

ORIGINAL ARTICLE

## *Prostatic artery embolization as a countermeasure to prostatic surgery cancellations during the COVID pandemic*

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### ABSTRACT

The coronavirus disease 2019 (COVID-19) pandemic has been associated with a dramatic change in surgical priorities and with cancellations of most elective surgeries (including those for benign prostatic hyperplasia-BPH) in hospitals all over the world. In the institution of the authors, COVID-19 outbreak caused a 60-80% reduction of the available urology operating theaters, resulting in cancellation of the majority of surgeries for BPH and in increase of referrals for prostatic artery embolization (PAE). This retrospective, single-center study describes the utilization and role of PAE for symptomatic BPH during the COVID pandemic from March 2020 to November 2021. Included were patients with BPH complications who were referred for evaluation for PAE as a result of cancellation of their scheduled surgery (transurethral resection or open prostatectomy) due to the COVID pandemic. The usual selection criteria for PAE were applied.

*Keywords:* COVID-19, pandemic, benign prostatic hyperplasia, surgery cancellations, PAE

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### INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has been associated with a dramatic change in surgical priorities and with cancellations of most elective surgeries (including those for benign prostatic hyperplasia-BPH) in hospitals all over the world. In the institution of the authors, COVID-19 outbreak caused an 60-80% reduction of the available urology operating theaters, resulting in cancellation of a significant number of surgeries for benign

prostatic hyperplasia (BPH) and in increase of referrals for prostatic artery embolization (PAE). This report describes the utilization and role of PAE for symptomatic BPH during the COVID pandemic in a single tertiary center.

### MATERIAL AND METHODS

#### Patients

The material of this study was consisted of BPH patients whose treatment delay could compromise treatment outcome and patients' overall health (eg. patients with BPH related

urinary retention and indwelling catheter, patients with BPH related gross hematuria, patients with BPH related urinary infection). Patients' demographics are displayed in table 1.

**Table 1. BASELINE DATA OF PATIENTS INCLUDED IN THIS STUDY**

Age (mean ± SD ,yrs)	71.5±11.3
Body Mass Index (mean ± SD)	26.9±2.9
Prostate Volume (mean ± SD, ml)	90.6±44.5
LUTS (proportion of pts)	34/65
IPSS (mean ± SD)	26.8±3.8
Post Void Residual (mean ± SD, ml)	126±85
IBC (proportion of pts)	31/65

## Procedure

All eligible patients underwent planning computed tomographic angiography. Vascular access was achieved through femoral artery (4 Fr. sheath) or left radial artery (4 or 5 Fr. sheath). Prostatic artery was catheterized with a microcatheter ( $\leq 2.0$  Fr). Embolization was performed with microspheres (100-300 and/or 300-500 microns, Embosphere, Merit Medical). Technical data of PAE of this study is displayed in table 2.

## Follow up

To minimize personal contact, only one hospital visit was scheduled at 3 months post PAE for ultrasonographic and clinical evaluation by the interventional radiologist

**Table 2. TECHNICAL DATA OF PAE OF THIS STUDY**

RADIAL/FEMORAL APPROACH (proportion of pts)	12/53
UNI-/BI-LATERAL PAE (proportion of pts)	14/51
FLUOROSCOPY TIME (mean ± SD ,min)	45.1±15.0
DOSE-AREA PRODUCT (mean ± SD , $\mu\text{Gy}\cdot\text{m}^2$ )	16713±8139
HOSPITAL STAY (hrs post PAE)	3-10

