

AMSER Case of the Month

August 2024

21 y.o. F presenting with AMS, after initially presenting with DKA which had resolved



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Patient Presentation

- **HPI:** 21 y.o. F initially presented with DKA, requiring intubation & central line placement. Pt's labs improved and she was extubated, but soon after developed AMS
- **PMH:** T1DM
- **PE on initial presentation:** obtunded, otherwise normal
- **PE after extubation:** unresponsive, decorticate posturing on R side, myoclonus
- **Vitals on initial presentation:** hypotensive, Temp 31.7, others unknown (OSH)
- **Labs on initial presentation:** glucose 1298, AG 36, bicarb < 7, WBC 45k, urinalysis clean
- **Vitals after extubation:** HR 90s, SBP 120-130 (on levophed)
- **Labs after extubation:** glucose 200, WBC 6.7, bicarb normalized

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 4: Intensive care unit patient following support device placement. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography chest portable	Usually Appropriate	⊕
US chest	May Be Appropriate (Disagreement)	○

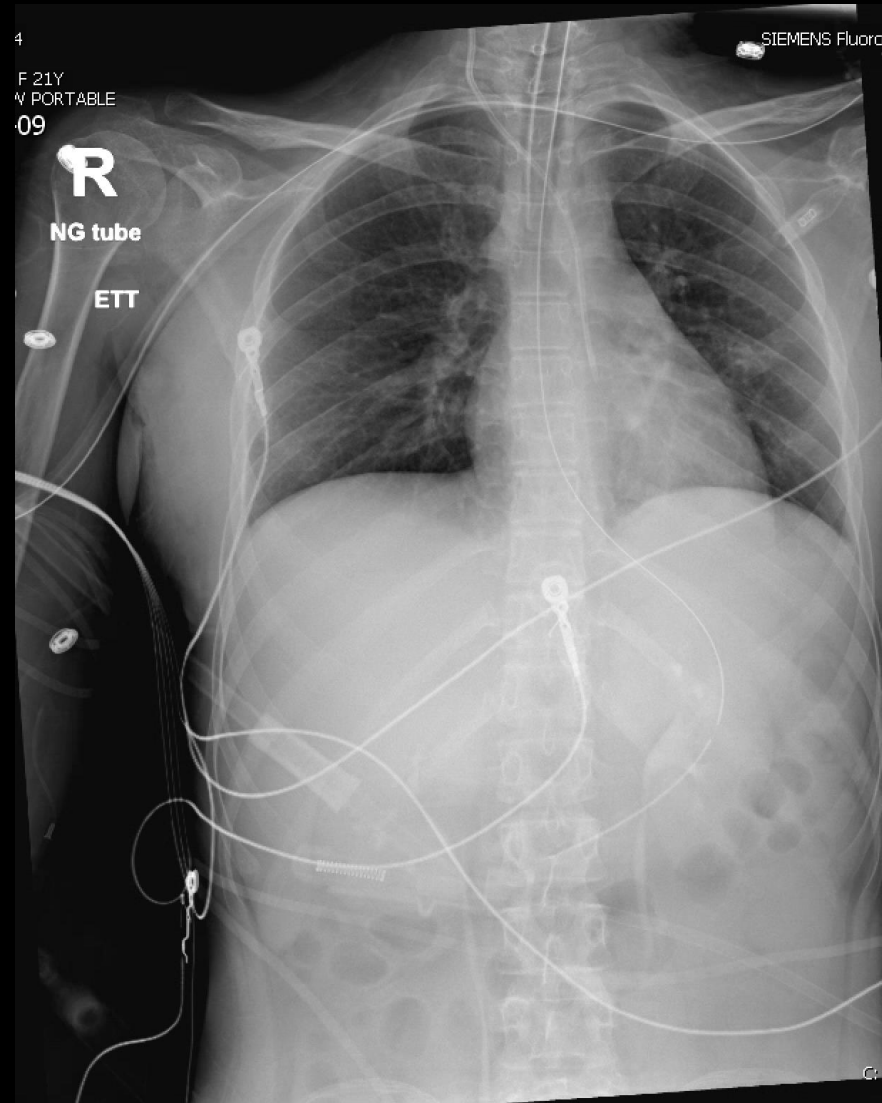
This imaging modality was ordered by the ER physician after initial central line placement

