



The dark side of the guidelines

2nd Interventional Radiologist under 40 Meeting

Interventional Oncology

8-10 Maggio 2017

Bologna

Società Medica Chirurgica - Palazzo dell'Archiginnasio



Embolizzazione prostatica

Giovanni Failla

***U.O.C. Diagnostica per Immagini
e Radiologia Interventistica***

***Azienda Ospedaliera per l'Emergenza "Cannizzaro",
Catania***

Direttore: Dott. D. Patané



Prostate therapy without surgery: Thousands of men to benefit from new technique that uses plastic beads to block blood supply and shrink the enlarged gland

- Successful trial in Portugal being followed up in UK with results due this year
- If it is successful the technique could be rolled out for routine use on the NHS
- Researchers expect it to largely replace surgery as the standard treatment

By BEN SPENCER MEDICAL CORRESPONDENT FOR THE DAILY MAIL

PUBLISHED: 05:00 BST, 8 March 2017 | UPDATED: 08:19 BST, 8 March 2017

Tens of thousands of men could benefit from a breakthrough prostate treatment announced today.

The technique uses tiny plastic beads to block the blood supply and shrink the enlarged gland – all without an operation.

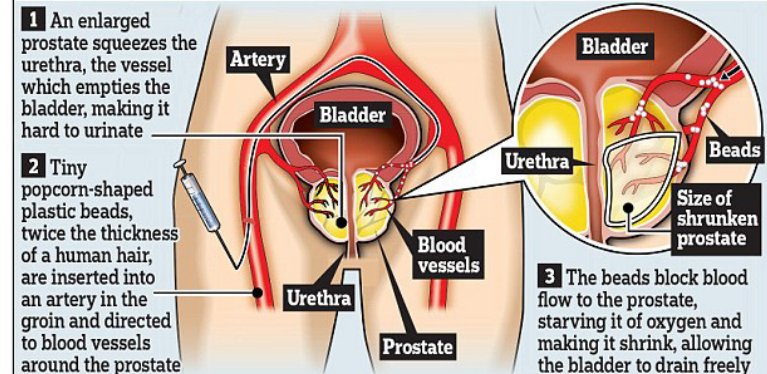
A successful trial in Portugal is being followed up in Britain, with results due back later this year. If successful it could be rolled out for routine use on the NHS.

Last night, researchers said they expected the new technique – prostate artery embolisation – to largely replace surgery as the standard treatment.

ETF European Trainee Forum
23 marzo ·

The general public is also taking note of the success story of prostate artery embolization, as shown in this article recently published by the Daily Mail.

HOW TINY BEADS SHRINK THE PROSTATE



InterventionalNews

1,000-patient study indicates prostate artery embolization remains effective for years

8th March 2017 👁 770

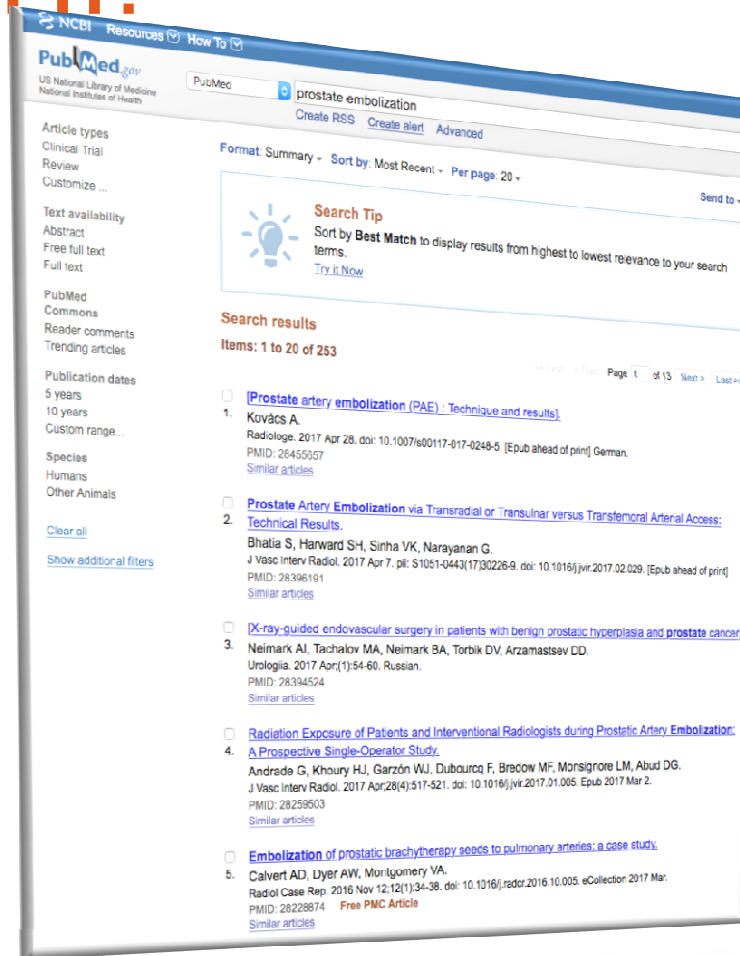


João Martins Pisco

Prostate artery embolization maintains its effectiveness for at least three years after patients undergo the therapy, according to research presented at the Society of Interventional Radiology's 2017 annual scientific meeting. The study was awarded as the "Abstract of the Year".

This study of 1,000 men is the largest of its kind to evaluate the long-term effectiveness of prostate artery embolization.

Ma la PAE è veramente una “nuova tecnica” per il trattamento della BPH?



PAE - Storia

2000

John S. DeMeritt, MD
Fakhir F. Elmasri, MD
Michael P. Esposito, MD
Gene S. Rosenberg, MD

Index terms: Prostate, hypertrophy
• Prostate, therapeutic radiology
JVIR 2000; 11:767-770

Relief of Benign Prostatic Hyperplasia-related Bladder Outlet Obstruction after Transarterial Polyvinyl Alcohol Prostate Embolization¹

- Effetti terapeutici della PAE nei pazienti con BPH
- Paziente di 76 anni con emorragia secondaria a biopsia prostatica
- riduzione del volume prostatico 40 % ad 1 anno
- Miglioramento del IPSS (24 a 13)

PAE – Storia

Studi preclinici

2008-2013

Radiology. 2008 Mar;246(3):783-9. doi: 10.1148/radiol.2463070647. Epub 2008 Jan 25.

Benign prostatic hyperplasia: transcatheter arterial embolization as potential treatment--preliminary study in pigs.

Sun F¹, Sánchez FM, Crisóstomo V, Lima JR, Luis L, García-Martínez V, López-Sánchez C, Usón J, Maynar M.

J Vasc Interv Radiol. 2009 Mar;20(3):384-90. doi: 10.1016/j.jvir.2008.11.014. Epub 2009 Jan 20.

The effect of transarterial prostate embolization in hormone-induced benign prostatic hyperplasia in dogs: a pilot study.

Jeon GS¹, Won JH, Lee BM, Kim JH, Ahn HS, Lee EJ, Park SI, Park SW.

AJR Am J Roentgenol. 2011 Aug;197(2):495-501. doi: 10.2214/AJR.10.5947.

Transarterial prostatic embolization: initial experience in a canine model.

Sun F¹, Sánchez FM, Crisóstomo V, Díaz-Güemes I, López-Sánchez C, Usón J, Maynar M.

J Magn Reson Imaging. 2013 Aug;38(2):380-7. doi: 10.1002/jmri.23981. Epub 2012 Dec 12.

Embolization therapy for benign prostatic hyperplasia: influence of embolization particle size on gland perfusion.

Brook OR¹, Faintuch S, Brook A, Goldberg SN, Rofsky NM, Lenkinski RE.

PAE – Storia

2010-2011

Cardiovasc Intervent Radiol (2010) 33:355–361
DOI 10.1007/s00270-009-9727-z

TECHNICAL NOTE

Prostatic Artery Embolization as a Primary Treatment for Benign Prostatic Hyperplasia: Preliminary Results in Two Patients

Francisco Cesar Carnevale · Alberto Azoubel Antunes · Joaquim Mauricio da Motta Leal Filho · Luciana Mendes de Oliveira Cerri · Ronaldo Hueb Baroni · Antonio Sergio Zafred Marcelino · Geraldo Campos Freire · Ailton Mota Moreira · Miguel Srougi · Giovanni Guido Cerri

Cardiovasc Intervent Radiol (2011) 34:1330–1333
DOI 10.1007/s00270-011-0136-8

LETTER TO THE EDITOR

Midterm Follow-Up After Prostate Embolization in Two Patients with Benign Prostatic Hyperplasia

Francisco C. Carnevale · Joaquim M. da Motta-Leal-Filho · Alberto A. Antunes · Ronaldo H. Baroni · Geraldo C. Freire · Luciana M. O. Cerri · Antonio S. Z. Marcelino · Giovanni G. Cerri · Miguel Srougi

- Nel 2010. Primo trattamento intenzionale in 2 pazienti con BPH con sintomi refrattari agli alfa bloccanti
- Miglioramento sintomatico, diminuzione del volume prostatico e del volume post-minzionale a 6 mesi
- Nel 2011 follow-up a 30 mesi. Persistenza della diminuzione del volume prostatico e miglioramento dei sintomi



PAE – Storia

2011



CLINICAL STUDY

Prostatic Arterial Embolization to Treat Benign Prostatic Hyperplasia

João M. Pisco, MD, PhD, Luis C. Pinheiro, MD, PhD, Tiago Bilhim, MD, Marisa Duarte, MD, Jorge R. Mendes, MD, and Antonio G. Oliveira, MD, PhD

From the SIR 2010 Annual Meeting.

None of the authors have identified a conflict of interest.

© SIR, 2011

J Vasc Interv Radiol 2011; 22:11–19

DOI: 10.1016/j.jvir.2010.09.030

15 pt età media 71 y

PAE was technically successful in 14 of the 15 patients (93.3%). There was a mean follow-up of 7.9 months (range, 3-12 months).

There was one major complication (a 1.5-cm(2) ischemic area of the bladder wall) and four clinical failures (28.6%).

In this small group of patients, PAE was a feasible procedure, without sexual dysfunction in suitable candidates, associated with a reduction in prostate volume.

PAE – Storia

2013-2014

Cardiovasc Intervent Radiol (2013) 36:1452–1463
DOI 10.1007/s00270-013-0680-5

CIRSE

REVIEW/STATE OF THE ART

Prostatic Artery Embolization for Enlarged Prostates Due to Benign Prostatic Hyperplasia. How I Do It

Francisco C. Carnevale • Alberto A. Antunes

Cardiovasc Intervent Radiol
DOI 10.1007/s00270-014-0908-z

CIRSE

TECHNICAL NOTE

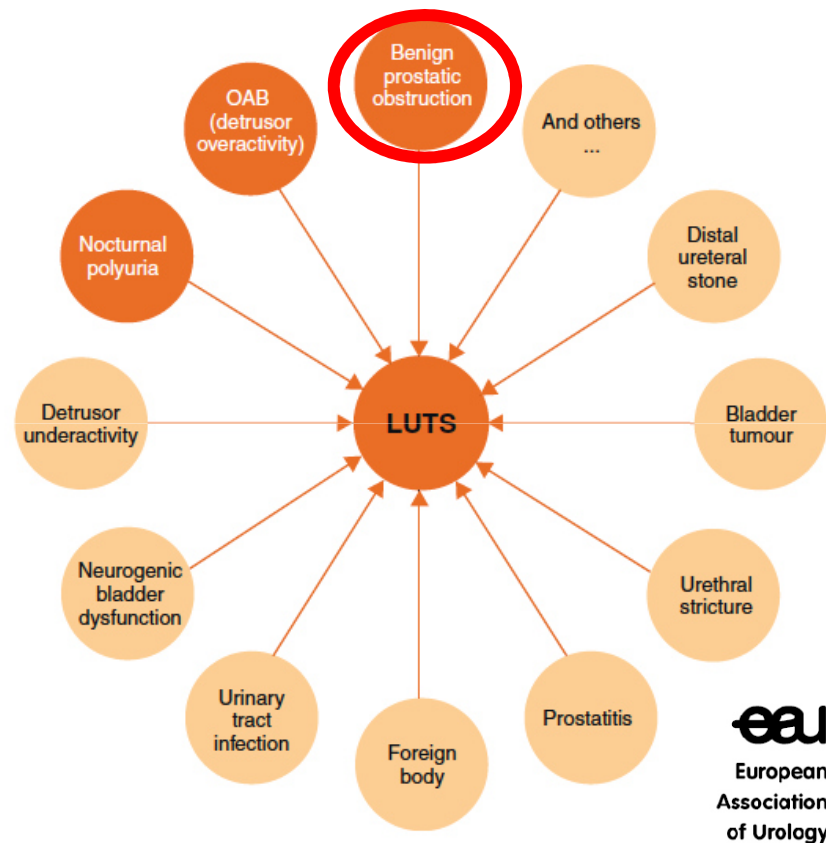
The “PERfecTED Technique”: Proximal Embolization First, Then Embolize Distal for Benign Prostatic Hyperplasia

