88% respectively) were having grade 3 or 4 at inclusion of study and still a far majority had absolute dysphagia. As the study had focused on any benefit from post-operative care related to nutrition using a feeding jejunostomy, anthropometric and biochemical estimates of nutritional state was also compared but still history based data such as estimated weight loss was a source of bias. Some patients preferentially placed on initial nutritional resuscitation and support for late presentation did not result

Table 1: Demographic and nutritional data

	Group A, n=162	Group B, n=163	P value
Age in Years (Mean ±SD)	52.8 ±9.8	48.9 ±11.2	0.89t
Gender (M:F)	113:70	102:68	0.911☐
Weight in Kg (Mean ±SD)	62.1 ±18.7	55.9 ±13.9	0.85t
Approx. Weight Loss (Kg)	22.8	18.3	0.78m
Triceps Folds in cm (Mean ±SD)	3.8 ±0.8	3.5 ±1.2	1.13m
Serum Albumin (g/dl) (Mean ±SD)	3.1 ±1.4	3.3 ±0.8	1.05m
Serum Transferrin (mg/dl) (Mean ±SD)	199.2 ±28.3	201.9 ±24.5	0.89m
Serum Pre-Albumin (mg/dl) (Mean ±SD)	20.3 ±4.1	21.5 ±3.8	0.86m
Pre-Op Nutrition (Y/N, %)	42 (25.9)	38(23.3)	0.73☐

Chi Square test=☐, Students T test= t, Mann Whitney U test= m

Table 2: Tumor characteristics

		Group A n=162	Group B n=163	P value
Histopathology	Squamous Cell Carcinoma	102 (62.9)	96 (58.8)	0.67☐
	Adenocarcinoma	60 (37.03)	67 (41.1)	
Stage	Stage II	34 (20.8)	49 (30.06)	0.77☐
	Stage III	128 (79.01)	114 (69.9)	
Tumor size (cm)		4.3 (±2.2)	5.1 (±2.1)	0.43m
Multi-focality		43 (26.5)	58 (35.5)	0.58☐
Grade	Grade I	21 (12.9)	30 (18.4)	0.49☐
	Grade II	83 (51.2)	89 (54.6)	
	Grade III	58 (35.8)	44 (26.9)	
Tumor location	Upper third	12 (7.4)	17 (10.4)	0.55☐
	Middle third	78 (48.1)	89 (54.6)	
	Lower third	72 (44.4)	57(34.9)	
Anastomosis	Single layer Interrupted	107 (±66.04)	121 (±74.2)	0.61t
	Single Layer Continuous	55(±33.9)	42 (±25.7)	
Pyloroplasty (Y/N)		22 (±13.5)	18 (±11.04)	0.82☐

Chi Square test=☐, Students T test= t, Mann Whitney U test= m

Table 3: Complications and mortality

Complications	Group A, n=162 (Percentage/Mean ±SD)	GroupB, n=163 (Percentage/Mean ±SD)	P Value
Chylothorax	03 (1.85)	05 (3.06)	0.344⬚
Anastomotic Leak	04 (2.46)	02 (1.22)	0.112⬚
Fundal Necrosis	02 (1.23)	01 (0.6)	0.386⬚
Hoarseness (transient)	13 (8.02)	11 (6.74)	0.66⬚
Pulmonary Complications	28 (17.2)	09 (5.52)	0.001⬚
Mortality	12 (7.4)	04 (2.45)	0.041⬚
Bloating/Distention	17 (10.4)	09 (5.52)	0.061⬚
Nausea/Vomiting	37 (22.8)	13 (7.97)	0.02⬚
Haemothorax (Clotted)	16 (9.87)	17 (10.4)	0.91⬚
Wound Infection	27 (16.6)	16 (9.81)	0.067⬚
Wound Dehiscence	02 (1.23)	03 (1.84)	0.211⬚
Post-operative Hospital Stay (days)	11.3 (±8.1)	8.9 (±6.7)	0.16m

Chi Square test=⬚, Mann Whitney U test= m

in increased duration but were mentioned to compare groups and rule out bias as well (p=0.73). Both group A and group B had comparable and very similar data in this regard with no significant differences (Table 1). All patients were either stage II or III in our study (p=0.77). In both groups the best share of patients included the squamous cell carcinoma type (p=0.67). Those that had received neoadjuvant therapy including radiotherapy were included in the study and by multivariate analysis the segment of patients from both group had no different outcome in our study (M =0.88).

