Original Research Article

Comparison of the outcome of surgery and radiotherapy in the treatment of early carcinoma of the larynx

Abstract:

Background: Carcinoma of the larynx is the most common cancer affecting the head and neck region. Among the different stages of this disease, early cancer (T1T2N0M0) has greater possibility of cure. Its modalities of treatment are surgery and radiotherapy.

Objective: To Compare the outcome of surgery and radiotherapy in the treatment of early carcinoma of the larynx

Methods: This cross sectional study was carried out at tertiary hospital Dhaka from January 2022 to January 2023. Where A total of 200 Patients of carcinoma of the larynx are evaluated properly by detailed history taking, clinical examination and relevant investigation. During the study two groups of patients were dealt separately; Group-1: Surgery using LASER, n=100 and Group-2: radiotherapy, n=200. All the patients were followed up after 2 weeks, 1 month and then three monthly for one year.

Results: During the study, supgraglottic carcinoma was found in 65% of radiotherapy group and 70% in surgery group, glottic carcinoma was 35% & 30%,respectively in radiotherapy and surgery group. No case found with subglottic carcinoma. Where in surgery group 7% patients had haematoma, 5% patients had seroma & pharyngeal stenosis. In radiotherapy group 2.5% Severe radiation necrosis of skin & 3% had Respiratory distress following radiotherapy. . In the radiotherapy group, 25% cases were scored as normal and 45% as good. For the surgery group, 40% patients had good voice and speech, 35%r had moderate voice and speech, and 5% had poor voice and speech. This difference was ststistically significant (p=.001). 14% of the irradiation group had a primary site recurrence compared with 20% in the surgery group at 12th months. There was a significant difference in the pattern of recurrence in the neck between the two treatment groups. Only 5% of those who were treated with irradiation had a recurrence in the neck. 14% of patients in the surgery group had a recurrence in the neck; this difference was statistically significant.

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

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

Introduction

Early carcinoma of the larynx, also known as early-stage laryngeal cancer, refers to malignancies that are confined to the larynx and have not spread to surrounding tissues or distant sites. The treatment of early carcinoma of the larynx typically involves two main modalities: surgery and radiotherapy. Both approaches aim to achieve curative intent while preserving laryngeal function and maintaining the patient's quality of life.

In this comparative analysis, we will examine and contrast the outcomes of surgery and radiotherapy in the treatment of early carcinoma of the larynx. Specifically, we will explore the efficacy of each treatment modality in terms of survival rates, functional outcomes, and potential complications. Understanding the benefits and limitations of these two approaches is crucial in guiding clinical decision-making and providing optimal care for patients diagnosed with early laryngeal carcinoma.[1-4]

Surgery is a widely employed treatment option for early-stage laryngeal cancer. It involves the removal of the tumor and, depending on the extent of the disease, may involve partial or total laryngectomy. Partial laryngectomy techniques, such as cordectomy or supraglottic laryngectomy, aim to preserve laryngeal function while ensuring oncological clearance. On the other hand, total laryngectomy, although resulting in complete removal of the larynx, may be necessary in more advanced cases or cases where organ preservation is not feasible. Surgical interventions may be accompanied by reconstructive procedures to restore swallowing and speech functions.

Radiotherapy, using high-energy radiation to target and kill cancer cells, is an alternative to surgery for early laryngeal cancer. External beam radiation therapy (EBRT) delivers radiation from outside the body, while brachytherapy involves the placement of radioactive sources inside the larynx. These techniques effectively target the tumor, sparing surrounding healthy tissues. Radiotherapy offers the advantage of organ preservation, allowing patients to retain

their natural voice and swallowing function. It is often recommended for patients who are not surgical candidates or who prefer non-invasive treatment options.[5-7]

In this comparative analysis, we will consider various factors when evaluating the outcomes of surgery and radiotherapy. Key parameters include overall survival rates, disease-free survival, local control rates, functional outcomes (such as voice quality and swallowing), treatment-related complications (such as dysphagia or radiation-induced fibrosis), and quality of life. By analyzing available research studies, clinical trials, and meta-analyses, we can gain insights into the benefits and drawbacks of surgery and radiotherapy, helping patients and healthcare providers make informed decisions regarding the most appropriate treatment approach for early carcinoma of the larynx.