Francisco C. Carnevale • Airton Mota Moreira •
Alberto A. Antunes

Received: 10 March 2014 / Accepted: 13 April 2014

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Prostate Erterial Embolization

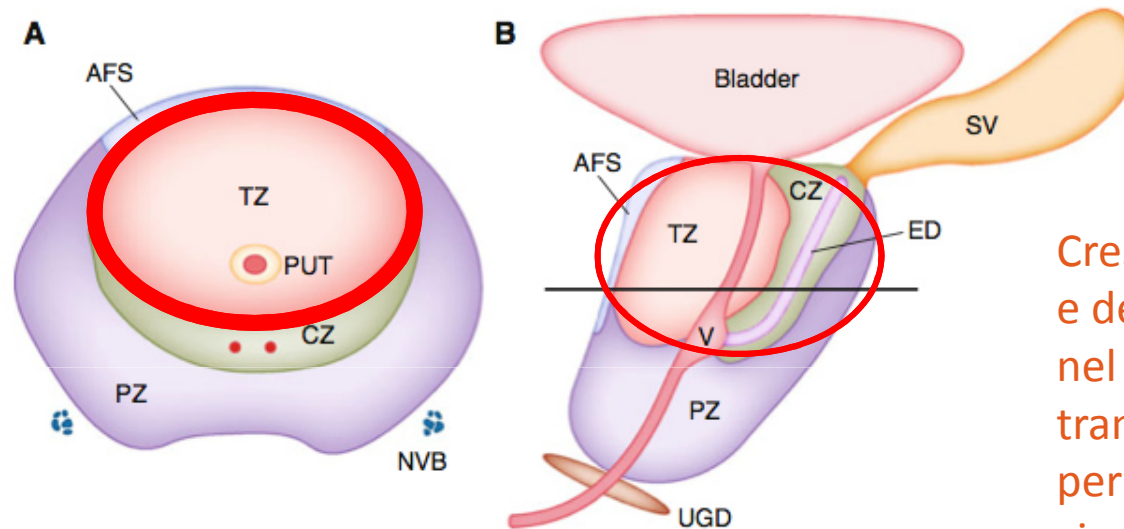


Trattamento endovascolare mininvasivo quale terapia alternativa per il trattamento dei LUTS associati all'ostruzione dell'outlet vescicale secondaria a BPH

Fig. 1 – Causes of male lower urinary tract symptoms (LUTS). OAB = overactive bladder.

© European Association of Urology 2014

Iperplasia Prostatica Benigna (BPH)

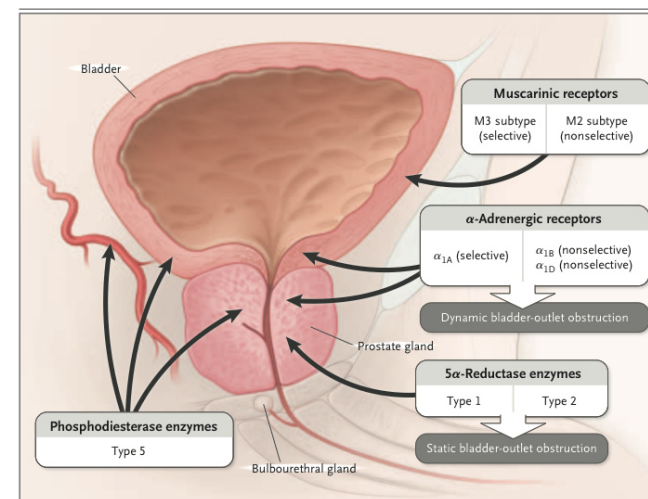
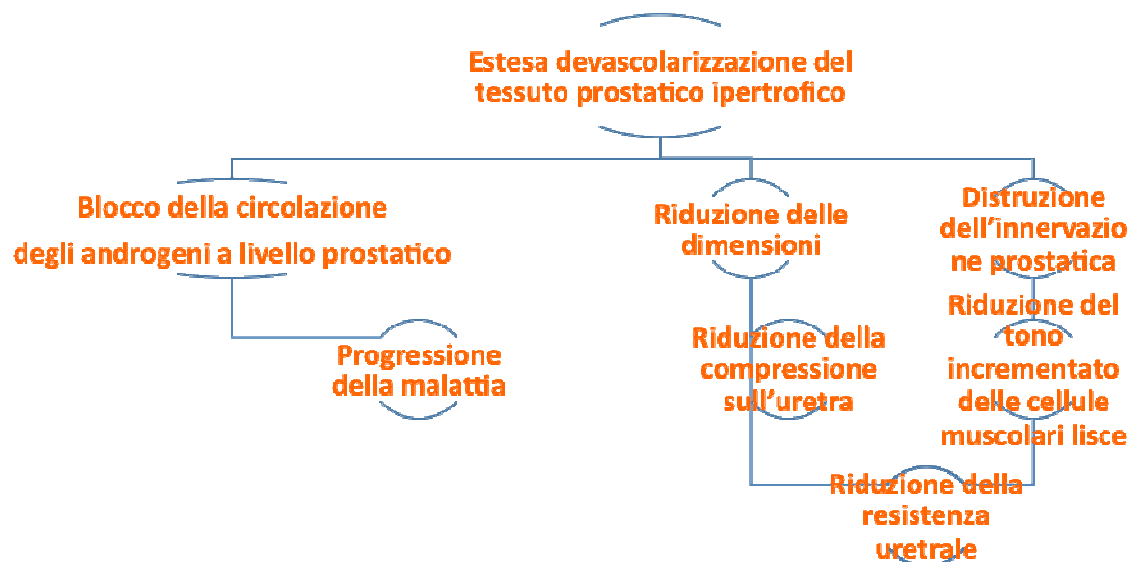


Crescita nodulare dell'epitelio e del tessuto fibromuscolare nel contesto della zona di transizione e dell'area periureterale (1) che affligge circa il 6% della popolazione maschile mondiale (2).

1. Sarma A. V. & Wei J. T. Clinical practice. Benign prostatic hyperplasia and lower urinary tract symptoms. *N Engl J Med* 367, 248–257 (2012)
2. A. Rampoldi et al.: Prostatic Artery Embolization as an Alternative to Indwelling Bladder Catheterization to Manage Benign Prostatic Hyperplasia in Poor Surgical Candidates, *Cardiovasc Intervent Radiol* (2017) 40:530–536

PAE - Rationale

The dark side of the guidelines



Sarma A. V. & Wei J. T. Clinical practice. Benign prostatic hyperplasia and lower urinary tract symptoms. N Engl J Med 367, 248–257 (2012)

Cardiovasc Intervent Radiol (2016) 39:161–169
DOI 10.1007/s00270-015-1238-5

CIRSE CrossMark

REVIEW

Prostatic Artery Embolization (PAE) for Symptomatic Benign Prostatic Hyperplasia (BPH): Part 2, Insights into the Technical Rationale

Fei Sun¹ · Verónica Crisóstomo¹ · Claudia Báez-Díaz¹ · Francisco M. Sánchez¹

Miglioramento del flusso urinario, dei sintomi e della qualità di vita (QoL)

BPH- Sintomi

Statici

- Nicturia
- Frequenza e urgenza urinaria
- Diminuzione del flusso urinario
- Svuotamento incompleto
- Ritenzione acuta di urina



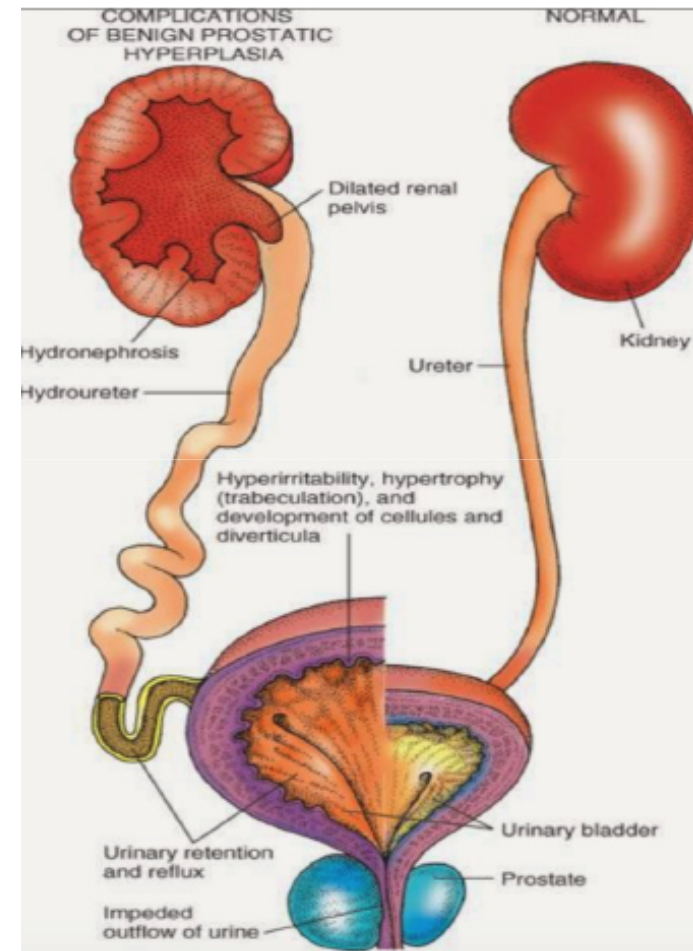
"I swear I'll give up smoking, drinking, gluttony, even my fat-back bacon if only you will let me pee."

