PANEL DISCUSSION

Enhancing Recognition of Embolotherapy in the Wider Medical Audience

Addressing misconceptions, engaging referring physicians, fostering clinical ownership, and advancing embolotherapy into the mainstream.

With Parag J. Patel, MD, MS, FSIR; Constantino S. Peña, MD; and Amy Taylor, MD, MBA

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What are the biggest misconceptions noninterventional physicians still have about embolotherapy?

Dr. Patel: Many noninterventional physicians still view embolization as a desperate measure reserved solely for catastrophic, uncontrollable bleeding when surgical options fail. They fail to recognize embolotherapy as a first-line therapy for conditions like uterine fibroids, benign prostatic hyperplasia (BPH), or chronic osteoarthritis (OA) pain. They often equate ischemia with uncontrolled necrosis. Noninterventionalists do not appreciate the concept of calibrated targeted ischemia, where selective embolization of the pathologic vascular bed can be completed while maintaining collateral networks to preserve underlying organ function.

Dr. Peña: The concept that embolization is not binary but has an infinite number of gradations between open and closed may be one of the hardest concepts for a noninterventionalist to grasp. Understanding the vessel bed, desired result, and current situation goes into the decision of when and how to embolize. It is different than tying off a vessel.

Dr. Taylor: The most persistent misconception is that embolotherapy is a last resort rather than a primary, curative, or disease-modifying treatment. Noninterventional colleagues are frequently surprised that uterine artery embolization (UAE) carries durable outcomes rivaling myomectomy, or that yttrium-90 produces survival data competitive with ablative or surgical therapy in selected hepatic malignancy patients. Many noninterventionalists also imagine embolotherapy as a blunt instrument. Modern technique is extraordinarily selective, targeting tumor feeders or prostatic arterioles with submillimeter specificity. Additionally, landmark trials in UAE, prostate artery embolization (PAE), hepatocellular carcinoma, and traumatic hemorrhage have established level 1 evidence across multiple domains. The challenge is ensuring this literature reaches physicians who trained before it existed.

What messaging, outcomes, or types of data resonate most with referring physicians outside the interventional specialties? And with hospital leaders?

Dr. Taylor: For referring physicians, the most resonant data map to their own clinical goals. A urologist evaluating PAE wants IPSS (International Prostate Symptom Score), erectile function preservation, and catheter-free rates, not angiographic success. The currency of persuasion is functional outcomes data in each specialty's own metrics. Presenting complication rates honestly, including frequency, severity, and management pathways, builds more trust than generalization. Interventional radiologists who demonstrate rigorous tracking and reporting of adverse events shift the conversation from wariness to collegial engagement. For hospital administrators, the algorithm differs. They respond to length of stay reduction, avoidance of costly surgical procedures, readmission rates, and contribution margin. Tracking and presenting your own program's outcomes in terms that leadership understands is more persuasive than published literature alone.

Dr. Peña: In the acute setting, the ability to manage acute bleeding in a controlled, minimally invasive manner is still the situation that best highlights the value of interventional radiology (IR) for directly reducing mortality and further morbidity.

Dr. Patel: Referring physicians and hospital administrators are two completely different audiences. Referring physicians prioritize patient-centric, comparative outcomes. Ideally, the comparative outcomes are measured directly against the current gold standard. For example, uterine fibroid embolization (UFE) versus hysterectomy and comparison of long-term symptom control, need for reintervention, complications, and speed of recovery. The reduction in major complication rates with the absence of general anesthesia, incisional wound infections, and shortened recovery time are major factors favoring embolotherapy.

Hospital leaders or administrators will never deny the importance of patient care; however, they are most strongly motivated by hospital metrics. Operational efficiency, resource optimization, and cost of care will resonate with this audience. Embolotherapy is an economic engine with largely same-day outpatient or short-stay observations, which frees up premium inpatient beds or intensive care unit capacity. Also, lowering costs to the system in the form of reduced readmission rates, lower per-procedure consumable costs compared to the open surgical alternative, and overall higher patient satisfaction scores will drive hospital support. These are all directly related to hospital reimbursement and margin.

How can training evolve to prepare new interventionalists for greater clinical ownership and multidisciplinary leadership in therapeutic areas involving embolotherapy?

Dr. Peña: The clinical emphasis of an interventional practice has evolved significantly over the last 5 to 10 years, and I think all strong programs have emphasized the clinical model. As someone working in a very clinical practice for > 25 years, I have found that this is critical for the growth of these procedures and interventional specialties.

I have seen many young interventionalists recognize the importance of learning not only indications and techniques but also how and when to evaluate a patient. They should be sufficiently comfortable discussing competing procedures and, specifically, discussing them with referring physicians.