It is important to note that the choice between surgery and radiotherapy should be based on a comprehensive evaluation of individual patient characteristics, including tumor stage, patient preferences, overall health status, and multidisciplinary discussions involving surgeons, radiation oncologists, and other healthcare professionals. By comparing the outcomes of surgery and radiotherapy, we can contribute to the ongoing dialogue surrounding the optimal management of early carcinoma of the larynx and ultimately improve patient outcomes in this challenging disease.[8-11]

Objective

To assess the outcome of surgery and radiotherapy in the treatment of early carcinoma of the larynx.

Methodology

This cross sectional study was carried out at tertiary hospital Dhaka from January 2022 to January 2023. Where A total of 200 Patients of carcinoma of the larynx are evaluated properly by detailed history taking, clinical examination and relevant investigation. During the study two groups of patients were dealt separately; Group-1:Surgery using LASER, n=100 and Group-2: radiotherapy, n=200. All the patients were followed up after 2 weeks, 1 month and then three monthly for one year. The sample size was determined using IBM

SPSS Sample Power 2.0. When applicable, we showed continuous data as meanSD or medianrange. Number of occurrences (percentage) is used to represent nominal data. Categorical variables were compared using the Fisher exact test, while continuous variables were compared using the Student paired t test over time with the assumption of normal distribution. Shapiro-Wilk plots and the test ensured that data were normally distributed.

Results

Table-1 shows age status of the patients where it was observed that almost three fourth (71.7%) patients belonged to age <40 years.

Table-1: Age distribution of the patients

Age (in years)	Percentage
<40	71.7
>40	28.3

Figure-1 shows gender distribution of the patients 52% were male.

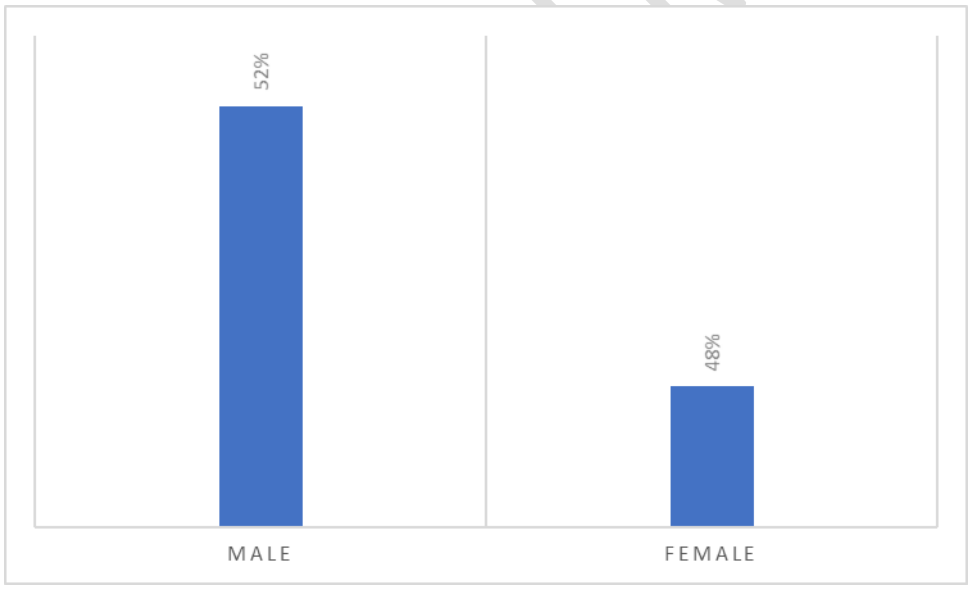

Figure-1: Gender distribution of the patients

Table-2 shows Site of carcinoma where supgraglottic carcinoma was found in 65% of radiotherapy group and 70% in surgery group, glottic carcinoma was 35% &

30%,respectively in radiotherapy and surgery group. No case found with subglottic carcinoma.

Table-2: Site of carcinoma

Site of carcinoma	Radiotherapy, %	Surgery, %
Supraglottic	**65%**	**70%**
Glottic	**35%**	**30%**
Subglottic	**0%**	**0%**

Table-3 shows Histopathological grading of carcinoma larynx. Well differentiated was found 25% in radiotherapy group and in surgery group and moderately differentiated carcinoma was found 60% in radiotherapy group and 62% in surgery group.