Dinamici

- Urgenza minzionale
- Pollachiuria
- Nicturia
- Pesantezza e dolore sovrapubico

BPH- complicate

- Ritenzione acuta di urina
- Infezioni urinarie ricorrenti
- Ematuria
- Calcoli Vescicali
- Ritenzione urinaria cronica



BPH- Valutazione iniziale

INTERNATIONAL PROSTATE SYMPTOM SCORE SHEET

Dr Name: Address:
 Patient Name: Address:
 Date:

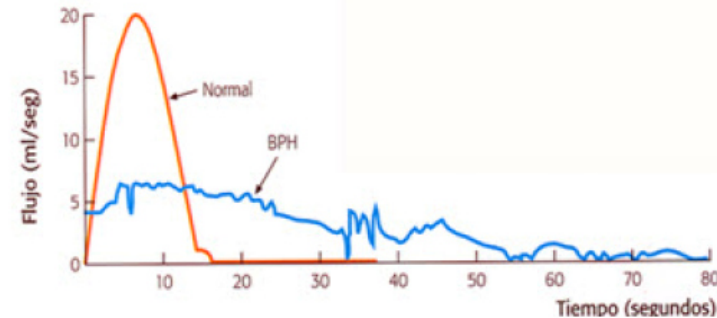
Age Group: 40-49 ☐ 50-59 ☐
 60-69 ☐ 70+ ☐

	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always	Your score
1. INCOMPLETE EMPTYING Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5	
2. FREQUENCY Over the past month, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5	
3. INTERMITTENCY Over the past month, how often have you found you stopped and started several times when you urinated?	0	1	2	3	4	5	
4. URGENCY Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. WEAK STREAM Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
6. STRAINING Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	
7. NOCTURIA Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	None 0	1 time 1	2 times 2	3 times 3	4 times 4	5 or more times 5	

Which of the above do you regard as most troublesome (1-7) _____
 TOTAL PROSTATE SYMPTOM SCORE _____

	Delighted	Pleased	Mostly satisfied	Mixed - satisfied and dissatisfied	Mostly dissatisfied	Unhappy	Terrible
QUALITY OF LIFE DUE TO URINARY SYMPTOMS If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that? (tick one).	0	1	2	3	4	5	6

Mild (score 0-7)
 Moderate (score 8-19)
 Severe (score 20- 35)



- IPSS
- Stima della qualità di vita (QoL)
- Indice Internazionale della funzione erettile
- Uroflussimetria
- PSA
- Diagnostica per immagini

Valutazione multidisciplinare pre e post
 Urologo-Radiologo Interventista

BPH- Guidelines



CIRSE



EUROPEAN UROLOGY 67 (2015) 1099–1109

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

EAU
European Association of Urology



American Urological Association Guideline: Management of Benign Prostatic Hyperplasia (BPH)

Revised, 2010

Panel Members:	Consultants:
Kevin T. McVary, MD (Chair)	Susan Norris, MD, MPH, MSc
Claus G. Roehrborn, MD (Co-Chair)	Suzanne Pope, MBA
Andrew L. Avins, MD, MPH	Natalie Jacuzzi, MPH
Michael J. Barry, MD	Tarra McNally, MA, MPH
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John T. Wei, MD	Mari Zuckerman, MA
	Michael Folmer
	Kadiatu Kebe

Platinum Priority – Guidelines

Editorial by Jean-Nicolas Cornu and Bertrand Lukacs on pp. 1110–1111 of this issue

EAU Guidelines on the Assessment of Non-neurogenic Male Lower Urinary Tract Symptoms including Benign Prostatic Obstruction

Christian Gratzke^a, Alexander Bachmann^b, Aurelien Descazeaud^c, Marcus J. Drake^d,
Stephan Madersbacher^e, Charalampos Mamoulakis^f, Matthias Oelke^g, Kari A.O. Tikkinen^h,
Stavros Gravas^{i,*}

BPH- Guidelines

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105 Result(s) for 'prostate embolization'



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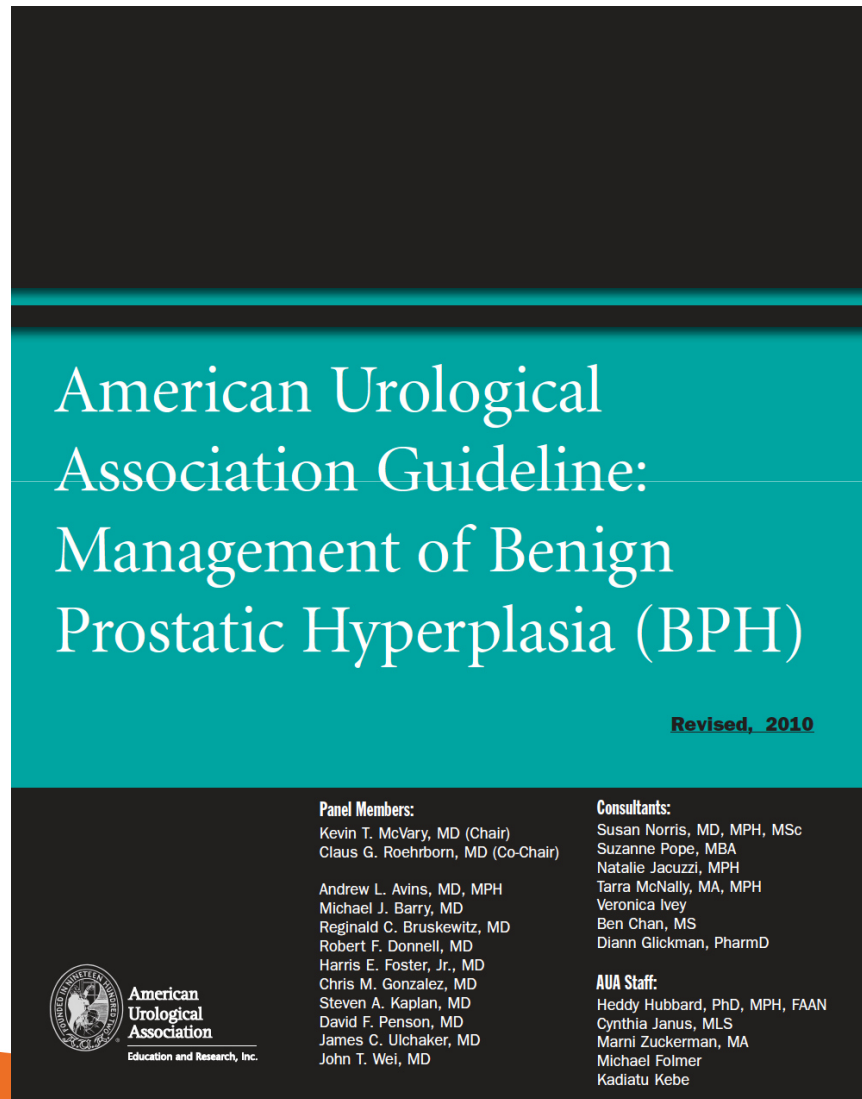
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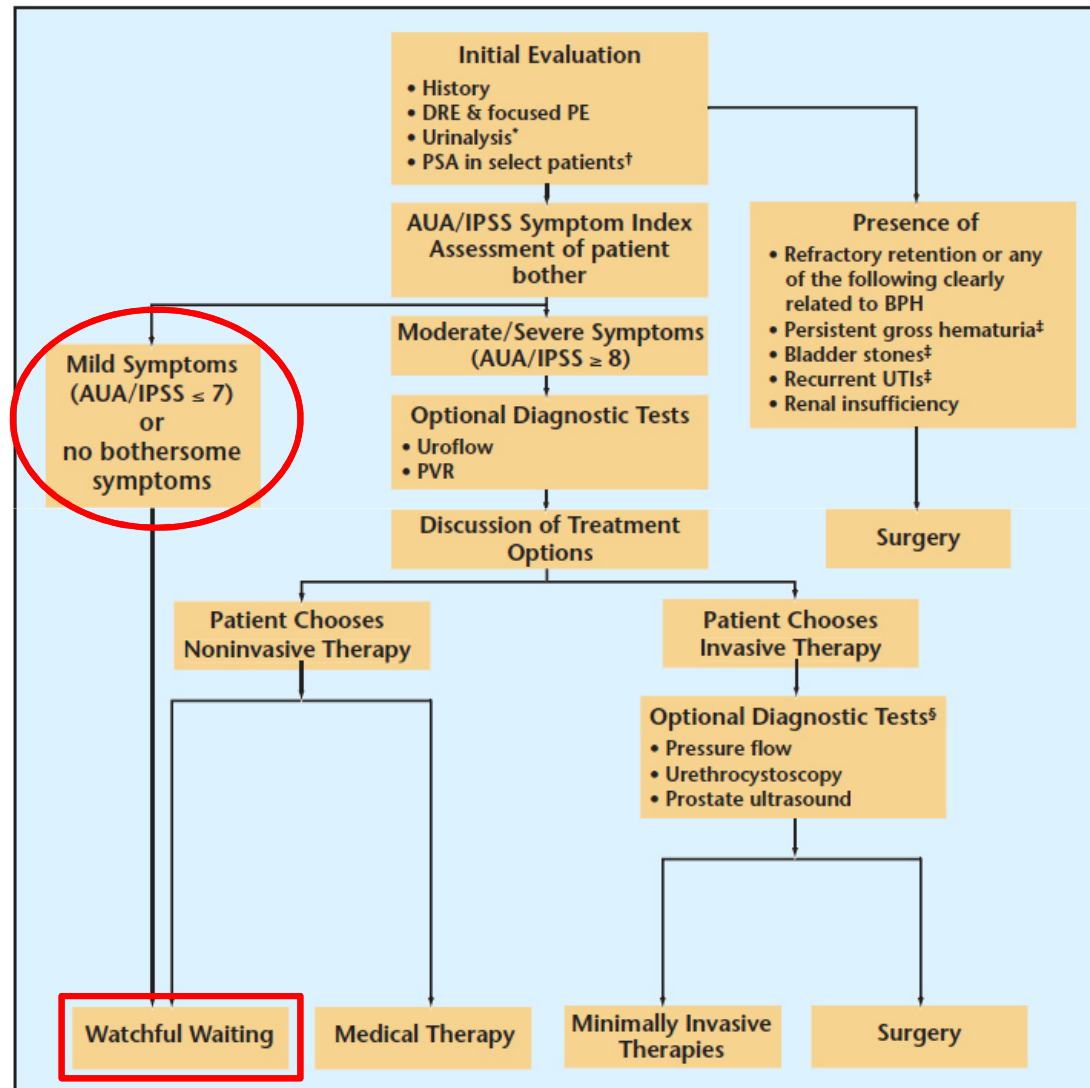