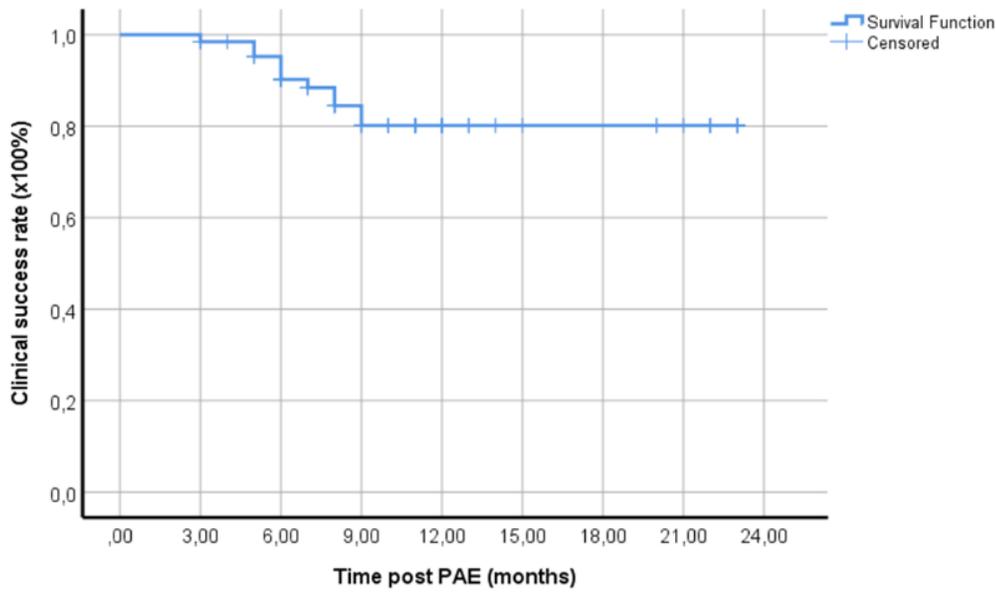
and urologist. Hospital visits were limited to trials of removal of indwelling catheter. Telephone calls were made 1-2 days post PAE and every 3 months post PAE, to calculate IPSS and to report on any symptom indicative of complication or of recurrence; in these cases, additional hospital visits were made.

## Definition of clinical success

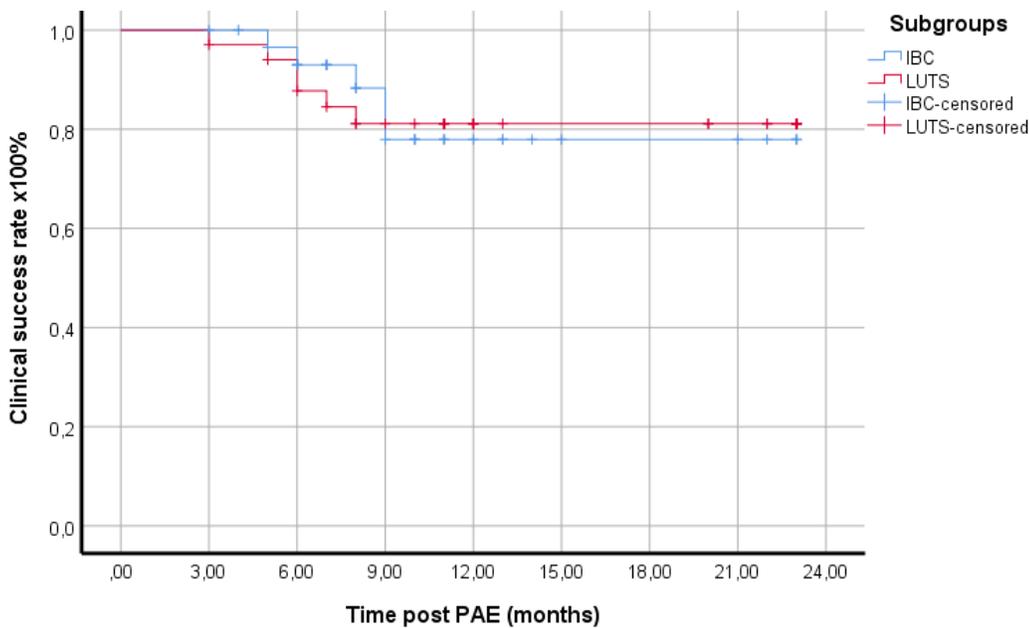
Regarding patients with BPH related urinary retention and indwelling catheter, the main criterion of clinical success was the regaining of the ability to urinate. For all patients however, definition of clinical success included a reduction of prostate volume (PV) at least 30% from the baseline, a reduction of IPSS at least 25% from the baseline (absolute value  $\leq 15$ ) and a reduction of the post-void residual of urine volume (PVR) at least 50% from the baseline.

