

# WebM&M

Morbidity and Mortality Rounds on the Web

## Spotlight

### Respiratory Distress after Neck Surgery: Two Cases of Post-Operative Cervical Hematoma



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## Source and Credits

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- This presentation is based on the January 2023 AHRQ WebM&M Spotlight Case
  - See the full article at <https://psnet.ahrq.gov/webmm>
  - CME credit is available
- Commentary by: *Claire E. Graves, MD and Maggie A. Kuhn, MD, MAS*
- AHRQ WebM&M Editors in Chief: Patrick Romano, MD, MPH and Deb Bakerjian, PhD, APRN, RN
  - Spotlight Editors: Patrick Romano, MD, MPH and Garth Utter, MD
  - Managing Editor: Meghan Weyrich, MPH

## Objectives

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*At the conclusion of this educational activity, participants should be able to:*

- Identify patients at risk for postoperative cervical hematomas
- Describe the signs of cervical hematoma in the early postoperative period
- Understand approaches for managing cervical hematomas

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# RESPIRATORY DISTRESS AFTER NECK SURGERY: TWO CASES OF POSTOPERATIVE CERVICAL HEMATOMA

Two cases highlighting the rare but dangerous complication of hematoma following neck surgery and approaches for managing postoperative cervical hematomas

## Case #1 Details (1)

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- A 61-year-old man presented with a history of hypertension, peripheral neuropathy, osteoarthritis, and spinal stenosis, status/post two previous spine surgeries and long-term use of opioid analgesics.
- He reported a recent history of right arm weakness, which was attributed to severe cervical spinal canal and foraminal stenosis at the C4-C5 level.
- He underwent elective C3-C5 anterior discectomy and cervical disc arthroplasty.
- The patient recovered in the Post-Anesthesia Care Unit (PACU) overnight, was evaluated by physical therapy, and was discharged home about 24 hours after surgery with home health follow-up. The nurse's discharge note mentioned that the patient's nurse practitioner was notified regarding neck swelling and evaluated the patient one hour before discharge.

## Case #1 Details (2)

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- About three days later, the patient was transported by ambulance in cardiopulmonary arrest after complaining to his wife of shortness of breath and becoming unresponsive.
- The paramedic was unable to intubate the patient due to “excessive airway swelling and tracheal deviation”; they also noted “blood weeping through surgical incision.”
- Intubation was attempted multiple times after the patient arrived in the Emergency Department (ED). The ED provider noted bright red blood in the oropharynx, significant retropharyngeal distension, and a 2.5 cm vertical laceration of the posterior pharynx below the uvula, with bleeding. The patient could not be resuscitated and expired.
- Autopsy revealed a large hematoma at the operative site, causing compression of the upper airway, which was the suspected cause of respiratory and cardiac arrest.

## Case #2 Details (3)

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- A 52-year-old woman with a chronic cough attributed to COVID-19 pneumonia one year earlier was admitted to a tertiary care center for elective thyroid lobectomy for papillary thyroid cancer.
- Her operation was uncomplicated so according to the surgeon's protocol, she was observed in the PACU for six hours.
- On assessment prior to discharge, she had no significant pain or nausea, was eating, vocalized normally, and her incision had no swelling or ecchymosis.
- The patient was discharged to a hotel across the street from the hospital, where a one-night stay had been pre-arranged because the patient's home was two hours away.

## Case #2 Details (4)

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- The following morning, the patient called the surgery clinic to report increased neck pain and swelling that developed after a coughing fit.
- She was instructed by a triage nurse to present to the ED, where she was fast-tracked to a resuscitation bay and met by her primary surgical team.
- The patient had a large hematoma but was breathing and phonating normally. She was taken emergently to the operating room for hematoma evacuation. The field was washed out and explored with no source of bleeding identified and the incision was re-closed. She was observed for 24 hours and discharged home on post-operative day 1.



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# RESPIRATORY DISTRESS AFTER NECK SURGERY: TWO CASES OF POSTOPERATIVE CERVICAL HEMATOMA

## THE COMMENTARY

By Claire E. Graves, MD and Maggie A. Kuhn, MD, MAS

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# BACKGROUND

## Background (1)

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- These cases describe the rare but dangerous complication of hematoma following neck surgery.
- The estimated rate of cervical hematoma is approximately 1% to 1.5% in thyroid or parathyroid surgery<sup>1-5</sup> and approximately 1% in anterior cervical spine surgery (ACSS).<sup>6</sup> After thyroidectomy, patients are at highest risk of hematoma within 6 hours of surgery, but delayed presentations can occur even after a week or longer.<sup>2,7-10</sup> Following ACSS, approximately two-thirds of hematomas occur within 24 hours, with the remainder occurring within six days.<sup>11,12</sup>
- Up to 14% of hematomas after ACSS result in airway compromise, often due to post-surgical pharyngeal edema or a parapharyngeal abscess in addition to the hematoma.<sup>13</sup>

