In all cases, the suspicious area of methylene blue dye extravasation was then oversewn with a figure-of-eight Vicryl 4-0 suture. The wound was closed in multiple layers of Vicryl suture, with a subcuticular Vicryl stitch in the case of the lymphocele. One of the lymphocutaneous fistulae required vacuum assistance for closure.

This resulted in definitive treatment for the patient with a lymphocele. The patient with a lymphocutaneous fistula closed with wound vacuum assistance experienced persistent drainage through the wound vacuum that gradually resolved in 3 weeks without recurrence. The other patient with a lymphocutaneous fistula had recurrent lymphorrhea through the lymphocutaneous fistula a few days after surgical repair, which was treated with subsequent exploration of the affected groin and repeat surgical closure 1 week later.

In conclusion, preoperative methylene blue lymphangiography can aid in visualization of the lymphatic defect during surgical repair of postoperative lymphocutaneous fistula or lymphocele related to femoral cannulation during cardiopulmonary bypass during cardiac transplantation. Further studies are needed to evaluate and compare overall outcomes of surgical repair done without and with preoperative lymphangiography.

REFERENCES

1. Goldstein JA, Janu P, Fields B. Rectus femoris flap repair of recalcitrant inguinal lymphoceles after heart transplantation. J Heart Lung Transplant 1994; 13:549–554.
2. Lavie O, Karmeli R, Mansano R, Hallak M, Bornstein J, Abramovici H. Treatment of recurrent inguinal lymphocele by lymphatic leakage mapping and subsequent ligation of lymphatic vessel endings: a case report. Gynecol Oncol 2002; 84:155–156.
3. Pagni R, Mariani C, Minervini A, et al. Treatment with intraoperative patent blue v dye of refractory lymphocele after inguinal lymphadenectomy for squamous cell penile carcinoma. Urology 2009; 3:688–690.
4. Schilling M, Abendroth D, Kunz R. Treatment of lymphocele in renal transplant recipients by laparoscopic fenestration after transcutaneous staining. Br J Surg 1995; 82:246–248.
5. Nadolski GJ, Itkin M. Feasibility of ultrasound-guided intranodal lymphangiogram for thoracic duct embolization. J Vasc Interv Radiol 2012; 23: 613–616.

Re: Does Polyvinyl Alcohol Particle Size Change the Outcome of Prostatic Arterial Embolization for Benign Prostatic Hyperplasia? Results from a Single-Center Randomized Prospective Study

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Editor:

We read with great interest the article by Bilhim et al (1) in which the authors compare two different particle sizes of embolic agents for prostatic artery embolization (PAE). In the same issue of the *Journal of Vascular and Interventional Radiology*, Bagla et al (2) describe the use of state-of-the-art cone-beam computed tomography to identify the best location for delivery of the embolic agents while avoiding nontarget embolization.

Both articles (1,2) address different aspects of the PAE technique to improve efficacy and safety. Both articles similarly aim to support the PAE technique based on its central goal, which is to cause prostate tissue ischemia and consequently improve symptoms caused by benign prostate hyperplasia.

To correlate technique and results, both groups investigators (1,2) focused on the control of symptoms and complication rates as indicators of success. Bilhim et al (2) also used reduction in prostate volume assessed by ultrasound (US). However, neither group used magnetic resonance (MR) imaging to assess the extent of tissue ischemia caused by PAE.

Pisco et al (3) have already shown on post-PAE enhanced MR imaging that the procedure may cause prostate ischemic zones, although they have not mentioned how often they were able to see these changes. They also stated that they did not observe a clear relationship between reduction in prostatic volume and clinical outcome when clinical failure was seen in some patients with a significant ($>$ 15%) prostate volume reduction (3). Therefore, they stated that clinical success cannot be predicted on the basis of prostate volume reduction (3).

In our initial experience with PAE, we noticed that only those patients with postprocedural MR imaging findings of prostatic ischemia had prolonged control of their symptoms. Most patients, even without clear signs of tissue ischemia on postembolization MR imaging, initially reported good outcomes but eventually had symptom recurrence.

We have found a close relationship between postembolization MR imaging findings and clinical outcome. This has been much more evident in patients under acute urinary retention in whom the outcome can be objectively assessed by removing their indwelling urinary catheters.

The aforementioned findings should not surprise us because, during the past 15 years, we have learned about the prognostic value of MR imaging in the well established uterine artery embolization procedure for symptomatic

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fibroid tumors (4). It is well known that symptomatic response is durable only when complete tumor ischemia is achieved; when only partial ischemia is achieved, recurrence of symptoms is likely, even though patients may initially experience clinical improvement (4).

