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## Case Report

# Upper extremity tumor embolization using a transradial artery approach: technical note

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### ABSTRACT

Transradial access is being used with increasing frequency for interventional radiology procedures and offers several key advantages, including decreased access site complications and increased patient comfort. We report the technique of using transradial access to perform preoperative embolization of a humeral renal cell carcinoma metastasis and pathologic fracture. A transradial approach for performing humeral preoperative tumor embolization has not been previously reported, to our knowledge. In the appropriately selected patient, this approach may be safely used to perform upper extremity embolization.

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## Introduction

Radial artery access is increasingly used in percutaneous coronary intervention (PCI) in part due to lower vascular complication rates and improved patient comfort [1]. Transradial access has been adopted to some degree as well for interventional radiology procedures, such as uterine fibroid embolization [2]. Nevertheless, preoperative embolization of osseous metastases from hypervascular tumors (such as renal cell carcinoma [RCC]) is traditionally performed through transfemoral access. We describe a case of a patient with RCC presenting with right upper extremity pain found to have a lytic lesion of the right humerus (subsequently biopsy proven

RCC metastasis). To our knowledge, we present the first reported case of preoperative humeral tumor embolization performed through transradial artery access.

## Case report

A 76-year-old man presented to the emergency room complaining of right upper extremity pain. The pain developed after heavy lifting and gradually progressed to difficulty lifting the arm over the next several days. Outside hospital evaluation revealed a mildly displaced right humeral midshaft fracture with associated lytic lesion. The patient was referred

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to our institution for further evaluation and management. On arrival, the patient was in severe 10/10 pain, and physical examination was significant for right upper extremity tenderness and immobility.

The patient's medical history was notable for RCC status after left radical nephrectomy 10 years prior. Given the appearance of the lesion and the age and history of the patient, differential diagnosis included metastatic disease, with primary malignancy and benign entities such as osteomyelitis or brown tumor considered less likely. Laboratory tests demonstrated normal white blood cells (5.5 K/uL) and Ca (8.7 mg/dL) with no evidence of infection, hyperparathyroidism, or monoclonal proteins, thereby making brown tumor, osteomyelitis, multiple myeloma, or plasmacytoma unlikely. Preoperative laboratory tests demonstrated Hgb, 12.1 g/dL; Hct, 36.9%; Plt, 274 K/uL; international normalized ratio, 1.0.

### Imaging

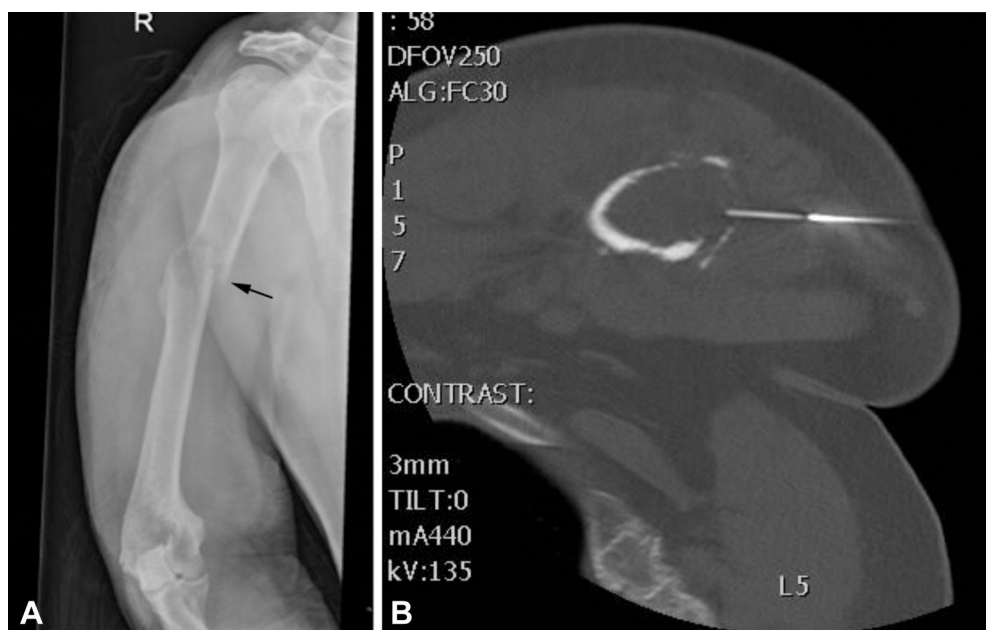
Outside hospital humerus radiographs (Fig. 1) revealed pathologic fracture of the right humeral midshaft with associated lytic lesion. Subsequent computed tomography-guided biopsy (Fig. 1) confirmed RCC metastasis.

### Interventions

Before obtaining radial artery access, modified Allen's test was performed using pulse oximetry and plethysmography as described by Barbeau et al [3], confirming palmar arterial supply through the ulnopalmar arcade. In addition, ultrasound was performed and demonstrated the radial artery to be of adequate diameter for safe access and sheath

placement. After induction of general anesthesia, right radial access was obtained with a Terumo 4-French radial artery access kit, and a 4-French sheath was placed (Terumo Medical, Somerset, NJ, USA). Nitroglycerin 200  $\mu$ g and verapamil 2.5 mg were administered through the arterial sheath simultaneously to prevent arterial spasm and to reduce vascular tone. In addition, 3000 units of heparin were administered intravenously to minimize the risk of radial artery thrombosis. A 0.035-angled Glidewire (Terumo) and 4-French Kumpe catheter (Cook Medical, Bloomington, IN, USA) were used together to access the right subclavian artery. An angiogram of the right upper extremity was performed revealing a hypervascular tumor at the site of the displaced proximal humeral fracture (Fig. 2). The tumor demonstrated a complex blood supply via numerous branches of the right brachial artery and the posterior circumflex humeral artery. The catheter and guidewire were then used in conjunction to subselect a branch of the right brachial artery feeding the tumor. The wire was exchanged for a Renegade HI-FLO microcatheter (Boston Scientific, Marlborough, MA, USA) and a Fathom-14 guidewire (Boston Scientific), which were advanced into a tertiary arterial branch. Embolization with 300-500  $\mu$  and 500-700  $\mu$  Embospheres (Merit Medical Systems, South Jordan, UT, USA) was attempted but discontinued due to early draining vein visualization. The decision was made to carefully administer the higher viscosity Onyx-34 liquid embolic agent (Covidien, Mansfield, MA, USA) with caution to prevent deep venous reflux. Embolization to stasis was performed successfully with Onyx-34.

Postembolization angiography displayed additional tumor supply from an additional brachial artery branch (Fig. 2). After subselection using the microcatheter system, embolization was performed again with 500-700  $\mu$  Embospheres and Onyx-34. Embolization to stasis was repeated in one additional



**Fig. 1 – (A) Preoperative right humeral radiograph demonstrates a mid-diaphyseal fracture with surrounding lucency concerning for pathologic fracture. (B) Intraprocedural computed tomography scan during biopsy demonstrates needle within the lucent mass, subsequently pathologically proven to be RCC metastasis.**

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