Variant 3: Intensive care unit patient with clinically worsening condition. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography chest portable	Usually Appropriate	⊕
US chest	May Be Appropriate (Disagreement)	○

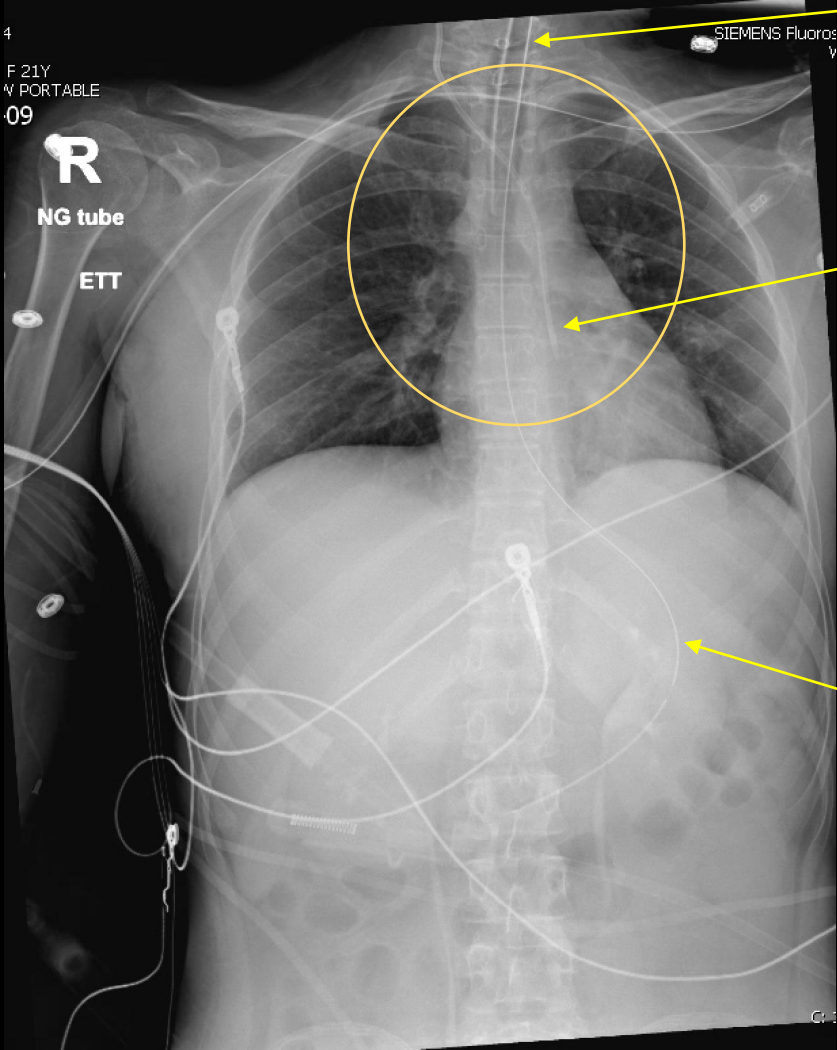
This imaging modality was again ordered in the ICU due to worsening clinical status of unknown etiology

Findings (unlabeled)



Findings (labeled)

