History of Tonsillectomy

2005/09/14

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Introduction

- History
- Cold steel tonsillectomy
- The modern tonsillectomy
  1. Laser
  2. Microdebrider
  3. Harmonic scapel
  4. Coblation
- Conclusion
History

- Latin “Tonsilla”, mooring post
- First century A.D., Cornelius Celsus in Rome
- The tonsil were covered by a thin membrane, can be removed by being separated with the fingernail
- Washed with vinegar
History-partial tonsillectomy

- Finger dissection
- a hook, knife
- Toothed forceps, wire, string
- Guillotine, tonsillotome
Adenotone (La Force; Beckmann)
History - Complete Tonsillectomy

- 1930: Fowler; the modern tonsillectomy
  Removing “the tonsil, the whole tonsil, and nothing but the tonsil”; Philadelphia, USA
Adenoidectomy + Tonsillectomy
(ENT USA, Kevin)  http://www.entusa.com/surgery_videos.htm
Equipment
Cold Steel Tonsillectomy

- Supine position, under GA, neck extended
- Mouth gag: lip, teeth, endotracheal tube occlusion
- Dissection: early identification the plane; lower pole: scissor or snare; a ligature
- Hemostasis: artery clips, ligature
Cold Steel Tonsillectomy

Final check:

- remove any packs
- post-nasal space: blood clot suction
- Recheck: lip and teeth
- Temporo-mandibular joints: subluxation
- Final swab count
Dissection v.s. diathermy

- Diathermy: increased post-op pain
- Dissection: higher intra-op BL, esp. in infants
- No difference: primary or secondary post-op hemorrhage
Morbidity

- Post-op pain
- Post-op hemorrhage
- Diet
- Activity
- Cost
The modern tonsillectomy

- Powered microdebrider
- Laser
- Harmonic
- Coblation
History of partial tonsillectomy
(Intracapsular tonsillectomy)

- Early 19 century: guillotine
- 1970s: cryosurgery (tonsil regrowth, unpredictable and excessive scarring)
- 1994: Krespi & Ling; Laser
- 2002: Koltai et al.; microdebrider
- Coblation
Partial tonsillectomy

Fundamental design of partial tonsillectomy: preserved the tonsil capsule as a biological “dressing”

- Reducing post-op pain
- Reducing recovery time
- Reduction in delayed post-op hemorrhage
Partial tonsillectomy

Disadvantage:

- Increase the rate of tonsillar regrowth
- Contraindication for chronic tonsillitis
Powered microdebrider

- 2002: Koltai et al. (Ohio, USA)
- Tonsillar hypertrophy causing obstructive sleep-disordered breathing
- Gr1: an endoscopic microdebrider
  Gr2: standard tonsillectomy
# Powered microdebrider

<table>
<thead>
<tr>
<th>Group</th>
<th>Intra-op BL</th>
<th>Intermediate post-op bleeding</th>
<th>Delayed post-op bleeding</th>
<th>Readmission (dehydration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gr. 1</td>
<td>30 ml</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gr. 2</td>
<td>25 ml</td>
<td>0</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
Complications of Microdebrider-Assisted Powered Intracapsular Tonsillectomy and Adenoidectomy

- Retrospective chart review & long-term follow-up in office or by telephone
- Sep 2000 and Oct 2002: 278 children; obstructive sleep apnea (OSA)
- 11 patients complication (3.9%)
Complications of Microdebrider-Assisted Powered Intracapsular Tonsillectomy and Adenoidectomy

<table>
<thead>
<tr>
<th>Patient (N = 278)</th>
<th>Sex</th>
<th>Age (months)</th>
<th>Complication</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>27</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>32</td>
<td>Tonsil regrowth, snore, rOSA</td>
<td>Tonsillectomy</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>40</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>42</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>44</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>6</td>
<td>Female</td>
<td>54</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>55</td>
<td>Immediate self-limit bleed</td>
<td>Observe</td>
</tr>
<tr>
<td>8</td>
<td>Female</td>
<td>58</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>9</td>
<td>Female</td>
<td>60</td>
<td>Tonsil regrowth, snore</td>
<td>Observe</td>
</tr>
<tr>
<td>10</td>
<td>Female</td>
<td>60</td>
<td>Delayed bleed POD#5</td>
<td>Removed clot</td>
</tr>
<tr>
<td>11</td>
<td>Male</td>
<td>79</td>
<td>Tonsil regrowth, snore, rOSA, Strep.</td>
<td>Tonsillectomy</td>
</tr>
</tbody>
</table>

rOSA; return of obstructive sleep apnea; snore, return of snoring without OSA; Strep., Streptococcus-positive pharyngitis; POD#5; post-operative day 5.

