

Early oral intake through meticulous chewing after esophagectomy

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Introduction

Enhanced recovery after surgery (ERAS) has gained popularity in surgery, having the potential to reduce morbidity rates, shorten hospital stay, and lessen the cost. Esophagectomy has high morbidities among general surgical operations and is ideal for ERAS to make an impact. Among the various components in the multidisciplinary ERAS management program, nutritional support and early oral feeding are very relevant to esophageal surgery. There is a Chinese saying, “*bread is the staff of life*”, food is people’s paramount concern, and this stays true across the globe. Zhu and associates published a study entitled “*Chewing 50 times per bite could help to resume oral feeding on the first postoperative day following minimally invasive esophagectomy*”. In this study, 95 patients started solid food intake on the first postoperative day. This was made possible by meticulous chewing which turned solid food into liquid nutrition after mixing with saliva. The author concluded that there was no difference in rates of anastomotic leak or pneumonia (1).

Early oral feeding after esophagectomy

The concept of early oral feeding in upper gastrointestinal surgery was first tested in a randomized trial in 2008. A total of 453 patients with hepatic, pancreatic, esophageal and gastric resections (1.8% esophagectomy) were randomized to normal food as tolerated on the first postoperative day versus gradual stepping up of enteral jejunostomy tube feeding till day 6. The author concluded that early normal

oral intake did not increase major complication rate when comparing enteral tube feeding (33.5%) with normal food at will (28.2%), $P=0.26$. The anastomotic leakage rate and pulmonary insufficiency rate are also not significantly different. They especially highlighted the complication rate of jejunostomy of 7.2%; 13.9% unscheduled removal due to various causes and 1.3% reoperation rate caused by the catheter (2). Another study targeted exclusively at minimally invasive Ivor Lewis esophagectomy patients compared 50 patients having immediate liquid nutrition postoperatively to a retrospective cohort with delayed oral feeding on day 4 to 7 plus feeding via a jejunostomy or a nasojejunal tube. It showed that the median caloric intake at postoperative day 5 was only 58% of required, which was calculated by the modified Harris-Benedict formula plus 30% for postoperative energy expenditure. The complication and mortality rates were not significantly different although the anastomotic leak rate was considered high in both groups at 14–24% (3). The 1-year postoperative result showed that patients with early oral feeding lost more weight during the first postoperative month but the difference was not observed thereafter (4). Sun *et al.* published their results on minimally invasive McKeown esophagectomy, focusing on postoperative gastric emptying time and feasibility of early postoperative oral feeding. Sixty-eight patients were studied; postoperative gastric emptying time was found to be significantly shorter on day 1 and 7 postoperatively compared to preoperative assessment. This cohort was allowed liquid diet at will on postoperative day 1. When

compared with a retrospective cohort with delayed oral intake on day 7, early oral feeding patients had earlier recovery on bowel function and no significant difference in complication rate (5). Based on the above study, the same group has recently published a randomized controlled trial on 280 patients with minimally invasive McKeown esophagectomy. Patients were randomized to early oral feeding when liquid nutrition was administered on the first postoperative day and late oral feeding when naso-enteral feeding was given from day 1 to 7. There was no significant difference in gastrointestinal, anastomotic leakage, pneumonia or other complications. There was a significantly shorter time to first bowel movement and hospital stay for the early oral feeding group. The patients receiving oral feeding on first postoperative day also reported higher short-term quality of life scores (6). These studies have tried to demonstrate the effect of early “liquid” nutrition on the first day after operation with limited calorie intake and parental nutrition supplement. Zhu *et al.* advocated meticulous chewing of 50 times per bite to turn solid food into a viscous semi-liquid diet. Solids are chewed to reduce particle size and further compressed between the tongue and hard palate during the oral processing phase. Saliva served as a lubricant, solvent, softener and contains enzymes for breakdown of food fragments (1,7). Although “chewing” was shown to aid returning of bowel function and lowering analgesic requirement after surgery in randomized control trial, through the postulated vagal stimulation mechanism (8), there is no evidence that esophagectomy or vagotomised patient would enjoy this benefit (9).