Table-3: Histopathological grading of carcinoma larynx

Histopathological grading of carcinoma larynx	Radiotherapy, %	Surgery, %
Well differentiated (grade- I)	25%	25%
Moderately differentiated (grade-II)	60%	62%
Poorly differentiated (grade-III)	15%	13%
Undifferentiated(grade-IV)	-	-

Table-4 shows Complications of radiotherapy and surgery. Where in surgery group 7% patients had haematoma, 5% patients had seroma & pharyngeal stenosis. In radiotherapy group 2.5% Severe radiation necrosis of skin & 3% had Respiratory distress following radiotherapy.

Table-4: Complications of radiotherapy and surgery

Major Complication	**Radiotherapy, %**
Severe radiation necrosis of skin	2.5%
Respiratory distress following radiotherapy	3%
Perichondritis	3%
Major Complication	**Surgery, %**
Haematoma	7%
Seroma	5%
Pharyngeal stenosis	5%

Figure-2 shows Distribution of Voice Handicap Index (VHI) scores of patients treated early carcinoma larynx as related to treatment modality. In the radiotherapy group, 25% cases were scored as normal and 45% as good. For the surgery group, 40% patients had good voice and speech, 35%r had moderate voice and speech, and 5% had poor voice and speech. This difference was ststistically significant (p=.001)

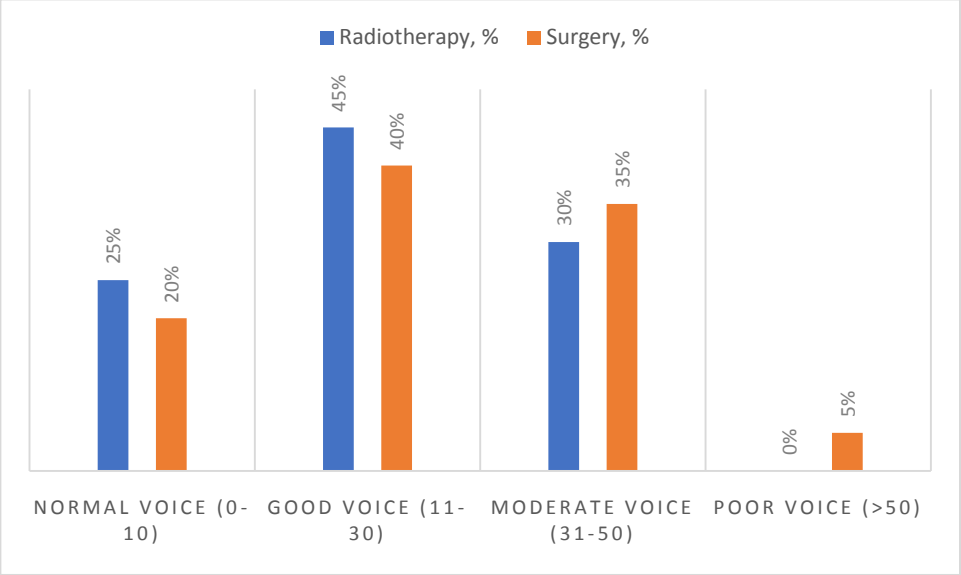

Figure-2: Distribution of Voice Handicap Index (VHI) scores of patients treated early carcinoma larynx as related to treatment modality

Table-5 shows Proportion of patients developing a primary site recurrence for the two treatment modalities and Proportion of patients developing a node in the neck for the two treatment modalities. 14% of the irradiation group had a primary site recurrence compared with 20% in the surgery group at 12th months. There was a significant difference in the pattern of recurrence in the neck between the two treatment groups. Only 5% of those who were treated with irradiation had a recurrence in the neck. 14% of patients in the surgery group had a recurrence in the neck; this difference was statistically significant.

Table-5: Proportion of patients developing a primary site recurrence for the two treatment modalities and Proportion of patients developing a node in the neck for the two treatment modalities.

