

Outcome of Laser Surgery and Radiotherapy in Early Laryngeal Cancer

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Abstract

The study was undertaken to compare between surgery and radiotherapy in early carcinoma larynx (T1N0). 60 cases of early carcinoma larynx were selected purposive sampling technique from all the patients of carcinoma larynx admitted into Otolaryngology and Head-Neck Surgery Department of Bangabandhu Sheikh Mujib Medical University, Dhaka; Dhaka Medical College Hospital, Dhaka; Shaheed Suhrawardy Medical College Hospital, Dhaka; Taqwah Specialized Hospital, Dhaka from January 2010 to June 2011. Carcinoma of the larynx is the most common cancer affecting the head and neck region. The main aim of this study was to determine whether there was any difference in the two main therapeutic options. The secondary aim was to assess speech and voice quality in a small, randomized sample of patients from each treatment group.

The subjects investigated were 60 patients with T₁N₀ squamous cell carcinoma of the larynx. 30 patients were treated by irradiation, and 30 were treated with surgery. The primary outcome measures were recurrence at the primary site, recurrence in the neck. The secondary outcome measure was speech and voice quality. Surgery included laser assisted partial laryngectomy and various minor procedures on the glottis, including cordectomy. Surgery was more likely to be carried out for supraglottic disease.

Result showed 16.67% of the irradiation group had a primary site recurrence compared with 20.0% in the surgery group at 12th months ($p = 0.59$) and 6.67% of those who were treated with irradiation had a recurrence in the neck. 16.67% of patients in the surgery group had a recurrence in the neck ($p < 0.05$). There was no significant difference in primary site recurrence rates for the two treatment modalities, but regional recurrence was higher in the surgery group.

Regarding speech and voice quality, radiotherapy was far superior to surgery. All patients in the radiotherapy group but only 3 of 10 in the surgery group were judged to have a good or normal voice ($p = .0017$).

Both surgery and irradiation are equally effective at treating early laryngeal carcinoma but Speech and voice quality were significantly better in patients treated by irradiation than those treated by surgery.

Keywords

Partial laryngectomy; conservative laryngectomy; speech and voice quality; head and neck cancer; squamous cell carcinoma

Introduction

Cancer of the larynx is the most common cancer of the head and neck, excluding the skin.¹ It would seem that early laryngeal cancer could be treated with equal success by either radiotherapy or by conservative surgery.²⁻⁸ The preferred treatment modality at present is highly dependent on geography, with radiotherapy tending to be the treatment of choice in northern Europe, whereas patients are more likely to be treated with surgery in the United States and southern Europe. Organ preservation strategy favoring primary radical radiotherapy followed, if necessary, by salvage surgery. This strategy evolved over the years is based on the premise that treatment goals should include cure with acceptable side effects, minimal complications, and laryngeal preservation. Irradiation treatment failures can usually be salvaged by total or partial laryngectomy. The data for this article have been collected in a prospective manner over a period of one year. During the last two decades, radiotherapy gradually superseded surgery as the treatment of choice, and thus we are able to compare the results of surgery with radiotherapy for the treatment of early laryngeal cancer. The aim of this article is therefore to compare the results of the two treatment modalities in terms of recurrence at the site of the primary tumor, in the neck. Associations between variables were also studied. A small, intercalated study investigates speech and voice quality in patients from each treatment modality.

Materials & Methods

Type Of Study : Cross sectional study

Place Of Study : Department of Otolaryngology and Head-Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Shaheed Suhrawardy Medical College & Hospital, Dhaka, Dhaka Medical college hospital, Dhaka, Taqwah Specialized Hospital, Dhaka.

Period Of Study : January' 2010 to June' 2011

Study Population : All consecutive cases of carcinoma admitted in the above hospital during the study period.

Methods of sampling : Patients suspected of carcinoma of the larynx are evaluated properly by detailed history taking, clinical examination and relevant investigation.

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Technique of Treatment: laser surgery and radiotherapy.