Prostate Embolisation
Milan (IT), October 11-12, 2017

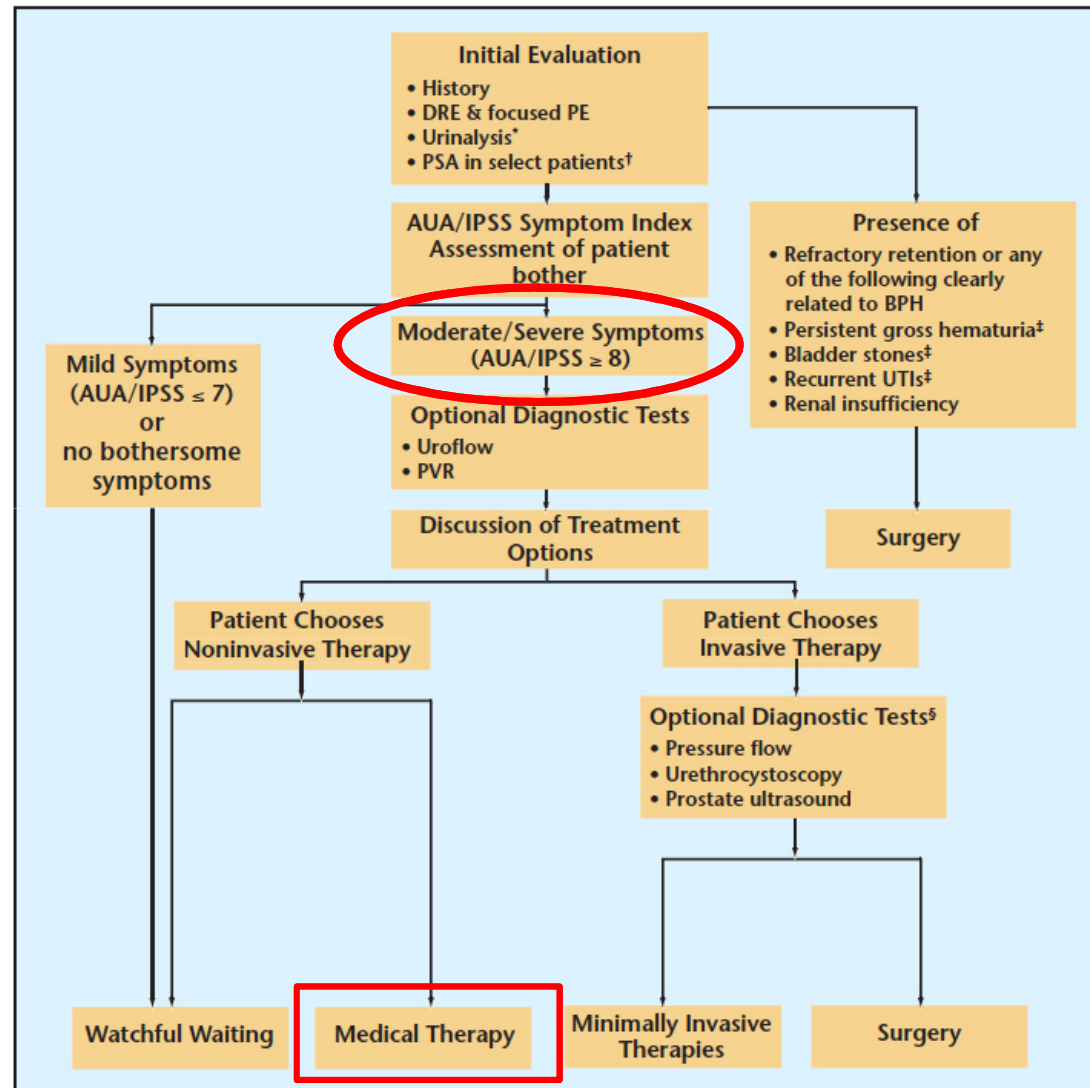
BPH- Guidelines



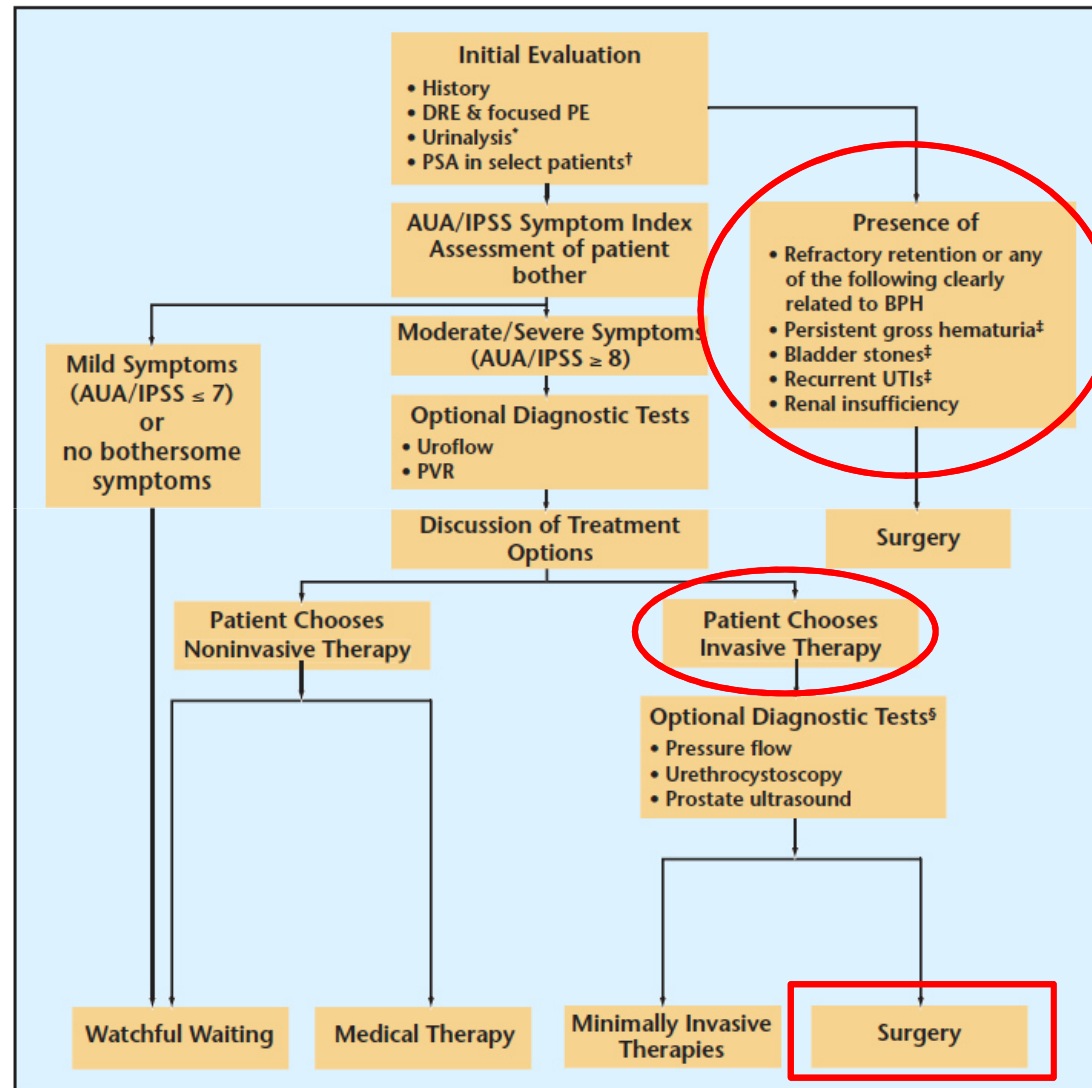
BPH- Guidelines



BPH- Guidelines



BPH- Guidelines



BPH- Guidelines

Watchful Waiting

Medical Therapies

Alpha-Blockers

- Alfuzosin
- Doxazosin
- Tamsulosin
- Terazosin
- Silodosin*

5- Alpha-reductase inhibitors (5-ARIs)

- Dutasteride
- Finasteride

Combination Therapy

- Alpha blocker and 5-alpha-reductase inhibitor
- Alpha blocker and anticholinergics

Anticholinergic Agents

Complementary and Alternative Medicines (CAM)

Minimally Invasive Therapies

- Transurethral needle ablation (TUNA)
- Transurethral microwave thermotherapy (TUMT)

Surgical Therapies

- Open prostatectomy
- Transurethral holmium laser ablation of the prostate (HoLAP)
- Transurethral holmium laser enucleation of the prostate (HoLEP)
- Holmium laser resection of the prostate (HoLRP)
- Photoselective vaporization of the prostate (PVP)
- Transurethral incision of the prostate (TUIP)
- Transurethral vaporization of the prostate (TUVP)
- Transurethral resection of the prostate (TURP)

*Silodosin was approved by the US Food and Drug Administration but there were no published articles in reviewed literature prior to the cut-off date for the literature search.



BPH- TURP

- Procedura chirurgica più frequente
- Visualizzazione endoscopica diretta
- Trattamento di scelta in prostate con volume minore di 80-100 gr
- **Eiaculazione retrograda**
- Tasso di re-intervento tra 3 e 14 %

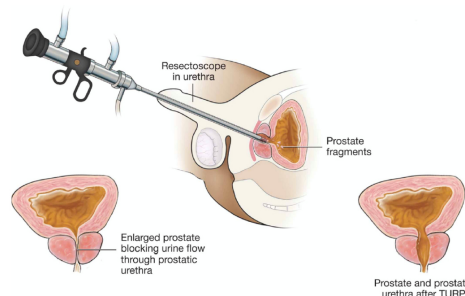
Risultati

Miglioramento del Qmax 115%

Riduzione del residuo post-minzionale

60%

Miglioramento del IPSS ad 1 anno 70%



Complicanze immediate

Emorragie

Infezioni ricorrenti

Complicanze tardive

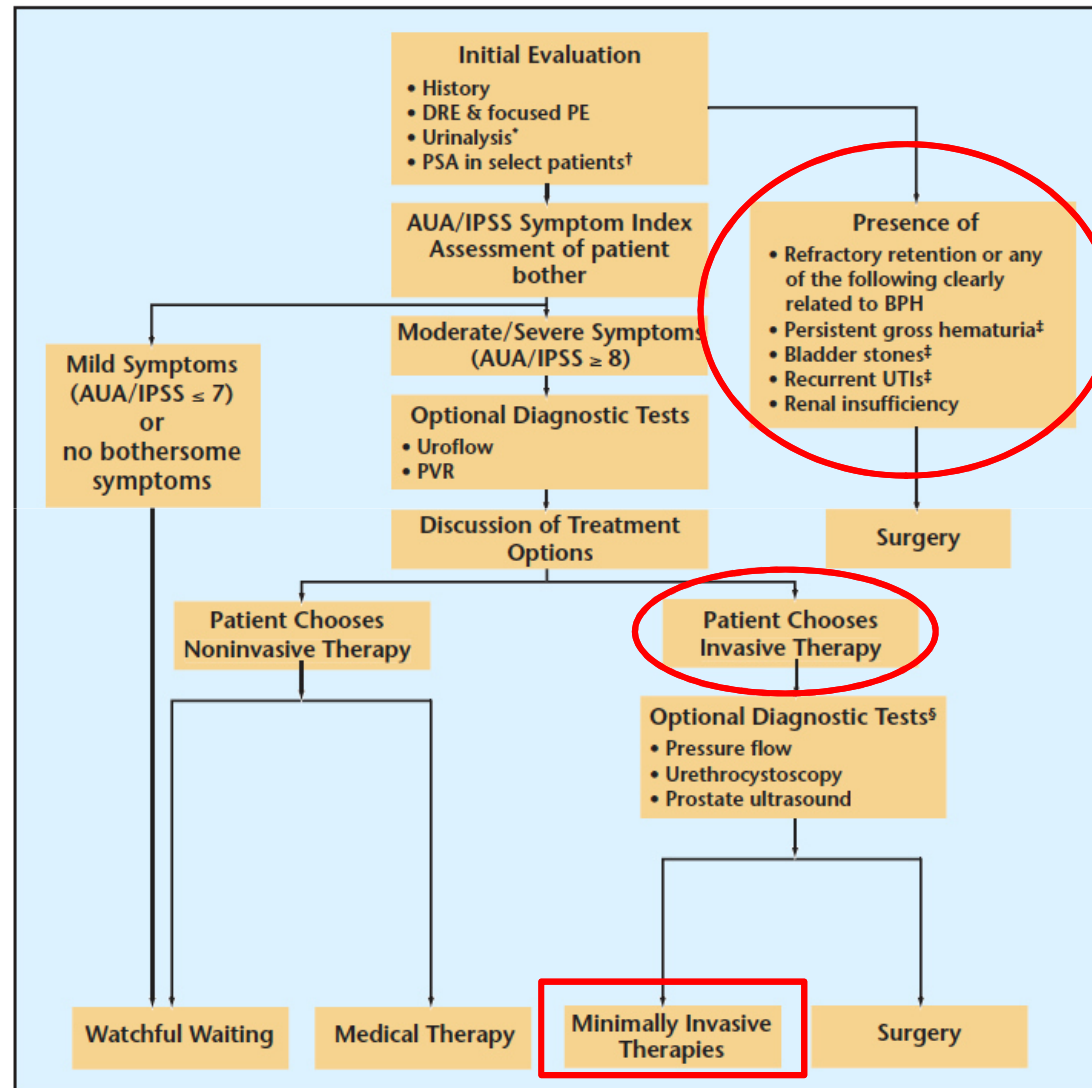
Stenosi del collo vescicale 4%

Stenosi uretrale 1,7%

Disfunzione erettile 6%

Incontinenza 2%

BPH- Guidelines



BPH- Guidelines

Watchful Waiting

Medical Therapies

Alpha-Blockers

- Alfuzosin
- Doxazosin
- Tamsulosin
- Terazosin
- Silodosin*

5- Alpha-reductase inhibitors (5-ARIs)

- Dutasteride
- Finasteride

Combination Therapy

- Alpha blocker and 5-alpha-reductase inhibitor
- Alpha blocker and anticholinergics

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- Transurethral needle ablation (TUNA)
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Surgical Therapies

- Open prostatectomy
- Transurethral holmium laser ablation of the prostate (HoLAP)
- Transurethral holmium laser enucleation of the prostate (HoLEP)
- Holmium laser resection of the prostate (HoLRP)
- Photoselective vaporization of the prostate (PVP)
- Transurethral incision of the prostate (TUIP)
- Transurethral vaporization of the prostate (TUVP)
- Transurethral resection of the prostate (TURP)

*Silodosin was approved by the US Food and Drug Administration but there were no published articles in the peer reviewed literature prior to the cut-off date for the literature search.

Revised 2010!!

No PAE !!



