Surgery for Vocal Fold Scar

A prospective evaluation of treatment efficacy

Nathan V. Welham
Seong Hee Choi
Seth H. Dailey
Charles N. Ford
Jack J. Jiang
Diane M. Bless

Rationale

No prospective, multi-arm comparisons of relative treatment efficacy for vocal fold scar or pathologic sulcus vocalis in the clinical literature.

Goal: Compare the effectiveness of three treatment modalities (type I thyroplasty; injection laryngoplasty; graft implantation)

Why these three?

Most cited approaches to scar/sulcus treatment in the clinical literature.

They attempt to address two key aspects of voice impairment associated with these conditions:

- Glottal incompetence (thyroplasty, injection)
- Lamina propria ECM disruption (graft)

Study Design

- 28 patients with VF scar and/or pathologic sulcus vocalis
- No prior medical/surgical/behavioral treatment
- Non-random assignment to treatment group
- No blinding to treatment condition
- All patients received perioperative voice therapy
- Unilateral pathology – unilateral treatment
- Bilateral pathology – bilateral treatment
- Vocal function data collected pre-treatment and 1, 6, 12, 18 months post-treatment

- Psychosocial (VHI)
- Auditory-perceptual (Grade)
- Acoustic (perturbation + D2)
- Aerodynamic ($P_{02}$)
- Videostroboscopic

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Non-randomized and based on clinical judgment of the pathology and major factors causing the dysphonia

- **Injection laryngoplasty** was used for relatively small volumetric deficiencies with limited scar contracture

- **Type I thyroplasty** was used for larger deficiencies where preoperative manual compression of the thyroid alae yielded a perceptible improvement in voice quality

- **Graft implantation** was reserved for large deficiencies associated with extensive scarring and/or deep sulci

Injectate/implant material varied by patient

### Demographics

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Thyroplasty</th>
<th>Injection</th>
<th>Graft</th>
<th>Total</th>
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<tbody>
<tr>
<td>Gender</td>
<td>n = 9</td>
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<td>n = 28</td>
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<tr>
<td>Male</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>11</td>
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<tr>
<td>Female</td>
<td>6</td>
<td>2</td>
<td>9</td>
<td>17</td>
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<tr>
<td>Mean age (SD)</td>
<td>48.2 (6.6)</td>
<td>58.7 (12.6)</td>
<td>56.5 (12.2)</td>
<td>54.5 (10.6)</td>
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<tr>
<td>Diagnosis</td>
<td></td>
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<tr>
<td>Vocal fold scar</td>
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<td>2</td>
<td>1</td>
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<td>Pathologic sulcus vocalis</td>
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<tr>
<td>Sulcus vergeture</td>
<td>5</td>
<td>4</td>
<td>6</td>
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<tr>
<td>ePTFE</td>
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<td>-</td>
<td>9</td>
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<tr>
<td>Calcium hydroxyapatite</td>
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<td>BDDE crosslinked HA</td>
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</tbody>
</table>

BDDE, butanediol diglycidyl ether; ePTFE, expanded polytetrafluoroethylene; HA, hyaluronic acid.

### Representative Cases

58-year-old male
Dx: Type III sulcus vocalis (R)
Tx: Graft (R)

78-year-old male
Dx: Vocal fold scar (R); Type II sulcus vergeture (L)
Tx: Injection (B)
Summary

- Type I thyroplasty and graft implantation lead to reduced voice handicap; however, the improvement trajectory following graft implementation is relatively slow.

- Although select patients exhibit benefit, none of the treatment approaches reliably improve auditory-perceptual, acoustic, aerodynamic or vocal fold physiologic function.

- No single treatment modality is successful for the majority of patients – there is no evidence-based decision algorithm for matching a given treatment to a given patient.

Limitations

- No randomization to treatment group
- No control of injectate/implant material
- Heterogenous patient presentation (typical for scars/sulcus)
- Only three treatment modalities evaluated (no sequential/combinative therapies)

Emerging Therapies

- Growth factors, tunable biomaterials, various cell therapies await clinical translation and may prove more effective.

Clinical Guidance

- For now, rely on careful assessment of the pathology so that the most critical aspects are addressed during initial treatment.
- Where there is extensive tissue loss/glottal incompetence, tissue replacement and medialization seem appropriate first steps.