Post operative follow up: All the patients were followed up after 2 weeks, 1 month and then three monthly for one year

Operational Definition

Major morbidity- which significantly hampered the patients quality of life like haematoma, seroma, flapnecrosis, stomal recurrence, stenosis of the tracheostomy, recurrent chest infections, distal metastasis, pharyngeal stenosis in partial laryngectomy patients. Severe radiation reaction necrosis of skin, respiratory distress following radiation and perichondritis of the larynx in radiotherapy.

Minor morbidity- Unavoidable minor complications like wound infection, nausea, vomiting, skin rashes, alopecia, mucositis or painful erythematous reaction in larynx and pharynx, dryness of mouth and throat, loss of taste, subcutaneous fibrosis in radiotherapy.

Intercalated Study of Voice Quality

We comparing the voice quality of patients from the two treatment groups. Randomly 10 patients from each treatment group were selected. The patients in the radiotherapy group were older (mean age, 56 years) than those in the surgery group (mean age, 52 years). There were no other significant differences between the two groups. Voice and speech quality was assessed by a simple scoring system Voice Handicap Index (VHI score) validated in standard questionnaires* The scoring method was a simple 4-point score.

1. Normal voice and speech (score 0-10).
2. Good voice and speech (score 11-30).
3. Moderate voice and speech (score 31-50).
4. Poor voice and speech (score >50).

Results

Table-I: Age distribution of the patients (n=60)

Age group (in years)	Radiotherapy (n=30)	Surgery (n=30)	P value
30-39	2(6.67%)	3(10.0%)	0.145 ^{NS}
40-49	7(23.33%)	6(20.0%)	
50-59	10(34.2%)	14(46.67%)	
60-69	7(23.33%)	5(16.67%)	
70-79	4(13.33%)	2(6.67%)	
Mean±SD	55.96±10.52	52.03±10.11	

Table shows The age of the patient ranged from 30 to 79 year. The mean ± SD age was (54±10.94) most of the patients were above 40 years of age. The mean age of the radiotherapy group was 56 years, and the mean age for the surgical group was 52 years.

Table-II: Sex distribution of the subject (n=60)

Sex	Radiotherapy (n=30) No. (%)	Surgery (n=30) No. (%)	P value
Male	26(87.6%)	28(93.33%)	0.38 ^{NS}
Female	4(13.33)	2(6.67%)	

Table shows that out of 30 cases 26 were male in radiotherapy group and out of 30 cases 28 were male in surgery group . Almost all cases were male. There was no significant difference in male-female ratio for the two groups.

Table-III: Habit of the patients carcinoma of larynx (n=60)

Habit	Radiotherapy No. (%)	Surgery No. (%)
Smoking	29(96.67%)	28(93.33%)
Drinking alcohol	1(3.33%)	2(6.67%)
Chewing betel nut & tobacco	28(93.33%)	29(96.67 %)
Chewing betel nut, tobacco & smoking	15(50.0%)	13 (43.33 %)

Table shows that out of 30 cases 29 were smokers in radiotherapy group and 28 were in surgery group, 28 cases were habituated with chewing betel nut and tobacco in radiotherapy group 29 in surgery group. On the otherhand 50% patients in radiotherapy group had the habit of Chewing betel nut, tobacco & smoking and surgery group it was 43.33%.

Table-IV: Site of carcinoma on the basis of fiber optic laryngoscopy and direct laryngoscopic findings (n=60)

Site of carcinoma larynx	Radiotherapy (n=30) No. (%)	Surgery (n=30) No. (%)	P value
Supraglottic	18(60.0%)	20(66.67%)	.787 ^{NS}
Glottic	12(40.0%)	10(33.33%)	
Subglottic	0	0	

Table shows that supraglottic carcinoma was found in 60% of radiotherapy group and 66.67% in surgery group, glottic carcinoma was 40% & 33%, respectively in radiotherapy and surgery group. No case found with subglottic carcinoma. There was no significant difference in these two groups regarding site of carcinoma.

