

IR Below the Belt: Vascular and Non-Vascular Embolotherapy in the Pelvis

Purpose

We aim to highlight the wide spectrum of embolotherapy for benign and malignant disease in the female and male pelvis.

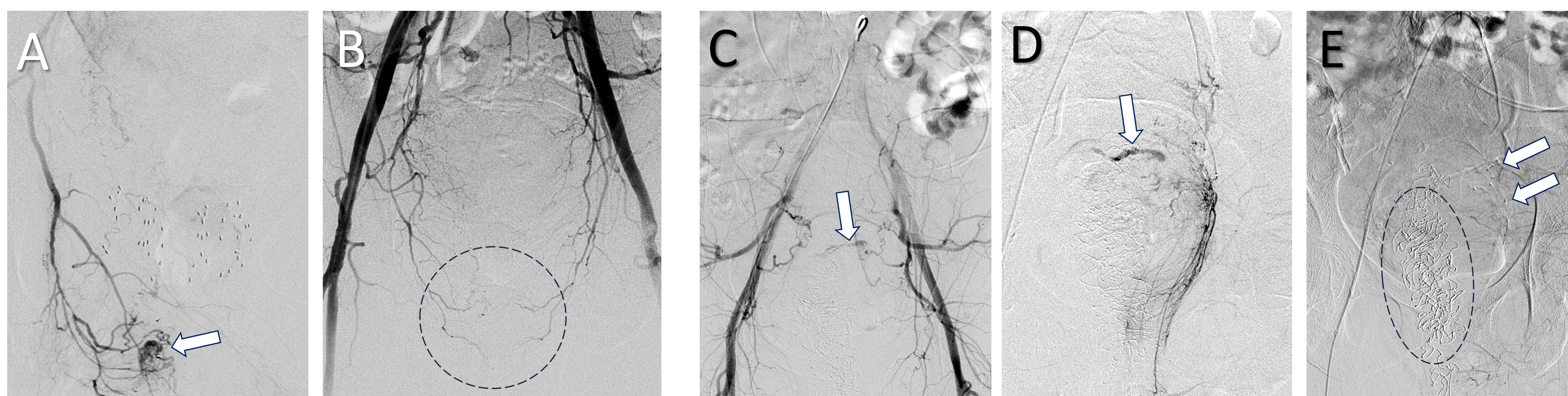
Materials and Methods

In this pictorial review, we describe imaging features and IR treatment strategies for hemorrhagic, non-hemorrhagic, and non-vascular embolization to treat benign pelvic arterial and venous disease, trauma, and malignancy. We highlight various indications for embolotherapy while discussing technical considerations for success.

Traumatic Pelvic Hemorrhage

Case 1: 74-year-old man with prior prostate brachytherapy who developed persistent hematuria after traumatic Foley removal.

Case 2: 33-year-old female status post D&C for retained products after vaginal delivery with massive bleed despite uterine packing.



Case 1 – (A) Selective right internal pudendal arteriogram shows a small focal pseudoaneurysm (arrow). (B) No further filling of the pseudoaneurysm after glue embolization (dashed circle).

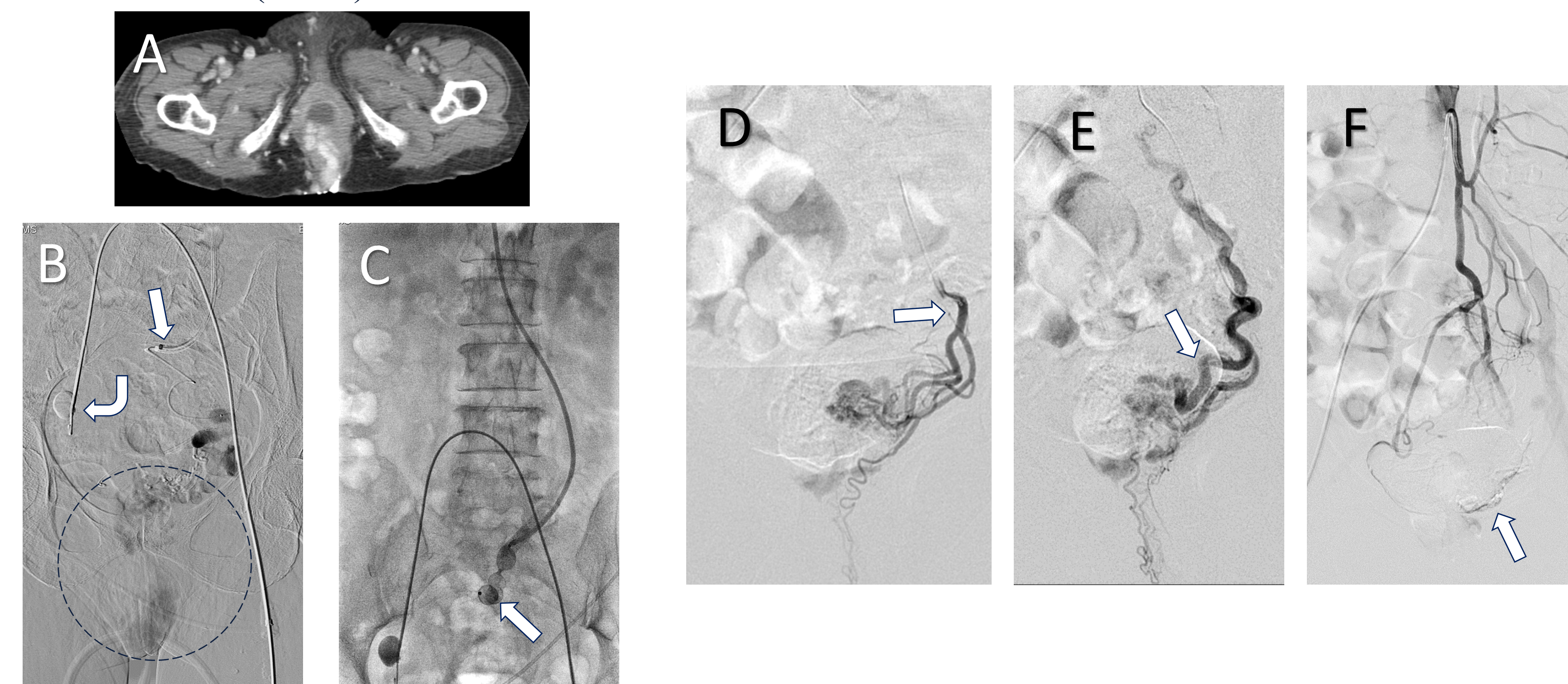
Case 2 – (C) Pelvic angiogram and (D) confirmatory selective anterior division internal iliac arteriogram demonstrating active left uterine artery bleeding (arrows). (E) Post-embolization glue cast in the uterine artery (straight arrows) with pelvic packing material (dashed oval) still in place.

