Uterine Artery Embolization and Antibiotic Prophylaxis: How to Use or Not to Use?

Ricardo Garcia-Monaco, MD, PhD

ABBREVIATIONS

UAE = uterine artery embolization

The article published in the present issue of the *Journal of Vascular and Interventional Radiology*, "Evaluation of the Effect of Routine Postprocedural Antibiotics on Infection Rates after Uterine Artery Embolization" (UAE), brings up the controversial issue of the role of antibiotics in "clean" interventional radiology (IR) procedures. The authors reported the routine use of pre- and post-UAE antibiotics from 2013 to 2016 in otherwise healthy patients. In 2016, they discontinued the use of routine postprocedural antibiotics and found that it did not result in an increased rate of infectious complications compared with the former strategy. The result of this study reflects the general consensus that antibiotic prophylaxis, if deemed useful, should be in a single dose before the procedure and not a course of antibiotic therapy after the intervention (1,2).

A concern since the early days of UAE was the risk of serious uterine infections that might necessitate hysterectomy or lead to septicemia. Routine use of antibiotic therapy was then a must in the UAE strategy to decrease infectious complications. Antibiotic regimens have evolved from multiple-day, multidrug therapy to a single prophylactic dose or even no antibiotic therapy at all; the latter has been the author's own practice for the past 15 years.

The risk of uterine infection exists if bacteria are present in the bloodstream after UAE, either by skin flora inoculation during arterial access or by direct invasion from the bladder or vagina (3). In the necrotic tissue that results from embolization, bacteria find a favorable environment for proliferation as a consequence of ischemia and modification of oxide-reduction potential. In addition, the installation of foreign material (embolic materials) and induced anomalies of immune defenses (stress, medication) may increase the risk. The utility of routine antibiotic prophylaxis, the goal of which is to prevent bacterial growth to reduce the risk of infection, is a matter of debate.

The concept of antibiotic prophylaxis derives from surgical procedures, in which pathogenic bacteria are found in 90% of wounds during closure despite aseptic technique and laminar flow (2). Compared with incision/wound infection, percutaneous arterial access limits bacterial presence, but it does not completely eliminate pathogen entry points into the body. It is important to recall that prophylactic antibiotic agents are, by definition, those administered before creation of an incision or puncture wound (2). The prophylactic intravenous antibiotic agents should be administered within 1 hour of an incision or puncture (2,4). Following these concepts, routine multiple-day post-UAE antibiotic regimens are not considered antibiotic prophylaxis and should be discontinued, as described by Graif et al.

Randomized, controlled data regarding antibiotic prophylaxis in UAE are lacking, and the rare occurrence of infectious complications makes powered randomized controlled trials impractical. However, despite the low complication rate and lack of evidence, routine antibiotic prophylaxis is widely used (2,3). This does not occur only in UAE, but also in many other clean IR procedures (with "clean" defined as any procedure performed without active inflammation, not breaking sterile technique, and not violating gastrointestinal, genitourinary, or respiratory tracts [2]). Embolization is considered a clean procedure, as it enters only blood vessels, even though some authors may argue that UAE involves necrosis of uterine (ie, genitourinary) tissue, rendering it a clean/contaminated procedure. Indeed, the Society of Interventional Radiology issued a recommendation for routine preprocedural prophylaxis with intravenous cefazolin, albeit without consensus because of a lack of a definitive position to define UAE as a clean or clean/contaminated procedure (2).

On the contrary, the guidelines for surgery and interventional medicine issued by the French Steering Committee of Critical Medical Care do not recommend antibiotic

From the Department of Vascular and Interventional Radiology, Hospital Italiano, University of Buenos Aires, JD Peron 4190, Ciudad de Buenos Aires C1181ACH, Argentina. Received April 21, 2020; final version accepted April 23, 2020. **Address correspondence to** R.G.-M.; E-mail: ricardo.garciamonaco@hospitalitaliano.org.ar; Twitter handle: @rgm2602

The author has not identified a conflict of interest.

J Vasc Interv Radiol 2020; 31:1270–1271

https://doi.org/10.1016/j.jvir.2020.04.022

prophylaxis in UAE, which is defined by them as a clean procedure (1). The Royal College of Obstetricians and Gynecologists, extrapolating from data on hysterectomy for cesarean section, acknowledged that antibiotic prophylaxis targeted at skin flora was reasonable for UAE. However, the recommendations concluded that there are limited data and that prophylaxis is at the discretion of the treating hospital (5).

The effectiveness of routine antibiotic prophylaxis can certainly be debated because it has not been proven that it results in lower infection rates in clean IR procedures. In addition, vaginal discharge resulting from endometritis was seen in as many as 58% of patients in some UAE series (6), suggesting that aggressive prophylaxis led to imbalance of bacterial flora, allowing Gram-negative bacteria or yeast infections to flourish. Studies have also shown that infective complications after UAE can occur weeks or months after the procedure (7), rendering antibiotic prophylaxis useless in this setting. The interventional radiologist should recall that antibiotic agents are not hazard-free. Anaphylaxis after antibiotic administration can lead to serious complications, and widespread antibiotic use may contribute to the development of multidrug-resistant organisms.

