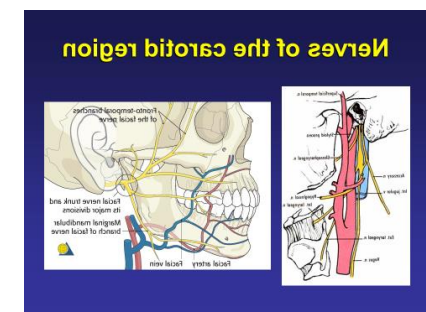


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Problem

Our vascular program was concerned about our high cranial nerve injury incidence after carotid surgery. Our stroke, mortality and LOS work was excellent. We were hoping to use our hospital VQI data, review cases that had cranial nerve injury documented and evaluate new processes



Background



Cranial/cervical nerve dysfunction after carotid endarterectomy

Michael D. Schaubert, Maj., USAF, MC, FS, Larry J. Fontenelle, MD, FACS, James W. Solomon, MD, FACS, and Travis L. Hanson, RDMS, RVT, Biloxi, Miss.

Table V. Comparative studies

| Reference | Year | No. of operations | Nerves injured: n (%) | | | Total |
|--------------------------------|---------|-------------------|-----------------------|---------------------|-----------|-----------|
| | | | Hypoglossal | Marginal mandibular | SLN & RLN | |
| Ransom et al. ²⁹ | 1962-67 | 214 | 11 (5.1) | 3 (1.4) | 3 (1.4) | 17 (7.9) |
| DeWeese et al. ¹⁷ | 1963-68 | 103 | 18 (17.5) | | | |
| Matsumoto et al. ¹⁸ | 1974-76 | 130 | 11 (8.5) | 2 (1.5) | 3 (2.3) | 16 (2.3) |
| Hertzler et al. ⁸ | 1978-79 | 240 | 13 (5.4) | 6 (2.5) | 19 (7.9) | 38 (15.8) |
| Knight et al. ⁶ | 1974-84 | 129 | 3 (2.3) | 4 (3.1) | 5 (3.9)* | 12 (9.3) |
| Schauber et al. | 1990-95 | 183 | 8 (4.4) | 2 (1.1) | 14 (7.7)* | 24 (13.1) |

*RLN.

Table III. Results

| Nerve | Total | | Transient | | Permanent | |
|---------------------|-------|---------------|-----------|--------------|-----------|--------------|
| | No. | Percent | No. | Percent | No. | Percent |
| Recurrent laryngeal | 14 | 7.7 (14/183) | 8 | 4.4 (8/183) | 1 | 0.55 (1/183) |
| Hypoglossal | 8 | 4.4 (8/183) | 7 | 3.8 (7/183) | 1 | 0.55 (1/183) |
| Marginal mandibular | 2 | 1.1 (2/183) | 2 | 1.1 (2/183) | 0 | 0 |
| Greater auricular | 2 | 1.1 (2/183) | 1 | 0.55 (1/183) | 0 | 0 |
| Total | 26 | 14.2 (26/183) | 18 | 9.8 (18/183) | 2 | 1.1 (2/183) |

Goals

Improve our cranial nerve injury rate after carotid surgery using VQI data

Improvement Opportunities

Large reported series

| Complications | CEA* (n=233) |
|--------------------------------------|--------------|
| Stroke | 3 (1.3%) |
| Ipsilateral Disabling | 1 (0.4%) |
| Cranial nerve injury | 2 (0.9%) |
| Marginal branch of facial nerve | 10 (4.3%) |
| Hypoglossal nerve | 4 (1.7%) |
| Recurrent laryngeal nerve | 5 (2.1%) |
| Hyperperfusion syndrome [†] | 1 (0.4%) |
| Myocardial infarction | 3 (1.3%) |
| Postoperative bleeding | 4 (1.7%) |
| Mortality (<30 days) | 8 (3.4%) |
| | 0 (0%) |

