

Transarterial embolization using combined microparticles and n-butyl cyanoacrylate in the treatment of benign prostate hyperplasia

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Purpose: To evaluate the safety and short-term outcome of prostatic artery embolization (PAE) using N-butyl cyanoacrylate (NBCA) in the treatment of benign prostatic hyperplasia (BPH) with lower urinary tract symptoms.

Result: The mean of total volume of NBCA/Lipiodol was $0,8 \pm 0,3$ ml, the total NBCA injection time was $22,5 \pm 5,4$ seconds, and the total radiation dose was $17,454 \pm 5,397$ mGy·cm². Statistically significant improvements in International Prostate Symptoms Score ($9,6 \pm 6,1$ versus $18,6 \pm 6,4$, $p < 0,001$), quality-of-life score ($2,9 \pm 1,6$ versus $4,7 \pm 1,3$, $p < 0,001$), prostate-specific antigen level ($4,7 \pm 2,4$ versus $7,8 \pm 3,5$, $p < 0,001$), IIEF5 ($14,5 \pm 3,5$ versus $15,6 \pm 6,5$, $p = 0,067$), and prostate volume ($56,5 \pm 24,1$ versus $71,3 \pm 36,3$, $p < 0,001$) at a median of 3 months versus baseline. No major complications were noted. The International Index of Erectile Function did not change significantly.

Abbreviations: MRI, Magnetic Resonance Imaging; IPSS, International Prostatic Symptoms Score; PSA, prostate-specific antigen; QoL, quality of life; IIEFS, International Index of Erectile Function score.

Materials and methods:

50 patients with LUTS symptoms due to BPH treated with PAE from June 2022 to November 2023 enrolled in this retrospective study.

The PAE procedure

PAE procedures are generally performed via unilateral transfemoral access. Usually, the right femoral artery transradial/translunar access has been used. Then, evaluate the branches of the internal iliac artery (IIA), DSA is performed by using a 5 Fr catheter (Simmons I or Cobra) at the main IIA by using 35°–55° ipsilateral and 10° craniocaudal angulation, with an injection of 9–18 mL of contrast medium at a rate of 3–6 mL/s. Superselective prostatic artery angiography is performed using a coaxial 1.7–2.7 Fr microcatheter, with 3–6 mL of contrast agent injection at a rate of 1.0–2.0 mL/s. A vasodilator (nitroglycerine 0.5-1ml) is injected through a microcatheter. Dilute embolic agents (100–300 μm) are injected slowly with a 1 mL syringe. When near stasis is achieved, a 5-minute waiting time is necessary for the particles to redistribute into the feeding arteries. Repeat angiography and ensure that most of the parenchyma microvessels of the anteromedial branch have been embolized, at which point collateral shunts may appear, mainly from the posterolateral branch. NBCA mixed with Lipiodol (ratio 1:4 - 1:8 depending on each case) is injected slowly and controlled to embolize larger branches and collateral shunts until its origin. This step is performed to avoid earlier recanalization of the main prostatic artery. All steps must be done on each pelvic side.

Follow-up after three months with IPSS score, QoL score, IIEF5, MRI or US images is performed.

Table 1: Technical features of PAE

Variables	Data
Arterial approach, n (%)	
Right radial	16 (32%)
Right femoral	34 (68%)
Type of embolization, n (%)	
Unilateral	2 (4%)
Bilateral	48 (96%)
Number of arteries each side, n (%)	
1	98/100 (98%)
2	2/100 (2%)
Total injected embolic mixture a volume, mL	$0,8 \pm 0,3$
Total mixture a injection time, s	$22,5 \pm 5,4$
Total PAE duration, min	$72,6 \pm 27,2$
Fluoroscopy duration, min	$30,6 \pm 13,5$
Radiation dose (mGy·cm ²)	$17,454 \pm 5,397$
Major complications according to SIR d, n (%)	0