Table-V: Histopathological grading of carcinoma larynx (n= 60)

Degree of differentiation	Radiotherapy (n=30) No. (%)	Surgery (n=30) No. (%)	P value
Well differentiated (grade-I)	7 (23.33%)	6 (20.0%)	0.411 ^{NS}
Moderately differentiated (grade-II)	18 (60.0%)	18 (60.0%)	
Poorly differentiated (grade-III)	5 (16.67%)	6 (20.0%)	
Undifferentiated (grade-IV)	0	0	

Table shows that histopathological examination: Well differentiated was found 23.33% in radiotherapy group and 20% were in surgery group and moderately differentiated carcinoma was 60% & 16.67%, poorly differentiated carcinoma was 6(20.0%) & 2(6.67%). There was no significant difference in these two groups- Majority of the subject belong to grade-II.

Table-VI: Complications of radiotherapy and surgery

Surgery			
Major complications	No. (%)	Minor complications	No. (%)
Haematoma	2 (6.67%)	Tracheal crusting	1 (3.33%)
Seroma	1 (3.33%)		
Pharyngeal stenosis	2 (6.67%)		
Recurrent chest infection	1 (3.33%)		
Radiotherapy			
Major complications	No. (%)	Minor complications	No. (%)
Severe radiation necrosis of skin	1 (3.33%)	Mucositis or painful erythematous reaction in larynx and pharynx	3 (10.0%)
Respiratory distress following radiotherapy	1 (3.33%)	Dryness of mouth and throat	15 (50.0%)
Perichondritis	1 (3.33%)	Loss of taste	3 (10.0%)
		Subcutaneous fibrosis	2 (6.67%)
		Dysphagia	4 (13.33%)

Table shows in surgery group 2 patients had haematoma, 2 patients had pharyngeal stenosis and 1 patient had tracheal crusting. In radiotherapy group 3 patients had major complications and 27 patients had minor complications most of them were dryness of mouth and throat.

Table-VII: Morbidity due to surgery and radiotherapy (n=60)

Morbidity	Radiotherapy	Surgery	P value
Major morbidities	3	6	0.471
Minor morbidities	27	1	0.001

Table shows that major morbidities and minor morbidities for surgery were 6 and 1 respectively and major morbidities & minor morbidities for radiotherapy were 3 and 27 respectively.

Table-VIII: Distribution of Voice Handicap Index (VHI) scores of patients treated early carcinoma larynx as related to treatment modality

VHI score	Radiotherapy (n=10)	Surgery (n=10)	P value
Normal voice (0-10)	8	0	0.001 ^S
Good voice (11-30)	2	3	
Moderate voice (31-50)	0	4	
Poor voice (>50)	0	3	

Table shows that ten patients from each treatment group were recruited randomly. In the radiotherapy group, eight were scored as normal and two as good. For the surgery group, three patients had good voice and speech, four had moderate voice and speech, and three had poor voice and speech. This difference was statistically significant (p=.001).

Table-IX: Proportion of patients developing a primary site recurrence for the two treatment modalities

Time of recurrence (months)	Radiotherapy	Surgery	P value
6 th months	2 (6.67%)	3 (10.0%)	0.59 ^{NS}
9 th months	3 (10.0%)	4 (13.33%)	
12 th months	5 (16.67%)	6 (20.0%)	

Table shows that no significant difference was found when recurrence at the primary site for those patients treated by surgery or by irradiation was studied. 16.67% of the irradiation group had a primary site recurrence compared with 20.0% in the surgery group at 12th months (p = 0.59).

Table-X : Proportion of patients developing a node in the neck for the two treatment modalities

Time of recurrence (months)	Surgery	Radiotherapy	P value
6 th months	1(3.33%)	0	0.05 ^s
9 th months	3(10.0%)	1(3.33%)	
12 th months	5(16.67%)	2(6.67%)	

Table shows that there was a significant difference in the pattern of recurrence in the neck between the two treatment groups. Only 6.67% of those who were treated with irradiation had a recurrence in the neck. 16.67% of patients in the surgery group had a recurrence in the neck; this difference was statistically significant ($p < 0.05$).

