

The Benefits of PAE over TURP: “Fewer Minor and Major Complications”

Marc Sapoval, MD, PhD, Head of the Vascular and Oncological Interventional Radiology Department at the Hôpital Européen Georges Pompidou in Paris, France, and Olivier Pellerin, MD, Deputy Head of Interventional Radiology talk about the practical aspects of prostate artery embolization (PAE) to treat benign prostatic hyperplasia (BPH).



Marc Sapoval, MD, PhD, is Professor of Clinical Radiology and Chair of the Vascular and Oncological Interventional Radiology Department at Hôpital Européen Georges Pompidou in Paris, France. He is co-founder and course director of the Global Embolization Symposium and Technologies (GEST). He also served as 2008 – 2009 Program Chairman for the Cardiovascular and Interventional Radiological Society of Europe. Holder of a PhD as well as an MD, Marc Sapoval is an expert in the area of renal disease.



Olivier Pellerin, MD, is Assistant Professor of Clinical Radiology at Hôpital Européen Georges Pompidou in Paris. He was a visiting research radiologist at Johns Hopkins University in 2011 – 2012 and has authored or co-authored more than 30 peer-reviewed publications. Since 2013, Marc Sapoval and Olivier Pellerin have trained more than 30 radiologists from several countries in the PAE technique.

What are the complexities and risks of PAE?

Sapoval: PAE is a complex procedure. The target arteries are small and difficult to access and there are a lot of anastomoses and tiny vessels that go to the bladder, rectum and penis that you don't want to embolize. In PAE you need to be 100% sure to block the appropriate artery.

Please describe the optimal patient for PAE.

Sapoval: PAE is particularly suitable for relatively young patients – say less than 70 – as they are easier to catheterize. Patients with large prostates around 80 g benefit the most from the treatment. It's also an eligible treatment option for patients who are afraid of or don't qualify for surgical therapy. We would not treat patients at risk or with suspected cancer.

What is the workflow for PAE treatment?

Sapoval: Patients are referred to us by urologists and sometimes directly through various communication pathways. In this case we send the patient to the urologist in order to allow multidisciplinary assessment. In the pre-procedure phase we as a board of specialists all come together to collate all the pertinent information including scores like PSA (prostate-specific antigen), urinary flow max, IPSS (International Prostate Symptom Score) and QoL (Quality of Life) as well as imaging information such as MR, MRA, and echographs of the prostate. We discuss treatment with the patient and staff and make sure the case is suitable for PAE. We explain that we have a success rate of between 80 and 90 percent and that we've never had major complications.

When preparing the patient for the intervention, we place a foley catheter in the bladder that we use as additional landmark during the procedure. For assessing the vascular anatomy of the pelvic region, we acquire a *syngo* DynaCT at the very start of the procedure. We study this dataset thoroughly to understand the vascular supply of the prostate and neighboring organs such as bladder, rectum and penis. And we use it for access path planning using *syngo* Embolization Guidance. The planning data is overlaid on live fluoroscopy to guide us in catheter navigation.

After having positioned the micro-catheter according to the planning, we perform another DynaCT. It visualizes which portion of the prostate will be affected by embolization from this catheter position, but it also reveals potential areas of non-target embolization. When we see the catheter position is safe and ensures embolization of left or right prostate portion, we slowly inject microspheres until stasis is reached.

How much training is required to perform the procedure and why is it essential?

Sapoval: You need to have an in depth understanding of the anatomy and the potential complications. You also need to learn imaging skills to get the necessary confidence to begin performing PAE. First, interested doctors go to conferences and expert meetings. Then, they can come to our institution for two days in groups of five or six. They are exposed to lectures and previous case studies, and they observe at least three live cases to see how the procedure is performed with all the difficulties and problems. Later, we go to their medical centers to follow up. So far we have taught the procedure to about 30 people since 2013.

How important is Siemens technology to the success of PAE?

Sapoval: PAE is still a new technique and Siemens knows PAE is challenging technically. Therefore Siemens has developed several imaging tools that help us do the procedure with more confidence, and we are working with Siemens engineers to refine the tech-

nological support and make it easier and safer.

Most important software applications today are *syngo* DynaCT, providing intraprocedural CT-like crosssectional imaging, and *syngo* Embolization Guidance for access path planning.

Can you discuss the various Siemens PAE software applications and how they help?

Pellerin: *syngo* DynaCT serves two main purposes during the procedure. First, it allows us to assess the vascular anatomy and define target vessel(s) in the beginning of the intervention. Second – and even more important esp. in PAE – it is a crucial intraprocedural tool to confirm safe catheter position for embolization, avoiding non-target embolization.

In the context of the very complex pelvic vessel anatomy, access path planning and guidance during catheter navigation is a very much desired support functionality. This is where *syngo* Embolization Guidance comes into play as a navigation tool to the prostate. It helps speed up the procedure and thereby facilitates reduction of fluoroscopy time and contrast material.

And there is the exciting possibility of assessing the functionality of tissue using *syngo* DynaPBV Body. This software can help you quantify the reduction in blood volume in the prostate due to PAE by making comparisons of the blood volume maps from before and after the procedure. We hope in the future it will prove to be predictive and well correlated with results, but we still need further mid-term clinical studies to provide evidence.

Is dose reduction an important factor in PAE?

Sapoval: It's the way we have to work as we stand every day in the Angio lab and for the patient, this is a very dose sensitive area of the body.

Pellerin: The PAE procedure is still quite long, at least one and a half hours, but we apply radiation only while we are manipulating the

catheter and embolizing the target. That adds up to about 40 minutes of radiation. However, we are just in the initial phase, and intervention time and radiation dose will decrease with experience. Moreover, through our collaboration with Siemens, we will find technical ways to reduce dose in addition to the already existing wide range of CARE options that come with each Artis system.

If patient size allows, we apply low-dose fluoroscopy at very low framerates. And we constantly use the DynaCT Body Care protocol – a dedicated cone-beam CT that saves more than 30% of dose compared to standard DynaCT.

If anatomy allows, we even collimate our DynaCTs cranial/caudally to expose the patient and ourselves to as little dose as possible. Due to the fact that we are working in a region with extremely small and fragile vessels most DynaCTs are done with manual injection which requires us to stand table-side during the rotational angiography. And as mentioned before, the use of navigation tools reduces fluoroscopy time and therefore overall dose.

Based on the experiences you gained so far – Are all signs for PAE being an effective treatment of BPH positive?

Sapoval: It's too soon to measure the complications in a really large number of medical centers. And we don't have the answers to long-term questions such as relapse rate because the procedure is too new. But the basic message so far is that with PAE you have the same results as with TURP but with fewer minor and major complications, especially sexual dysfunction. That's why it's important for us that Siemens is really focused on understanding what we need to improve our results and our safety in specific clinical situations.

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