BPH- Guidelines



Platinum Priority – Guidelines

Editorial by Jean-Nicolas Cornu and Bertrand Lukacs on pp. 1110–1111 of this issue

EAU Guidelines on the Assessment of Non-neurogenic Male Lower Urinary Tract Symptoms including Benign Prostatic Obstruction

Christian Gratzke^a, Alexander Bachmann^b, Aurelien Descazeaud^c, Marcus J. Drake^d,
Stephan Madersbacher^e, Charalampos Mamoulakis^f, Matthias Oelke^g, Kari A.O. Tikkinen^h,
Stavros Gravas^{i,*}

^aDepartment of Urology, Urologische Klinik und Poliklinik, Klinikum der Universität München-Grosshadern, Munich, Germany; ^bDepartment of Urology, University Hospital Basel, Basel, Switzerland; ^cDepartment of Urology, Dupuytren Hospital, University of Limoges, Limoges, France; ^dDepartment of Urology, Institute and School of Clinical Sciences, University of Bristol, Bristol, UK; ^eDepartment of Urology and Andrology, Kaiser-Franz-Josef-Spital, Vienna, Austria; ^fDepartment of Urology, General Hospital of Heraklion, University of Crete Medical School, Heraklion, Greece; ^gDepartment of Urology, Hannover Medical School, Hannover, Germany; ^hDepartments of Urology and Public Health, Helsinki University Central Hospital, University of Helsinki, Helsinki, Finland; ⁱDepartment of Urology, University of Thessaly, Larissa, Greece

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Bladder outlet obstruction
Benign prostatic hyperplasia
Detrusor overactivity
Overactive bladder
Nocturia
Nocturnal polyuria

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Abstract

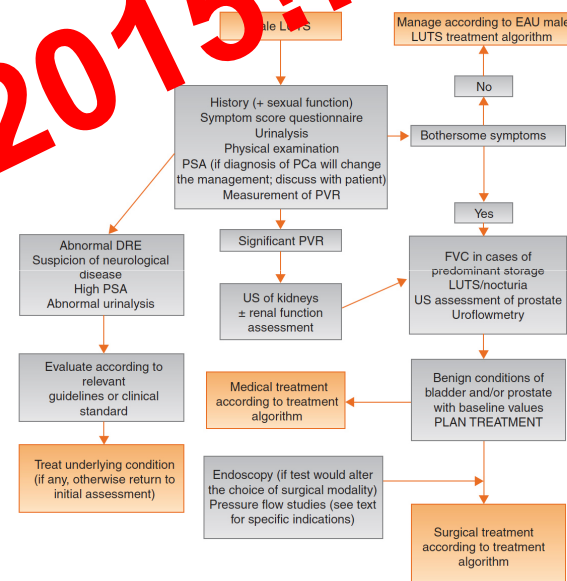
Context: Lower urinary tract symptoms (LUTS) represent one of the most common clinical complaints in adult men and have a multifactorial aetiology.
Objective: To develop European Association of Urology (EAU) guidelines on the assessment of men with non-neurogenic LUTS.
Evidence acquisition: A structured literature search on the assessment of non-neurogenic male LUTS was conducted. Articles with the highest available level of evidence were selected. The Delphi technique consensus approach was used to develop the recommendations.
Evidence synthesis: As a routine part of the initial assessment of male LUTS, a medical history must be taken, a validated symptom score questionnaire with quality-of-life question(s) should be completed, a physical examination including digital rectal examination should be performed, urinalysis must be ordered, post-void residual urine (PVR) should be measured, and uroflowmetry may be performed. Micturition frequency-volume charts or bladder diaries should be used to assess male LUTS with a prominent storage component or nocturia. Prostate-specific antigen (PSA) should be measured only if a diagnosis of prostate cancer will change the management or if PSA can assist in decision-making for patients at risk of symptom progression and complications. Renal function must be assessed if renal impairment is suspected from the history and clinical examination, if the patient has hydronephrosis, or when considering surgical treatment for male LUTS. Uroflowmetry should be performed before any treatment. Imaging of the upper urinary tract in men with LUTS should be performed in patients with large PVR, haematuria, or a history of urolithiasis. Imaging of the prostate should be performed if this assists in choosing the appropriate drug and when considering surgical treatment. Urethrocystoscopy should only be performed in men with LUTS to exclude suspected bladder or urethral pathology and/or before minimally invasive/surgical therapies if the findings may change treatment. Pressure-flow studies should be performed only in individual patients for specific indications before surgery or when evaluation of the pathophysiology underlying LUTS is warranted.

* Corresponding author. Department of Urology, University of Thessaly, Feidiou 6–8, Larissa 41221, Greece. Tel.: +30 69 44626086; Fax: +30 24 13501900.
E-mail address: sgravas2002@yahoo.com (S. Gravas).

<http://dx.doi.org/10.1016/j.eururo.2014.12.038>
0302-2838/© 2014 European Association of Urology. Published by Elsevier B.V. All rights reserved.



Revised 2015!!



PAE- Guidelines ? 2014

*No level of evidence
No recommendation*



STANDARDS OF PRACTICE

Society of Interventional Radiology Position Statement: Prostate Artery Embolization for Treatment of Benign Disease of the Prostate

Justin P. McWilliams, MD, Michael D. Kuo, MD, Steven C. Rose, MD, Sandeep Bagla, MD, Drew M. Caplin, MD, Emil I. Cohen, MD, Salomao Faintuch, MD, MSc, James B. Spies, MD, MPH, Wael E. Saad, MD, and Boris Nikolic, MD, MBA

SIR POSITION

PAE for BPH is a novel and promising therapy that appears safe and efficacious based on short-term follow-up. Patient satisfaction is high, and repeat intervention rates are low.

The PAE procedure is technically challenging, with a possibility of complications if it is not performed meticulously. Interventional radiologists, given their knowledge of arterial anatomy, experience with microcatheter techniques, and expertise in other embolization procedures, are the specialists best suited for the performance of PAE.

SIR supports the performance of high-quality clinical research to expand the numbers of patients studied, to extend the duration of follow-up, and to compare the PAE procedure against existing surgical therapies.

FURTHER STUDY OF PAE

Although there may be emergency indications for PAE for post-operative bleeding or other urgent indications, elective PAE for BPH requires additional investigation before its acceptance into routine therapy. Additional studies, some of which are ongoing, should investigate midterm and long-term efficacy of the procedure, including subjective symptom scores and objective measures such as peak flow rate, prostate volume, and postvoid residual volume. Prospective,

PAE- Guidelines ?

2014



SPECIAL COMMUNICATION

Prostatic Artery Embolization to Treat Lower Urinary Tract Symptoms Related to Benign Prostatic Hyperplasia and Bleeding in Patients with Prostate Cancer: Proceedings from a Multidisciplinary Research Consensus Panel

Jafar Golzarian, MD, Alberto A. Antunes, MD, Tiago Bilhim, MD, Francisco Cesar Carnevale, MD, Badrinath Konety, MD, Kevin T. McVary, MD, J. Kellogg Parsons, MD, João-Martins Pisco, MD, David N. Siegel, MD, James Spies, MD, Neil Wasserman, MD, Naveen Gowda, MD, and Kamran Ahrar, MD

Radiologic Issues Related to Embolization in Prostate Cancer

Despite the promising results of PAE, no study to date has evaluated the therapeutic value of embolization for the treatment of primary prostate cancer. Carmignani

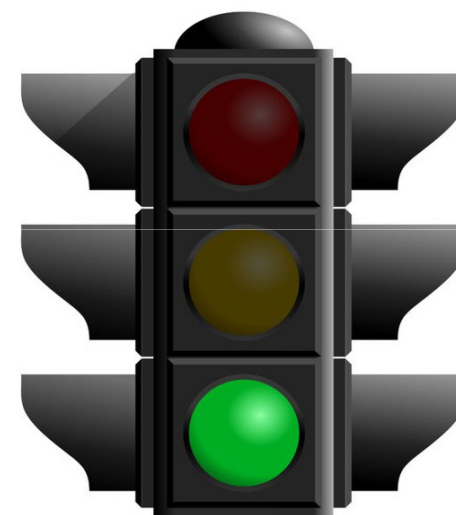
Embolization for the treatment of prostatic hematuria should be performed only after all more conservative methods have been exhausted. Embolization discussed in

Embolization does not currently have a defined role in the management of patients with prostate cancer other than as a treatment for hemorrhage. As we gain experience with embolization for BPH, we will continue to learn more about the prostatic vascular anatomy and collateral and communicating circulation. It is possible that some currently used intraarterial therapies may be adopted and proven effective for the treatment of prostate cancer.

The panel also discussed the role of embolization in treating complications of prostate cancer, such as bleeding. The panel unanimously agreed that PAE should be offered to these patients much earlier—before palliative radiation therapy in patients with advanced disease.

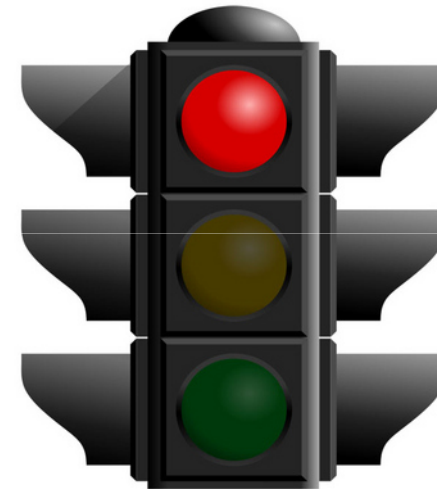
Indicazioni

- Intolleranza o mancata risposta al trattamento medico per più di sei mesi
- Alto rischio chirurgico
- PZ.Portatori di catetere vescicale a permanenza



Controindicazioni

- infezioni urinarie ricorrenti
- Vescica neurogenica
- Diverticoli vescicali > 5 cm
- Calcolosi vescicale
- Stenosi uretrale
- Insufficienza renale



