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Case Report

Airway compromise following contrast extravasation from an external jugular intravenous line ☆,☆☆

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ABSTRACT

Extravasation of iodinated contrast material (ICM) is an uncommon complication (0.1%-1.2%) following intravenous injection for computed tomography exams and other procedures. Most cases of contrast extravasation are mild and resolve without treatment. Alternative injections sites are occasionally necessary among patients with difficult vascular access and are at increased risk of contrast extravasation and subsequent complications compared to the antecubital fossa. We describe a rare case of airway compromise necessitating intubation following iodinated contrast extravasation from an external jugular IV line. Additional care and monitoring must be performed during and after injection of contrast into these higher-risk vascular access sites.

Case report

A 67-year-old male with a history significant for ischemic cardiomyopathy status postcardiac transplant on immunosuppressive and antiplatelet therapy but no prior history of thrombosis or coagulopathy presented to the emergency department (ED) with a cyanotic appearance of the distal right extremity and associated arm pain, swelling, and diminished right radial pulse. Upper extremity ultrasound was suggestive of high-grade proximal arterial thrombus in the upper arm, prompting the ED provider to request a CT angiogram (CTA) of the right upper extremity for confirmation of this suspected clot. A 16 Ga left antecubital fossa IV placed in the ED was assessed by nursing staff and could not be used for contrast injection due to poor blood return. Accordingly, the ED attending staff placed a 16-gauge peripheral IV in the external jugular (EJ) vein using ultrasound guidance, and patency was confirmed with a saline flush. During the subsequent CTA exam, a total of 140 mL contrast material and a 30 mL saline flush

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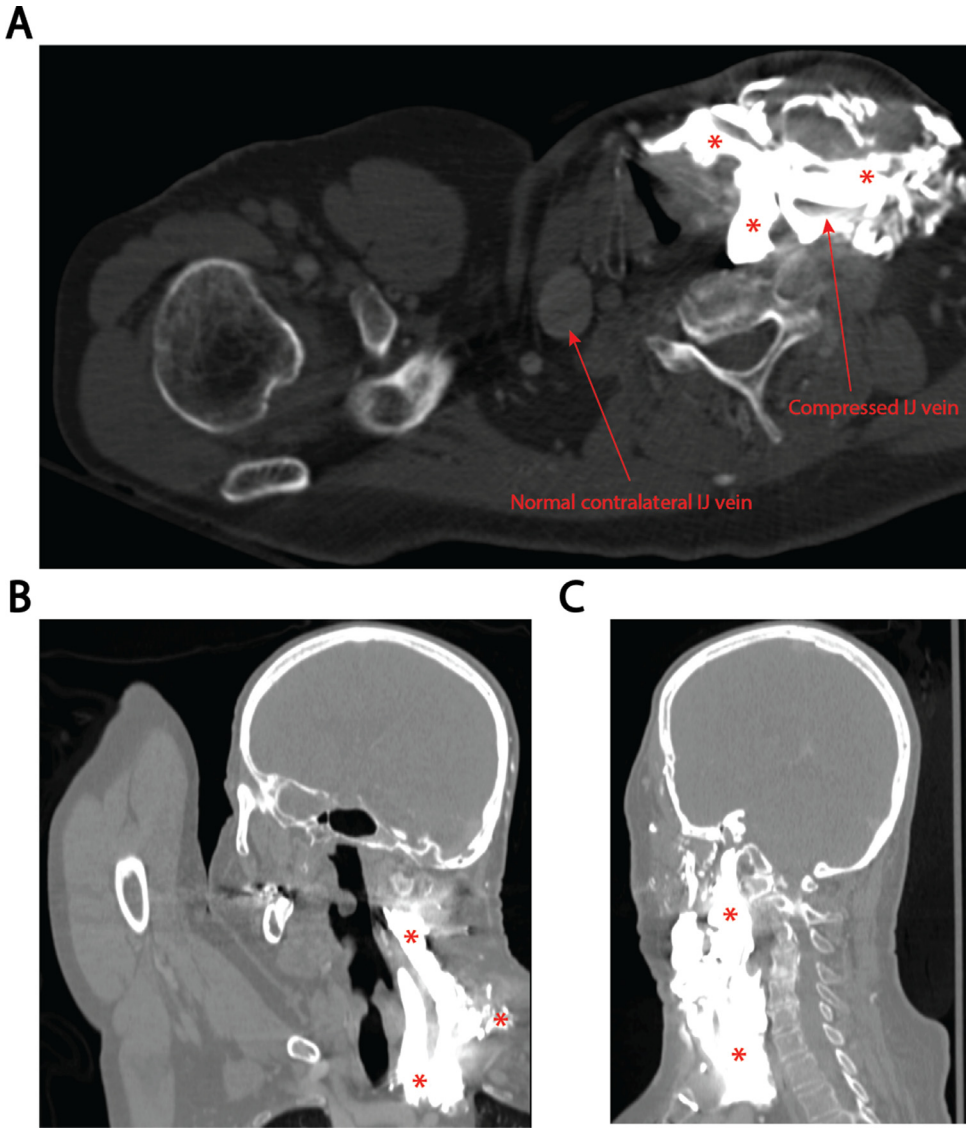