## RESULTS

Of the 105 patients initially evaluated, 65 (61.9%) were eventually selected and



**Diagram 1.** Time trends in Clinical success rates (%) for total patient cohort (n=65)



**Diagram 2.** Comparison of success rates between the subgroup with indwelling bladder catheter (IBC) and the subgroup with lower urinary tract symptoms (LUTS).

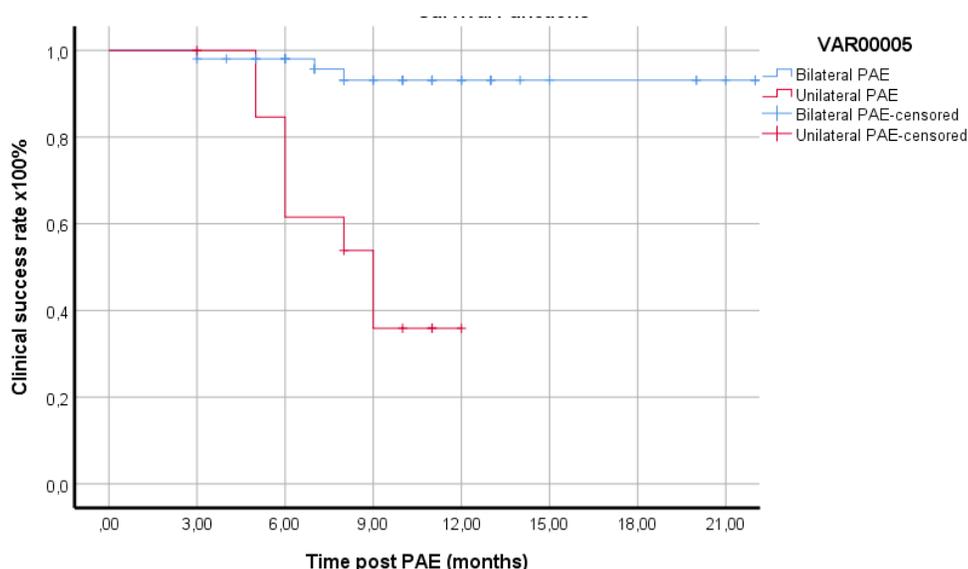
underwent PAE. The remaining were less urgent cases and were scheduled for surgery. Nevertheless, increase in referrals for PAE during the study period (compared to pre-pandemic) was estimated at 50-60%. Clinical efficacy (mean  $\pm$  SD,%) in terms of PV, IPSS and PVR at 3 months was 34.9(+/-14.2), 52.8(+/-15.9) and 62(+/-42) respectively. A slight reduction of the clinical success rates overtime was noticed. More precisely, the overall clinical success rates (%) for total patient cohort (n=65) was 98.5 at 3 months, 90.2 at 6 months and 80.2 at 12 and 18 months of follow up (diagram 1). Comparison of success rates between the subgroup with indwelling bladder catheter (IBC) and the subgroup with lower urinary tract symptoms (LUTS) revealed no significant difference ( $p=0.966$ ). More precisely, clinical success rates (%) of the IBC subgroup were as follows: 100 at 3 months, 98 at 6 months, 77,9 at 12 and 77.9 at 18 months of follow up. Clinical success rates (%) of the LUTS subgroup were 97.1 at 3 months, 87.8 at 6 months, 81.1 at 12 and 81.1 at 18 months (diagram 2).

As for the technique used to approach prostatic artery no significant difference in clinical success was found between femoral and radial approach ( $p=0.929$ ).

However, a statistically significant difference ( $p=0.001$ ) in overall clinical success was noted between bilateral and unilateral PAE. More precisely, clinical success rates (%) of the Bilateral PAE subgroup were 98 at 3 months, 98 at 6 months, 93.1 at 12 and 93.1 at 18 months. Clinical success rates (%) of the Unilateral PAE subgroup were 100 at 3 months, 61.5 at 6 months, and 35.9 at 12 months (diagram 3).

Complications were minimal and all were managed on outpatient basis (table 3).

In addition to the scheduled hospital visit at 3 months, 42 hospital visits were also made, (most of them in the first 10 days post PAE) for management of the aforementioned complications, for IBC removal trials or for patients counselling and reassurance.