Diet protocol & nutritional aspect

Zhu *et al.* had strict inclusion criteria and stringent diet protocol in the study. Only patients with no severe medical illness, age less than 80 years, BMI >15 kg/m² and no vocal cord palsy postoperatively were recruited. Patients were monitored by dedicated clinicians and dieticians while they were eating a spoonful at a time. They were taught to maintain an upright position for at least 30 min. The oral feeding episodes were repeated 6–8 times per day (1). Apart from the devotion and time from the family and healthcare workers, this protocol would require determination and perseverance from the patient to ensure compliance. Even so, the result presented is very encouraging, with only less than 5% of patients deviated from the diet protocol. Patients achieved more than 77% of daily mean caloric

intake in comparison to less than 60% in previous studies. With pre-existing high background incidence of dysphagia and sarcopenia in esophageal cancer patients, nutritional support is of utmost importance perioperatively to improve patients’ outcome (10–12). The European Society for Clinical Nutrition and Metabolism (ESPEN) guideline recommends early initiation of a combination of enteral and parenteral nutrition when oral intake is expected to be less than 50% for more than 7 days (13). In this study, the caloric requirement was calculated based on modified Harris-benedict formula plus 30%. More than 94% of patients achieving the goal of at least 75% of their postoperative energy requirement.

Complication and outcome

The primary outcomes of the study were the incidence of anastomotic leak and pneumonia which were thought to be closely related to early oral feeding. The incidence was reported to be 2.1% for anastomotic leakage and 7.4% for pneumonia which was similar to the standard regimen group with enteral tube feeding for 7 days. These figures, when compared to the benchmark complications rate reported by the Esophageal Complications Consensus Group (ECCG), are much lower. With 2,704 esophagectomies in 24 high volume centers around the world in 2015–2016, the reported anastomotic leakage rate was 11.4% and pneumonia rate was 14.6%. Other important postoperative parameters that would affect oral feeding are delayed gastric emptying and vocal cord paralysis, which were reported as 6.7% and 4.2% respectively by ECCG (14). Recurrent laryngeal nerve injury is not uncommon after esophagectomy for squamous cell carcinoma during superior mediastinal dissection. The rate of vocal cord palsy was reported to be around 27% (15). Although the majority will recover eventually, it may directly affect the short-term aspiration risk and quality-of-life. It is not surprising that this group of patients is excluded in Zhu *et al.* study, however, the exact figure is not provided. Delayed gastric emptying can be contributed by various factors; the size, and shape of the gastric conduit, route of reconstruction and any mechanical gastric outlet obstruction (e.g., tight hiatal opening, twisting or pyloric spasm). Conduit dilatation can put the anastomosis at risk. Regurgitation and vomiting can also lead to aspiration. The previous study by Sun *et al.* showed that postoperative gastric emptying time was significantly lower postoperatively compared to preoperative assessment (5). The incidence of delayed

gastric emptying was not reported in Zhu *et al.* study and pyloroplasty was not performed.

Generalizability and application

A protocol is only successful when it is generalizable and applicable. A center should have: (I) the expertise and case volume to achieve a low operative complication rate; (II) the supporting staff and allied health professional to educate and monitor the progress of diet tolerance; (III) motivated patients and family members to comply and follow the complex instruction that was given, especially when the patient is under psychological and physical stress immediately after surgery. To make the study result applicable, the outcome should translate into other parameters such as patient satisfaction (quality-of-life) length of hospital stay (cost). As previously discussed, postoperative oral feeding is one of the major elements of ERAS, the other components in the multidisciplinary management cannot be understated. Preoperative counseling, prehabilitation, minimally invasive surgery, postoperative pain control and mobilization and so forth are of importance (16).

Conclusions

This study is unique and innovative. Both the compliance and the results are impressive. The caloric requirement is well achieved while the safety of the protocol is nicely demonstrated. The comparison study in longer-term results, quality-of-life and cost is eagerly awaited.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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