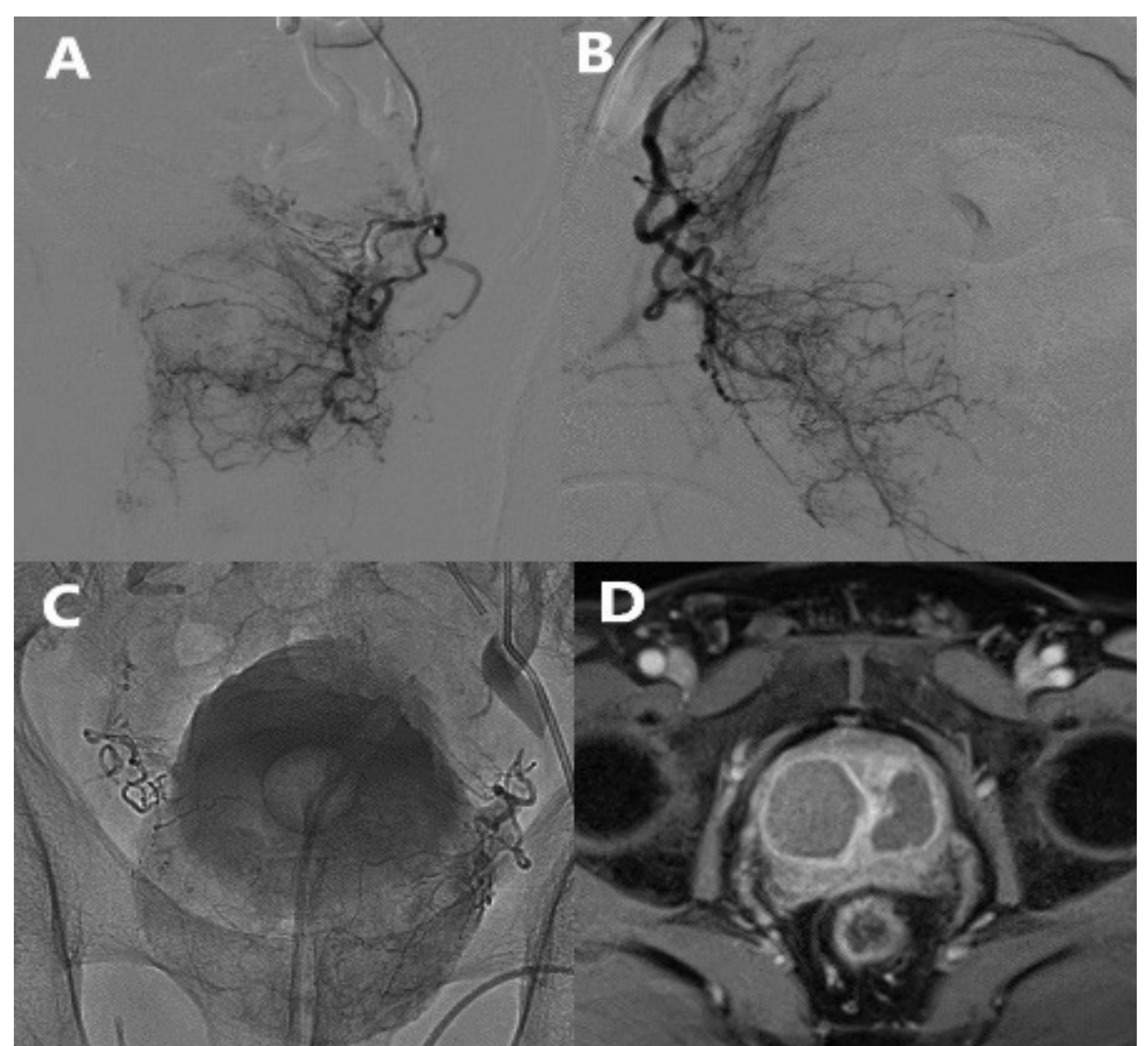


Figure 1. Example of PAE with microparticles and NBCA in a 74-year-old patient with symptomatic BPH. (A) and (B) Left and Right prostatic artery angiogram before PAE. (C). Single shot image after bilateral PAE. (D). MRI at 3-month follow-up showed significantly decreased prostatic volume with central necrosis zones.

Table 2: PAE efficacy outcomes after 3 months

Variables	Baseline	3 Months	Change (%)	p
Prostate volume (mL)	$71,3 \pm 36,3$	$56,5 \pm 24,1$	- 14,8 (20,7%)	<0,001
IPSS	$18,6 \pm 6,4$	$9,6 \pm 6,1$	- 9 (48,4%)	<0,001
QoL score	$4,7 \pm 1,3$	$2,9 \pm 1,6$	- 1,8 (38,3%)	<0,001
Prostate-specific antigen level (PSA)	$7,8 \pm 3,5$	$4,7 \pm 2,4$	3,1 (39,7%)	<0,001
IIEF5	$15,6 \pm 6,5$	$14,5 \pm 3,5$	- 1,1 (7%)	0,067

Conclusion: Prostate artery embolization by microparticles (100 – 300 μm) and NBCA for treatment of symptomatic BPH is feasible, safe, rapid and effective.

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