**Diagram 3.** Clinical success: superiority of bilateral over unilateral PAE.

	N of patients (%)	Treatment
Urinary retention	6 (9.3)	Bladder catheter (3-7 days)
Urinary infection	2 (3)	Antibiotics p.os.
Hemospermia (mild)	2 (3)	-
Hematuria (mild)	1 (1.5)	-
Forearm hematoma (small)*	1 (1.5)	-
Total	<b>12 (18.5)</b>	

**Table 6.** Complications and treatment.

## DISCUSSION

Only a few studies investigated trends in BPH management during COVID-19 pandemic and so far, there are no studies examining the role of PAE in the treatment of BPH as an alternative to the postponed prostate surgeries due to COVID-19 restrictions [1-4]. However, a significant number of papers showed that, the COVID-19 pandemic has created a big deal of challenges for health care services and the need for care redesign [1]. At the beginning of the pandemic many hospitals worldwide shifted and retrained healthcare professionals in order to reallocate resources and develop COVID-19 facilities. During the first wave, as a consequence to the rearrangement of hospital staff, more urgent surgeries have been prioritized over the less urgent while elective surgical procedures have been postponed [1].

As COVID-19 incidence rose again in December 2021 and stressed hospitals capacities, elective surgeries were ulteriorly limited. In an effort to keep a balance between caring for COVID-19 patients and those with other diseases some hospitals have emphasized intra-specialty collaboration and innovation in order to provide effective

alternative treatments for the patients whose original treatments have been postponed. The abovementioned situation created the perfect opportunity for PAE to play a key role.

In our hospital, significantly fewer prostate surgeries were performed between March 2020 and March 2021, compared with the pre-pandemic period. At the present time restrictions regarding safety of elective surgery during COVID-19 pandemic still cause cancellations and delays of elective surgery in patients following a prior diagnosis of COVID-19. On the other hand, the number of PAEs was significantly increased in an attempt to bridge the gap in the number of treated patients.

As the matter of fact, PAE is an outpatient procedure involving much lesser staff than surgery and is highly effective and safe. For the above reasons PAE could be an ideal alternative to prostate surgery in pandemic conditions.

Unfortunately, the global magnitude of the use of PAE as an alternative to the postponed prostate surgeries during of COVID-19 pandemic remains unknown.

## CONCLUSIONS

During the COVID pandemic, in the center of the study, PAE proved to be an effective countermeasure to prostatic surgery cancellations. The safety and efficacy of PAE during this period were not inferior to PAE performed before the health crisis. This was achieved despite the modifications that were implemented in technique and follow up, in

order to reduce hospital stay and hospital visits.

Interventional radiologists and urologists should view the COVID pandemic (and, possibly, similar events in the future) not only as global health threats, but also as chances to promote new techniques as valid alternatives to standard surgical treatments.

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ΠΡΩΤΟΤΥΠΟ ΑΡΘΡΟ

## Εμβολισμός προστατικής αρτηρίας ως αντίμετρο σε ακυρώσεις προστατικής χειρουργικής κατά τη διάρκεια της πανδημίας COVID

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### ΠΕΡΙΛΗΨΗ

Η πανδημία της νόσου του κορωνοϊού 2019 (COVID-19) έχει συσχετιστεί με μια δραματική αλλαγή στις χειρουργικές προτεραιότητες και με ακυρώσεις των περισσότερων προαιρετικών χειρουργικών επεμβάσεων (συμπεριλαμβανομένων αυτών για την καλοήγη υπερπλασία του προστάτη σε νοσοκομεία σε όλο τον κόσμο. Στο ίδρυμα των συγγραφέων, η επιδημία COVID-19 προκάλεσε μείωση 60-80% των διαθέσιμων χειρουργείων ουρολογίας, με αποτέλεσμα την ακύρωση ενός σημαντικού αριθμού χειρουργικών επεμβάσεων και την αύξηση των παραπομπών για εμβολισμό προστατικής αρτηρίας (ΡΑΕ). Αυτό το άρθρο περιγράφει τη χρήση και τον ρόλο της ΡΑΕ για τη συμπτωματική καλοήγη υπερπλασία του προστάτη κατά την πανδημία COVID σε ένα μόνο τριτοβάθμιο κέντρο.

*Λέξεις ευρετηρίου:* COVID-19, πανδημία, καλοήγη υπερπλασία προστάτη, ακυρώσεις χειρουργείων, ΡΑΕ

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