Despite the debate and the potential hazards, routine antibiotic prophylaxis in IR is used worldwide, with many variations in practice. The knee-jerk response of administering antibiotic therapy so frequently in medicine probably relies on the physician's relief rather than the patient's protection. Indeed, in real life, if an infection develops in a patient who received antibiotic prophylaxis, it would be better accepted by the family or medical community than the same complication in a patient who did not receive antibiotic prophylaxis. Other reasons for antibiotic overuse may be related to the feeling that antibiotic complications are uncommon, as well as underestimation of the potential to increase drug resistance. A defensive medical attitude in some hospitals and/or private practice caused by a high degree of medicolegal pressure may also contribute.

In fact, standard care in the IR suite that includes maintenance of maximal sterile precautions, including operating in a sterile environment, adherence to aseptic technique, and an emphasis on hand hygiene, is the best way to prevent infectious complications in clean IR procedures (2,8), probably outperforming antibiotic prophylaxis.

The gradual maturation of our specialty includes advocating for more adherence to these aseptic measures and limiting the maximum use of antibiotic prophylaxis. As such, there is a trend toward considering prophylaxis not routinely, but only in specific patients deemed to be at high risk of infection (1,2). Patients with uterine leiomyomas and a history of pelvic inflammatory disease, previous pelvic surgeries, endocervical incompetence, hydrosalpinx, submucosal tumor location, or immunosuppression are generally considered as high-risk cases. In such cases in which UAE could have relative contraindications, a specific protocol of antibiotic therapy may be considered under scrutiny of an interdisciplinary panel of an interventional radiologist, clinician, pharmacist, and infectious specialists (1).

The IR outpatient consultation represents a privileged moment to decide on the prescription of antibiotic prophylaxis. It is possible to define the type of intervention planned, the associated risk of infection (and therefore the necessity of antibiotic prophylaxis), the time of prescription before embolization, and any allergic antecedents that may modify the choice of antibiotic molecule (1). Patient education is critical because infection can occur well after the procedure and may not be present on routine follow-up. Patients should be informed of the symptoms and advised to seek medical attention if the symptoms develop weeks or months after the procedure (7).

Avoiding unnecessary use of antibiotic therapy in IR has benefits for the patient as well as the community, from decreasing the risk of adverse events to reducing the development of drug-resistant organisms. The interventional radiologist must be familiar with practice guidelines and incorporate them according to local practice patterns and individualized patient care. Identifying instances of questionable antibiotic use is a further first step in improving IR practice. The article of Graif et al revisits this subject and emphasizes that the interventionalist must be knowledgeable to keep rising to the challenge of IR as a clinical specialty.

REFERENCES

1. Martin C, Auboyer C, Boisson M, et al. Steering committee of the French Society of Anaesthesia and Intensive Care Medicine (SFAR) responsible for the establishment of the guidelines. Antibioprophylaxis in surgery and interventional medicine (adult patients). Update 2017. Anaesth Crit Care Pain Med 2019; 38:549–562.
2. Chehab MA, Thakor AS, Tulin-Silver S, et al. Adult and pediatric antibiotic prophylaxis during vascular and IR procedures: A Society of Interventional Radiology Practice Parameter Update endorsed by the Cardiovascular and Interventional Radiological Society of Europe and the Canadian Association for Interventional Radiology. J Vasc Interv Radiol 2018; 29:1483–1501.e2.
3. Sutcliffe JA, Briggs JH, Little MW, et al. Antibiotics in interventional radiology. Clin Radiol 2015; 70:223–234.
4. Joint Commission. MIF0110–manual–performance measurement network. Specifications manual for Joint Commission National Quality Core Measures–prophylactic antibiotic received within one hour prior to surgical incision. Available at https://manual.jointcommission.org/releases/archive/TJC2010B/MIF0110.html. Accessed April 1, 2020.
5. Clinical recommendations on the use of uterine artery embolization (UAE) in the management of fibroids, third edition (2013). Available at https://www.rcog.org.uk/globalassets/documents/guidelines/23-12-2013_rcog_rcr_uae.pdf. Accessed April 1, 2020.
6. Moon W, Tam M, Kikano R, Karuppasamy K. Prophylactic antibiotic guidelines in modern interventional radiology practice. Semin Intervent Radiol 2010; 27:327–337.
7. Martin J, Bhanot K, Athreya S. Complications and reinterventions in uterine artery embolization for symptomatic uterine fibroids: a literature review and meta-analysis. Cardiovasc Intervent Radiol 2013; 36:395–402.
8. Chan D, Downing D, Keough CE, et al. Joint practice guideline for sterile technique during vascular and interventional radiology procedures: from the Society of Interventional Radiology, Association of peri Operative Registered Nurses, and Association for Radiologic and Imaging Nursing, for the Society of Interventional Radiology [corrected] Standards of Practice Committee, and endorsed by the Cardiovascular Interventional Radiological Society of Europe and the Canadian Interventional Radiology Association. J Vasc Interv Radiol 2012; 23:1603–1612.