Ultrasonic Surgical Aspirator-assisted Phonosurgery: A novel technique for laryngeal cartilage dissection

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Laryngeal Framework Surgery
• Need to cut or remove cartilage
  – The cartilage may be partially or totally ossified
  – The cut must be exact in length and contour
• Need to protect soft tissue deep to the cartilage
  – Inner perichondrium
  – Anterior commissure
• Time is limited under local anesthesia

Laryngeal Framework Surgery
• Options
  – Scalpel
  – Drill (cutting burr, diamond burr)
  – Ultrasonic surgical aspirator

The authors have no conflicts of interests with the manufacturers or distributors of the products discussed in this presentation.
Ultrasonic Surgical Aspirator (Sonopet)

Developed by Synergetics USA, Inc. Distributed by Stryker, Inc.

• Components
  – Main control Unit
  – Hand piece
  – Ultrasonic tip
  – Foot control

Ultrasonic Surgical Aspirator (Sonopet)

• Ultrasonic vibration that selectively grades rigid structures (i.e. cartilage, bone) while sparing adjacent soft tissue
• Tip vibrates at 25kHz frequency
• Emulsifies tissue requiring minimal downward pressure
• Hand piece provides concurrent irrigation and suction
Medialization Thyroplasty

Ultrasound Surgical Aspirator (SONOPET)

- Retrospective chart review 7/1/09 – 6/30/11
- 50 patients underwent laryngeal framework surgery
- The authors began using the Sonopet ultrasonic surgical system during the last 12 months of this period
- Patients undergoing bilateral thyroplasty, concurrent arytenoid adduction, revision thyroplasty and laryngofissure procedure were excluded
- Primary endpoints of operative time and complications were assessed
Ultrasonic Surgical Aspirator (SONOPET)

• Retrospective chart review 7/1/09 – 6/30/11
  – 20 patients in the standard surgery group
    • 10 males / 10 females
    • Mean age 62
    • Mean follow-up – 354 days
  – 13 patients in the ultrasonic dissection group
    • 4 males / 9 females
    • Mean age 64
    • Mean follow-up – 99 days

• Complications
  Standard group
  – One patient with neck infection requiring removal of implant
  Ultrasonic group
  – One patient experienced laryngospasm 2-3 days post-op without sequelae
  – One patient suffered laryngeal fracture during initial resection requiring repair – no sequelae

• Mean operative time
  Standard surgery group – 85 minutes
  Ultrasonic surgery group – 76 minutes
  No significant difference (p = 0.22)

Discussion

• Halum et al. found reduced operative time and reduced perichondrial violation in a cadaver study
  – Also found no difference in the hands of resident and staff surgeons
  – Used a “claw” tip as opposed to the Nakagawa knife tip used in this study
    • The knife tip provides a more precise (1mm) cut but does not allow for integrated suction port

**Discussion**

- The ultrasonic surgical aspirator equipment is costly
  - Base unit - $100,000
  - Hand piece - $10,000
  - Disposable tip and suction (per case) - $300
- The initial investment must depend on the diverse use of this technology in neurosurgery, maxillofacial surgery and other surgical disciplines.
- Current data does not justify the costs for laryngeal framework surgery alone.

**Conclusions**

- The ultrasonic surgical aspirator is a safe effective and efficient alternative to the drill for creation of a medialization thyroplasty window and other laryngeal framework surgery.
- This tool may also play a key role in resident education while ensuring patient safety.
- Larger studies will be necessary to compare operative times, complication rates and cost-effectiveness.