

Management of T1N0 Glottic SCC—Comparative Outcomes Between Laser and Radiotherapy Treatment with Emphasis on Organ Preservation

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ABSTRACT

Background

Glottic laryngeal cancers often present at an early stage due to changes in voice. The treatment options for stage I disease include transoral laser microsurgery (TLM) and radiation therapy (RT). Although the survival and ultimate local control have been reported to be similar between these two treatment modalities, the ability to preserve the larynx might be better with TLM. The aim of this study is to evaluate the treatment outcomes amongst patients with T1N0 laryngeal cancer who were treated at the London Regional Cancer Program (LRCP).

Methods

A retrospective review of all consecutive patients with T1N0 glottic squamous cell carcinoma (SCC) treated at the LRCP from 2003 to 2013. Patients with T1a laryngeal SCC were offered the options of either radiation treatment or TLM. Patients with T1b laryngeal SCC were generally offered treatment with radiation treatment. Tumor control, survival outcomes, and laryngectomy-free survival were calculated.

Results

There were 168 patients, of which 56 were treated with TLM (53 T1a and 3 T1b) and 112 treated with RT (52 T1a and 60 T1b). The mean age were 65.4±13.0 and 68.7±10.1 respectively. There were 11 recurrences within the TLM group, of which 7 were successfully salvaged with repeated TLM and 4 salvaged with radiotherapy. Amongst the 11 recurrences within the RT group, 1 had a salvage modified radical neck dissection and 10 had salvage total laryngectomy. The 5 years overall survival for T1a patients was 86% with TLM vs. RT vs. 85% with RT (p=0.887), 77% vs. 88% disease free survival (p=0.080), 100% for ultimate locoregional control in both groups, and 100% vs. 88% for laryngectomy free survival, respectively (p = 0.030).

Conclusion

Patients with T1N0 glottic SCC treated with RT or TLM have similar survival outcomes. Patients with T1a tumor treated with TLM in this series had improved laryngectomy free survival compared to RT, requiring repeat procedures.

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INTRODUCTION

- Incidence of Laryngeal Cancer
 - Over 150,000 new cases globally
 - ~11,600 cases in the United States
 - In the US National Cancer Database, 51% arise from the glottis
- Most glottic cancers present early due to voice perturbation and hence prognosis is generally favorable
- Contemporary treatment options include TLM and RT
 - A recent Cochrane review demonstrated no difference in the survival outcomes between the two treatment modalities
 - Preservation of function (voice and swallowing) remains important in the treatment decision
- Generally, in cases of recurrence:
 - Post-TLM, recurrences can be managed with re-resection with TLM, open partial laryngeal surgery, or RT
 - Post-RT, although recurrences can be treated with partial laryngeal surgery, most are treated with salvage total laryngectomy
- The aim of this study is to evaluate the treatment outcomes amongst patients with T1N0 glottic laryngeal cancer who were treated at the London Regional Cancer Program (LRCP), a regional referral center, with a particular emphasis on organ preservation

METHODS & MATERIALS

- Included all consecutive patients with biopsy proven T1N0 glottic laryngeal squamous cell carcinoma treated at the LRCP from 2003 to 2013, with a minimum of 6 months follow-up
- Clinicopathological information and treatment modalities were extracted from chart reviews
- Pros & cons of each modality discussed in multidisciplinary setting then patients were offered RT or TLM
- RT:** Before 2009, 61Gy in 25 fractions with conventional 2-field techniques; 2009 onward: IMRT with the same dose
- TLM:** CO₂ laser with 1-2 mm margins
- Survival differences compared using Kaplan-Meier method and log-rank test
- Comparisons of clinicopathologic data between the treatment groups were made using the chi squared and t-test

