Patient tolerance of the flexible CO_2 laser versus the 585-nm pulsed-dye laser for office-based laryngeal surgery

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Disclosure

- OmniGuide, Inc., Cambridge, MA, supplied OmniGuide flexible CO_2 laser fibers for use in this study at no cost to the investigators or patients involved

Outline

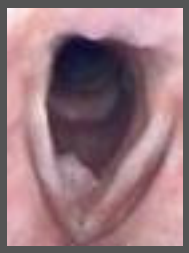
- Review office-based laryngeal surgery for benign laryngeal disease
- Describe lasers used
- Present results of pilot study comparing patient tolerance of flexible OmniGuide CO_2 laser versus PDL

Office-based laryngeal surgery

- OBLS
- Advantages over traditional laser therapy in OR under general anesthesia:
  - Decreased cost, recovery time, discomfort[1,2]
  - Increased patient safety, satisfaction

Office-based laryngeal surgery

- Several benign glottal disorders well suited[3]
- Recurrent glottal dysplasia and recurrent respiratory papillomatosis (RRP) traditionally followed clinically until:
  - Airway restriction
  - Voice deterioration
  - Worrisome appearance
- Multiple surgical treatments
- OBLS: treat more frequently at earlier stage



OBLS lasers

- Two categories

  - Photoangiolytic lasers
    - 585-nm pulsed-dye laser (PDL)
    - 532-nm potassium-titanyl-phosphate (KTP) laser
  - Water-targeting lasers
    - 10,600-nm carbon dioxide (CO_2) laser
    - 2013-nm thulium-YAG ("LISA") laser

Photoangiolytic lasers (PDL/KTP)

- Fibers via flexible transnasal laryngoscope
- Wavelengths approximate absorbance of oxyhemoglobin for:
  - Small feeding vessels of dysplasia/papilloma
  - Vascular ectasias, varices, and hemorrhagic polyps[4,5]
- Photoangiolytic lasers well tolerated and effective in treating benign laryngeal disorders[2-4]

Water-targeting lasers (CO_2/thulium)

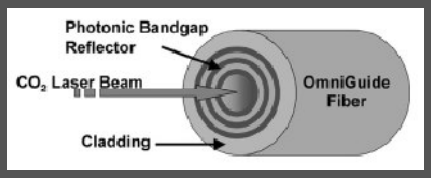
- CO_2 laser allows direct tissue debulking
- Previously, use of CO_2 laser limited to OR under rigid laryngoscopy with micromanipulator[8]
- 2013-nm thulium flexible laser induces thermal damage[8-10]; reduced with cooling device[10] but no clinically applicable tool

Photoangiolytic vs. water-targeting

- Photoangiolytic lasers limited in depth of penetration, applicability to bulky disease
- Photoangiolytic lasers result only in mildly blanched appearance
- Water-targeted lasers give immediate visible debulking of lesion

OmniGuide flexible CO_2 laser

- Photonic band-gap fiber assembly (PBFA)
- Fiber consists of hollow core surrounded by dielectric mirror and outer supportive cladding
- Hollow core delivers laser beam and nitrogen gas



Devaiah, et al. Laryngoscope. 2005.

Objective

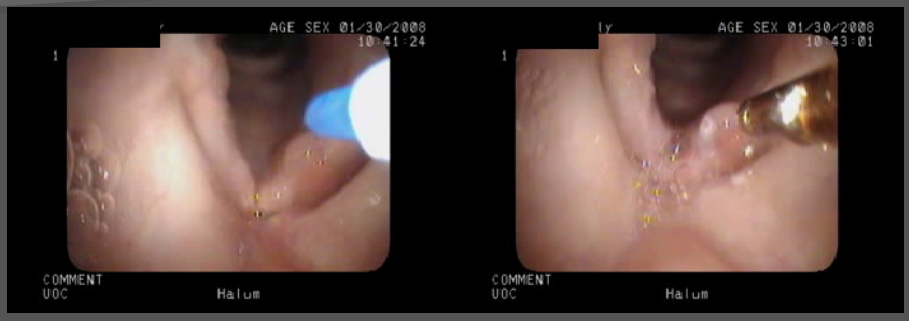
- No studies compare tolerance of new flexible CO_2 laser system with PDL in OBLS
- Purpose: to compare patient tolerance of benign laryngeal lesions treated with OmniGuide flexible CO_2 laser vs. Cynosure flexible PDL

Methods

- Ten adult subjects: RRP, squamous dysplasia, granuloma, amyloid
- Bilateral superior laryngeal nerve blocks, nasal decongestant/anesthesia, topical lidocaine
- Within-subjects design: 50% of each lesion treated with CO_2 laser and 50% treated with PDL
- Patients randomized and blinded to which laser used first, which side treated first

- Immediately after each laser, patients rated "pain" and "burning" on scales from 1 to 10 (1 no pain/burning, 10 intolerable)

RRP



PDL **CO_2**

Results – patient tolerance

- All completed intra- and post-operative questionnaires, follow-up at one month
- Mean intra-op pain:
  - CO_2 laser 2.0
  - PDL 3.0 (p=0.015)
- Mean intra-op burning:
  - CO_2 laser 2.3
  - PDL 3.0 (p=0.025)
- Three patients took single oral dose pain medication within first 24 hours; none required medications after 24 hours

Day of Surgery:

Please rate your discomfort or pain DURING use of laser #1:

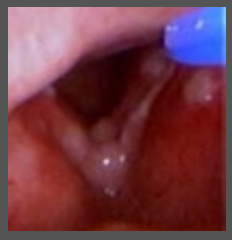
	None		Mild				Severe			Intolerable
PAIN:	1	2	3	4	5	6	7	8	9	10
BURNING SENSATION:	1	2	3	4	5	6	7	8	9	10

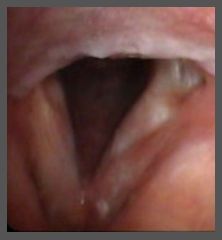
Please rate your discomfort or pain DURING use of laser #2:

	None		Mild				Severe			Intolerable
PAIN:	1	2	3	4	5	6	7	8	9	10
BURNING SENSATION:	1	2	3	4	5	6	7	8	9	10

Results - videostroboscopy

RRP pre-treatment





RRP post-treatment

- No scar tissue or impaired mucosal waveform

Conclusion

- Unsedated OBLS with flexible CO_2 laser extremely well tolerated and efficacious
- Patients consistently rated pain and burning during treatment with CO_2 laser slightly lower than with PDL
- No scar tissue or impaired mucosal waveform
- Future studies to compare different laser power settings and disease outcomes

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