Treatment of vocal fold scar, sulcus, atrophy

Shigeru Hirano, MD., PhD.
Associate Professor
Department of Otolaryngology HNS
Graduate School of Medicine, Kyoto University

Normal structure of human vocal fold mucosa

Sulcus / Scar

Vocal Fold Scarring
- Occurs following injury, inflammation, DML
- Disrupts layer structure of lamina propria
- Increases tissue stiffness
- Severe dysphonia
- No optimal treatment
Tissue Engineering Approach

Cell

Scaffold

MSC
ASC

Regulation

Collagen sheet
Gelatin

bFGF
HGF

Regenerative scaffold

- Provide appropriate “space” for regeneration
- Provide appropriate environment for cells to grow and work
- Biodegradable
- Biocompatible

Atelocollagen sponge

(Terudermis®; Terumo Corporation, Japan)

- Dehydrothermally cross-linked atelocollagen sponge derived from calf dermis
- Gradually degraded in vivo by endogenous collagenases
- Approved for clinical use by the Ministry of Health in Japan

Scaffolding surgery

- Terudermis®
  - Atelocollagen sheet
  - Scaffold for tissue regener.


72yrs Male, Sulcus

Bilateral Implant of Terdermis

3 months postop
Results

- Aerodynamic analysis
  - MPT (Maximum phonation time)
  - MFR (Mean flow rate)


Results

- Acoustic analysis
  - PPQ (Pitch perturbation quotient)
  - APQ (Amplitude perturbation quotient)
  - NHR (Noise to harmonic ratio)


Scaffolding surgery

- Regenerative effect
- Outcome still vary due to individuals
- Ideal material should be warranted
- Additional element needed for induction of regeneration

Tissue Engineering Approach

Cell

Scaffold

Regulation

bFGF

HGF
Basic fibroblast growth factor (bFGF)

- Stimulate growth of fibroblast
- Control ECM production from fibroblast
  - Increase HA
  - Suppress collagen
- Improve wound healing
- Angiogenesis

Treatment of aged vocal fold atrophy with bFGF

- 63-year-old male
- Bilateral vocal fold atrophy

bFGF injection under topical anesthesia

1 month post-injx
MPT: Maximum phonation time

Acoustic analysis

Treatment of sulcus with bFGF

- 43 yrs male, teacher
- Sulcus vocalis

Post 8 injections in 3mos

MPT: 11s to 20s, VHI-10: 14 to 8
Treatment of sulcus with bFGF

- 60 yrs old, male
- Bil post-cordectomy scar

Lt dissection & bFGF application

1 yr post-op

Regenerative Approach to Vocal Fold Scar - Current Status -

- Scaffolding
  - Atelocollagen sheet, gelatin sponge
  - Variable results
- Basic FGF
  - Induce regenerative effects for atrophy, sulcus, scar
  - Some limitation for scar, sulcus
- Scaffold + Growth factor
  - Expected to be promising
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