Respiratory Distress Requiring Surgical Intervention Following Traumatic Central Internal Jugular Vein Cannulation: Review Of 2 Cases

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INTRODUCTION

Acute upper airway obstruction may occur secondary to hematoma formation following traumatic internal jugular vein (IJV) cannulation. Though uncommon, hematoma after central access can be a life-threatening event that requires early and prompt intervention. We present two different cases of airway obstruction caused by hematoma formation following UV central line placement and discuss key management strategies.

CASE #1

A 67-year-old man with a history of coronary artery disease underwent elective percutaneous intervention with drug-eluting stent placement in his LAD. The patient had been anticoagulated for the procedure with both heparin and anti-platelet therapy. During the procedure multiple failed attempts had been made at obtaining right UV access for hemodynamic monitoring. The patient developed immediate swelling in the region of the UV puncture sites and was admitted for observation. After arrival to the hospital floor, the primary service noted increasing hematoma formation. Additionally, the patient was complaining of worsening pain, new-onset hoarseness, and difficulty swallowing his own secretions. An ENT consultation was requested.

A CT of the neck demonstrated a large (2x0.9x0.8 cm) hematoma in the right neck abutting the UV at the level of the clavicle and infiltrating the retropharyngeal tissues (Figure A) resulting in a narrowing of the supraglottic airway. No contrast extravasation was noted.

On physical exam the patient was drooling and hoarse but did not have any audible stridor. He had minimal swelling of his right neck from just below the level of the cricoid to the supravacular region; however, there was significant ecchymosis around multiple puncture sites. The trachea was midline. Flexible nasopharyngoscopy revealed pooling secretions in the hypopharynx and soft tissue fluctuance of the posterior pharyngeal wall with airway encroachment. The patient underwent immediate fiberoptic nasotracheal intubation.

The following day the patient was taken to the operating room where he underwent tracheotomy for a more secure airway (Figure B). Direct laryngoscopy was subsequently performed, revealing a severe amount of posterior pharyngeal wall ecchymosis and edema (Figure C), though the glottic structures themselves appeared minimally edematous (Figure D). The patient was decannulated without event on postoperative day #9.

CASE #2

A 75-year-old man with a history of paroxysmal atrial fibrillation underwent a right heart catheterization via UV access for radiofrequency ablation of his pulmonary veins. Prior to successful venous access for the procedure, multiple attempts had been made, during which a hematoma developed in the patient’s right neck. The patient had been anticoagulated for this procedure. He immediately underwent orotracheal intubation, and an ENT consultation was requested.

On physical exam the patient was noted to have marked soft tissue edema on the right side of his neck extending from the mandible down to the clavicle. He had ecchymosis around the intravenous site and his trachea was significantly deviated to the contralateral, left side. The remainder of the physical examination was normal.

A CT angiogram of the neck (Figure E) showed a prominent hematoma in the right neck (8x7x12cm). There was no evidence of contrast extravasation. The trachea was deviated approximately 2.5cm as a result of the mass effect from the hematoma.

The following day the patient was taken to the operating room where he underwent neck exploration and hematoma evacuation. Intraoperatively, the patient was found to have a large hematoma extending into the retropharyngeal space and a moderate amount of bleeding around the entrance point of the central venous line. The line was removed, revealing a 3mm hole in the UV, which was oversewn. The patient was extubated the following day without event.

DISCUSSION

UV cannulation resulting in a cervical hematoma and airway obstruction is uncommon (0-4.7%) but can be fatal [1-3]. When this occurs, one must suspect inadvertent arterial puncture by a large bore cannula or vessel dilator, though this can occur from venous effusion alone, as seen in case #2. Pseudoeurysm of the carotid, vertebral, and subclavian arteries, have been described following UV cannulation [4-6]. Early diagnosis is important, as smaller aneurysms are easier to treat surgically.

Proper cannulation of the UV is dependent on the UV running just lateral to the carotid artery, which occurs in the vast majority of patients (92-97%) [7-8]. The use of ultrasound to aid cannulation of the vein is associated with a reduced number of attempts and arterial puncture, and is recommended in high-risk patients, e.g. obesity, short neck, coagulopathy, and repeated cannulations [8]. Both of our patients were anticoagulated but did not undergo ultrasound-guided UV cannulation.

Direct compression of the trachea by a hematoma can result in airway obstruction [10]. Many authors, alternatively, believe that the rigidity of the trachea is difficult to compress and that a more likely mechanism of airway obstruction is pharyngolaryngeal edema secondary to venous and lymphatic obstruction by the hematoma [11-13]. This second mechanism may explain why more significant airway obstruction can be delayed.

Initial presentation of a patient with hematoma development following UV central line access may be subtle as in case #1. This patient had rather unremarkable cervical neck edema but no contrast extravasation was noted. The following day the patient was taken to the operating room where he underwent UV central line replacement. A retropharyngeal hematoma may have variable presentation, depending on its size and rate of formation. Patients classically present with clinical symptoms of tracheal and esophageal compression, manifesting as dysphagia, odynophagia, or dyspnea. A compression of the arytenoid cartilages can also occur, leading to hoarseness or complete airway obstruction.

Frequently, though often unnecessary, imaging studies are performed in assessment of a retropharyngeal hematoma. In general, the retropharyngeal soft tissue should measure no more than one-third to one-half the width of the cervical vertebrae [15].

The insidious nature of retropharyngeal hematomas may lead to serious consequences. Careful observation must be undertaken, even in patients who do not immediately present with a compromised airway. Dyspnea can begin suddenly with a possible fatal outcome [14]. Early precautions to secure the airway should be undertaken when patients present with dyspnea. Endotracheal intubation was performed in both of our patients; however, this may be difficult in some situations because of the hematoma compression on the airway. Traumatic intubation may result in the rupture of the hematoma and worsening edema, leading to further airway compromise. Fiberoptic endoscopy, as performed in case #1, may aid in performing a non-traumatic intubation.

The second stage of treatment is management of the hematoma. This may be evacuated through a lateral cervical approach, as in case #2, and drains may be placed into the retropharyngeal space. Some authors prefer transoral aspiration. This is not an emergency procedure and should be performed only after the airway has been secured. Waiting for the resorption of the hematoma is also possible.

Surgery for cervical and/or retropharyngeal hematoma formation is not always mandatory. When a hematoma does not cause any dyspnea or dysphagia, hospitalization for observation (24-72 hours) and supportive treatment are acceptable.

CONCLUSIONS

The development of a hematoma following traumatic UV cannulation is a rare but potentially life-threatening event that requires early recognition and may require urgent intervention. It is important to consider inadvertent arterial puncture and retropharyngeal hematoma formation when evaluating these patients. Anticoagulated patients are at a higher risk of hematoma progression and resultant airway compromise. Early precautions to secure the airway by intubation or tracheostomy placement are critical in some cases. Others may only require close observation in the hospital. Hematoma evacuation by a transoral or lateral cervical approach may also be necessary. The outcome in these patients is good when the diagnosis is made early and followed by the appropriate treatment.

REFERENCES


PATIENT CONSENT

The patient provided consent for publication of this case report.