Bilateral Glossopharyngeal Nerve Paralysis after Tonsillectomy: Case Report and Anatomic Study

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Introduction (1)

- Tonsillectomy is one of the most common procedures.
- Postoperative hemorrhage and dehydration: the most common complications.
- Dysphagia persisting > 10 to 14 days → possibility of infection, pharyngeal muscle trauma, excessive scar tissue formation, or psychologic factors as possible causes.
Introduction (2)

- Injury to the CN IX—by secondary cautery transmission, nerve stretching, or direct surgical trauma: a rare cause of postoperative dysphagia.

- Garnett et al.: postoperative dysfunctional swallowing in a child→by symptoms and from the results of fluoroscopic studies.
Introduction (3)

- In 1946, Wilson and McAlpine sectioned the CN IX: located in the inferior tonsillar fossa.

- Hollinshead described the main trunk of the CN IX as lying immediately outside the tonsillar fossa and sometimes crossing the fossa after tonsillectomy.
Introduction (4)

- medical literature has alluded to CN IX injury occurring as a complication of tonsillectomy ➔ no adequate documentation supporting a causal relation
30-year-old woman

At tonsillectomy, unipolar electrobovie cautery had been used to dissect the tonsils from their fossa

severe dysphagia, numbness, decreased taste sensation at the posterior aspect of the tongue, nasal regurgitation of liquids, nasal voice quality
Case Report (2)

- remained in the hospital 1 week postoperatively
- With home intravenous fluid administration
- percutaneous endoscopic gastrostomy tube for years
Case Report (3)

- hypernasal voice, absent bilateral gag reflex, decreased posterior pharyngeal sensation, sluggishly mobile palate, and pyriform sinus secretion pooling
- vocal folds were mobile, and supraglottic cough reflex was normal
Case Report (4)

- Modified barium swallows with videofluoroscopy: delayed initiation of swallowing, decreased pharyngeal peristalsis
Case Report (5)

- Esophageal motility study on POD 79: difficulty in initiating swallowing, reduced amplitude of hypopharyngeal contraction, normal upper esophageal sphincter pressure and distal esophageal motility.

- CT and MRI scans of the brain to neck were normal.
Material and Methods

- Twenty glossopharyngeal nerves in 10 cadaver necks were dissected.
- The thickness of mucosa and muscular wall: < 1 mm

Fig. 2. Anatomic relation between glossopharyngeal nerve and tonsil. A = distance from posterosuperior tonsillar fossa to main trunk of glossopharyngeal nerve; B = distance from posteroinferior tonsillar fossa to closest lingual branch of glossopharyngeal nerve.
Results (1)

- The nerve was located in the same sagittal plane as the tonsillar bed muscles and was consistently located posteriorly as it reached and entered the tongue base.
Results (2)

### TABLE I.
Comparison of Distance from Posterosuperior Tonsillar Fossa to Main Trunk of Glossopharyngeal Nerve (Distance A) with Distance from Posteriorinferior Tonsillar Fossa to Lingual Branch(es) of Glossopharyngeal Nerve (Distance B) in Left and Right Sides of 10 Cadaver Specimens of Head and Neck.

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Distance A (mm)</th>
<th>Distance B (mm)</th>
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<tbody>
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<td>Left</td>
<td>Right</td>
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<td>1</td>
<td>12</td>
<td>10</td>
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<td>10</td>
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<td><strong>Mean</strong></td>
<td>10.8</td>
<td>10.7</td>
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<tr>
<td><strong>Mean</strong></td>
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</table>
Discussion (1)

- Main trunk of the CN IX curves around the lat. border of the stylopharyngeus muscle and travels toward the lingual base.
- Deep to the hyoglossus muscle, it divides into its terminal lingual and tonsillar branches.
Superiorly in the parapharyngeal space, the CN IX branches:

- the tympanic branch
- Hering’s nerve (directed toward the carotid sinus)
- the glossopharyngeal branch (directed toward the pharyngeal plexus)
Discussion (3)

- **sensory** fibers: the mucous membranes of the pharynx, soft palate, tonsillar pillars, palatine tonsil, and posterior third of the tongue;

- **Motor** fibers supply the stylopharyngeus muscle and indirectly supply the pharyngeal constrictors through pharyngeal plexus branches.
swallowing mechanism: oral, pharyngeal, and esophageal phase

the involuntary pharyngeal swallowing reflex: triggered by CN IX; loss of sensation in the pharynx is thought to produce more swallowing difficulty
Discussion (5)

- **Unilateral** paralysis: dysphagia, loss of gag reflex, deviation of the uvula to the contralateral side, loss of taste in the post. third of the tongue, and decreased sensation in the soft palate, post. third of the tongue, and pharynx

- **Bilateral** paralysis: both hypernasal voice (rhinolalia aperta) and nasal regurgitation
Discussion (6)

- Isolated **unilateral** CN IX paralysis: minor swallowing difficulties to severe dysphagia and recurrent aspiration

- **Bilateral** CN IX paralysis: an extremely rare complication → only one case report → resolved on POD 38; not documented by radiologic, motility, or other studies.
Discussion (7)

- glossopharyngeal nerve passes close to the tonsillar fossa, direct nerve injury is the most plausible explanation for CN IX paralysis

- A poorly delineated surgical plane between the tonsillar capsule and posterior fossa (especially if near the tongue base) could inadvertently injure the nerve: surgery for repeated infection or peritonsillar abscess
Discussion (5)

- Other causes:
  - Transmission of unipolar cautery heat;
  - extending the excision of posteroinferior tonsillar tissue to include lymphoid tissue in the lateral aspect of the lingual base
  - Cutting or burning the superior pharyngeal constrictor muscle → pharyngeal plexus, main trunk, and lingual branch
  - aberrant CN IX
  - stretching injury caused by mouth gag.
Conclusion

- Correct surgical plane is the most important factor
- Electrocautery: **direct** injury & **indirect** injury by way of thermal conduction
- Other techniques: 1) result in more blood loss \(\rightarrow\) consequent loss of the correct surgical plane and 2) may necessitate more suture ligations
Thanks for Your Attention!!