Technical challenge

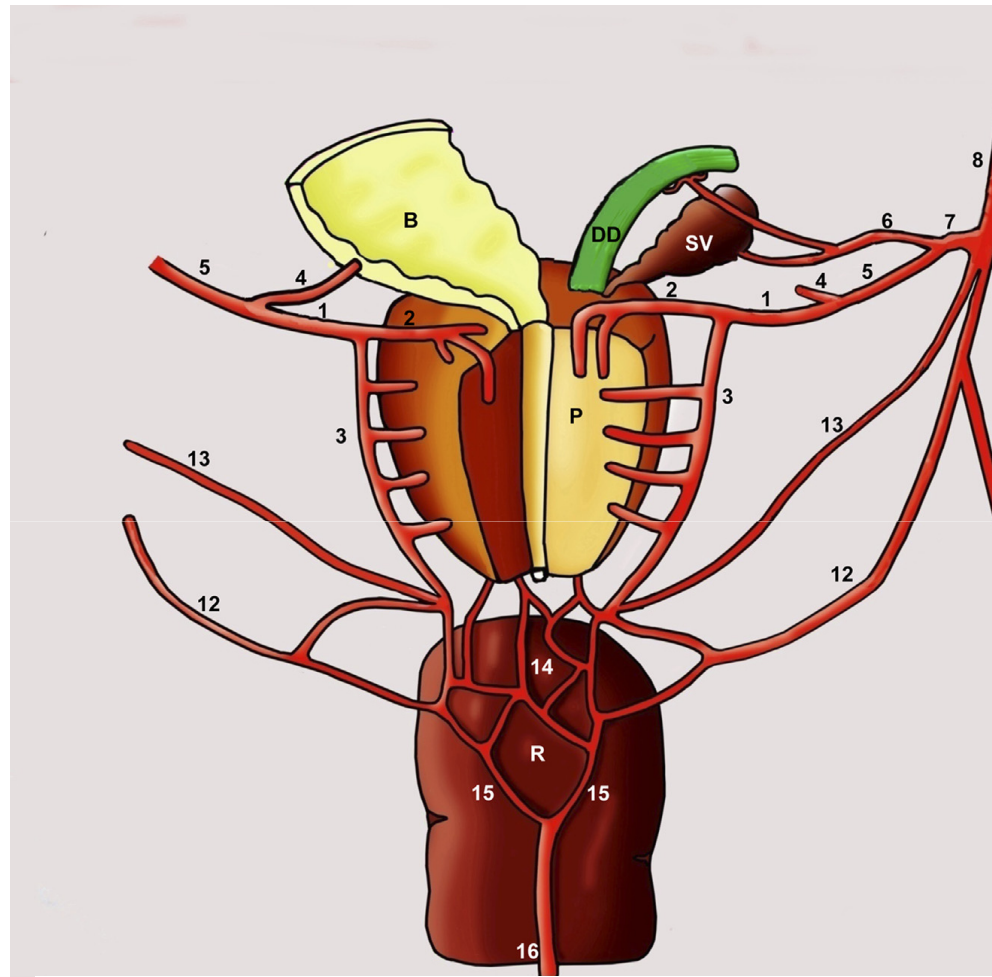


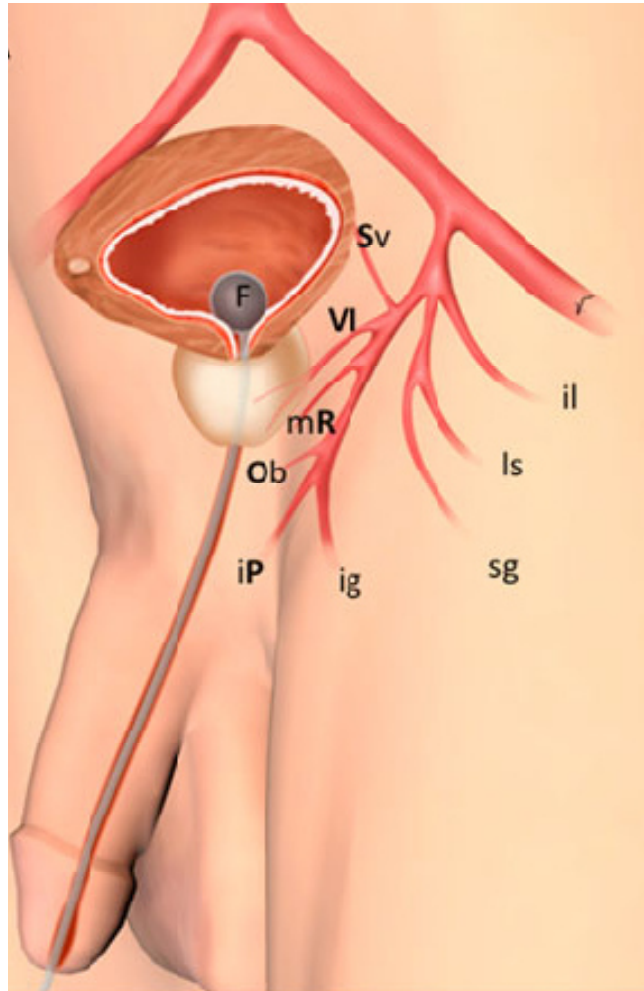
Table 1. Glossary of Arteries and Anatomic Structures Shown in Figures 1-10

Arteries		Anatomic Structures	
1	Superior prostatic pedicle	B	Bladder
2	Medial prostatic branch	P	Prostate
3	Lateral prostatic branch	PB	Pubis
4	Inferior vesical	R	Rectum
5	Prostatic-vesical	SV	Seminal vesicles
6	Vesicle deferential	DD	Deferent ducts
7	Genito-vesical	IOM	Internal obturator muscle
8	Gluteo-pudendal trunk	IB	Iliac bone
9	Obturator	ISC	Ischium
10	Superior gluteal	U	Ureter
11	Inferior gluteal	S	Sacrum
12	Internal pudendal		
13	Middle rectal		
14	Inferior prostatic pedicle		
15	Superior rectal		
16	Inferior mesenteric		
17	Hypogastric		
18	Superior vesical		
19	Inferior rectal		

Human Cadaveric Specimen Study of the Prostatic Arterial Anatomy: Implications for Arterial Embolization

J Vasc Interv Radiol 2014; 25:315-322

Technical challenge



Acronym PROVISO

P – internal pudendal

R- middle rectal

O- obturator

VI- inferior vesical

S – superior vesical

under

O- oblique view

ig- inferior gluteal

sg- superior gluteal

ls- lateral sacral

Il-iliolumbar



Cardiovasc Intervent Radiol (2013) 36:1452–1463

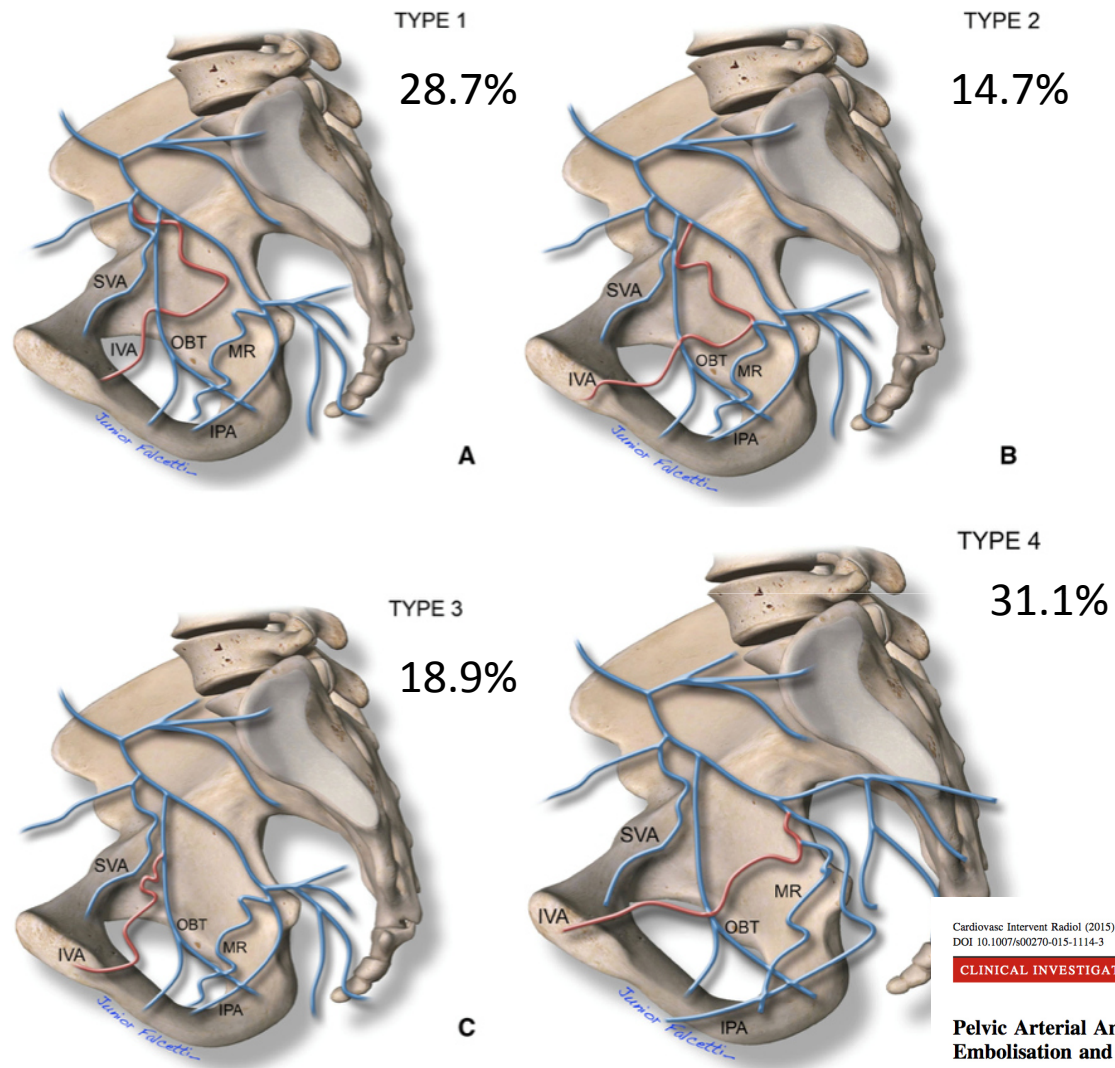


Fig. 3 Common anatomic variations of internal iliac anterior division and its branches. A Type I B type II C type III D type IV

Cardiovasc Intervent Radiol (2015) 38:855–861
DOI 10.1007/s00270-015-1114-3

CIRSE CrossMark

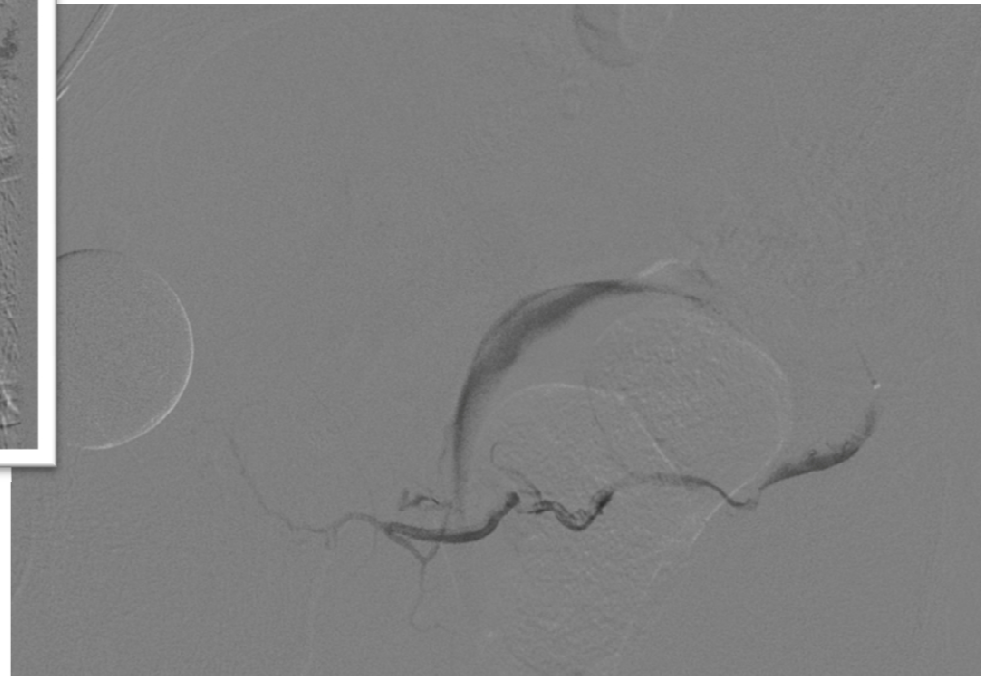
CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