The goal is for patients to view you as their doctor. That means you can clinically manage the disease and treatment while feeling comfortable enough to bring concerns to other physicians as needed. You need a setting where the procedure can be discussed and the patient assessed. Follow-up of the patient and tracking procedural outcomes are also critical to a successful practice.

Dr. Patel: The historical view of IR as procedural technicians has long been established as outdated. The current training paradigms require mandatory longitudinal clinical infrastructure and training. The evolution was initially slow but is now in its second decade of formal accredited training programs. The next step in evolution must now occur with disease-specific expertise. This will likely come with formal rotations and multidisciplinary conferences to intimately understand the medical and surgical alternatives. This allows the practitioner to debate and discuss clinical management as peers rather than subordinates.

Last but equally important is a nod to my prior response. Fellowship and residency tracks must incorporate formal education in coding, billing, outpatient clinic management, and hospital economics so young interventionalists can advocate for their service lines at the hospital/administrative level.

Dr. Taylor: Training must shift from a procedure-centric model to a patient-centric one, beginning in residency. Trainees need exposure to the full clinical arc: pre-procedural consultation, shared decision-making, post-procedural follow-up, and complication management. Trainees who encounter patients only on the table are not equipped for the clinical ownership the health care landscape demands. Successful programs build IR-specific outpatient clinics where trainees participate in consultations, treatment planning, and follow-up, mirroring surgi-

cal subspecialty training. Multidisciplinary engagement skills are currently underemphasized. Teaching trainees to present at tumor boards and communicate effectively with referring physicians is as important as technical proficiency. Exposure to outcomes tracking and registry participation produces interventionalists who can lead evidence-based multidisciplinary conversations.

Which procedures have the most potential to bring embolotherapy into the medical mainstream as adoption expands?

Dr. Taylor: PAE offers durable symptom improvement with sexual function preservation in an outpatient setting, and as urologic societies engage with PAE data, integration into BPH care pathways is near-term. Genicular artery embolization (GAE) for knee OA addresses an enormous, underserved population; if trial data continue to support efficacy, GAE has the potential to become a mainstream musculoskeletal intervention. UAE is one of the most validated embolotherapy procedures, with level 1 evidence supporting durable symptom relief and uterine preservation over hysterectomy. Patients increasingly arrive having researched fibroid options independently and seek UAE without a gynecologist referral, making patient-driven demand a real mainstream force.

Dr. Peña: I think we have a number of procedures that are already part of the accepted treatment. UAE has been performed for > 30 years as an alternative to treat uterine fibroids, a very common and debilitating condition. However, it is likely still underutilized due to the lack of patient awareness.

Future mainstream embolization procedures include PAE, which is already having a significant clinical impact on patients with an enlarged prostate and lower urinary tract symptoms. Newer procedures such as GAE and hemorrhoid embolization are rapidly growing as well. Interestingly, these are common conditions treated as outpatients, in a minimally invasive manner, with durable and lasting results and avoiding more invasive surgical treatments. There is no reason that they won't become mainstream therapy.

Dr. Patel: The origins of embolization were rooted in stopping hemorrhage, whether it be gastrointestinal bleeding or vessel rupture. The first step in its maturation occurred within the oncology space, largely driven by treatment of primary and metastatic liver disease. This is now entrenched in the treatment algorithm for these patients. However, bringing embolotherapy to the mainstream will require therapies that affect high-prevalence, quality-of-life–altering benign conditions (eg, BPH, OA pain, hemorrhoidal bleeding).

What are the keys to embolization gaining wider adoption and recognition, whether in specific applications or on the whole?

Dr. Taylor: Clinical ownership is the foundation. Embolotherapy gains recognition when interventionalists are visible and engaged as physicians rather than technicians. This means running longitudinal clinics, participating in multidisciplinary tumor boards, and engaging in management discussions with physician colleagues. Evidence generation at the program level is equally critical. Building outcomes registries and presenting institutional data demonstrates that your program operates with the rigor of any clinical service. In an era of value-based contracting, this is not optional. Procedural excellence is necessary but not sufficient; relationship infrastructure converts competence into consistent referrals. Engaging patient communities is also part of a mature adoption strategy.

Dr. Patel: If we want embolotherapy to become the universal, de facto option for many of our patients, then we must strive to develop, enroll, follow up, and complete high-quality randomized controlled trials (RCTs) that directly compare embolotherapy to medical or surgical standards. This is where professional societies can play a critical role, as industry partners are often unable or unwilling to lead in this endeavor.