Discussion

The host and tumor factors for both treatment groups are shown in Table 1-2. The mean age of the radiotherapy group was 63 years, and the mean age for the surgical group was 61 years. There was no significant difference in male–female ratio for the two groups.

Among all the aetiological factors, smoking, habitual in chewing betel nuts and betel leaves and alcohol are the most important factors contributing to the carcinoma larynx. Out of 30 cases 96.67% were smokers in radiotherapy group and 93.33% were in surgery group, 93.33% cases were habituated with chewing betel nut and tobacco and only 50.0% and 43.33% cases were both chewing and smoker in Radiotherapy and Surgery groups respectively.

The findings of direct laryngoscopy showed supraglottic carcinoma was found 60% in radiotherapy group and 66.67% were in surgery group and glottic carcinoma was (40% & 33%) only. No case was found with subglottic carcinoma. The nature of lesion was exophytic in (66.67% & 63.33%) and ulcerative (33.33% & 36.67%). There was no significant difference between the two Regarding histopathological examination 95% were squamous variety, similarity was seen by another study¹⁶ There was no significant difference in these two groups- Majority of the subject

Among the total 60 study cases, 30 cases were treated by laser surgery and 30 cases were treated by radiotherapy.

In this study showed out of 30 cases in surgery group 6 patients had major complications most of them were pharyngeal stenosis 2(6.67%) and 1 patient had minor complications. In radiotherapy group 3 patients had major complications and 27 patients had minor complications most of them were dryness of mouth and throat.

Wound infection 30% in surgery group Haematoma 6.67%, seroma 3.33% Pharyngeal stenosis 6.67% were near to other

study Haematoma 8.82%, seroma 3%, Pharyngeal stenosis 5%.¹⁷

Among the 30 cases of radiotherapy patient developed several side effect of radiotherapy, dryness of mouth and throat, loss of taste, pigmentation of skin and subcutaneous fibrosis during study period. Another study reveals the same type of morbidity of acute radiation like difficulty in tasting food 76.3%, dryness of mouth 92% and changes in taste and dryness of mouth.¹⁸

Post radiotherapy 10.0% patients develop mucositis in larynx and pharynx, 3.33% developed severe reaction necrosis of skin, 3.33% developed respiratory distress following radiotherapy, 50% patients developed dryness of mouth and throat, and loss of taste, 6.67%, patients developed subcutaneous fibrosis.

These type of morbidity due to radiation also reveals in another study¹⁹. They reported pain and soreness of mouth in 86.8%, pain and itching of the skin in 86.8%, difficulty in chewing in 55.3% cases.

This study showed that Regarding speech and voice 10 patients from each treatment group were recruited randomly by using computer. In the radiotherapy group, 8 were scored as normal and 2 as good. For the surgery group, three patients had good voice and speech, 4 had moderate voice and speech, and 3 had poor voice and speech. This result coincides by another study.²⁰

In this study that no significant difference was found when recurrence at the primary site for those patients treated by surgery or by irradiation was studied. 16.67% of the irradiation group had a primary site recurrence compared with 20.0% in the surgery group at 12th months ($p = 0.59$). This result coincides by another study²⁰, where primary site recurrence were 20% in radiotherapy group and 22% in surgery group.

This study showed that there was a significant difference in the pattern of recurrence in the neck between the two treatment groups. Only 6.67% of those who were treated with irradiation had a recurrence in the neck. 16.67% of patients in the surgery group had a recurrence in the neck. This result coincide by another study 9.0% of radiotherapy group at primary site recurrence and 25.0% in surgery group.²⁰

Both surgery and irradiation are equally effective at treating early laryngeal carcinoma but Speech and voice quality were significantly better in patients treated by irradiation than those treated by surgery.

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