



## Choices of Food after Total Laryngectomy

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### Abstract

**Background:** Management of laryngeal cancer by total laryngectomy resulted in alteration of pharyngeal anatomy and physiology and with combined radiation makes it more difficult for food bolus to pass through pharynx and upper esophagus. The purpose of this study is to identify the choice of Thai food, which has variety of texture that laryngectomies could eat at different period of treatment. Ability to eat chili hot food is also studied.

**Method:** Prospective comparison choice of food types is done from preoperative and to 1,3 and 6 months post-operative period using questionnaire. Thai food were classified by texture into 7 types as clear liquid, thick liquid, soft, semisolid, sticky, hard, and hard and dry food. Ability to eat chili hot food is compared between preoperative period and at 6 months after operation.

**Results:** Seventeen patients with uncomplicated total laryngectomy were enrolled. The patients could eat type 1-3 food (clear liquid, thick liquid and soft food) well at all time. For the rest of food types, the laryngectomies had more difficulty eating them. Sticky food is the most difficult to eat after total laryngectomy and radiation. Both hard food and hard and dry food were difficult for the patients but less than sticky food. The worst time of eating difficulty was at 3 months. At 6 months after surgery, 76.5% of patients who could eat semisolid food, which is the common food in daily life, without difficulties. This was the same as before treatment. Patients who could not eat sticky food, hard food and hard and dry food at all were 52.95%, 29.4% and 41.2% respectively. Approximately half of the patients (9/17) could eat hot food at 6 months after the operation although all of them could eat it before having cancer.

**Conclusion:** The result can be used for preoperative counseling on possible types of food at different period of treatment. To improve the eating satisfaction and life quality, the patients should be instructed to try all types of food, especially after complete healing from surgery and radiation.

**Keywords:** Thai food types; Choices of food; Total laryngectomy

### Introduction

Management of laryngeal cancer by total laryngectomy although successful in curing the diseases but the alteration of pharyngeal and laryngeal anatomy can affect eating and swallowing physiology of the patients. Eating is not only bringing energy sources for lives, but also giving people the pleasure of living. Questions about swallowing and eating ability have been part of many quality of life assessments. The purpose of this study is to evaluate the reality of eating status after total laryngectomy especially with Thai food.

In normal pharyngeal phase of swallowing, the tongue pushes backward and downward. Constrictor muscles start contraction. The larynx is closed and pulled upward and forward by many muscles connected to hyoid bone. Laryngeal closure not only prevents aspiration but also create subglottic pressure to help driving food. Upward and forward laryngeal movement create retroflex movement of epiglottis, protecting the airway while food sliding from vallecular to pyriform sinus and then esophagus. This movement also increases a space between cricoid and vertebrae, creating slight negative pressure and also help pulling open the cricopharyngeal muscle or upper esophageal sphincter. With all these mechanisms together, the food will easily pass pharynx to esophagus. The esophagus moves in peristalsis manner to move the food downward. It also needs to expand and contract when the food passing through it.

In total laryngectomy (TLG), the trachea is anteriorly fixed and opened to the neck and the positive pressure at subglottis is loss. Larynx and hyoid are removed which resulted in absence

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of hyolaryngeal elevation and the mechanism to pull open the cricopharyngeus [1,2]. The negative pressure to pull the food into esophagus is also lost. McConnel [3] found that higher tongue base to posterior pharyngeal wall pressures are required after laryngectomy to propel a bolus through the collapsed pharynx. Choi “et al.” [4] Studied upper esophageal sphincter (UES) in post TLG patients comparing to normal and found decreasing resting pressure, maximum contracting pressure, degree of relaxation and coordination of sphincter movement and length of sphincter had reduced. The proximal part of esophageal body had decreased maximum contraction pressure, contraction time and peristaltic wave propagation with statistical significance. There is no different of lower esophageal function between post TLG and normal. Duranceu “et al.” [5] found functional change of upper esophageal sphincter and body of esophagus in all 10 TLG patients in their study, 5 of which complained dysphagia. Both Choi and Duranceu found normal function of lower sphincter.

TLG can be used as a primary or secondary surgical treatment for laryngeal cancer. When indicated for a primary, untreated tumor, it is usually for advanced stage of cancer. It is almost always follows by postoperative radiation. Radiation can damaged salivary and mucous gland and also cause fibrosis. These reduce and thicken saliva, limit muscle contraction and limit esophageal expansion. Combination of Surgery and radiation makes it more difficult for food bolus to pass through pharynx and upper esophagus. Sense of smell which was reduced by redirection of inspiratory airflow not passing the nose and some effect of chemotherapy can cause alteration of taste. The patients tend to have swallowing difficulty, taste alteration and less apatite.