Right CVC courses across midline and projects over central heart



Normal endotracheal tube

Tip of catheter crossing the midline into left heart

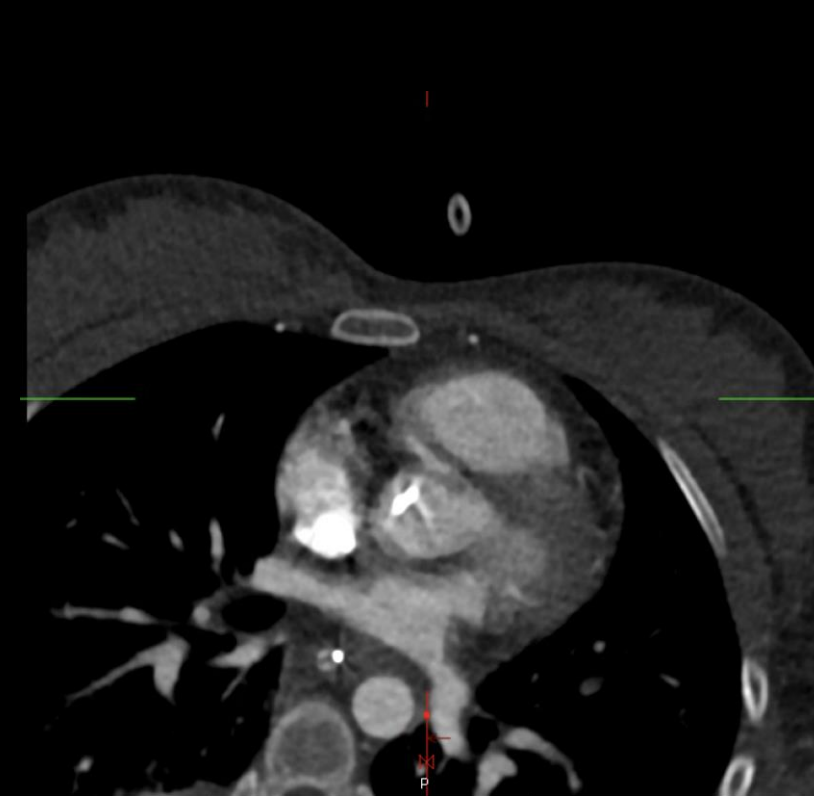
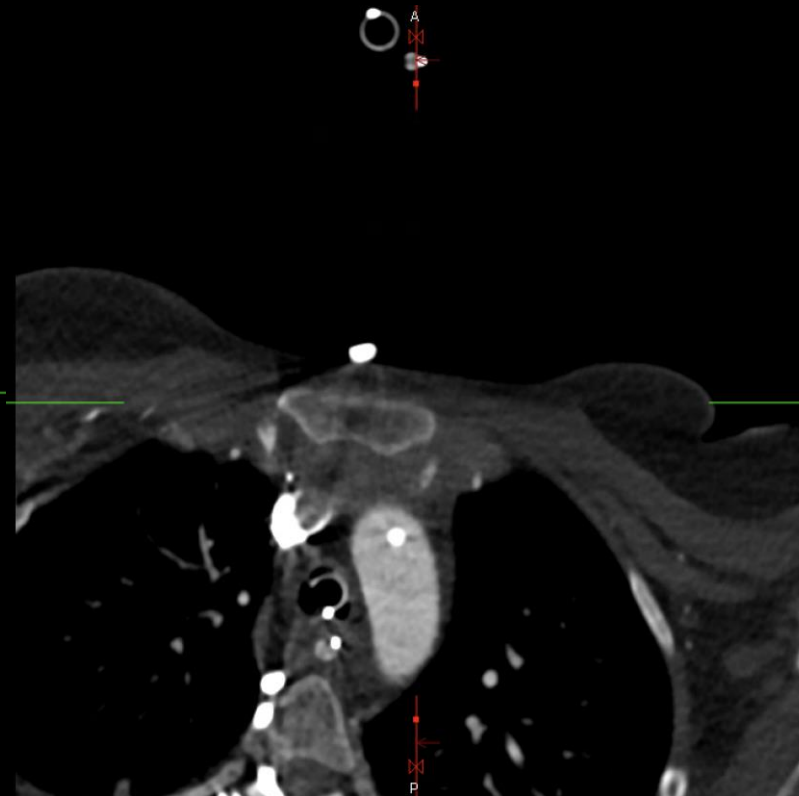
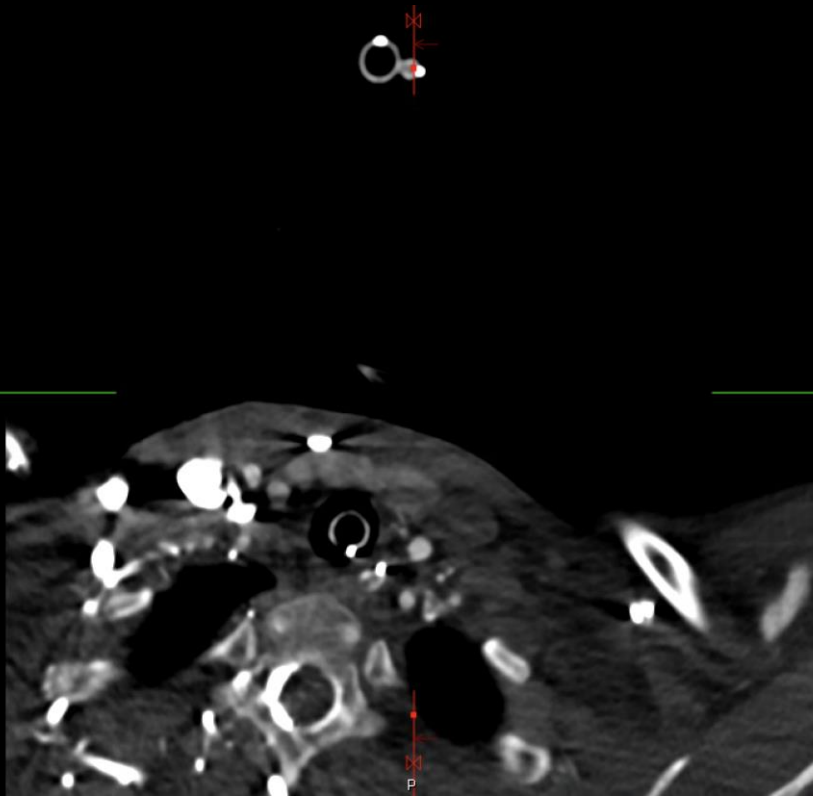
Normal NG tube