Discussion: In case 1, N-butyl cyanoacrylate (n-BCA):lipiodol in a 1:3 ratio was used due to the distal location of the pseudoaneurysm and multiple, tortuous feeding vessels. Proximal coil embolization would have been problematic as distal feeding vessels may have remained patent. In case 2, glue was similarly used to embolize the distal uterine artery. Glue is advantageous for the ability to titrate its rate of polymerization and ability to function independent of clotting factors. Polymerization times for 1:1, 1:2, and 1:3 n-BCA:lipiodol are approximately 3.2, 4.7, and 7.5 s, respectively¹. Glue allows controllable, rapid embolization of distal vessels or niduses that are potentially not directly accessible by a microcatheter.

Atraumatic Pelvic Hemorrhage

Case 1: 67-year-old female with cirrhosis presenting with significant rectal bleeding and large rectal varices on CT.

Case 2: 73-year-old male with intermittent rectal bleeding and imaging findings of arteriovenous malformation (AVM).



Case 1 – (A) CT with contrast showing large rectal varices. (B) Antegrade coaxial microcatheter system (straight arrow) positioned in the distal IMV varix with a balloon catheter (curved arrow) in the right internal iliac vein to prevent reflux of embolic material. Extravasated contrast in the rectum (circled). (C) Following embolization with a thick gelfoam slurry beyond an Amplatzer 2 plug (arrow).

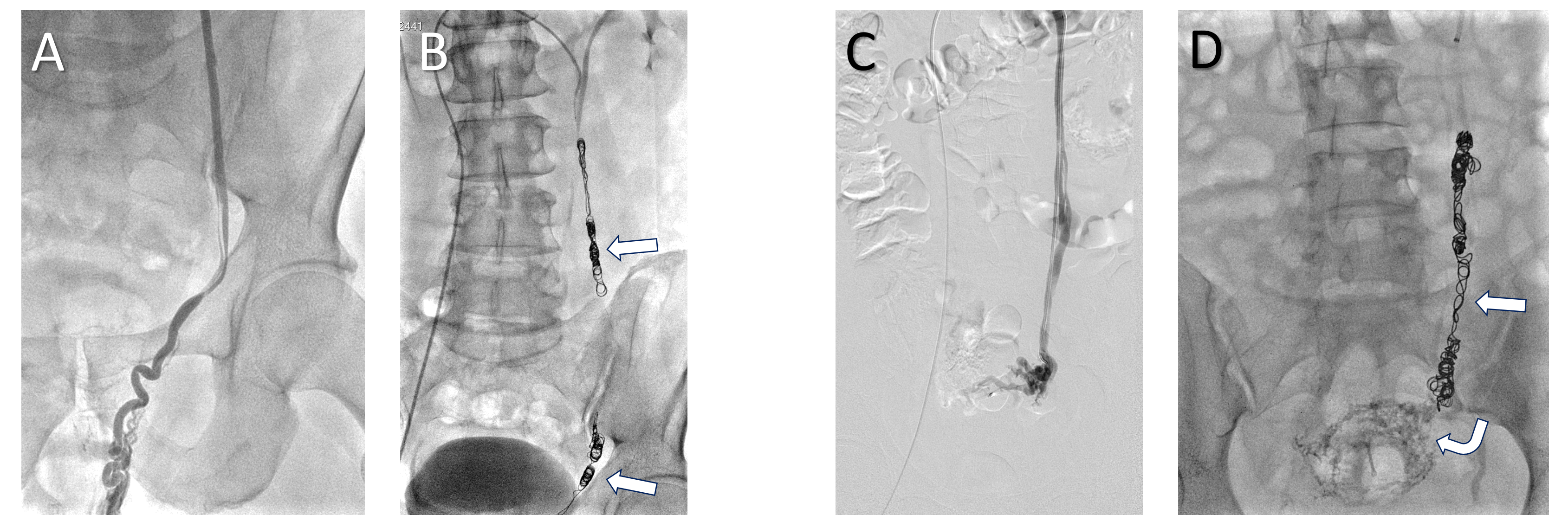
Figure 2 – (D) Arterial supply (arrow) from the superior hemorrhoidal artery and (E) venous drainage (arrow) of a rectal arteriovenous malformation (AVM). (F) Post-embolization glue cast (arrow) in the AVM.