- 9 patient: tonsil regrowth (2 require complete tonsillectomy)
- 1 patient: immediate self-limit bleed
- 1 patient: delayed bleed POD#5
Laser tonsillectomy

- Krespi & Ling; The Journal of Otolaryngology, Volume 23, Number 5, 1994
- Laser-assisted serial tonsillectomy (LAST)
- Adults with enlarged cryptic tonsils under LA, CO2 laser, hand-held device, vaporize, cryptolysis
- Achieved the functional result of reduction in tonsillar volume...without the morbidity of pain and bleeding
Laser tonsillectomy v.s.
Cold dissection and snare with bipolar cautery

- Double-blind randomized controlled trial
- Total: 151 patients; laser group: 79, dissection group: 72
- A KTP 532 laser: 10W continuous beam
Laser tonsillectomy v.s. Cold dissection and snare with bipolar cautery

<table>
<thead>
<tr>
<th></th>
<th>Op time</th>
<th>BL</th>
<th>Overnight stay (42%)</th>
<th>Pain</th>
<th>Ability to eat &amp; drink</th>
<th>Mood score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissection group</td>
<td>10 min</td>
<td>95 ml</td>
<td>4/72(5.5 %) bleeding 0 re-op</td>
<td></td>
<td></td>
<td>Happier in wk 2&amp;3</td>
</tr>
<tr>
<td>Laser group</td>
<td>12 min</td>
<td>20 ml</td>
<td>9/79(11.3 %) Bleeding 3 re-op</td>
<td>Higher on POD 1</td>
<td>Difficult y in wk 2&amp;3</td>
<td></td>
</tr>
</tbody>
</table>
Laser tonsillectomy v.s.
Cold dissection and snare with bipolar cautery

<table>
<thead>
<tr>
<th>Reason</th>
<th>Dissection (n = 72)</th>
<th>Laser (n = 79)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Return to theatre</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Pain</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Vomiting</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Blood in vomit</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Inadequate recovery from anaesthetic</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Patient or parents unhappy about discharge</td>
<td>14</td>
<td>4</td>
</tr>
</tbody>
</table>
Laser tonsillectomy v.s.
Cold dissection and snare with bipolar cautery

<table>
<thead>
<tr>
<th></th>
<th>Day 0</th>
<th></th>
<th>Day 1</th>
<th></th>
<th>Day 28</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dissection</td>
<td>Laser</td>
<td>Dissection</td>
<td>Laser</td>
<td>Dissection</td>
<td>Laser</td>
</tr>
<tr>
<td>No pain</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>42</td>
<td>43</td>
</tr>
<tr>
<td>Slight pain</td>
<td>24</td>
<td>25</td>
<td>24</td>
<td>17</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Moderate pain</td>
<td>22</td>
<td>25</td>
<td>18</td>
<td>28</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Bad pain</td>
<td>18</td>
<td>18</td>
<td>9</td>
<td>14</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Severe pain</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Blank</td>
<td>4</td>
<td>2</td>
<td>14</td>
<td>14</td>
<td>15</td>
<td>6</td>
</tr>
</tbody>
</table>
Harmonic scalpel

Tonsillectomy

- Ethicon, 1990s
- An ultrasonic dissector and coagulator
- Sharp blade, frequency: 55.5kHz, 80 μm
- Coagulation mechanism:
  1. Break hydrogen bonds of proteins
  2. Generate heat from tissue friction
- Temperature: 50~100°C
  (electrocautery: 150~400°C)
- An expensive product
Ultrasound tonsillectomy v.s. conventional tonsillectomy

- A randomized prospective simple blind study
- 1999/08~2000/03
- TEuc-group: Ultracision; 25 patients
  TEkonv-group: conventional; 25 patients
- Age: 18~65 y/o
## Ultrasound tonsillectomy v.s. conventional tonsillectomy