RCT data will inform and justify the inclusion of embolotherapy in specialty society guidelines, as we saw with UFE in the American College of Obstetricians and Gynecologists guidelines. Similar achievements must be made with the American Urological Association for PAE and orthopedic guidelines for GAE.

At some point, we must also be willing to take matters into our own hands. Educating our patients about their options will ultimately fall to those who perform these procedures. We have all experienced patient encounters where a surgical specialist made no mention of embolization therapy as an option. Educating patients directly is necessary as the public is increasingly driving their own health care choices.

Dr. Peña: Maximizing safety and outcomes comes down to (1) awareness, (2) clinical studies, and (3) procedural protocols. Awareness requires national and local emphasis. Clinical studies are the hardest to perform but the most important. Literature confirming the outcomes and complication profile, especially in the patient population being treated, is necessary to get an indication and payment. A randomized comparison of the procedure to other procedure is imperative.

Should caution accompany the rising enthusiasm seen in newer applications, and if so, how might this manifest?

Dr. Peña: I worry about overuse and stretching of the clinical indications. The embolization community must look at every patient individually and recognize when embolization may or may not be the ideal therapy. Reimbursement codes may be reduced as more embolizations occur, forcing changes to technique. The north star needs to be on patient safety and outcomes.

Dr. Taylor: Yes, and this may be the most important conversation the specialty should be having internally. IR is unique in how rapidly new devices and techniques enter clinical practice, often ahead of robust evidence, because the pace of innovation demands it. This makes postadoption evidence generation not just valuable but obligatory. The history of procedural medicine includes techniques that achieved early enthusiasm before limitations became apparent at scale. The core risk is a mismatch between procedural dissemination and evidence maturity. Caution should manifest as rigorous informed consent that honestly represents evidence maturity. Patients deserve to understand when a technique has strong level 1 evidence versus when it remains early adoption. Societies should develop appropriate use criteria calibrated to evidence strength, and participation in registries and trials should be the norm, ensuring adoption is followed by the evidence needed to confirm we are offering our best care.

Dr. Patel: The growth in this space is tremendous, but the accelerated use of new applications presents several risks. Early pioneers in this space may trigger wider adoption of its use before the therapy being fully studied. Deploying treatment without strict patient selection criteria will ultimately hinder the overall outcomes. For example, embolizing mild or inappropriate pathology will inevitably lead to poor efficacy data, which will ruin the therapy's reputation and prevent overall adoption within disease state guidelines.

GAE and PAE are exciting and beneficial therapies for the right patient. However, aggressive use of embolics can lead to severe nontarget complications, such as skin necrosis, nonhealing ulcers, or transient nerve ischemia. If the community experiences a rash of high-profile, catastrophic nontarget complications due to inadequate training, poor technique, or inappropriate patient selection, then referring networks will rapidly retract and regulatory and insurance bodies will pull coverage. The effects of this will stall decades of progress.

What is the optimal role of professional societies and industry in expanding awareness?

Dr. Patel: Expanding awareness and safely scaling embolotherapy requires a symbiotic but heavily transparent partnership between medical societies and medical device manufacturers. Professional societies must own the educational standards and define competency metrics, as this will inform credentialing definitions. They must also take ownership to collect real-world data through national clinical registries, drive national guideline development, and enforce ethical practices.

Meanwhile, industry partners fund research and development for new embolics, support RCTs, and lead global marketing campaigns that are not feasible for professional societies. They will often aid in the educational support established by professional societies.

A clear boundary remains between the roles of these two groups. Industry should not dictate clinical indications or bypass proper training pathways, and professional societies should hold industry accountable to ensure clinical efficacy and patient safety always precede commercial scalability.

Dr. Peña: Awareness is indeed important to grow the procedure. However, success relies on more than just awareness. You need a coordinated approach to outline and create a clinically proven technique with strong and reproducible results. The procedure should have guardrails established by multispecialty society groups, requiring certain clinical experience and techniques to protect outcomes and the procedure.

Dr. Taylor: Professional societies provide credibility that industry cannot: peer-endorsed standards, evidence synthesis, and a clinical voice acting in patients' interests. Society of Interventional Radiology, Cardiovascular and Interventional Radiological Society of Europe, and other organizations develop practice guidelines and appropriate use criteria, giving referring physicians and payers the framework to integrate embolotherapy with confidence. Societies should also bring this evidence to the meetings of relevant specialties; joint guidelines coauthored with surgical or medical colleagues carry more weight than unilateral statements. Industry funds trials, supports training, and raises awareness, all legitimate contributions. However, the interests of industry align with broad product adoption rather than nuanced utilization. The ideal is a collaborative ecosystem where societies set standards and physicians engage as informed consumers of evidence. ■

Disclosures
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