Fig. 1 – CT angiogram (CTA) of the right upper extremity demonstrating iodinated contrast material extravasation into neck tissue. Delayed phase axial CT (A) demonstrates large volume of extravascular contrast in the left neck, insinuating throughout the soft tissues (asterisks). The extravascular contrast outlines the extrinsically narrowed left internal jugular vein. The external right jugular vein is noted for reference. Delayed phase coronal (B) and sagittal (C) CT demonstrates extent of extravascular contrast media in the left neck (asterisks), also outlining the common carotid artery.

were injected into the EJ line by power injector at a rate of 5 cc/sec. Nursing reported a total of 65 mL of fluid (35 mL contrast and 30 mL saline) extravasated into the neck at the end of the injection. This extravasation was visible on CT images (Fig. 1). Nursing attempted to aspirate the extravasated contrast with no success. The patient reported both pain and localized swelling at the injection site. Upon closer evaluation, there was no evidence of skin turgor nor was there indication of airway compromise. Ice packs were applied by CT technologists and nursing staff and the ED staff were notified. Swelling persisted upon return to the ED.

Review of the CTA identified a 2 cm long intraluminal filling defect compatible with a nearly occlusive embolic-type thrombus in the proximal right axillary artery, 5 cm from the thoracic inlet. No venous thrombosis was identified with concurrent ultrasound. Two hours after extravasation, the patient underwent successful embolectomy under general anesthesia without complication and was subsequently extubated and transferred to postanesthesia recovery (3 hours after extravasation). However, almost immediately after extubation the patient decompensated and experienced respiratory distress due to worsening signs of upper airway obstruction. Providers felt that the cause of respiratory distress was neck swelling possibly due to fluid collection in the neck tissue. The patient was re-intubated and transferred to the intensive care unit for further management.

After ICU transfer, the care team identified an extensive neck hematoma with tracking to the upper chest wall based