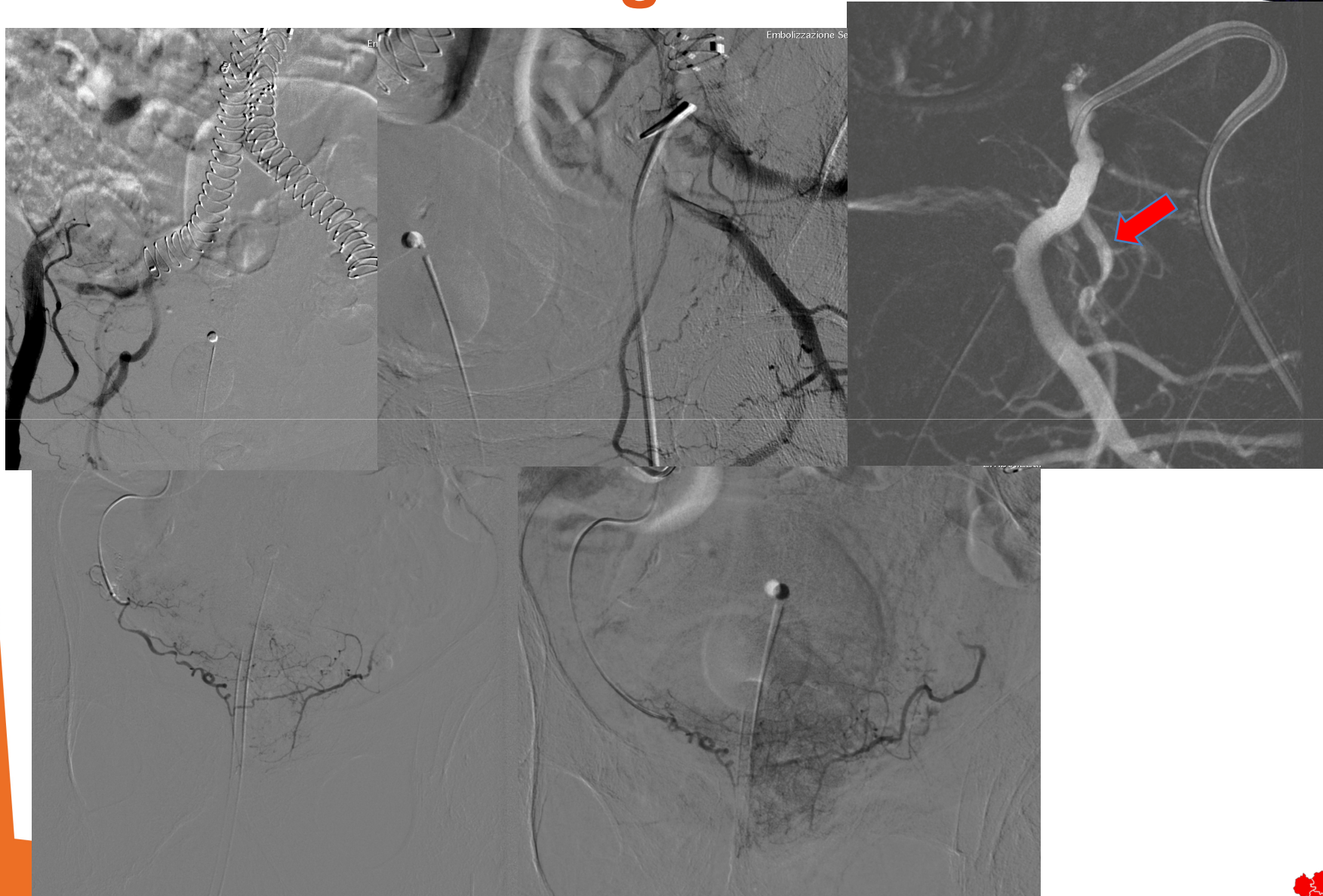
Pelvic Arterial Anatomy Relevant to Prostatic Artery Embolisation and Proposal for Angiographic Classification

André Moreira de Assis¹ · Ailton Mota Moreira¹ · Vanessa Cristina de Paula Rodrigues¹ ·
Sardis Honoria Harward² · Alberto Azoubel Antunes² · Miguel Srougi² ·
Francisco Cesar Carnevale¹

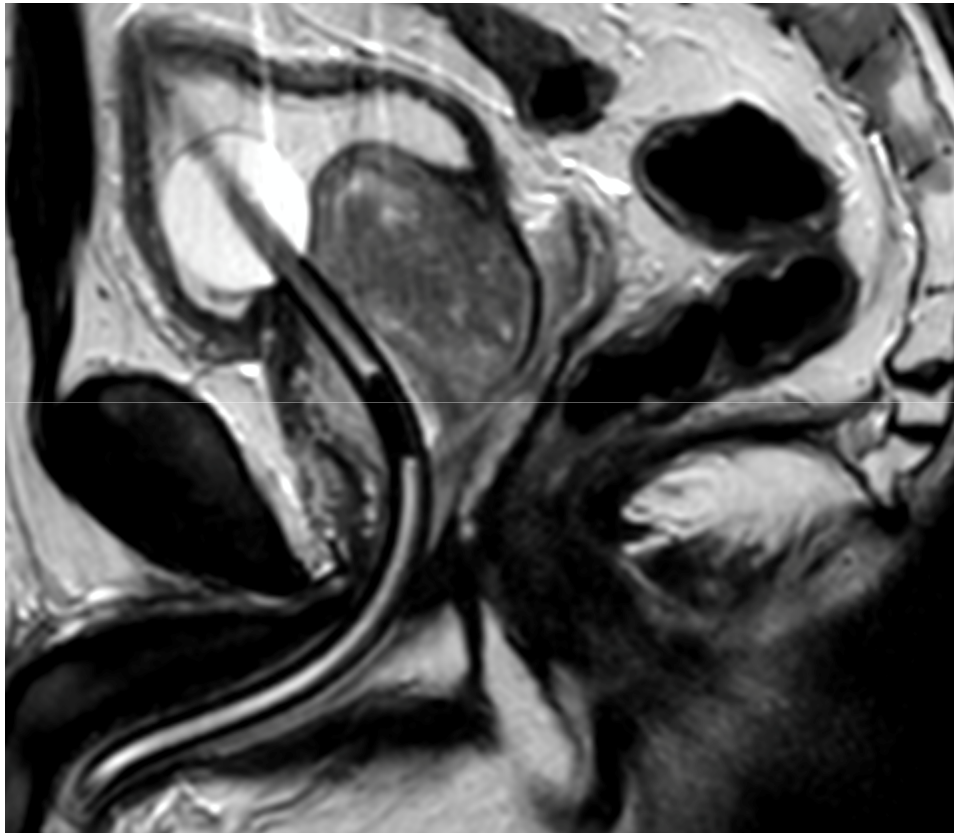
Technical challenge



Technical challenge



Preoperative imaging



PAE- Evidence

PAE-outcome

Successo Tecnico

Bilaterale 75-94%

Unilaterale 50%

Successo clinico

- Miglioramento IPSS e QoL
- Assenza di disturbi della funzione sessuale e complicanze maggiori
- Rimozione del catetere vescicale.

Unilateral Versus Bilateral Prostatic Arterial Embolization for Lower Urinary Tract Symptoms in Patients with Prostate Enlargement

Tiago Bilhim · João Pisco · Hugo Rio Tinto · Lúcia Fernandes ·
Luís Campos Pinheiro · Marisa Duarte · José A. Pereira ·
António G. Oliveira · João O'Neill

2013

Single retrospective study 122 pts treated with PVA 100-200 micron

103 bilateral PAE mean age 65.8 ± 6.9 19 unilateral PAE mean age 71.3 ± 1.7

Campione non omogeneo con età media differenza non statisticamente significativa

not significant differences in terms of (IPSS), (Qmax), or QOL improvements between the unilateral and bilateral PAE groups.

Poor outcomes (defined as an IPSS ≥ 20 and/ or reduction $< 25\%$, QOL ≥ 4 and or reduction < 1 , Qmax < 2.5 mL/s, and additional treatments required [ie, medication or surgery]) were seen more in the unilateral group compared to the bilateral group.

Radiol med (2015) 120:361–368
DOI 10.1007/s11547-014-0447-3

VASCULAR AND INTERVENTIONAL RADIOLOGY

2015

Prostatic artery embolization in benign prostatic hyperplasia: preliminary results in 13 patients

Maurizio Grosso · Alberto Balderi · Matteo Arnò · Davide Sortino ·
Alberto Antonietti · Fulvio Pedrazzini · Grazia Giovino · Claudia Vinay ·
Orazio Maugeri · Carlo Ambruosi · Giuseppe Arena

13 consecutive pts mean age 75.9

follow up 12 mesi

1 cases not performed because of
tortuosity and atherosclerosis

Bilateral 75% unilateral 27%

Results PAE was technically successful in 12/13 patients (92 %). In one patient, PAE was not performed because of tortuosity and atherosclerosis of iliac arteries. PAE was completed bilaterally in 9/13 (75 %) patients and unilaterally in three (27 %). All patients removed the bladder catheter from 4 days to 4 weeks after PAE. We obtained a reduction in IPSS (mean, 17.1 points), an increase in IIEF (mean, 2.6 points), an improvement in QoL (mean, 2.6 points) and a volume reduction (mean, 28 %) at 12 months.

Conclusions Consistent with the literature, our experience showed the feasibility, safety and efficacy of PAE in the management of patients with LUTS related to BPH. PAE may

Cardiovasc Intervent Radiol (2017) 40:780–787
DOI 10.1007/s00270-016-1540-x



CASE REPORT

2017

Bilateral Arterial Embolization of the Prostate Through a Single Prostatic Artery: A Case Series

Gregory Amouyal^{1,2} · Olivier Pellerin^{1,2,3} · Costantino Del Giudice^{1,2} ·
Carole Déan^{2,3} · Nicolas Thiounn^{1,4} · Marc Sapoval^{1,2,3}

Case series di 3 pazienti estrapolata da una casistica di 89 pt trattati con PAE
Primo report dell'utilizzo clinico delle Anastomosi intraprostatiche

Cardiovasc Intervent Radiol (2017) 40:530–536
DOI 10.1007/s00270-017-1582-8



CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

2017

Prostatic Artery Embolization as an Alternative to Indwelling Bladder Catheterization to Manage Benign Prostatic Hyperplasia in Poor Surgical Candidates

Antonio Rampoldi¹ · Fabiane Barbosa¹ · Silvia Secco² · Carmelo Migliorisi¹ · Antonio Galfano² · Giovanni Prestini² · Sardis Honoria Harward³ · Dario Di Trapani² · Pietro Maria Brambillasca¹ · Vercelli Ruggero¹ · Marco Solcia¹ · Francisco Cesar Carnevale⁴ · Aldo Massimo Bocciardi²

43 patients were enrolled; bilateral embolization was performed in 33 (76.7%), unilateral embolization was performed in 8 (18.6%), and two patients could not be embolized due to tortuous and atherosclerotic pelvic vasculature (4.7%).

mean prostate size decrease from 75.6 ± 33.2
to 63.0 ± 23.2 g (sign rank $p = 0.0001$, mean reduction of $19.6 \pm 17.3\%$).

PAE: Original vs PErFectED

2017

Cardiovasc Intervent Radiol (2017) 40:366–374
DOI 10.1007/s00270-017-1569-5



CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

Recurrence of Lower Urinary Tract Symptoms Following Prostate Artery Embolization for Benign Hyperplasia: Single Center Experience Comparing Two Techniques

Francisco Cesar Carnevale¹ · Airton Mota Moreira¹ · Sardis Honoria Harward³ · Shivank Bhatia⁴ · Andre Moreira de Assis¹ · Miguel Srougi² · Giovanni Guido Cerri¹ · Alberto Azoubel Antunes²

review of two phase 2 prospective cohorts evaluating the recurrence of LUT symptoms at **12 months**.

97 pts and recurrence of symptoms

was defined as IPSS ≥ 8 or QOL ≥ 3 at 12 months.

Symptom recurrence was significantly

more common with original PAE when only a single prostatic artery was embolized.

The same was not true for the PErFecTED technique, but only one patient in this group underwent unilateral PAE.