Process

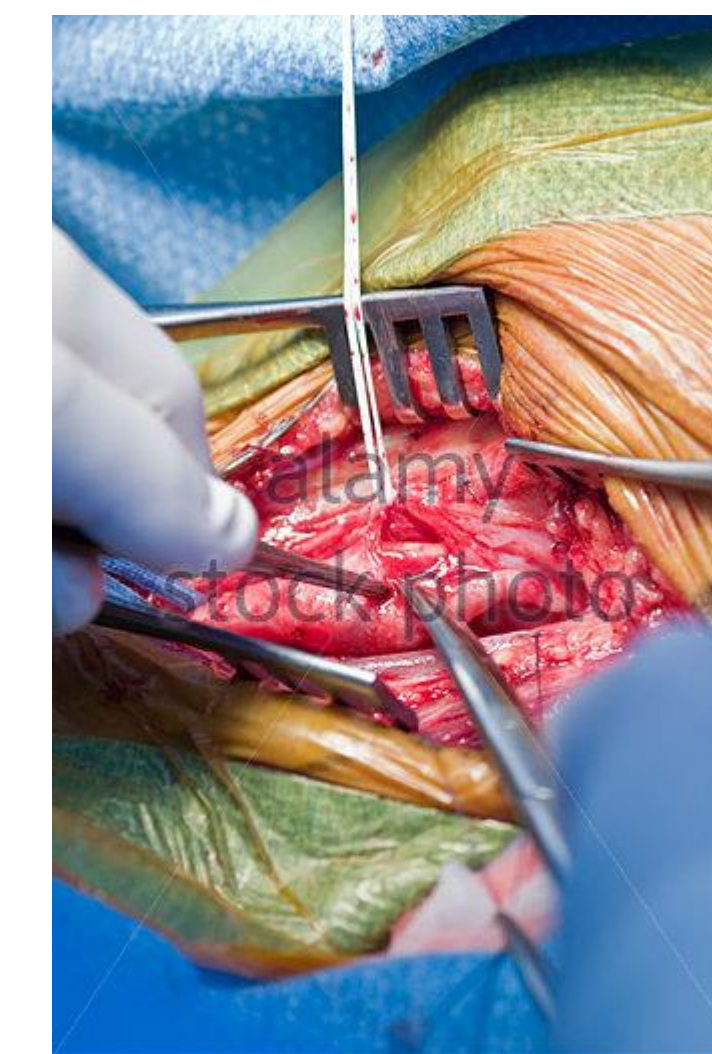
Identify cranial nerve incidence in our practice. Most cases were transient marginal mandibular nerve injury based on VQI. Evaluated our practice. Felt deep retractor placement was culprit. Re-focussed our attention to superficial to platysma retractor placement medically

Results

ECH and PAMF Carotid Data

- ECH:
 - 76 CEA
 - 13.2% at DC (10 cases)
 - 8 MMN and 2 RLN
- PAMF
 - 41 CEA
 - 17.1% at DC, 7 cases
 - MMN cases 6
 - CN 10: 1

Weitlaner Retractor Placement



www.alamy.com - CT3HGA



Most cranial nerve injuries in carotid surgery are transient and can be caused by poor exposure and nerve clamping, nerve transection, or retractor stretch or compression

Conclusions

Cranial nerve injuries do occur with carotid surgery. Mostly CN 7, 10, or 12. Most injuries are usually transient. Our injuries were mostly related to CN 7 with transient lower lip weakness. We addressed our procedure retractor placement and will track our results. We feel deep retractor placement medially is the significant cause of marginal mandibular nerve injuries

Success Factors

Ways to avoid nerve injuries

- CONCLUSION**
Cranial and cervical nerve dysfunction after CEA usually is caused by direct trauma to the specific nerve by stretch, retraction, clamping, or transection. Adherence to the following guidelines will help minimize neuropraxia during CEA.
1. Verify correct positioning of the endotracheal cuff below the level of the cricoid cartilage.
 2. Avoid excessive hyperextension of the neck during patient positioning.
 3. Preoperatively place the skin incision.
 4. Correctly position self-retaining retractors (i.e., avoid the angle of the mandible, trachea, and tracheoesophageal groove).
 5. Maintain circumferential dissection of the CCA/ICA/ICA.
 6. Maintain dissection of the vessels in the carotid sheath.
 7. Meticulously place clamps on CCA/ICA to avoid vagal injury.
 8. Encircle the superior thyroid artery at its junction with CCA to avoid SLN injury.
 9. Perform atraumatic mobilization of the hypoglossal nerve if high exposure of the ICA is needed (i.e., division of the descending hypoglossal and secure ligation of the sternomastoid artery/vein).
 10. Be aware of glossopharyngeal and spinal accessory nerve injury risk when dissection extends above the level of the posterior belly of the digastric muscle.
 11. Never attempt to separate the hypoglossal and vagus nerves if they fuse together.
 12. Be aware of the possibility of a nonrecurrent laryngeal nerve crossing posterior to the CCA.