Thai food is worldwide popular for its balance combination of taste including sour, sweet, salty, bitter and also its hotness. Many kinds of spices give “heat” or hotness to Thai food, but the most prominent is from chili which contains capsaicin. Although capsaicin can reduce appetite and energy intake in non-users [6], it adds food flavor to regular users and tend to increase appetite.

There are also many kinds of Thai foods, with not only variety of taste but also texture. Variation of Thai food’s taste and texture can be used as representative of many Asian foods. Some people, also health care personnel’s still believe that hot food or hard food is not suitable for sick people, cancer patients or post radiation and try to restrict types of food for patients. Long term intake of bland and soft diet tends to decrease appetite which may result in decrease food intake and quality of life.

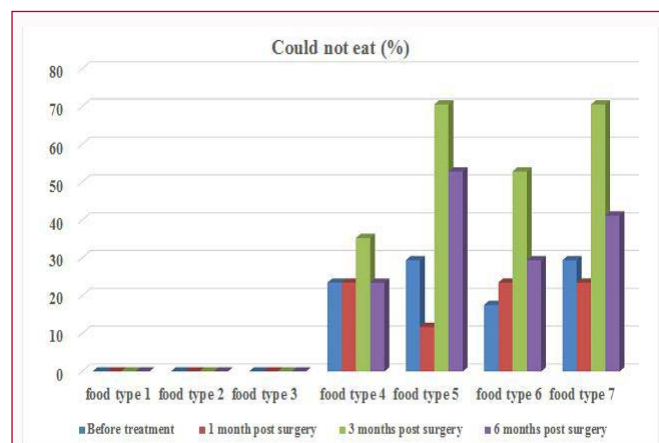
It is our purpose to study the choices of food and eating ability of laryngectomees on different types of common food in Thailand and also on chilli hot food. The type of food that the patients choose during the different postoperative periods and what final type of food that patients were comfortable to eat at the end of 6 months after surgery comparing to their preoperative food. We also study the ability to eat chili hot food. The result can help surgeons and care team for realistic preoperative counseling and also help patients and families to prepare better food to fit the patients’ ability and satisfaction.

**Study design**

The design is a prospective comparison of pre- and post-surgery eating ability, using questionnaire on choices of food. The study had been approved by Siriraj Institutional Review Board (SIRB), Faculty of Medicine Siriraj Hospital, Mahidol University.

**Table 1:** Types of Thai food, classified by consistency.

No.	Type of food	Samples of food
1	Clear liquid food	clear soup, clear fruit juice
2	Thick liquid food	rice congee, ground corn soup, pumpkin soup, ice cream
3	Soft food	soft-boiled rice, minced vegetable soup, tofu soup, steamed fish, steamed egg, Thai fried egg, jelly, bird nest
4	Semisolid food (regular food)	steamed rice, soft bean, fried vegetable, Thai fried egg with minced pork
5	Sticky food	sticky rice, Thai banana in sticky rice, desert made from sticky rice, banana conserve, Thai layer sweet cake
6	Hard food	fried pork, grilled pork , grilled chicken
7	Hard and dry food	fried small fish, crisp rice, fried rice cake, rice cookies, biscuits



**Figure 1:** Percentage of patients who could not eat comparing 7 types of food and timing from before operation to 1, 3 and 6 months after surgery.

**Methods and Materials**

Questionnaire on choice of food and eating ability had been done on TLG patients at Dept. of Otorhinolaryngology, Siriraj Hospital, Mahidol University, and Bangkok, Thailand from July 2003-September 2004. The patients complete the questionnaire before surgery and at 1, 3 and 6 months after completion of Surgery. Patients with flap reconstruction, recurrence diseases after treatment, history of pharyngocutaneous fistula, and medical condition that affect swallowing such as cerebrovascular diseases were excluded from the study. In our hospital, the mucosa of hypopharynx is preserved in all cases of laryngeal cancer. In case of hypopharyngeal cancer primary closure is done if one side of pyriform mucosa is preserved and pharyngeal mucosal is wider than 5 cm relaxed. Pharyngeal closure is usually done in T-shaped closure or transverse if there is minimal tension. The cricopharyngeus muscle is usually not sutured approximation on the front of the mucosal suture.

The Thai therapeutic food are classified into food type no 1- 5 (Table 1) [7] The food type no 5-7 are classified by authors in order to separate into more detail of hard and sticky food. Totally there 7 types of Thai food depending on texture and examples of real food in each type are shown in (Table 1).