<table>
<thead>
<tr>
<th>Group</th>
<th>Intra-op BL</th>
<th>Post-op BL</th>
<th>Post-op pain</th>
<th>Wound healing</th>
<th>Development of wound covering</th>
<th>Swelling of uvula</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEkonv-group</td>
<td>19.0g</td>
<td>3/25</td>
<td>++</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(convention)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEuc-group</td>
<td>176.0g</td>
<td>7/25</td>
<td>+</td>
<td>slowly</td>
<td>longer</td>
<td>longer</td>
</tr>
<tr>
<td>(ultrasound)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coblation Tonsillectomy

- Cold ablation
- Radiofrequency bipolar current excited sodium irons in the saline medium
- Create a plasma field lyses the peritonsillar connective tissue
- Coagulation: low power coagulation current
- Temperature: 40~85°C
Coblation Tonsillectomy
Coblation tonsillectomy v.s. Bipolar dissector

- M.S. Timms at al. 2002 June. Journal of Laryngology and Otology
- A double blind randomized control study
- 10 adults with a history of recurrent tonsillitis, no tonsillitis within 3 wks
- One tonsil: coblation; the other: bipolar dissection
- Same surgeon, same anaesthetist, same post-op analgesia, discharge on the same day
Coblation tonsillectomy v.s. Bipolar dissector

- A daily questionnaire: pain score (1~10; 1: no pain, 10: severe pain)
- POD 9: OPD; a different surgeon: exam the wound condition of tonsillar fossa
Coblation tonsillectomy v.s. Bipolar dissector

### TABLE I
**MEDIAN DAILY PAIN SCORES (RANGE)**

<table>
<thead>
<tr>
<th>Day</th>
<th>Coblation</th>
<th>Bipolar</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 (1-9)</td>
<td>7 (3-10)</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>4 (1-6)</td>
<td>7 (4-10)</td>
<td>0.002</td>
</tr>
<tr>
<td>3</td>
<td>5 (1-6)</td>
<td>7.5 (6-9)</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>3.5 (1-6)</td>
<td>7.5 (6-10)</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>3 (1-5)</td>
<td>7.5 (4-9)</td>
<td>0.001</td>
</tr>
<tr>
<td>6</td>
<td>1.5 (1-6)</td>
<td>7.5 (4-10)</td>
<td>0.001</td>
</tr>
<tr>
<td>7</td>
<td>1.5 (1-6)</td>
<td>6 (2-10)</td>
<td>0.001</td>
</tr>
<tr>
<td>8</td>
<td>1 (1-3)</td>
<td>5.5 (1-8)</td>
<td>0.002</td>
</tr>
<tr>
<td>9</td>
<td>1 (1-3)</td>
<td>4.5 (1-7)</td>
<td>0.002</td>
</tr>
</tbody>
</table>

### TABLE II
**AREA OF SLLOUGH IN EACH TONSILLAR FOSSA**
(0% totally healed, 100% covered in slough)

<table>
<thead>
<tr>
<th>Name</th>
<th>Coblation side</th>
<th>Bipolar side</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>DA</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>LM</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>EC</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>DM</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>SA</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>ZC</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td>AL</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td>SC</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>EW</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>
National Prospective Tonsillectomy Audit (NPTA)

- Department of Health in UK
- 1995 to present: complication rate increased after tonsillectomy
- Jul 2003 to Feb 2004
- Nearly 15,000 operation
- Great majority of hospital in England and North Ireland
Top 5 in UK:
Tonsillectomy technique

- Cold steel tonsillectomy
- Cold steel dissection with (bipolar or monopolar) diathermy haemostasis
- Bipolar (forceps or scissors) diathermy
- Monopolar diathermy
- Coblation
Bipolar scissor

Coagulation during cutting

Coagulation prior to cutting

Pinpoint coagulation

Zone coagulation
Post-operative bleeding

<table>
<thead>
<tr>
<th></th>
<th>Cold steel</th>
<th>Cold steel dissection + diathermy hemostasis</th>
<th>Bipolar diathermy</th>
<th>Monopolar diathermy</th>
<th>Coblation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-op hemorrhage</td>
<td>1.3%</td>
<td>2.9%</td>
<td>3.9%</td>
<td>6.1%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Return to theater</td>
<td>1.0%</td>
<td>1.7%</td>
<td>2.4%</td>
<td>4.0%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>
Conclusion

Although considered rather dated by some, the cold steel technique for tonsillectomy has stood the test of time as an effective and safe operation.
Reference

Reference


- [http://www.entusa.com/surgery_videos.htm](http://www.entusa.com/surgery_videos.htm)
THE END

Thank you!