Utility of the Hybrid CT/Angiography IR Suite for Percutaneous Sclerotherapy of an Infiltrative Venous Malformation

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Teaching Point

Hybrid angiography-computed tomography (Angio-CT) suites can provide better image quality, support stream-line procedure day workflows, and improve clinical outcomes compared to traditional angiography suites.

Background

Hybrid Angio-CT suites combine a mobile, sliding CT unit with a fully functional angiography system and allow for integration of CT and fluoroscopy image acquisition with enhanced field-of-view. This hybrid system allows the operator to perform complex procedures requiring both high-resolution cross-sectional imaging and fluoroscopy while reducing transportation time between the interventional radiology (IR) suite and diagnostic CT rooms. In addition to superior imaging quality and stream-lined workflow, the use of hybrid Angio-CT suites can reduce the use burden of diagnostic CT systems, reduce radiation exposure to both patient and operator, and improve the efficiency of hospital-wide radiologic services. The benefit of Angio-CT suites for the localization and treatment of liver tumors is well established. Emerging Angio-CT uses include cryoablation therapy of renal cancers, sclerotherapy of vascular malformations, and embolization in trauma.

Objective

To highlight the utility of the hybrid Angio-CT suite (Nexaris; Edge/AXIOM-Artis, Siemens, Forchheim, Germany) for percutaneous sclerotherapy of a complex, infiltrative vascular malformation involving the head and neck.

Case Presentation

A 37-year-old female with a large, infiltrative face and neck venous malformation (VM) underwent percutaneous sclerotherapy using combined ultrasound, fluoroscopy, and computed tomography (CT) guidance. Symptoms included pain, swelling, difficulty swallowing, and facial pressure. On MRI, the VM involved the right masticator, parotid, and parapharyngeal spaces with significant laryngeal narrowing. Due to the need to treat both superficial and deep pharyngeal lesions, a hybrid CT/Angiography IR suite was used **(Figure 1)**.

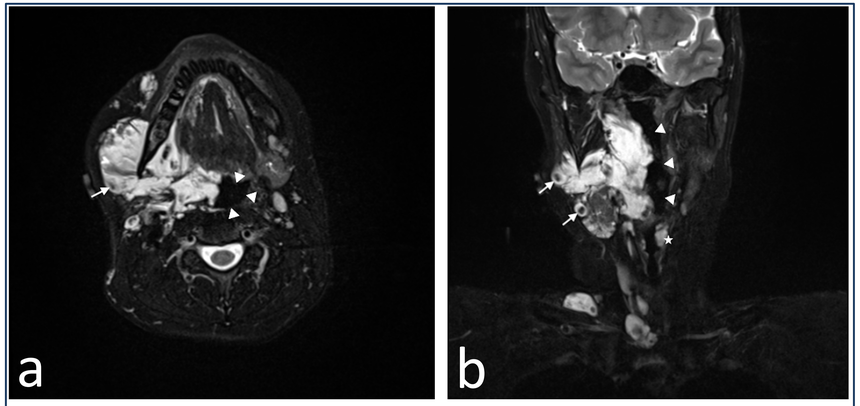

Figure 1. T2-weighted MR (1.5 Tesla, Aera, Siemens, Germany) axial (a) and coronal (b) images with fat-saturation (echo time = 90ms, repetition time = 5700ms, flip angle = 160°) showing a trans-spatial hyperintense venous malformation within the right face and neck, primarily centred within the right masticator space with extension into the right buccal space, right parapharyngeal space, right sublingual and submandibular spaces, and right parotid space. It also involves the right aspect of the tongue with mass effect on the right oropharynx (arrowheads), left aspect of the larynx (star), right sternocleidomastoid muscle, and right supraclavicular region. T2 hypointense foci are noted within the right masticator component corresponding to phleboliths (arrows).