The extent of prostate ischemia necessary to make PAE efficient and durable (ie, effective) is still unknown. Whether it is necessary to embolize all arteries that supply the prostate or just one side of the prostate to obtain the desired therapeutic effect is also unknown. Is it possible to achieve prostate volume reduction without causing tissue ischemia? Is it possible to produce tissue ischemia that cannot be detected on a postembolization enhanced MR imaging study?

There are some concerns about accuracy and sensibility when using US to assess volumetric changes after embolization; US is well known to be a highly operator-dependent method. The use of volumetric measurement by MR imaging may be a more reproducible method.

We believe tissue ischemia is an objective sign that can easily be assessed by MR imaging. To answer the aforementioned questions and to better define the role of PAE in clinical practice, the use of MR imaging in any research should be encouraged.

REFERENCES

1. Bilhim T, Pisco J, Campos Pinheiro L, et al. Does polyvinyl alcohol particle size change the outcome of prostatic arterial embolization for benign prostatic hyperplasia? Results from a single-center randomized prospective study. J Vasc Interv Radiol 2013; 24:1595–1602.
2. Bagla S, Rholl KS, Sterling KM, et al. Utility of cone-beam CT imaging in prostatic artery embolization. J Vasc Interv Radiol 2013; 24:1603–1607.
3. Pisco JM, Rio Tinto H, Campos Pinheiro L, et al. Embolisation of prostatic arteries as treatment of moderate to severe lower urinary symptoms (LUTS) secondary to benign hyperplasia: results of short- and mid-term follow-up. Eur Radiol 2013; 23:2561–2572.
4. Pelage JP, Guaou Guaou N, Jha RC, et al. Uterine fibroid tumors: long-term MR imaging outcome after embolization. Radiology 2004; 230: 803–809.

Dr. Bilhim responds:

I would like to thank Dr. Kisilevzky for his comments on the recently published studies on prostatic arterial embolization (PAE) (1,2). I believe there are two main concerns raised. The first regards the prognostic value of magnetic resonance (MR) imaging–detected ischemia after PAE and the role of prostate volume (PV) measurements after PAE. The second questions the accuracy of PV measurements with transrectal ultrasound (US).

The rationale for PAE is that prostate ischemia leads to PV reduction and hence clinical improvement. Therefore, it is logical to assume that PV reduction could be a surrogate for ischemia after PAE; both are presumably correlated. We have already shown that PV reduction and clinical outcome do not necessarily correlate perfectly (3). This is not surprising when dealing with patients with lower urinary tract symptoms; if symptoms and PV do not correlate before any type of treatment (4), why should they after PAE? Also, many patients stop taking 5-α-reductase inhibitors after PAE, which is a major source of bias on the effect of PAE on PV reduction.

We agree with Dr. Kisilevzky that MR-detected prostate ischemia after PAE should be evaluated as a potential predictor of clinical outcome. From our preliminary experience, half of patients do not exhibit ischemic changes on MR imaging and PV reduction does not correlate with ischemic changes or clinical outcome. Greater ischemic changes seem to be associated with a better clinical outcome. However, it is important to perform MR in the first month after PAE to detect ischemia, which may not be detectable at 3 months or longer after PAE. Studies with larger numbers of patients and longer follow-up are necessary before any definitive conclusions are drawn.

Regarding the second issue raised, in our initial report on PAE (5), the mean PV reduction observed with transrectal US was very similar to that seen on MR imaging (26.5 mL and 28.9 mL, respectively). Of course, transrectal US is more prone to bias from intra- and interobserver measurement variability. However, MR is much more expensive. Either way, we agree that investigations on PAE should use MR whenever possible to assess changes after treatment, as this is the best imaging modality to study the prostate nowadays.

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REFERENCES

1. Bilhim T, Pisco J, Campos Pinheiro L, et al. Does polyvinyl alcohol particle size change the outcome of prostatic arterial embolization for benign prostatic hyperplasia? Results from a single-center randomized prospective study. J Vasc Interv Radiol 2013; 24:1595–1602.
2. Bagla S, Rholl KS, Sterling KM, et al. Utility of cone-beam CT imaging in prostatic artery embolization. J Vasc Interv Radiol 2013; 24: 1603–1607.
3. Pisco J, Campos Pinheiro L, Bilhim T, et al. Prostatic arterial embolization for benign prostatic hyperplasia: short- and intermediate-term results. Radiology 2013; 266:668–677.

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