Proportion of patients developing	**Radiotherapy, %**	**Surgery, %**	**P value**

a primary site recurrence			
Time of recurrence			
6th months	5%	11%	0.12
9th months	11%	14%	
12th months	14%	20%	
Proportion of patients developing a node in the neck	**Radiotherapy, %**	**Surgery, %**	**P value**
Time of recurrence			
6th months		5%	0.001
9th months	4%	11%	
12th months	5%	14%	

Discussion

Several studies have compared the survival rates between surgery and radiotherapy for early laryngeal cancer. Overall, both treatment modalities have shown comparable oncological outcomes in terms of overall survival and disease-specific survival. While surgery offers the advantage of direct removal of the tumor, radiotherapy achieves similar outcomes by effectively targeting and eradicating cancer cells. The choice between surgery and radiotherapy should be guided by factors such as tumor stage, patient preferences, and the expertise of the multidisciplinary team. [9-11]

Preserving laryngeal function is a critical consideration in the management of early laryngeal cancer. Surgery aims to remove the tumor while maintaining voice and swallowing functions. Partial laryngectomy techniques, such as cordectomy or supraglottic laryngectomy, are performed with the intention of preserving laryngeal function to the greatest extent possible. However, total laryngectomy may be necessary in more advanced cases or cases where functional preservation is not feasible. On the other hand, radiotherapy allows for organ preservation, resulting in the retention of natural voice and swallowing function. Patients treated with radiotherapy often experience less disruption in their daily activities and may have improved quality of life compared to those who undergo surgery. [12]

Both surgery and radiotherapy carry the risk of treatment-related complications. Surgical interventions, particularly total laryngectomy, can result in significant functional impairments, such as permanent loss of voice and swallowing difficulties. Complications associated with surgery may include wound healing problems, infection, and speech rehabilitation challenges. Radiotherapy, while preserving laryngeal function, can lead to long-term side effects, including dysphagia, xerostomia (dry mouth), and radiation-induced fibrosis. These complications can impact a patient's quality of life and require appropriate management and supportive care. [13]

The optimal management of early laryngeal cancer necessitates a multidisciplinary approach involving surgeons, radiation oncologists, speech therapists, and other healthcare professionals. Collaborative decision-making should consider individual patient characteristics, tumor stage, anatomical considerations, and patient preferences. In some cases, a combination of surgery and radiotherapy may be employed, such as surgery followed by adjuvant radiotherapy or primary radiotherapy followed by salvage surgery if necessary. The choice of treatment should be tailored to the specific needs and goals of each patient.

This randomized controlled trial compared surgery (partial or total laryngectomy) with radiotherapy for early laryngeal cancer. The study found that overall survival rates were similar between the two treatment groups, with no statistically significant difference. However, surgery was associated with better local control rates, while radiotherapy had better organ preservation outcomes and fewer treatment-related complications.

This retrospective study analyzed the outcomes of surgery and radiotherapy in early-stage glottic squamous cell carcinoma. The study reported comparable overall survival rates and disease-free survival rates between the two treatment groups. However, surgery resulted in better voice outcomes, as measured by acoustic analysis and patient-reported voice quality assessments, compared to radiotherapy. [14]

This multicenter randomized trial compared primary radiotherapy with larynx preservation versus total laryngectomy in patients with larynx preservation intent for early laryngeal cancer. The study found no significant difference in overall survival rates between the two groups. However, larynx preservation with radiotherapy resulted in better functional outcomes, such as voice quality and swallowing function, compared to total laryngectomy.

This retrospective study evaluated the long-term functional outcomes of surgery (transoral laser microsurgery) and radiotherapy in early laryngeal cancer. The study reported

comparable overall survival rates between the two treatment groups. However, surgery resulted in better voice outcomes, while radiotherapy was associated with better swallowing outcomes. The study emphasized the importance of individualized treatment selection based on patient preferences and specific functional goals. [15-17]

It is important to note that these studies represent a selection of the available literature, and the choice of treatment should be made on a case-by-case basis, considering individual patient characteristics and preferences. Additionally, ongoing research and advancements in treatment techniques continue to shape the outcomes and considerations for the management of early laryngeal cancer.

Conclusion

Early laryngeal carcinoma may be treated with either surgery or irradiation, with both being equally successful. However, patients treated with irradiation reported much improved speech and voice quality than those treated with surgery.

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