Procedure Details

Pre-sclerotherapy non-contrast CT of the head and neck was performed to plan needle placement. Under general anaesthesia with nasotracheal intubation, the masticator, posterior mandibular, and parapharyngeal components were accessed percutaneously using five 21-gauge needles under CT guidance **(Figure 2)**. Ultrasound (EPIQ-7, Philips, USA) was used to access additional four superficial sites. Pre-embolization Digital Subtraction Venography (DSV) was performed at each site to confirm intravascular location of needle tip, and to assess VM distribution and draining veins. Foamed bleomycin foam was injected using negative DSV **(Figure 2)**. Bleomycin was selected to minimize post-sclerotherapy airway oedema. Post-treatment, non-contrast CT (Nexaris) was performed to evaluate bleomycin distribution showing expected coverage **(Figure 3)**.

Outcome

The patient tolerated the procedure well with no complications. She remained intubated for airway protection and admitted overnight to the ICU. She was extubated in <24 hours and was able to tolerate oral diet with no respiratory or pain-control issues. At 3-month follow-up, her pain and morning soreness had resolved.

Procedure Details

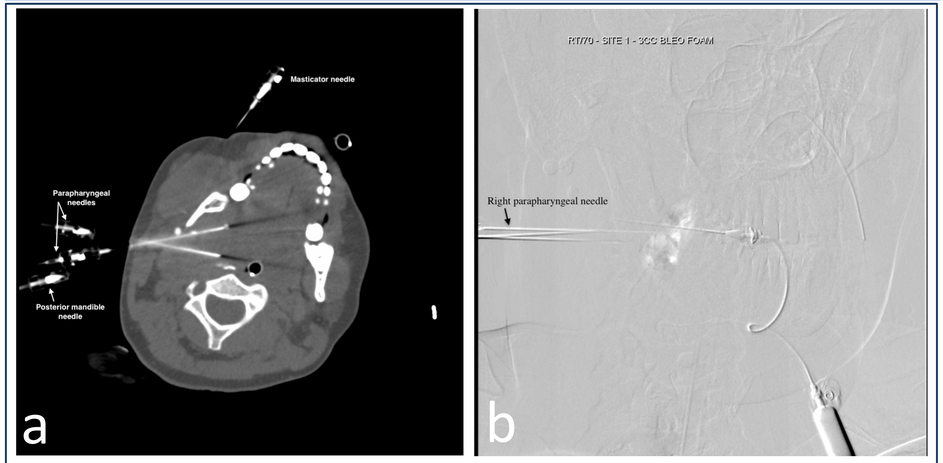

Figure 2. (a) Intra-procedural non-contrast CT axial image showing initial percutaneous needle placement at different components of the venous malformation. Two 7 cm 21-gauge needles are seen placed at the parapharyngeal component of the lesion. (b) Negative contrast Digital Subtraction Venography (DSV) image showing percutaneous injection of foamed bleomycin at the right parapharyngeal component of the venous malformation. 6 U of bleomycin (Pfizer, New York) in 1 mL normal saline solution plus 1 mL human 25% serum albumin mixed 2:1 air to liquid were used. A total of 31 mL foamed bleomycin was injected at 7 different sites.

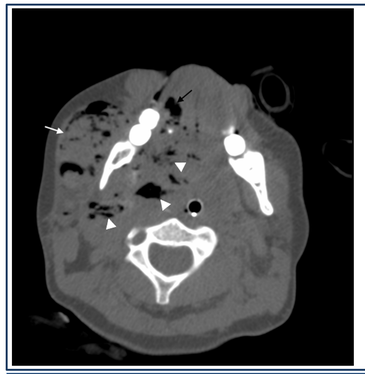

Figure 3. Post-sclerotherapy intra-procedural non-contrast CT image in axial plane showing immediate treatment changes within the right masticator (white arrow), right parapharyngeal (arrowheads), and right posterior tongue (black arrow) components of the venous malformation. An intra-tracheal tube was inserted for temporary airway protection against post-sclerotherapy oedema.

Conclusion

This case underscores the utility of hybrid Angio-CT systems for treating an infiltrative/deep venous malformation without the need for endoscopic or laryngoscopic assistance.

References

1. Khalil A, Bailey CR, Weiss CR. Percutaneous Sclerotherapy of a Large Trans-Spatial Oropharyngeal Venous Malformation Using Multimodality Guidance. J Vasc Interv Radiol. 2022;33(1):92-93.e1. doi:10.1016/j.jvir.2021.09.017
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