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RESULTS

Figure 1. Treatment pathway of patients with transoral laser microsurgery

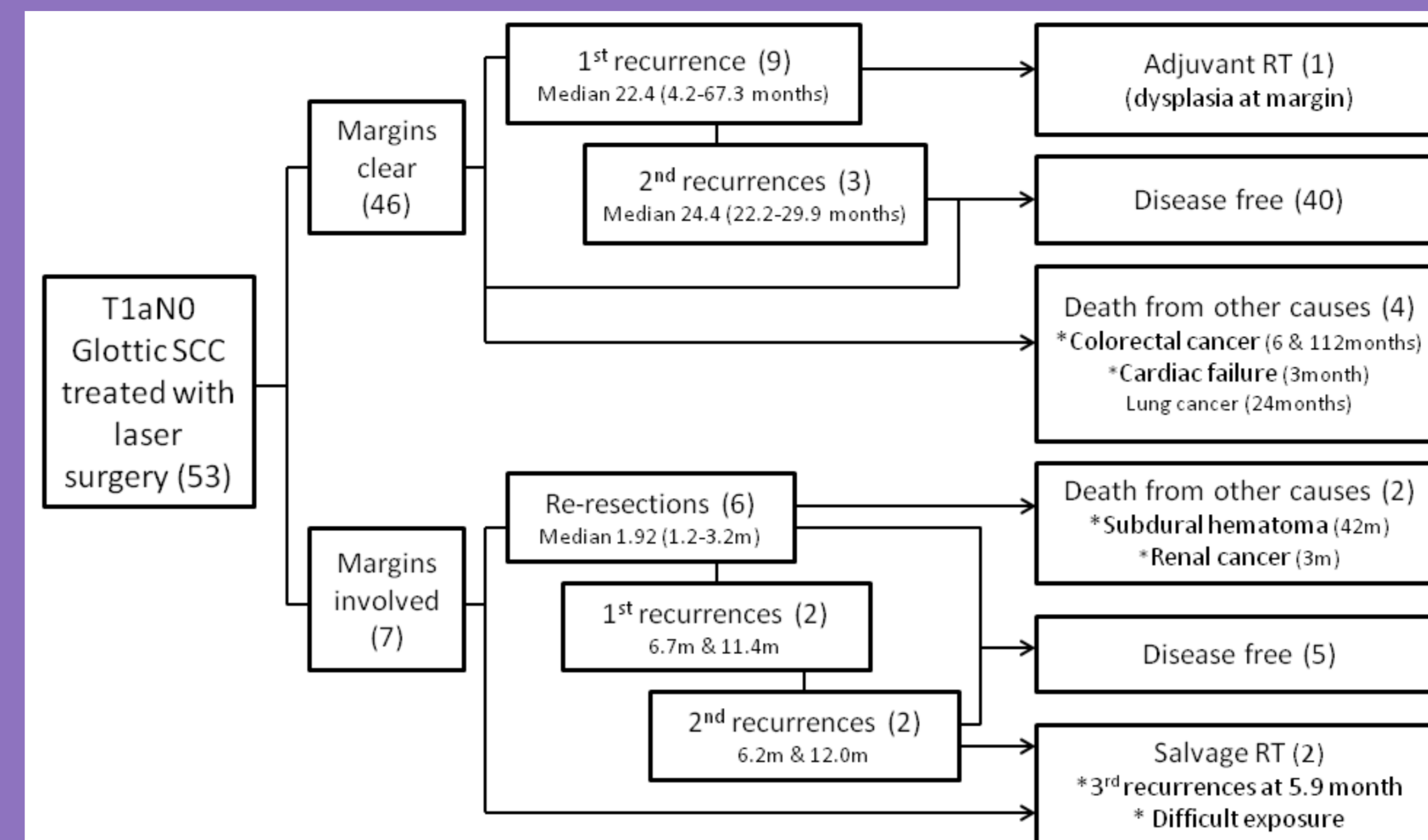
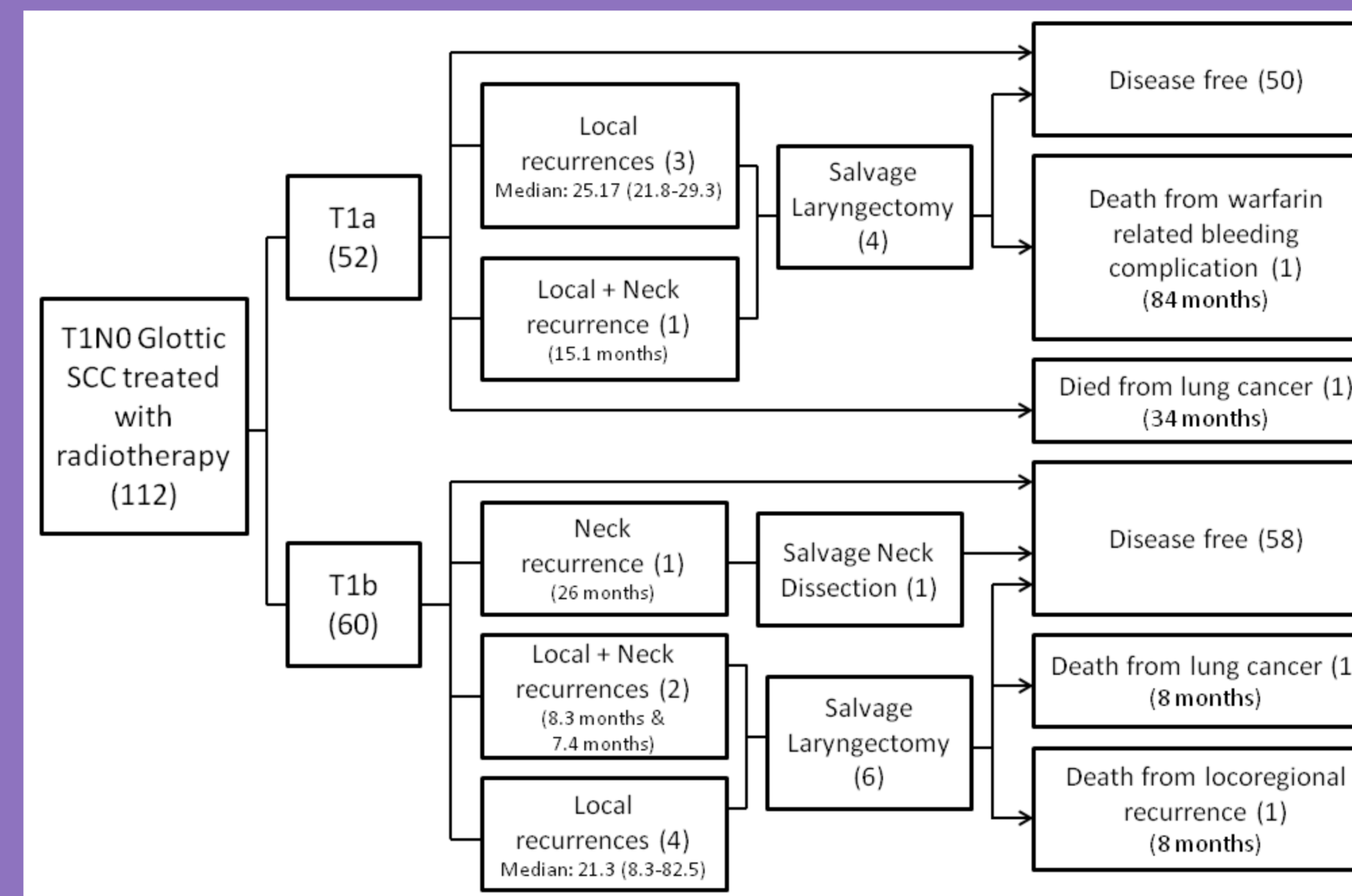


