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1

**Title**: Prostatic artery embolisation versus medical treatment in patients with benign prostatic hyperplasia (PARTEM): a randomised, multicentre, open-label, phase 3, superiority trial

**Summary**:
Multicenter RCT (n=90) showed PAE provided greater symptom relief (IPSS −10.0 vs. −5.7), improved quality of life, and enhanced sexual function (IIEF-15 ↑8.2 vs. ↓2.8) compared to combined therapy in men with BPH ≥50 mL unresponsive to alpha-blockers.

**Abstract**:
Background: Prostatic artery embolisation (PAE) is a minimally invasive treatment of symptomatic benign prostatic hyperplasia (BPH). Our aim was to compare patient's symptoms improvement after PAE and medical treatment.
Methods: A randomised, open-label, superiority trial was set in 10 French hospitals. Patients with bothersome lower urinary tract symptoms (LUTS) defined by International Prostatic Symptom Score (IPSS) > 11 and quality of life (QoL) > 3, and BPH ≥50 ml resistant to alpha-blocker monotherapy were randomly assigned (1:1) to PAE or Combined Therapy ([CT], oral dutasteride 0.5 mg/tamsulosin hydrochloride 0.4 mg per day). Randomisation was stratified by centre, IPSS and prostate volume with a minimisation procedure. The primary outcome was the 9-month IPSS change. Primary and safety analysis were done according to the intention-to-treat (ITT) principle among patients with an evaluable primary outcome. ClinicalTrials.gov Identifier: NCT02869971.
Findings: Ninety patients were randomised from September 2016 to February 2020, and 44 and 43 patients assessed for primary endpoint in PAE and CT groups, respectively. The 9-month change of IPSS was -10.0 (95% confidence interval [CI]: -11.8 to -8.3) and -5.7 (95% CI: -7.5 to -3.8) in the PAE and CT groups, respectively. This reduction was significantly greater in the PAE group than in the CT group (-4.4 [95% CI: -6.9 to -1.9], p = 0.0008). The IIEF-15 score change was 8.2 (95% CI: 2.9-13.5) and -2.8 (95% CI: -8.4 to 2.8) in the PAE and CT groups, respectively. No treatment-related AE or hospitalisation was noticed. After 9 months, 5 and 18 patients had invasive prostate re-treatment in the PAE and CT group, respectively.
Interpretation: In patients with BPH ≥50 ml and bothersome LUTS resistant to alpha-blocker monotherapy, PAE provides more urinary and sexual symptoms benefit than CT up to 24 months.

**Reference**:
Sapoval M, Thiounn N, Descazeaud A, Déan C, Ruffion A, Pagnoux G, Duarte RC, Robert G, Petitpierre F, Karsenty G, Vidal V, Murez T, Vernhet-Kovacsik H, de la Taille A, Kobeiter H, Mathieu R, Heautot JF, Droupy S, Frandon J, Barry Delongchamps N, Korb-Savoldelli V, Durand-Zaleski I, Pereira H, Chatellier G; PARTEM study group. Prostatic artery embolisation versus medical treatment in patients with benign prostatic hyperplasia (PARTEM): a

randomised, multicentre, open-label, phase 3, superiority trial. Lancet Reg Health Eur. 2023 Jun 26;31:100672. doi: 10.1016/j.lanepe.2023.100672. PMID: 37415648; PMCID: PMC10320610. https://pubmed.ncbi.nlm.nih.gov/37415648/

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2

**Title**: Effect of Prostate Artery Embolization on Erectile Function


**Summary**:

- Retrospective study of 167 patients showed PAE significantly improved lower urinary tract symptoms (IPSS ↓16, QoL ↑, prostate volume ↓33g) with no adverse effect on erectile function.
- SHIM scores improved modestly at 3, 6, and 12 months; 38% of patients with baseline ED reported improvement, while 82% had no significant change.

**Abstract**:

Background: Prostate artery embolization (PAE) is an emerging therapy for lower urinary tract symptoms (LUTS) associated with benign prostatic hyperplasia (BPH).

Aim: This retrospective study was conducted to assess the effect of prostate artery embolization (PAE) on erectile function in a cohort of patients with LUTS attributable to BPH at 3-months after the procedure.

Methods: A retrospective review was performed on 167 patients who underwent PAE. Data collected included Sexual Health Inventory in Men (SHIM) scores at 3, 6, and 12 months post-PAE, in conjunction with the International Prostate Symptom Scores (IPSS), Quality of Life (QoL) scores, and prostate volumes. Primary outcome was erectile function as assessed by SHIM scores at 3 months after PAE. An analysis was performed to identify patients with a ±5-point SHIM change to group them according to this minimum clinically significant difference in erectile function. Adverse events were recorded using the Clavien-Dindo (CD) classification.

Outcomes: At 3 months following PAE, median IPSS decreased by 16.0 [IQR, 9.0-22.0] points, median QOL decreased by 4.0 [IQR, 2.0-5.0] points, and median prostate volume decreased by 33 g [IQR, 14-55].