Additional Imaging (unlabeled)

CTA neck with IV contrast



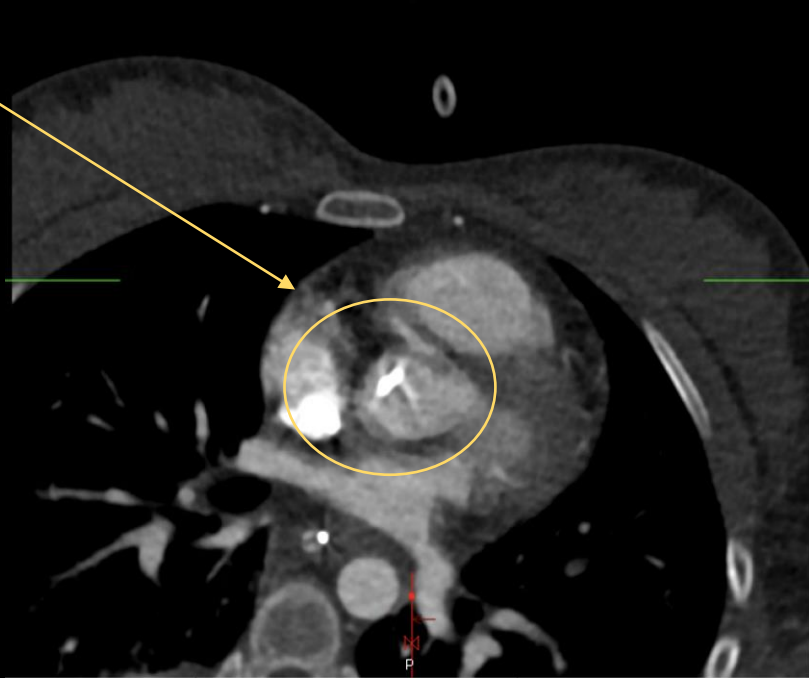
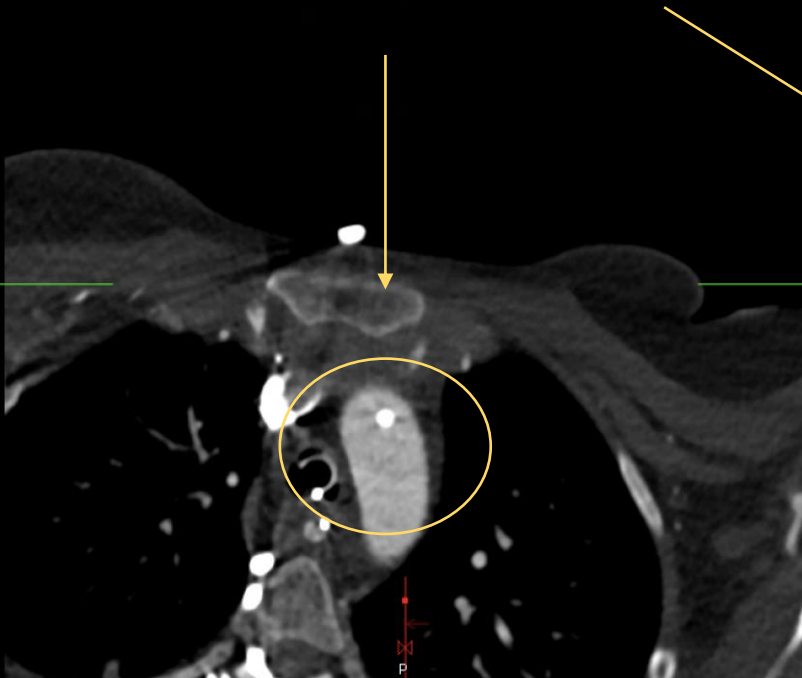
This imaging study was ordered to confirm catheter malplacement and aid in surgical planning