Figure 2. Treatment pathway of patients treated with radiotherapy



DISCUSSION

- Main outcome measures for T1a Glottic SCC**
 - Equivalent 5-year overall survival and disease-specific survival rates with TLM versus RT (OS 86% vs. 85%, p=0.887) and (DSS 100% vs. 97%, p=0.975)
 - Equivalent ultimate local control between TLM vs. RT (100% vs. 100%, p=0.308)
 - Laryngectomy free survival superior with TLM vs. RT (100% vs. 87%, p=0.03)**
- T1a Glottic TLM Re-Excision**
 - 31.5% required 2 or more laser procedures
 - Overall, TLM is superior to RT for organ preservation
- T1 Glottic RT failures**
 - 10/112 patients who recurred after RT ultimately underwent salvage total laryngectomy
 - Open partial laryngectomy offered to 1 patient, but went on to total salvage laryngectomy due to poor function
 - 9/10 post-RT recurrences had advanced disease necessitating total laryngectomy
- Our outcomes with organ preservation in T1a glottic SCC were consistent with the literature
- Literature also demonstrated cost-effectiveness analysis favors TLM over RT
- Limitations include single institution, lack of randomization, and retrospective nature of our study

Table 1. Baseline clinicopathological information.

	TLM	RT	p-Value
Number (Total)	56	112	
T1a	53	52	
T1b	3	60	
Age	65.4 ± 13.0	68.7 ± 10.1	0.092
Sex (Male: Female)	44:12	102:10	0.024
Mean Follow up (years)	3.54 ± 2.38	4.80 ± 3.03	0.097
Pathology			0.256
Well differentiated	22	27	
Moderately differentiated	21	36	
Poorly Differentiated	0	3	
Growth Pattern			0.236
Exophytic	47	63	
Endophytic	3	9	
Smoking Status			0.080
Non-smoker	11	10	
Ex-smoker	30	65	
Current smoker	12	36	
Alcohol Consumption			0.982
Non-drinker	11	20	
≤3 standard drinks a day	32	61	
>3 standard drinks a day	13	26	

Table 2. Comparative outcomes between the TLM and RT groups

	TLM	RT	p-Value
No. of recurrences			
1 Recurrence	11	11	0.092
2+ Recurrences	5	0	
Time to 1 st Recurrence (mos)	15.5 (4.2-44.6)	21.6 (7.4-34.2)	0.831
Salvage Radiotherapy	4	N/A	
Salvage Laryngectomy	0	10	
G-tube dependency	0	1	

Table 3. The 5-Year outcomes of patients with T1a treated with TLM or RT, and T1b treated with RT

5 Year Outcome	T1a	T1a	T1b	p-value ¹	p-value ²
	TLM	RT	RT		
Disease Free Survival	77%	88%	87%	0.080	0.592
Overall Survival	86%	85%	86%	0.887	0.531
Disease Specific Survival	100%	97%	95%	0.975	0.806
Ultimate Local Control	100%	100%	98%	-	0.308
Laryngectomy Free Survival	100%	87%	88%	0.030	0.810

¹ the p-value for comparisons between the T1a patients treated with TLM vs. RT

² the p-value for comparison between patients with T1a and T1b treated with RT

CONCLUSIONS

- In the treatment of T1a glottic SCC, overall and disease-specific survival outcomes are equivalent with TLM and RT
- Patients treated with TLM had superior laryngeal preservation compared with RT and should be strongly considered as primary treatment