The laryngeal cancer patients were instructed about food types and examples of them. They were persuaded to eat all types of food that they felt comfortable. For types 4-7, we suggested the patients to start with small amount, chew properly, eat slowly and sip enough water. They are instructed that they can eat chili hot food when they felt stable after treatment and no radiation mucositis. They should

**Table 2:** Types of surgery for 17 patients.

Types of surgery	No.	Percentage
Total laryngectomy (TLG)	6	35.3
TLG and neck dissection	7	41.2
TLG, partial pharyngectomy , neck dissection	4	23.5
Total	17	100

started with less hot and increase hotness later to the extent that they were comfortable and satisfied.

The questionnaire was designed by authors to evaluate whether patients can eat each type of food or not and is there any difficulty during eating. The questionnaire also gave the real names of food in each type to make sure that the patients understand the exact type of food.

### Result

Initially, there were 25 patients enrolled in the study. During the follow up period, 2 had local recurrence, 2 had distant metastasis, 1 died of other disease and 3 were lost to follow up. Only 17 patients had complete data and inclusion criteria for analysis. They were all male, age range from 38 to 76 years (mean 68.28 years). One patient did not smoked, while the rest smoke more than 10 packs year (Figure 1).

Among 17 patients, 13 patients (76.5%) has transglottic cancer, 1 (5.9%) had primary subglottic cancer and 3 (17.6%) has pyriform sinus cancer. Twenty nine point five percent had stage III and 70.6 % had stage VI cancer. Type of operation is shows in (Table 2). All the patients in this study had primary total laryngectomy as those who had secondary or salvage surgery in the same study period had

either fistula or flap reconstruction and were excluded from the study. All patients did not need NG tube feeding before the operation and NG was able to be removed before 1 month. All patients received postoperative radiation of 6000 cGy after the operation except 2 patients who received 4000cGY and 5000cGy due to complications. The radiation started at 4-6 weeks after the operation and finished before 3 months. At 6 months after the operation, all wounds heal well, there was no effect of radiation such as mucositis and all patients were in stable conditions.

### Discussion

We studied the effect of total laryngectomy on eating ability especially in detail of Thai food. In the preoperative period, patients already had cancer either in the larynx or hypopharynx and only 76.5% could eat semisolid food without any difficulty. For sticky food, hard food and hard and dry food patients could not eat were 29.4%, 17.6% and 29.4% respectively.

All of patients could eat types 1-3 food (clear liquid, thick liquid and soft food) at all time from preoperative to 1,3 and 6 months after surgery although with some difficulties at first. There was no more difficulty after 6 months. These food types contain lot of water and its softness made them easy for swallowing and should be recommended to patients to eat at all period.

After 1 month, there was effect of surgery and adaptation requirement to new physiology, the patients had more problems with type's 4-6 food. At 3 months postoperative, most people had mucositis from radiation and had more difficulty eating semisolid, sticky, hard and hard and dry food. By 6 months, the wound healing and eating ability had settled. All patients can eat clear liquid, thick liquid and soft food without any difficulty which may be due to soft

**Table 3:** Comparing the type of food that the patients eat before and after treatment completion at 1,3 and 6 month among 17 patients. Detail of each number of food types are shown in table 1.

	Food types						
	1	2	3	4	5	6	7
<b>Before treatment no. (%)</b>							
EWD	15/17 (88.2)	15/17 (88.2)	15/17 (88.2)	13/17 (76.5)	11/17 (64.7)	13/17 (76.5)	11/17 (64.7)
ED	2/17 (11.8)	2/17 (11.8)	2/17 (11.8)	0	1/17 (5.9)	1/17 (5.9)	1/17 (5.9)
NE	0	0	0	4/17 (23.5)	5/17 (29.4)	3/17 (17.6)	5/17 (29.4)
<b>1 month post-surgery no. (%)</b>							
EWD	15/17 (88.2)	16/17 (94.1)	16/17 (94.1)	7/17 (41.2)	11/17 (64.7)	11/17 (64.7)	11/17 (64.7)
ED	2/17 (11.8)	1/17 (5.9)	1/17 (5.9)	6/17 (35.3)	4/17 (23.5)	2/17 (11.8)	2/17 (11.8)
NE	0	0	0	4/17 (23.5)	2/17 (11.8)	4/17 (23.5)	4/17 (23.5)
<b>3 months post-surgery no. (%)</b>							
EWD	16/17 (94.1)	16/17 (94.1)	15/17 (88.2)	10/17 (58.8)	3/17 (17.6)	6/17 (35.3)	3/17 (17.6)
ED	1/17 (5.9)	1/17 (5.9)	2/17 (11.8)	1/17 (5.9)	2/17 (11.8)	2/17 (11.8)	2/17 (11.8)
NE	0	0	0	6/17 (35.3)	12/17 (70.6)	9/17 (52.9)	12/17 (70.6)
<b>6 months post-surgery no. (%)</b>							
EWD	17/17 (100)	17/17 (100)	17/17 (100)	13/17 (76.5)	6/17 (35.3)	9/17 (52.9)	7/17 (41.2)
ED	0	0	0	0	2/17 (11.8)	3/17 (17.6)	3/17 (17.6)
NE	0	0	0	4/17 (23.5)	9/17 (52.9)	5/17 (29.4)	7/17 (41.2)

