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Application of cone-beam computed tomography angiography in a uterine fibroid embolization procedure: A case report

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ABSTRACT

One of the main causes of failure in uterine fibroid embolization procedures is incomplete infarction of the fibroid due to alternate vascular supply to the fibroid which was not identified by the operator. Cone-beam computed tomography angiography was used in this case to avoid nontarget embolization via a uterine artery, as well as identify incomplete embolization of the fibroid. This prompted a search for variant vascular supply to the fibroid, which was found to be originating from the right ovarian artery. Therefore, the use of cone-beam computed tomography angiography led to a successful outcome, which otherwise may not have been achieved.

Introduction

Cone-beam computed tomography (CBCT) angiography is an established radiographic study that is increasingly being used in the interventional radiology suite to guide and facilitate interventional procedures. It is performed by a 200° rotation of a C-arm while acquiring data continuously at different projections. The dataset is then processed to provide a CT study. This imaging modality allows excellent delineation of arterial anatomy, and has the advantage of providing cross-sectional evaluation of tissue perfusion. It enables the operator to deduce which arteries or arterial branches give supply to certain organs or specific regions of an organ.

This modality was initially used in oncologic interventional radiology procedures, such as transcatheter arterial chemoembolization and Y-90 radioembolization planning. Its use has recently expanded to other procedures, such as prostate artery embolization and aortic endoleak embolization. We report a case where CBCT angiography was used effectively in a uterine fibroid embolization (UFE) procedure.

Our ethics review board exempted this case report from institutional review.

Procedure

The patient on whom the procedure was performed is a 42-year-old woman who presented with menorrhagia and

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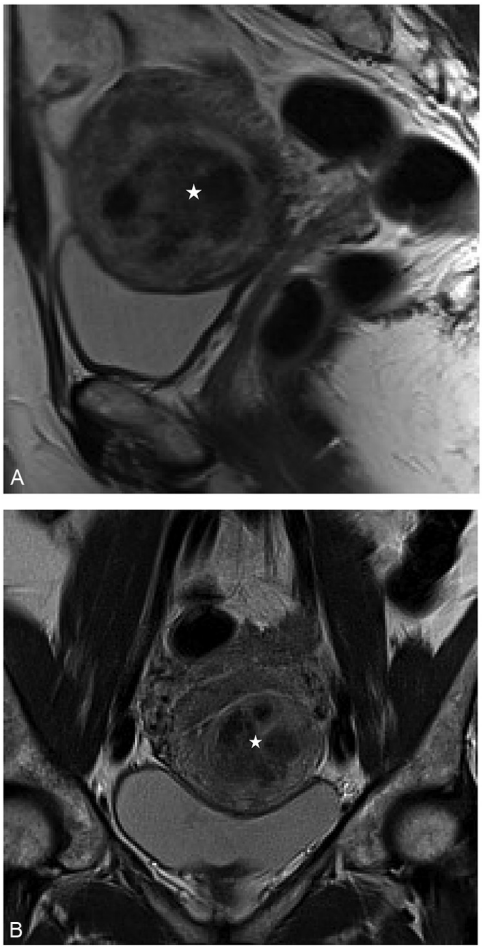

Fig. 1 – (A, B) Sagittal T2 magnetic resonance image showing low-intensity lesion in the myometrium abutting the endometrial canal, representing a large submucosal fibroid (star). Coronal T2 magnetic resonance image showing the same lesion (star).

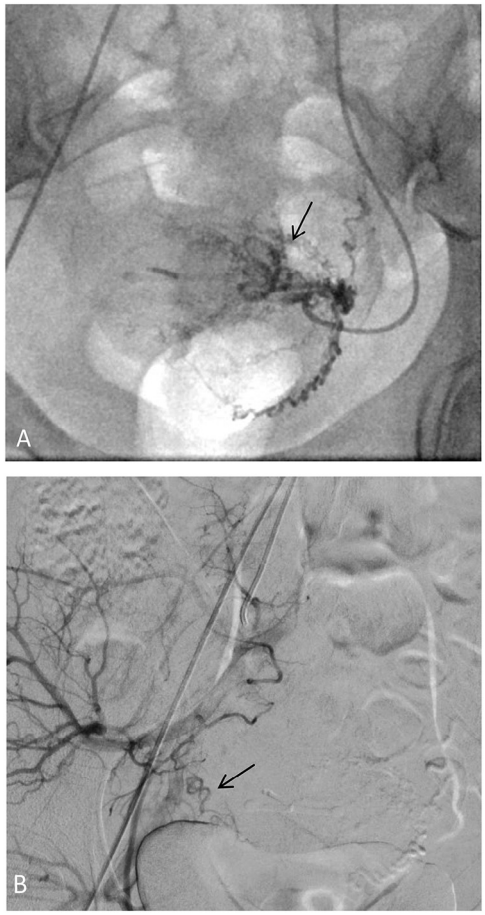

Fig. 2 – (A) Fluoroscopic screenshot with contrast media injected via the normal left uterine artery shows vascular perfusion of the left side of the uterus with expected increased vascularity at the body and fundus containing a uterine fibroid (arrow). (B) DSA performed via the anterior division of the right internal iliac artery shows a right uterine artery (arrow) that is of much smaller caliber than would be expected in a premenopausal woman with a large uterine fibroid.

dysmenorrhea. Her medical history was unremarkable, as was her surgical history except for 3 deliveries by cesarean section. A magnetic resonance imaging (MRI) study was obtained of her pelvis (Fig. 1A and B). The result demonstrated a large submucosal endometrial fibroid, measuring approximately $3.1 \times 4.2 \times 4.7$ cm in size with an estimated volume of 30.6 cc. After a discussion with the patient regarding all available treatment options, she accepted to undergo a UFE procedure (Figs. 1-8).

The procedure started in an uneventful fashion. The left uterine artery was cannulated using a hydrophilic Cobra 2 catheter (Glidecath, Terumo). Fluoroscopic screening with contrast media injected via the catheter demonstrated normal appearance of the uterine artery, with expected uptake of the contrast media at the fundus and body of the uterus containing the fibroid (Fig. 2A). Embolization was performed without complication using a solution of 700 μm microspheres (Embozene, Boston Scientific) mixed with iodinated water-soluble contrast media until stasis of flow was achieved.

The anterior division of the right internal iliac artery was then cannulated and digital subtraction angiography was performed. This demonstrated a right uterine artery of much smaller caliber than would be expected in a premenopausal woman with a large submucosal fibroid (Fig. 2B). To ascertain if embolization of this artery would be of any benefit, CBCT angiography was performed with the catheter within the right uterine artery (Fig. 3 and Fig. 4). The C-arm used was a Siemens Artis Q with PURE software. The CBCT protocol was a 5-second rotation with DR Body Care.

Axial, coronal, and sagittal reconstructions of the CT angiographic images were reviewed. They demonstrated no contrast media uptake within the right half of the fibroid, and no vascular supply to most of the body and fundus of the uterus from the right uterine artery. Small branches from the artery were seen to supply the cervix and a part of the lower body of the uterus. Furthermore, it showed static contrast within the left half of the fibroid, indicating the portion of the fibroid that had been treated by the embolic material injected via the left uterine artery.