## Background (2)

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Multiple risk factors associated with postoperative hematoma in thyroid and/or parathyroid surgery have been described, including:

- 1) Patient factors such as male sex, Black race, older age, hypertension, diabetes, and use of antiplatelet or anticoagulant medications;
- 2) Disease factors including previous thyroid operation, bilateral or total thyroidectomy, concurrent neck dissection, large gland and/or dominant nodule, substernal goiter, Graves' disease, and chronic lymphocytic thyroiditis; and
- 3) Process-of-care factors such as procedure performance by a low-volume surgeon, low-volume hospital, and use of a surgical drain.<sup>1-3, 5,7,9,10,14-17</sup>

## Background (3)

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Risk factors for hematoma following ACSS include:

- 1) Patient factors such as male sex, age over 65 years, low body mass index (e.g.,  $\leq 24$ ), medical comorbidities or American Society of Anesthesiologists classification  $\geq 3$ , and smoking;<sup>16,17</sup>
- 2) Disease-related factors such as diffuse idiopathic skeletal hyperostosis (DISH) and ossification of the posterior longitudinal ligament;<sup>12</sup> and
- 3) Process-of-care factors such as therapeutic anticoagulation, longer operative time, and multilevel surgery.<sup>12,16,17</sup>

As with thyroid or parathyroid surgery, operative drains do not consistently prevent the development of hematoma after ACSS.<sup>18</sup>

Maneuvers that transiently raise venous pressure, such as coughing, retching, and vomiting, may predispose to postoperative cervical bleeding and delayed presentation of hematoma, as in Case #2.<sup>19,20</sup>

## Background (4)

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- Cervical hematomas compromise the airway directly through compression by the collection of blood, as well as indirectly by venous and lymphatic obstruction.
- Decreased venous return and lymphatic obstruction cause airway edema, which is often the main cause of obstruction and can lead to rapid onset of stridor, tachypnea, and airway collapse.
- Early recognition is crucial for patient survival. Swelling, increased neck circumference, sensation of tightness, and purple discoloration of the skin are classic signs of hematoma, but early hematoma can be subtle and difficult to distinguish from routine postoperative swelling.
- Respiratory distress, voice changes, agitation or stridor are late signs of airway compromise, and even patients with life-threatening airway obstruction usually have normal oxygen saturation.<sup>19,21</sup>

## Background (5)

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- When postoperative cervical hematoma is suspected, prompt patient evaluation is necessary. The order and timing of interventions depends on the severity of presentation and surgeon judgment. Bedside evacuation by re-opening the incision may be required if the patient has signs/symptoms of airway compromise.
- In Case #1, multiple failed attempts at intubation and ventilation may have been avoided with early conversion to a surgical airway via cricothyrotomy or tracheotomy. Debkowska et al. recommend a surgical airway after a single failed attempt at oral intubation or two elapsed minutes since respiratory arrest.<sup>13</sup>
- In Case #2, there was time to safely transport to the operating room to treat in a controlled environment. Surgical and anesthesia teams should work together, as hematoma evacuation may be required prior to intubation if the airway is too constricted to accommodate an endotracheal tube. The surgeon's goals are to release the hematoma and control active bleeding, which requires re-opening the incision and fully exploring the surgical site.<sup>21</sup>

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# APPROACH TO IMPROVING SAFETY AND PATIENT SAFETY TARGET



# Approach to Improving Safety and Patient Safety Target (1)

- Multiple studies have demonstrated the safety of outpatient thyroidectomy in appropriately selected patients.<sup>22,23</sup>
  - Benefits of outpatient thyroidectomy include improved patient comfort and reduced healthcare resource utilization,<sup>19,24</sup> but these benefits must be carefully considered alongside important patient safety factors.
  - The American Thyroid Association outlines eligibility criteria for same-day discharge: no major patient comorbidities, appropriate and sufficient preoperative education, a team approach to education and clinical care, a willing and available caregiver, a social setting conducive to postoperative care, and proximity to a skilled care facility.<sup>19</sup>
  - All patients undergoing neck surgery and their caregivers should be thoroughly counseled regarding the life-threatening risk of cervical hematoma and given detailed instructions to call the clinical team and proceed to the nearest ED for care.