EWD= could eat without difficulties, ED= cloud eat with difficulties, NE=could not eat at all

**Table 4:** Patients' ability to eat chili hot food before and after 6 months of surgery.

Before treatment	No.( %)	6 months after surgery			P-value
		could eat without difficulty no.(%)	could eat but reduce hotness no.(%)	could not eat at all no.(%)	
could eat without difficulty	11 (64.7)	5/11 (45.5)	1/11 (9)	5/11 (11)	0.1801
could eat with some difficulty	2 ( 11.8)	0	1/2 (50)	1/2 (50)	0.4795
could not eat	4 (23.5)	1/4 (25)	1/4 (25)	2/4 (50)	0.7788
Total	17 (100)	6/17 (35.29)	3/17 (17.65)	8/17 (47.06)	0.5696

consistency and the fact that pharynx was no longer connected to the airway and there was no more aspiration. Patients can eat semisolid, which is the common food in daily life at 76.5%, but 35.3% had some difficulties.

At the end of 6 months, wound healed well and the acute side effect of radiation had diminished. Only the permanent change from both total laryngectomy operation and radiation were left. They could eat semisolid food at the same percentage as before the operation. For types 5-7 food, they could eat less than before surgery with more difficulty with sticky food and hard and dry food. The worst food was sticky food which only 47.2 % of the patients could eat it, while 58.9% of patients could eat the hard and dry food (Table 3). The choice of food types correlate well with altered functions of pharynx, upper esophageal sphincter and upper esophagus [1-3] which make propagation of food more difficult and slower. The sticky and dry food would be more difficult to pass through the pharynx and esophagus. Approximately half of the patients (9/17) could eat chili hot food at 6 months after the operation, although 3/9 had to reduce the hotness.

In the preoperative cancer counseling, most doctors and patients tend to discuss and explain more on diseases, treatment and treatment outcome. For total laryngectomy, there is also specific concern on how to communicate with other people. The anatomical and physiological changes that affect eating ability should also be informed to them. They should understand the type of food patient can eat. Although liquid and soft food are good for all stage of postoperative period as well as during radiation also. Patients should be instructed to try all type of Thai food that they were familiar before having cancer, even chili hot food. Even if they could not eat some food types during early postoperative and during radiation, they still can try it after the wound heals and effect of radiation is stable. Chili hot food is not prohibited for cancer patients but only half can go back to eat it Table 4. In this study, only uncomplicated cases of TLG were included. Although Hui (1996) [8] suggested that stretch pharyngeal mucosal larger than 2.5 cm is sufficient for swallowing function after primary closure, we keep larger mucosal width of 5 cm or more. And the swallowing result is relative good in our study. In complicated cases

like pharyngeal fistula, flap reconstruction, the patients are likely to have more swallowing problems and the eating ability could be worse than in this study. Any how they should be instructed to try as many types of food as possible. The essence of eating is to bring energy to life, but enjoyable food brings happiness and liveliness to people.

## Limitation

There were limit number of patients in this study and the eating satisfaction was not studied.

## Conclusion

After uncomplicated total laryngectomy with or without partial pharyngectomy and post operative radiation, patients were still able to eat all 7 types of Thai food, classified by consistency. All patients could eat clear liquid, thick liquid and soft food at all period of study. At 6 months after surgery, 13/17 (76.5%) had no difficulty eating semisolid food, which is the daily life food. Although sticky food, hard food and hard and dry food type are more difficult, high percentage of patients could eat them. Half of the patients could also eat chili hot food compare to before having cancer, although some with reduced hotness. Laryngectomees should be persuaded to try all kind of food even chili hot food to improve eating satisfaction and life quality.

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