The size of the tumors was also compared. The maximum dimensions of the tumor calculated by traversable scope (EUS) or number of slices in the CAT scan was used to document (p=0.43). High share of the squamous cell carcinomas had evidence of multifocality but the results in comparison from both groups was comparable as was the acceptably high frequency of moderately differentiated lesions of the population under study (p>0.05, Table 2).

No significant difference was observed for lower and middle third lesions of the esophagus (p =0.55). The operating surgeons had a similar view of the operative steps used in the study apart from the esophagogastric anastamosis that was single layered and fashioned in the continuous or interrupted fashion. Few of the large majority of esophagectomies had a pyloroplasty performed and the rest had dilatation (digital) with an invagination pair of surgical fingers by the operating surgeon (p =0.82).

Significant differences were observed between the 02 groups regarding pulmonary complications, bloating and vomiting (p= 0.046). Mortality was significant-

ly higher in the feeding jejunostomy group (7.4% Vs. 2.45%). Apart from these, the wound infection was found more in patients who had a feeding jejunostomy. Although wound dehiscence was observed in both groups with insignificant statistics yet anastomotic leak was found to have significant correlation ruling out the jejunostomy as a cause of the dehiscence.

Feeding was instated on the 1st POD and its relation to complications like bloating is relevant. Insignificantly the hospital stay was prolonged in patients receiving a feeding tube (Group A) and due to longer follow-up of patients in this group, many patients had difficulty in weaning and wound problems after removal of the tube (p =0.16, Table 3).

DISCUSSION

The tumor in both groups had similar characteristics, predominantly squamous cell variant which was similar to the findings by Bilal et al[16]. The corresponding figures of tumor grading were also comparable as majority of cases presented with moderately differentiated carcinoma particularly of the middle and lower third of the esophagus. Moreover, those operative cases which-needed conversion to a transthoracic procedure were similar to other studies (frequency of pulmonary infections being higher than the transhiatal procedure[17,18]).

Using the serum proteins as markers of existing nutritional status is argued more often than sought[19-22]. The markers (serum proteins) were comparable to an earlier study conducted by khan et al[17]; as we are working in similar conditions and had relatively same type of patients. Other western studies like that conducted by Daly et al[23] also had similar values. Anthropometric

measurements to assess nutrition have also been a gray area for nutritionists[24]. Using adequacy as a tool for justification of furnishing patients with a feeding jejunostomy after such a radical surgery would not be of great benefit for which the study took into account the overall outcome of surgery comparing to indigenous groups with similar common attributes such as demographics and serum proteins[25,26]. These outcomes mainly included early postoperative symptoms and complications including mortality[27].

The results of this study are intriguing as such a major difference with regards to mortality and pulmonary complications were apt to support a null hypothesis, yet these figures are seldom if not close to figures reported by studies with a similar design. The sensation of bloating and nausea were a significant finding in this study. Apparently the hold up of early intestinal contents could be the inciting factor[28] but recently no convincing data supports this attribute to feeding jejunostomy. Although the recommended tube is not freely available in this region, the modified tube could be held responsible.

A higher yet insignificant wound infection rate is another argument to the support of a null hypothesis. This observation is also in lieu of the infection rates of patients receiving total parenteral nutrition during the peri-operative period in a study conducted by Khan et al[28]. The study design of other studies was different from this study but the emphasis of provision of nutrition in an atretic patient during stress associated with a major procedure is comparable to earlier studies[30-32]. An already starved patient with added stress of surgery and the added stress of nutrition would be a focus of the recommended next level of research on this topic. Evident from details of provision of the nutrition in the perioperative period from similar studies on feeding jejunostomies and parenteral nutrition, the anastomotic leakage rate was higher in those studies whereas the anastomotic leakage rate was not significant with a slight edge to the group without feeding jejunostomies[33]. The attribute of a successful anastamosis secondary to adequate nutrition needs revisiting in an esophagogastric anastamosis following surgery for esophageal carcinoma.

Another observation was an insignificant but prolonged hospital stay in patients with a feeding jejunostomy at the end of the procedure (group A). Similarly, a study conducted by Correia et al[34] who focused on the outcome following nutritional rehabilitation in patients with preoperative malnutrition.

CONCLUSION

A significantly higher frequency of complications were observed in patients with feeding jejunostomies after transhiatal esophagectomy for esophageal cancer in terms of pulmonary complications and mortality. Apart from the above, significant number of patients had complaints of either nausea or vomiting.

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CONTRIBUTORS

AA conceived the idea, planned the study and drafted the manuscript. ANB, AG and MHK helped acquisition of data, did statistical analysis and critically revised the manuscript. All authors contributed significantly to the submitted manuscript.