Radiotherapy Outcomes for Early Glottic Cancers: A Systematic Review

V. Angadi, M.S, CF-SLP & J.C. Stemple, Ph.D, CCC-SLP

Dept. of Rehabilitation Sciences – Rehabilitation Sci. Doctoral Program, College of Health Sciences
University of Kentucky, Lexington
Background

• 12,740 men and women (10,160 men and 2,580 women) will be diagnosed with cancer of the larynx in 2011 (SEER, 2011)¹

• Glottic lesions constitute about 60% of all laryngeal cancers²

• Early glottic cancers: T1N0M0 and T2N0M0
T1 and T2 glottic cancers

Left T1 glottic cancer

T2 glottic cancer

http://www.massgeneral.org/
Treatment

• Treatment modalities for early glottic cancers include Radiation therapy (RT) and CO\(_2\) laser surgery

• Radiation fractionation schedules are fairly standardized across the world

• Delivery modes:
  – External beam (EBRT)
  – Intensity Modulated Radiation Therapy (IMRT)
Effects of radiation therapy

• Dysphagia
• Xerostomia
• Deterioration in voice quality
Research on effects of RT

- Focus is on survival and organ preservation rates
- Recently dysphagia, voice quality and quality of life following RT has been a topic of interest
- Present review attempts to investigate the impact of radiation across all of these aspects
Clinical question

- What are the survival rates, organ preservation rates, voice quality and quality of life outcomes associated with radiotherapy in the treatment of early glottic cancers?
Electronic search

- Pubmed (Medline)
- EBSCOhost
- Psychinfo
- Cochrane reviews
Search terms

- Early glottic cancers
- T2 glottic cancer
- Radiation therapy
- Voice quality
- Organ preservation

- T1 glottic cancer
- Radiotherapy
- Quality of life
- Voice
- Survival rates

Limits: Studies published in English and on human subjects
Inclusion criteria

- All study designs were included
- Only early glottic cancers
- Radiotherapy
- Comparative studies with CO₂ laser surgery or salvage surgeries
- Survival and organ preservation rates, voice quality, and quality of life measures
Article selection

271 studies identified

Records after duplicates were removed =116

116 articles screened: Abstracts and titles

51 full text articles assessed for eligibility

34 studies included in systematic review

65 studies excluded

17 full text articles excluded
## Levels of evidence classification

<table>
<thead>
<tr>
<th>Level</th>
<th>Number</th>
<th>Study design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>1</td>
<td>Prospective case series</td>
</tr>
<tr>
<td>2A</td>
<td>2</td>
<td>Systematic reviews</td>
</tr>
<tr>
<td>2B</td>
<td>21</td>
<td>Retrospective cohort, well-planned case series</td>
</tr>
<tr>
<td>3A</td>
<td>3</td>
<td>Case control studies</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>Retrospective case series</td>
</tr>
</tbody>
</table>
Discussion

- Survival rates and organ preservation rates
- Voice quality: *Stroboscopic, Aerodynamic, Acoustic, Perceptual and Subjective measures*
- Quality of life
Five year survival rates

• T1 cancers: 73-91% 

• T2 cancers: 66-88%\textsuperscript{4,5} 

• Organ preservation: T1 showed better rates than T2 cancers in terms of laryngeal preservation\textsuperscript{5} 

• Survival rates were higher when radiation therapy and surgical modalities were combined\textsuperscript{6}
Factors influencing survival rates and organ preservation

- Extent of tumor infiltration and involvement of the anterior commissure
- Spread to the sub or supraglottic areas
- Non-cessation of smoking
- Hypertrophic laryngitis: Higher incidence of recurrence
Voice quality:  

**Stroboscopic findings**

- Edema of the laryngeal structures
- Decreased mucosal wave on the affected and on the unaffected vocal fold
- Irregular vibratory margins and phase closure
- Increased supraglottic activity
Voice quality: *Aerodynamics*

- Mean laryngeal airway resistance values were 4.5 times higher than normal\(^9,10\)
- Increased values of airflow rate\(^11\)
- Increased subglottic pressure values\(^10\)
Voice quality: Acoustics

- Increased perturbation and noise measures\textsuperscript{11,12}

- Acoustic measures continued to be deviant several years post RT

- Decrease in breathiness index post RT and increase in strain index\textsuperscript{13}
Voice quality:

*Perceptual assessments*

- Increase in breathiness and hoarseness ratings post-radiation
- Breathiness and roughness parameters decreased gradually with time
- However, voices were still judged as mildly abnormal by SLPs$^{14}$
Quality of life

- VHI and VRQOL studies\textsuperscript{15,16}
- Lesser impairment: Social and emotional domain
- Greater impairment: Physical domain
- Recovery period and costs additionally affected quality of life\textsuperscript{16}
Limitations

• Lack of homogeneity of sample in terms of age and follow up period

• Study designs and statistical reporting are dominated by retrospective studies, lack of blinding

• Absence of a voice rehabilitation protocol
Conclusions

• Current & Future Needs:
  – Well planned prospective studies w/ homogeneous samples
  – Develop a reliable and valid questionnaire for this group of patients
  – Study the effect of RT on voice in patients treated for non-laryngeal tumors
  – Compare treatment modalities with reference to outcomes
  – Efficacy studies of voice rehabilitation with this population
  – Cost analysis related to outcome measures
References