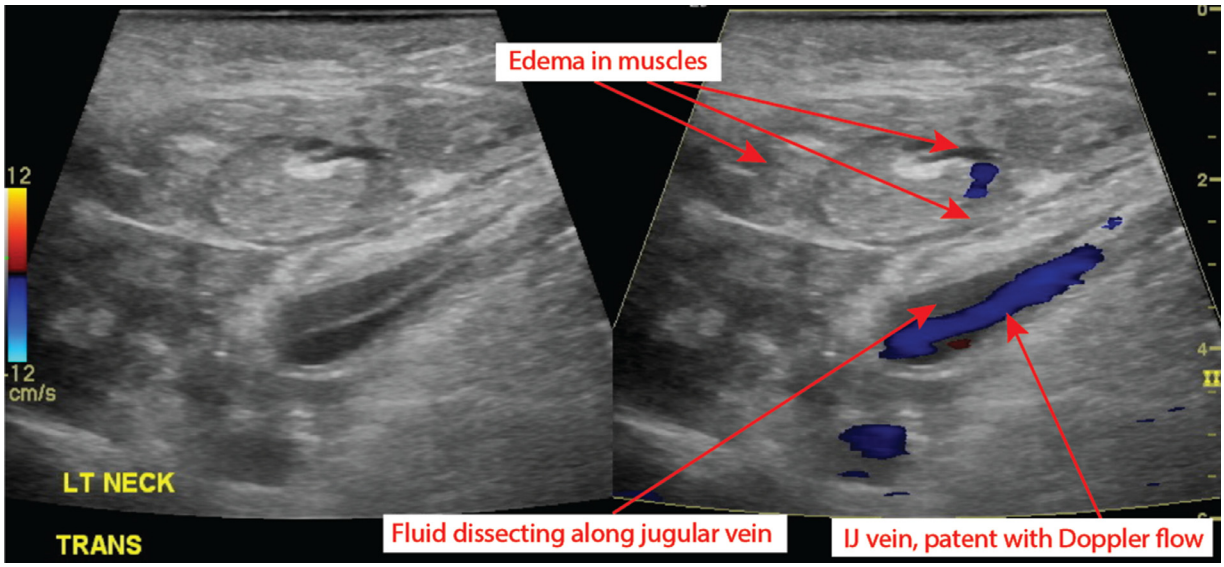

Fig. 2 – Neck ultrasound following contrast extravasation. Oblique transverse grayscale and Doppler images demonstrate patency of the left internal jugular vein which is compressed by extravascular fluid tracking along the vessel wall. Edema is noted in the overlying sternocleidomastoid muscle and along the fascial lines.

upon physical exam and portable ultrasound exam. The patient's hemodynamics remained stable throughout their ICU hospitalization without the need for pharmacologic intervention. Diagnostic ultrasound of the neck demonstrated marked soft tissue swelling in the affected region without evidence of discrete hematoma (Fig. 2). The patient was monitored overnight. The next morning the swelling was noted to have markedly improved and softened. The patient was extubated 24 hours after extravasation without complication and subsequently transferred to a step-down inpatient surgical service. The patient reported mild to moderate pain in his neck and odynophagia. The patient was discharged 5 days after initial presentation with minimal residual swelling noted at discharge. No further complications were reported during follow-up 19 days later.

Discussion

We report a rare severe adverse event associated with the injection of iodinated contrast media into an external jugular (EJ) line and subsequent contrast extravasation. This large extravasation caused rapid onset soft tissue injury to the deep fascial planes and tissues of the neck within a few hours of extravasation, triggering an acute local inflammatory response and pronounced swelling that resulted in airway compromise and required immediate intervention. This unfortunate complication resulted in intubation, prolonged hospitalization, and the need for ICU-level care for this patient. Immediate intervention is needed when there is contrast extravasation in the neck tissue. Had this complication not been immediately recognized or if intervention had been delayed, a more serious outcome or death could have occurred. We provide this case to educate radiologists, providers, and medical staff on this rare but serious adverse event.

Most cases of contrast extravasation are mild, presenting as swelling and tenderness that resolves within hours to days, and require no treatment [1–3]. Moderate injuries including skin blistering and prolonged pain can occur. Severe injuries including skin necrosis and compartment syndrome in the arm or extremity where injection occurred, are rare and require immediate treatment or surgery. These more serious adverse events are more likely to occur among patients with difficult vascular access [1].

Limited studies have been performed examining the safety of contrast injections into EJ or internal jugular (IJ) IV lines. A 2015 case report documented tracheal compression in a patient a few hours after contrast extravasation from an EJ line [4]. Urgent excision and drainage surgery was performed without complication, and the patient was discharged and fully recovered. Prior studies recommended utilizing EJ or IJ access in patients with difficult access to drug delivery [5]. Xu et al. [6] reviewed 96 cases of contrast injection through EJ access and reported good image quality and no complications. The authors recommended EJ access if antecubital access is not available. The American College of Radiology Manual on Contrast Media notes that extravasations and severe extravasation injuries are more common with hand, foot, and ankle injection sites, and notes that only certain central venous catheter port sites are certified for power injection [1]. Many radiology departments either only allow EJ/IJ contrast injections when they are injected by hand or a reduced power injection rate or do not allow EJ/IJ injections at all.

Based on this case and our overall institutional experience with contrast extravasation, we recommend avoiding contrast injection into central venous catheters (ie, smaller lumen EJ/IJ IV lines) whenever possible and utilizing peripheral vascular access sites instead, even if this vascular access

must be established prior to CT scanning. If peripheral venous access is not available, contrast should be injected by hand if possible in lieu of power injection into a central venous line to minimize the risk of vascular injury and extravasation amongst patients with “fragile” vasculature. This may mean that certain CT exams that require strict contrast bolus timing, such as angiographic exams, may either not be able to be performed in this clinical scenario or would warrant an informed discussion before proceeding. Following injection, any patient with suspected extravasation should be closely monitored over the next several hours to ensure that there is no risk of airway compromise. Equipment and staff should be readily available if intubation is necessary.

In conclusion, we report a severe adverse event of airway compromise necessitating intubation due to extravasation of iodinated contrast media from an external jugular (EJ) line. Contrast injection into EJ and IJ IV lines should be avoided to prevent this complication.

Patient consent

Informed consent was obtained from the patient for use of their medical record for research and educational purposes.

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