## Approach to Improving Safety and Patient Safety Target (2)

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- Patients undergoing ACSS are commonly admitted to the hospital postoperatively for wound observation, assurance of safe ambulation, initiation of physical therapy, and resumption of an oral diet.
- Even patients who are monitored overnight after surgery, such as the patient in Case #1, occasionally develop a delayed hematoma or other causes of airway obstruction, such as an abscess.
- Up to 14% of post-ACSS complications are airway-related.<sup>13</sup>

## Approach to Improving Safety and Patient Safety Target (3)

- Understanding these risks, many spine surgeons have advocated protocolized postoperative airway management for patients who undergo ACSS.
  - Such protocols are based on studies demonstrating reduced postoperative airway complications when patients were extubated according to an established algorithm.<sup>25</sup>
  - Most protocols stratify ACSS patients by surgical risk factors including exposure of >3 cervical levels, operative site C3-4 or above, operative time of >5 hours, blood loss >300ml, and significant medical comorbidity.<sup>26,27</sup> For patients who are selected to remain intubated postoperatively, extubation should be guided by the presence of endotracheal tube cuff leak or findings of a lateral neck radiograph, and should be performed when appropriate staff are available to manage the airway should respiratory distress arise.

## Approach to Improving Safety and Patient Safety Target (4)

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- These two cases demonstrate disparate outcomes in cases of postoperative cervical hematoma.
  - In Case #1, critical airway compromise developed at home resulting in cardiopulmonary arrest. In this case, delayed presentation made prompt and proactive management challenging, ultimately resulting in airway collapse and patient death.
  - In Case #2, prompt recognition and enactment of a rapid management strategy resulted in minimal patient morbidity. This patient was given clear instructions for neck swelling, called the appropriate emergency number, was triaged correctly, and quickly arrived at the ED because of her pre-arranged proximity. On arrival, the patient was immediately evaluated, and the hematoma was recognized, with a coordinated effort to evacuate the hematoma and secure the airway in the controlled environment of the operating room.

## Approach to Improving Safety and Patient Safety Target (5)

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- The first case additionally highlights a possible failure to recognize signs of hematoma in the early postoperative period.
  - Because early neck hematomas can be difficult to distinguish from benign postoperative swelling, appropriate education of all clinical staff caring for patients undergoing neck surgery is necessary.
  - Early identification is crucial, as airway obstruction may evolve rapidly and hypoxic brain injury follows precipitously.
  - Even when properly prepared, however, the high stress of airway emergencies can lead to cognitive overload, resulting in errors.<sup>28</sup> Often first-responders in the hospital are junior staff, and they should be instructed on pathways to summon help, as well as empowered to act quickly on their own in the case of airway compromise.

## Approach to Improving Safety and Patient Safety Target (6)

- Several training protocols and cognitive aids have been published to assist clinicians in early detection and management of neck swelling.<sup>8,29</sup> These aids include printed protocols, step-by-step guides, and, in some cases, emergency supply packs.
- A mnemonic device (“SCOOP”) may be useful to recall the indications and steps for opening the cervical incision:<sup>8</sup>
  - **S**welling of the wound
  - **C**lear steri-strips and pull sutures
  - **O**pen wound – cut skin and platysma stitches
  - **O**pen wound – cut strap muscle stitches
  - **P**robe wound to release clots

## Approach to Improving Safety and Patient Safety Target (7)

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- Any physicians caring for patients undergoing neck surgery or those responding to rapid response calls should be trained to create surgical airways.
  - Such training includes regular review of airway algorithms, methods for airway support and ventilation, as well as practicing surgical airway technique on a simulator.
- To successfully manage this life-threatening complication, appropriate patient, caregiver and clinical staff education, as well as systematic emergency protocols, are essential.

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# TAKE HOME POINTS



## Take-Home Points (1)

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- Postoperative hematoma causing airway collapse is a rare but potentially lethal complication of neck surgery.
- Hypoxic brain injury occurs rapidly after airway obstruction, and prompt recognition and management of cervical hematoma is crucial.
- Most cervical hematomas occur within 6 hours of thyroid surgery and within 24 hours of anterior spine surgery, but delayed presentations can occur after patient discharge.
- All clinical staff caring for patients undergoing neck surgery should be trained to recognize and manage cervical hematoma.
- Patients undergoing neck surgery and their caregivers should be counseled on the risk of cervical hematoma and given detailed instructions on how to contact the clinical team and to proceed to the nearest emergency department for care.

## Take-Home Points (2)

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- When hematoma threatens the airway, all layers of sutures should be emergently opened and hematoma evacuated – in many cases, at the bedside, before the airway is secured.
- Mucosal edema from lymphovascular congestion may render oral intubation impossible, and a surgical airway (cricothyrotomy or tracheotomy) should be performed.
- Training protocols and cognitive aids, as well as emergency supply packs, can be helpful tools for clinicians faced with management of a cervical hematoma.

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