Discussion: In case 1, plug-assistance slows flow in the varix and allows time for the gelfoam mixture to occlude while also preventing systemic venous embolization of embolic material. In case 2, a concentrated 1:1 Trufill:lipiodol was utilized for nidus penetration and rapid embolization. As noted above, the polymerization time is expected to be around 3.2 s. As in case 1, this minimizes the risk of distal embolization of glue through the AVM.

Venous Intervention

Case 1: 49-year-old male presenting with varicocele and fertility issues.

Case 2: 30-year-old female with chronic pelvic pain and prominent parametrial vessels on imaging diagnosed clinically with pelvic congestion syndrome.



Case 1 – (A) Left internal spermatic (gonadal) venogram showing dilated, refluxing vein. (B) Multiple coils (arrows) occlude the left internal spermatic vein post-embolization.

Case 2 – (C) Left ovarian (gonadal) venogram showing an engorged, refluxing left ovarian vein. (D) Embolization coils (straight arrow) and sclerosant (curved arrow) occluding the left ovarian vein after embolization. Sodium tetradecyl sulfate (STS):CO2:lipiodol in a 2:2:1 ratio was injected through a balloon occlusion catheter to prevent systemic embolization.

Discussion: In varicocele treatment, the internal spermatic vein is embolized proximally to the highest point of reflux and distally to no lower than the inguinal ligament. Embolization with coils is typical, although a variety of agents have been described². The dilated ovarian vein(s) in pelvic congestion syndrome are typically treated with sclerosant and coils, as in the provided case.

Prostatic and Non-Vascular Intervention

Case 1: 64-year-old male with bladder outlet obstruction from marked prostatic hypertrophy.

Case 2: 79-year-old female with advanced gynecologic malignancy complicated by vesicocutaneous fistula. IR was consulted for palliative ureteral embolization.



Case 1 – (A) Right and (B) left prostatic arteriograms during embolization with 300-500µm particles.

Case 2 – (C) CT demonstrating a fistulous tract between the urinary bladder and skin surface. (D) Antegrade left nephrostogram following embolization with an Amplatzer 4 plug (arrow). (E) Antegrade right nephrostogram following embolization with an Amplatzer 4 plug (arrow). The left plug is also visualized (curved arrow).

Discussion: Case 1 demonstrates a classic case of prostatic artery embolization utilizing particles as the embolic agent. Case 2 shows a unique, non-vascular pelvic procedure, transrenal ureteral embolization. This procedure is typically utilized for palliation in refractory bladder fistulas and recurrent ascending infections, which often occur in the setting of advanced pelvic malignancy³. Vascular plugs are typically utilized along with glue.

Results

Transcatheter arterial embolization is a highly effective technique for controlling acute and chronic bleeding in the setting gynecologic disease, obstetric emergencies, trauma, and male genitourinary disease. We also highlight the effective and safe role of venous and nonvascular embolotherapy in cases of pelvic congestion syndrome, varicocele, and ureteral occlusion.

Conclusions

The versatility and efficacy of embolotherapy in a range of pathologic processes within the pelvis has been illustrated by the series of cases presented.

References

1. Takeuchi, Y., Morishita, H., Sato, Y. et al. Guidelines for the use of NBCA in vascular embolization devised by the Committee of Practice Guidelines of the Japanese Society of Interventional Radiology (CGJSIR), 2012 edition. Jpn J Radiol 32, 500–517 (2014). <https://doi.org/10.1007/s11604-014-0328-7>
2. Baigorri BF, Dixon RG. Varicocele: A Review. Semin Intervent Radiol. 2016;33(3):170-176. doi:10.1055/s-0036-1586147
3. Natarajan V, Boucher NR, Meiring P, et al. Ureteric embolization: an alternative treatment strategy for urinary fistulae complicating advanced pelvic malignancy. BJU Int. 2007;99(1):147-149. doi:10.1111/j.1464-410X.2006.06522.x

Contact

Chandler Fountain (fountainch@upmc.edu) . UPMC Dept. of Radiology, 200 Lothrop Street, Pittsburgh, PA 15213, U.S.A.