Implementation of a Post-Carotid Endarterectomy Protocol in the PACU to Prevent and Manage Post-Operative Complications

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BACKGROUND

Wound hematoma following neck surgery can be a potentially life-threatening problem. The hematoma can be either above or below the platysma muscle, with superficial hematomas appearing more impressive in terms of neck swelling. Deeper hematomas are much more dangerous, as they compress and deviate the trachea and result loss of the airway and subsequent demise. Due to the high-pressure system within the arterial system, loss of the airway—and not carotid compression—is the most important life-threatening complication of neck surgery. Airway obstruction may be due to direct tracheal compression by hematoma, edema secondary to direct mucosal tracheal trauma from the operative intubation, or due to lymphatic and venous congestion from hematoma formation. There may be a surprisingly short time interval between development of the hematoma and respiratory arrest. Endotracheal intubation of the externally compressed airway is difficult and can be complicated by fatal laryngospasm.

PROCEDURE

1. Place a measuring tape around the patient's neck, mark the location on the skin. Measure the circumference of the neck at this point and record it on the patient's flow sheet, take a picture and attach it to the chart media. Repeat measurements of the neck circumference at the same interval as the vital signs.
2. Record all neck circumference measurements on the patient's flow sheet.
3. Notify the charge nurse for ANY INCREASE IN NECK CIRCUMFERENCE.
4. Notify the chief/senior resident and attending if:
    - The size increase is 1 cm (or greater) in one hour or less
    - The size increase is >0.5 cm in two consecutive hours
    - A total size increase of 2 cm (or greater) occurs over any time

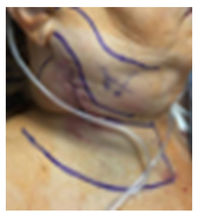
METHOD

We present a case in which a life-threatening neck hematoma developed in a post-carotid endarterectomy patient and highlight the pitfalls and cues which may lead to airway compromise and death. The lessons learned from this case were then used to develop a post-operative algorithm for health professionals caring for post-CEA patients in the PACU to follow, in order to alert the healthcare team to, and avoid potentially deadly complications.

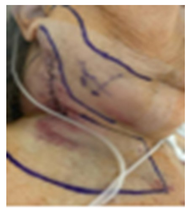
Time in PACU at 10:16

Time: 11:14

Time: 12:21



Time: 13:00



Time: 14:26

Taken to OR at 14:40 after MERT called to escalate admission to ICU

Time: 16:41 Post-Operative in CCU

PROCEDURE CONTINUED

If the charge nurse is notified by staff that there is a change in the measured diameter of the patient's neck, the following measures must be taken:

1. If the patient is having respiratory symptoms, get the crash-cart brought to the bedside, call the primary anesthesiologist of the case or the provider running the OR board IMMEDIATELY, and deliver hi-flow oxygen via nasal prongs or face mask. Do not leave the patient's bedside. Have the nursing staff call the primary resident of the case, the attending surgeon, and the OR charge nurse to get ready for operative re-exploration and closure of the wound. Have an emergency intubation and/or cricothyroidotomy kit at bedside.
2. If the patient is not yet in distress, deliver hi-flow oxygen via nasal prongs or face mask, examine the patient with specific emphasis on subtle changes in voice quality, tracheal deviation, size of hematoma and respiratory symptoms (anxiety, agitation, hoarseness, stridor, dyspnea, and tachypnea). Have the nurse call the anesthesiologist of the case to come and examine the patient. Call the surgery primary resident or attending to come and examine the patient.

PROCEDURE CONTINUED

It is recommended that the surgeon then does the following:

1. If there are any respiratory symptoms (anxiety, agitation, hoarseness, stridor, dyspnea, tachypnea) pour Betadine solution on the incision, put on sterile gloves, get a pair of sterile scissors and with sterile technique, open the neck incision. Manually evacuate the hematoma to relieve the mass effect on the airway. Tell the junior resident to hold gentle constant pressure (as to not occlude either the trachea or the carotid artery), while you call the attending surgeon.
2. If the patient is not yet in distress, immediately call the attending surgeon and discuss the situation and decide whether the hematoma should be observed, immediately evacuated at the bedside, or evacuated emergently in the operating room.
3. If a decision is made to evacuate the hematoma in the operating room, a surgeon who is capable of independently evacuating the hematoma should stay at the patient's bedside (with instruments for such a procedure) until the patient is intubated in the operating room.

SIGNIFICANCE

Implementation of evidence-based post-operative algorithms enforcing standard of post-operative care for surgical patients will result in a decrease in complication-related morbidity and mortality in post-carotid endarterectomy patients.

REFERENCES

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