Findings (labeled)

CVC crosses through right IJ into right subclavian artery

Catheter tip projects in ascending aorta at level of aortic valve



Final Dx:

Central Venous Catheter Malplacement

Central Venous Catheterization

- Definition: Insertion of an indwelling catheter device that terminates in SVC, IVC, or right atrium
- Indications for CVC placement include:
 - When medications harmful to peripheral veins must be administered (vasopressors, TPN, chemotherapy)
 - If unable to obtain venous access in emergency situation
 - Hemodialysis, plasmapheresis, and continuous renal replacement therapy
 - Hemodynamic monitoring (CVP)
 - For IVC placement, thrombolytic therapy, transvenous cardiac pacing
- Common access sites:
 - **Internal Jugular Vein (IJ)**: Reliable anatomy, direct path to SVC, accessible by ultrasound guidance
 - **Subclavian Vein (SC)**: accessible in trauma (C-collar blocks IJ); higher pneumothorax risk
 - **Femoral Vein**: Easily compressible, avoids pneumothorax risk, does not allow accurate CVP measuring

Case Discussion

- CVC placement should always be confirmed with chest xray
- Chest xray was obtained in this patient, however CVC malposition was not addressed
- Important to identify proper position of lines and tubes to avoid complications (ischemic stroke, vasospasm, dissection)
- Upon deterioration and transfer to higher level of care, catheter misplacement was identified on repeat chest xray and confirmed with CTA Neck
- Catheter was subsequently removed, subclavian artery repaired by vascular surgery

Takeaway Points

- Proper CVC placement can be confirmed with blood gas sampling
- Chest xray should always be performed after CVC placement to confirm proper positioning
- Always ensure proper position of lines and tubes when reading chest radiographs

References:

1. Ängeby E, Adrian M, Bozovic G, Borgquist O, Kander T. Central venous catheter tip misplacement: A multicentre cohort study of 8556 thoracocervical central venous catheterisations. *Acta Anaesthesiol Scand*. 2024;68(4):520-529. doi:10.1111/aas.14380
2. Demetrios A. Raptis, Kevin Neal, Sanjeev Bhalla. Imaging Approach to Misplaced Central Venous Catheters, *Radiologic Clinics of North America*, Volume 58, Issue 1, 2020, Pages 105-117.
3. Funaki B. Central venous access: a primer for the diagnostic radiologist. *AJR Am J Roentgenol*. 2002;179(2):309-318. doi:10.2214/ajr.179.2.1790309
4. Raptis DA, Neal K, Bhalla S. Imaging Approach to Misplaced Central Venous Catheters. *Radiol Clin North Am*. 2020;58(1):105-117. doi:10.1016/j.rcl.2019.08.011