Results: Median SHIM score was 17.0 [IQR, 12.0-22.0] at baseline, 18.0 [IQR, 14.0-23.0] at 3 months [P = .031], 19.0 [IQR, 14.5-21.5] at 6 months [P = .106] and 20 [IQR, 16.0-24.0] at 12 months [P = .010] following PAE. In patients with no erectile dysfunction (ED) at baseline, 21% (n = 9) reported some degree of decline in erectile function post-PAE. However, 38% (n = 40) of patients who presented with mild-to-moderate ED reported improvement in their erectile function 3 months following PAE. Overall, the changes in baseline SHIM score were relatively small; 82% (n = 137) of patients did not have more than 5 points of change in their SHIM scores at 3 months following PAE.

Clinical implications: Our findings suggest PAE has no adverse impact on erectile function for most patients.
Strengths & limitations: The study was performed at a single center with 1 operator's experience, and is retrospective with no control group.
Conclusion: Findings suggest that prostate artery embolization has no adverse effect on erectile function in the majority of patients with LUTS attributable to BPH at 3 months after the procedure. Bhatia S, Acharya V, Jalaeian H, et al., Effect of Prostate Artery Embolization on Erectile Function - A Single Center Experience of 167 Patients. J Sex Med 2022;19:594-602.

**Reference**:
Bhatia S, Acharya V, Jalaeian H, Kumar J, Bryant E, Richardson A, Malkova K, Harward S, Sinha V, Kably I, Kava BR. Effect of Prostate Artery Embolization on Erectile Function - A Single Center Experience of 167 Patients. J Sex Med. 2022 Apr;19(4):594-602. doi: 10.1016/j.jsxm.2022.01.006. Epub 2022 Feb 17. PMID: 35184995.
https://pubmed.ncbi.nlm.nih.gov/35184995/

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3

**Title**: Long-Term PAE Results: What Do We Know

**Summary**:
PAE has demonstrated long-term safety and efficacy in managing LUTS due to BPH, with consistent improvements in symptom scores, quality of life, and urinary parameters. Multiple large-scale studies confirm durability of outcomes beyond 3–5 years, though reintervention rates increase with time. PAE's minimally invasive nature, favorable safety profile, and technological refinements support its growing role as a durable alternative to surgery.

**Abstract**:
Prostatic artery embolization (PAE) is a minimally invasive technique with proven safety and efficacy to treat lower urinary tract symptoms (LUTS) due to benign prostatic obstruction (BPO) or benign prostatic hyperplasia (BPH). In this review, we discuss the required level of evidence to implement and adopt treatment options for patients with LUTS due to BPO/BPH. Focus is given on the long-term (>3 years) data after PAE with reported outcomes including cohort sizes, follow-up times, reintervention rates (repeat PAE and prostatectomy), need for LUTS/BPO medical therapy, and improvements in International Prostate Symptom Score/quality of life score, peak flow rate (Qmax), postvoid residual, prostate volume, and prostate-specific antigen. The durability of treatment effects after PAE and need for prostatic reinterventions need to be taken into consideration when discussing treatment options with patients and referring colleagues from other medical specialties. Developments in medical devices used for PAE have allowed for a continuous drop in unilateral PAE rates over the last 12 years and will probably

play a role in optimizing technical and thus clinical outcomes for patients with LUTS due to BPH/BPO.

**Reference**: .
Bilhim T. Long-Term PAE Results: What Do We Know. Semin Intervent Radiol. 2022 Dec 20;39(6):577-580. doi: 10.1055/s-0042-1759732. PMID: 36561801; PMCID: PMC9767787. https://pubmed.ncbi.nlm.nih.gov/36561801/

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4

**Title**: Two-Year Outcomes of Prostatic Artery Embolization for Symptomatic Benign Prostatic Hyperplasia: An International, Multicenter, Prospective Study

**Summary**:

- A multicenter prospective trial of 478 patients showed that PAE significantly improved LUTS, with IPSS dropping from 21.8 to 9.3 at 3 months and sustaining at 11.2 by 24 months.
- Sexual function was preserved, with no change in SHIM scores—unlike surgery.
- 66% of patients with urinary retention became catheter-free within 3 months and remained so at 24 months.

**Abstract**:
Purpose: To describe clinical outcomes among patients with benign prostatic hyperplasia (BPH) 24 months following prostatic artery embolization (PAE).
Materials and methods: This was an international, multicenter, prospective trial of males with BPH with lower urinary tract symptoms (LUTS) or acute urinary retention (AUR) treated with PAE. The primary outcome was the 12 month change in the International Prostate Symptom Score (IPSS) for patients referred for bothersome LUTS, or urinary catheter independence for patients treated for AUR. Secondary outcome measures included changes in IPSS at 3 and 24 months, changes in quality of life (QoL), changes in the Sexual Health Inventory for Men (SHIM) questionnaire, technical success rate, and adverse events (AEs). Data were summarized using descriptive statistics.
Results: Four hundred seventy-eight consecutive patients underwent PAE (bothersome LUTS: N = 405; AUR: N = 73), mean age was 70 years. For patients treated for bothersome LUTS, mean total IPSS at baseline was 21.8 and decreased to 9.3, 10.6, and 11.2 at 3, 12, and 24 months following PAE, respectively (all $p < 0.001$); QoL at baseline was 4.7 and decreased to 2.0, 2.1, and 2.3 at 3, 12, and 24 months, respectively (all $p < 0.001$). The mean SHIM score at baseline and 12 months following PAE was 13.8 and 13.9, respectively. Of the 73 patients

treated for AUR, 48 (65.8%) had their indwelling catheter removed within 3 months of PAE and remained catheter free at 24 months. Fifty-five patients (11.5%) experienced ≥ 1 AE and 10 (2.1%) experienced a serious AE.
Conclusion: PAE is a safe and effective treatment for symptomatic BPH and LUTS. Level of Evidence Level 3 Trial registration ClinicalTrials.gov NCT03527589.