PAE vs TURP

CULAR AND INTERVENTIONAL RADIOLOGY

Benign Prostatic Hyperplasia:

Prostatic Arterial Embolization
versus Transurethral Resection
of the Prostate—A Prospective,
Randomized, and Controlled
Clinical Trial¹

Radiology

Gao et al. Radiology

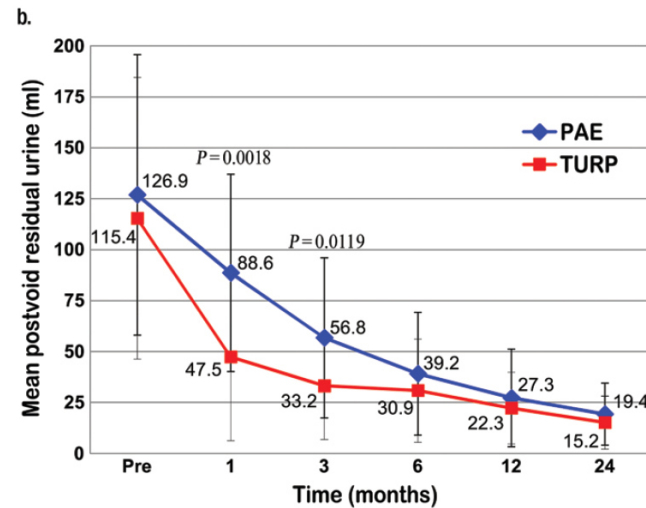
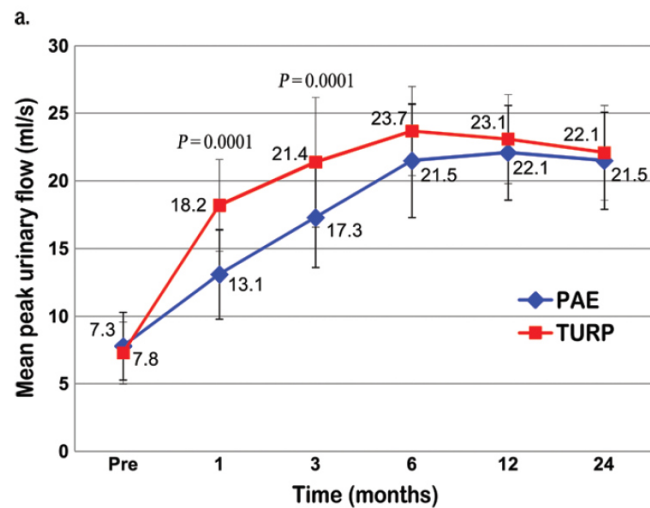
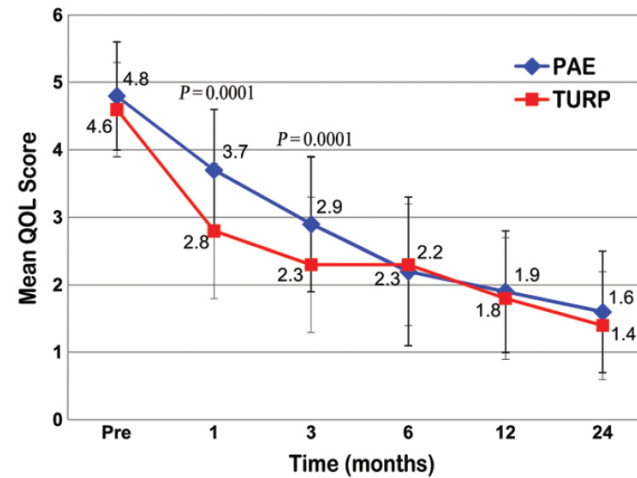
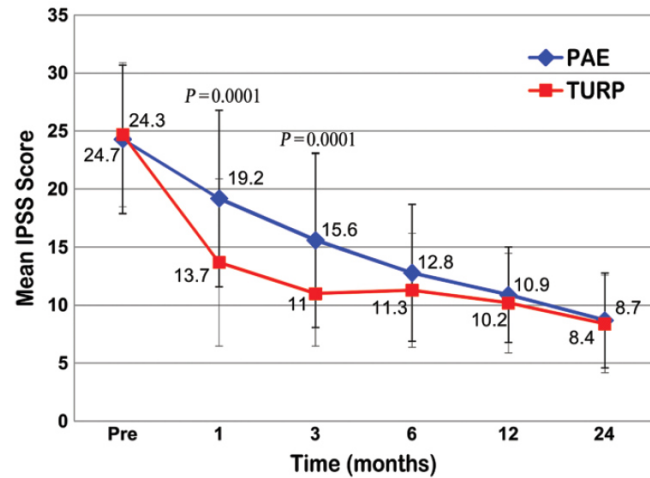
2014

114 pt RCT

- Technical success 94,7%
- Miglioramento dei sintomi per entrambe le procedure
- Complicanze più frequenti per PAE
- Ritenzione acuta di urina 25,9%
- S. postembolizzazione 11 %
- Fallimento clinico PAE 9,4%

PAE vs TURP

2014



Gao et al. Radiology

PAE vs TURP

2016

Cardiovasc Intervent Radiol (2016) 39:44–52
DOI 10.1007/s00270-015-1202-4



CrossMark

CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

Transurethral Resection of the Prostate (TURP) Versus Original and PErFecTED Prostate Artery Embolization (PAE) Due to Benign Prostatic Hyperplasia (BPH): Preliminary Results of a Single Center, Prospective, Urodynamic-Controlled Analysis

30 pts
Follow-up ad 1
anno

Francisco C. Carnevale^{1,3} · Alexandre Iscaife² · Eduardo M. Yoshina² ·
Airtón Mota Moreira¹ · Alberto A. Antunes² · Miguel Srougi²

Both PAE and TURP are safe and effective treatments for improving LUTS, QoL, urinary flow, PSA elevation, and large prostate size due to BPH. Symptom recurrence in the oPAE group was observed only in patients with hypocontractile bladders. In this small study, TURP and PErFecTED PAE resulted in similar symptom relief as measured by the IPSS questionnaire, but TURP resulted in significantly greater urine urinary flow than original or PErFecTED PAE. This improvement in urodynamic performance came at the expense of inpatient hospitalization and a greater number and severity of adverse events, however. A rigorous, multicenter, controlled study will be required to compare objective long-term outcomes after PAE and TURP.

Agenti embolizzanti: Quale il migliore?

J Vasc Interv Radiol 2013; 24:1595–1602

CLINICAL STUDY

Does Polyvinyl Alcohol Particle Size Change the Outcome of Prostatic Arterial Embolization for Benign Prostatic Hyperplasia? Results from a Single-Center Randomized Prospective Study

Tiago Bilhim, MD, PhD, João Pisco, MD, PhD, Luís Campos Pinheiro, MD, PhD, Hugo Rio Tinto, MD, Lúcia Fernandes, MD, José A. Pereira, MD, Marisa Duarte, MD, and António G. Oliveira, MD, PhD

Possibilità:
Embosphere
Embozene,
Non-spherical PVA,
Spherical PVA

2013

Randomized prospective study
80 pts
100micron vs 200 micron

Conclusions: No significant differences were found in pain scores and adverse events between groups. Whereas PSA level and PV showed greater reductions after PAE with 100- μ m PVA particles, clinical outcome was better with 200- μ m particles.

Agenti embolizzanti: Quale il migliore?

The dark side of the guidelines

Cardiovasc Intervent Radiol (2016) 39:1372–1378
DOI 10.1007/s00270-016-1443-x

CIRSE



CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

2016

Comparative Study Using 100–300 Versus 300–500 μm Microspheres for Symptomatic Patients Due to Enlarged-BPH Prostates

Octavio Meneghelli Gonçalves¹ • Francisco Cesar Carnevale¹ • Airton Mota Moreira¹ • Alberto Azoubel Antunes² • Vanessa Cristina Rodrigues¹ • Miguel Srougi²

Randomized prospective study

trisacryl gel microspheres

Follow-up 12 mesi

15 pts 300-500 micron 15 100-300 micron

No significant difference in IPSS reduction, QoL improvements, PSA and PV reduction

Significant regrowth with 100-300 micron at 3 e 12 m

Agenti embolizzanti: Quale il migliore?

Cardiovasc Intervent Radiol (2016) 39:1372–1378
DOI 10.1007/s00270-016-1443-x



CLINICAL INVESTIGATION

ARTERIAL INTERVENTIONS

2016

Comparative Study Using 100–300 Versus 300–500 μ m Microspheres for Symptomatic Patients Due to Enlarged-BPH Prostates

Octavio Meneghelli Gonçalves¹ · Francisco Cesar Carnevale¹ · Airton Mota Moreira¹ · Alberto Azoubel Antunes² · Vanessa Cristina Rodrigues¹ · Miguel Srougi²

Conclusions Both 100–300 and 300–500 μ m microspheres are safe and effective embolic agents for PAE to treat LUTS-related to BPH. Although functional and imaging outcomes did not differ significantly following use of the two embolic sizes, the greater incidence of adverse events with 100–300 μ m microspheres suggests that 300–500 μ m embolic materials may be more appropriate.

BPH- Outcome

2016

CLINICAL STUDY



Meta-Analysis of Prostatic Artery Embolization for Benign Prostatic Hyperplasia

90 studi di 268
662 pts

Andre Uflacker, MD, Ziv J Haskal, MD, Tiago Bilhim, MD, James Patrie, MS, Timothy Huber, MD, and João Martins Pisco, MD

Abstract

PURPOSE: To perform meta-analysis of available data on prostatic artery embolization (PAE).

MATERIALS AND METHODS: Meta-analysis was conducted on articles published between November 2009 and December 2015. Peer-reviewed studies with > 5 patients and standard deviations and/or individual-level data on one or more of the following outcomes were included: prostate volume (PV), peak flow rate (Qmax), postvoid residual (PVR), International Prostate Symptom Score (IPSS), quality of life (QOL) score, International Index of Erectile Function (IIEF) score, and prostate-specific antigen (PSA) level. A random-effects meta-analysis was performed on the outcomes at 1, 3, 6, and 12 months after PAE compared with baseline values, with a $P < .05$ decision rule as the null hypothesis rejection criterion.

RESULTS: Nineteen of 268 studies were included in data collection, with 6 included in the meta-analysis. At 12 months, PV decreased by 31.31 cm^3 ($P < .001$), PSA remained unchanged ($P = .248$), PVR decreased by 85.54 mL ($P < .001$), Qmax increased by 5.39 mL/s ($P < .001$), IPSS improved by 20.39 points ($P < .001$), QOL score improved by -2.49 points ($P < .001$), and IIEF was unchanged ($P = 1.0$). There were a total of 218 adverse events (AEs) among 662 patients (32.93%), with 216 being Society of Interventional Radiology class A/B (99%). The most common complications were rectalgia/dysuria ($n = 60$; 9.0%) and acute urinary retention ($n = 52$; 7.8%). No class D/E complications were reported.

CONCLUSIONS: PAE provided improvement in Qmax, PVR, IPSS, and QOL endpoints at 12 months, with a low incidence of serious AEs (0.3%), although minor AEs were common (32.93%). There was no adverse effect on erectile function.

Complicanze

Minori

- infezioni urinarie ricorrenti
- Sindrome post-embolizzazione
- Ematoma punto di accesso arterioso
- Sanguinamento rettale, seminale, ematuria
- Prostatiti

Maggiori

- Necrosi Vescicale
- Cistite ischemica
- Proctite ischemica

Complicanze

The dark side of the guidelines

2017

Cardiovasc Intervent Radiol (2017) 40:655–663
DOI 10.1007/s00270-016-1539-3



REVIEW

A Systematic Review of Prostatic Artery Embolization in the Treatment of Symptomatic Benign Prostatic Hyperplasia

Michelle Kuang¹ • Anthony Vu¹ • Sriharsha Athreya^{2,3}

193 articoli, 1 RCT, 9 studi
di coorte
788 pazienti età media
66.97 y

Complication	Number of patients	Incidence (%)
Major complications		
Vesicular artery dissection	1	0.13
Persistent UTI requiring hospitalization	1	0.13
Focal bladder wall ischemia	1	0.13
Minor complications		
Acute urinary retention	60	7.61
Rectal bleeding	45	5.71
Hemospermia	40	5.08
Hematuria	39	4.95
Dysuria	36	4.57
Urinary tract infection	34	4.30
Irritative voiding	28	3.55
Inguinal hematoma	16	2.03
Balanoposthitis	6	0.76
Post-embolization syndrome	6	0.76
Diarrhea	4	0.51

Presente

**I dati in nostro possesso supportano
con elevata evidenza scientifica:**

- Utilizzo della CBCT
- Particelle > di 200 micron
- PErFecTED technique > oPAE
- Bilateral PAE

Futuro

Per inserire e consolidare la PAE nell'algoritmo del trattamento dei pazienti con LUTS sono necessari:

- più trials randomizzati prospettici, con più pazienti e con follow-up più a lungo termine
- studi di confronto con le altre procedure chirurgiche (TURP, prostatectomia aperta e tutte le altre terapie mininvasive)
- Studi ad ampio spettro e con più pazienti sulle dimensioni degli agenti embolizzanti
- Effettuare studi o trials randomizzati prospettici in pazienti più giovani di età e non con catetere a permanenza
- Linee guida ICIR, CIRSE, SIR
- Studi prospettici sul trattamento dell'ematuria nel carcinoma prostatico

Conclusioni

- Considerando l'elevata evidenza scientifica attuale (livello di evidenza I), la PAE può essere considerata potenzialmente una alternativa sicura, mininvasiva ed efficace per il trattamento della BPH;
- provoca diminuzione del volume prostatico, miglioramento del IPSS, QoL e del Qmax a breve e medio termine;
- Basso rischio di complicazioni maggiori e di sintomi della sfera sessuale

Grazie per l'attenzione...

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