**Reference**:

Sapoval MR, Bhatia S, Déan C, Rampoldi A, Carnevale FC, Bent C, Tapping CR, Bongiovanni S, Taylor J, Brower JS, Rush M, McWilliams JP, Little MW; PROstate Study Investigators. Two-Year Outcomes of Prostatic Artery Embolization for Symptomatic Benign Prostatic Hyperplasia: An International, Multicenter, Prospective Study. Cardiovasc Intervent Radiol. 2024 Nov;47(11):1515-1524. doi: 10.1007/s00270-024-03802-0. Epub 2024 Sep 4. PMID: 39230672; PMCID: PMC11541243.

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5
**Title**: Management of Lower Urinary Tract Symptoms Attributed to Benign Prostatic Hyperplasia: AUA Guideline

**Summary**:
In its 2023 amendment, the American Urological Association formally recognized prostatic artery embolization (PAE) as a minimally invasive procedural option for managing lower urinary tract symptoms (LUTS) due to BPH, reflecting growing evidence of its safety and efficacy.

**Reference**:
Sandhu JS, Andriole GL, Bhattacharyya SK, et al. Management of lower urinary tract symptoms attributed to benign prostatic hyperplasia: AUA guideline amendment 2023. J Urol. 2024;211(3):601–610. doi:10.1097/JU.0000000000003582
https://www.auanet.org/guidelines-and-quality/guidelines/benign-prostatic-hyperplasia-%28bph%29-guideline

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**6**

**Title**: Benefits and advances of Cone Beam CT use in prostatic artery embolization: review of the literature and pictorial essay

**Summary**:
3D PAE using live cone-beam CT outperforms 2D angiography by clearly mapping the complex, highly variable prostate arterial anatomy, reducing non-target embolization, and improving technical success.

**Abstract**:
Prostatic artery embolization (PAE) has proven to be an efficacious treatment for urinary symptoms of benign prostatic hyperplasia. PAE is performed in a complex and challenging anatomical field which may pose difficulties from procedural standpoint. Cone beam computed tomography (CBCT) has been proposed as an invaluable tool during the PAE procedure. A review of different techniques and advancements, as well as demonstration of CBCT benefits via a pictorial overview of the salient examples is lacking. The techniques of CBCT are discussed herein and the virtual injection technology as an advancement in CBCT is discussed. To show the merits of CBCT in PAE, a pictorial overview of various clinical scenarios is presented where CBCT can be crucial in decision making. These scenarios are aimed at showing different benefits including identification of the origin of the prostatic artery and avoiding non-target embolization. Other benefits may include ensuring complete embolization of entire prostate gland as angiographic appearance alone can be inconclusive if it mimics a severely thickened bladder wall or ensuring adequate embolization of the median lobe to provide relief from "ball-valve" effect. Further examples include verification of embolization of the entire prostate when rare variants or multiple (> 2) arterial feeders are present.

**Reference**:
Rostambeigi N, Crawford D, Golzarian J. Benefits and advances of Cone Beam CT use in prostatic artery embolization: review of the literature and pictorial essay. CVIR Endovasc. 2024 May 15;7(1):46. doi: 10.1186/s42155-024-00459-1. PMID: 38744805; PMCID: PMC11093965. https://pubmed.ncbi.nlm.nih.gov/38744805/

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**8**

**Title**: Prostate Artery Embolization: State of the Evidence and Societal Guidelines

**Abstract**: Medically refractory benign prostatic hyperplasia induced lower urinary tract symptoms is an extremely prevalent issue in older men. The current gold standard therapy transurethral resection of the prostate does produce urologic improvements but is also associated with higher than desired morbidity. This has led to the need to develop new minimally invasive means to treat this disease; prostate artery embolization (PAE) has emerged as one minimally invasive treatment option for these patients. The body of evidence which

supports the use of PAE has grown quickly and substantially over the last decade. The goal of this review is to introduce and summarize the published urologic outcomes for PAE when utilized to treat benign prostatic hyperplasia induced lower urinary tract symptoms as well as document the established complication profile. Finally, the paper reviews current societal recommendations as they relate to PAE.

**Reference**: Young, Shamar, and Jafar Golzarian. “Prostate Artery Embolization: State of the Evidence and Societal Guidelines.” *Techniques in vascular and interventional radiology* vol. 23,3 (2020): 100695. doi:10.1016/j.tvir.2020.100695

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