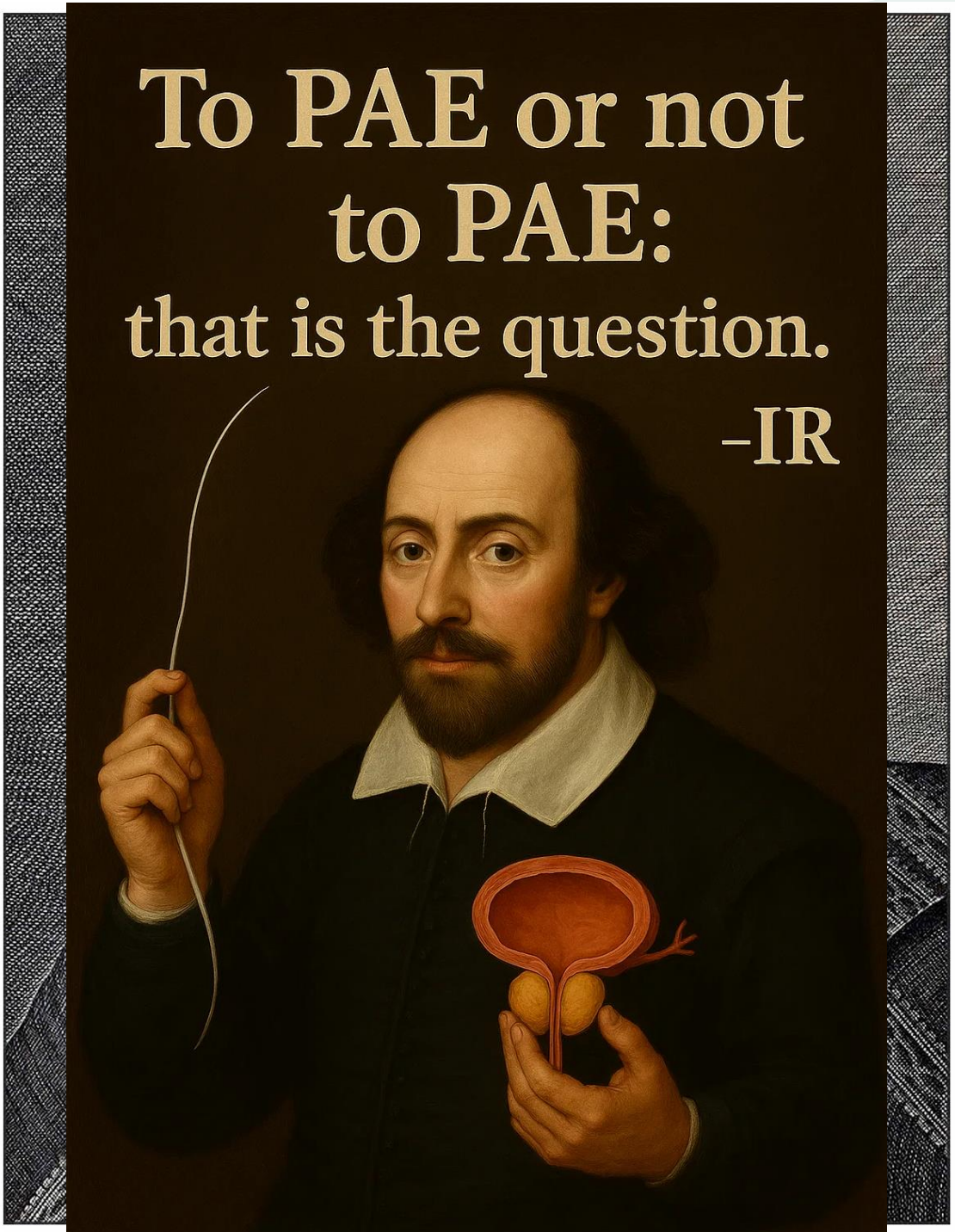
Prostataarterieembolisering (PAE)

Laurynas Kazlas, MD, EBIR
Aarhus Universitetshospital
Røntgen og Skanning


To PAE or not
to PAE:
that is the question.
-IR

Det kedelige…

Study	No. pts <2 y	No. pts 4 y	No. pts 5 y	No. pts 8 y	No. pts 10 y
Swiss RCT [14]	48	–	–	–	–
UK-ROPE study [15]	216	–	–	–	–
French study [16]	49	30	–	–	–
Brazilian study [17]	317	75	34	2	–
Portuguese study [18]	1,072	352	277	109	23
Chinese study [19]	110	40	14	–	–

Study	rostate medication ate after AE	Mean ± SD FU (y)	IPSS/QoL change [a]	IIEF change [a]	PV change [a]	PSA change [a]	Qmax change [a]	PVR change [a]
Swiss	%	2 y	−9.21 [b] /− 2.26 [b]	−1.59 [c]	−10.7 [b]	−1.76 [b]	3.9 [b]	−62.1 [b]
UK-R [15]	/A	1 y	−10.9 [b] /− 2.6 [b]	1.0 [c]	−28.6 [b]	N/A	4.4 [b]	−40.4 [b]
Frenc	/A	4.3 ± 0.9	−8.2 [b] /− 2.2 [b]	N/A	−23.8 [b]	N/A	8.9 [b]	−34.6 [b]
Brazi [17]	0.7% (n = 4)	2.25 (1–8)	−16 [b] /− 4 [b]	N/A	−39 [b]	−2.3 [b]	6 [b]	−70 [b]
Portu study	1.3% (n = 35)	4.39 ± 2.37	−10.1 [b] /− 1.9 [b]	−1.7 [c]	−6.8 [c]	−1.12 [c]	2.7 [b]	−8.35 [c]
Chine [19]	.4% n = 8)	2.88 ± 1.28	−14 [b] /− 2 [b]	N/A	−28.7 [b]	N/A	N/A	N/A

Long-Term PAE Results: What Do We Know

Tiago Bilhim, MD, PhD, EBIR-ES, FSIR, FCIRSE[1]

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Semin Intervent Radiol 2022;39:577–580

Prostatic Artery Embolisation Versus Transurethral Resection of the Prostate for Benign Prostatic Obstruction: 5-year Outcomes of a Randomised, Open-label, Noninferiority Trial

Gautier Müllhaupt [a,b,*], *Lukas Hechelhammer* [c], *Nicole Graf* [d], *Livio Mordasini* [a,e], *Hans-Peter Schmid* [a], *Daniel S. Engeler* [a,†], *Dominik Abt* [a,f,†]

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Prostatic Artery Embolisation Versus Transurethral Resection of the Prostate for Benign Prostatic Obstruction: 5-year Outcomes of a Randomised, Open-label, Noninferiority Trial

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Surgery for benign prostate enlargement in England: 10-year retrospective study of 155 874 patients

Toby Page[1,2], Edward O'Toole[1], Kim Keltie[1,2], Yehia Abdelmotagly[1], Hayley Richardson[1], Rosalyn Parker[1] and Andrew J. Sims[1,2]

[1]*The Newcastle Upon Tyne Hospitals NHS Foundation Trust, and* [2]*Translational and Clinical Research Institute, Faculty of Medical Sciences, University of Newcastle upon Tyne, Newcastle upon Tyne, UK*

Prostatic Artery Embolisation Versus Transurethral Resection of the Prostate for Benign Prostatic Obstruction: 5-year Outcomes of a Randomised, Open-label, Noninferiority Trial

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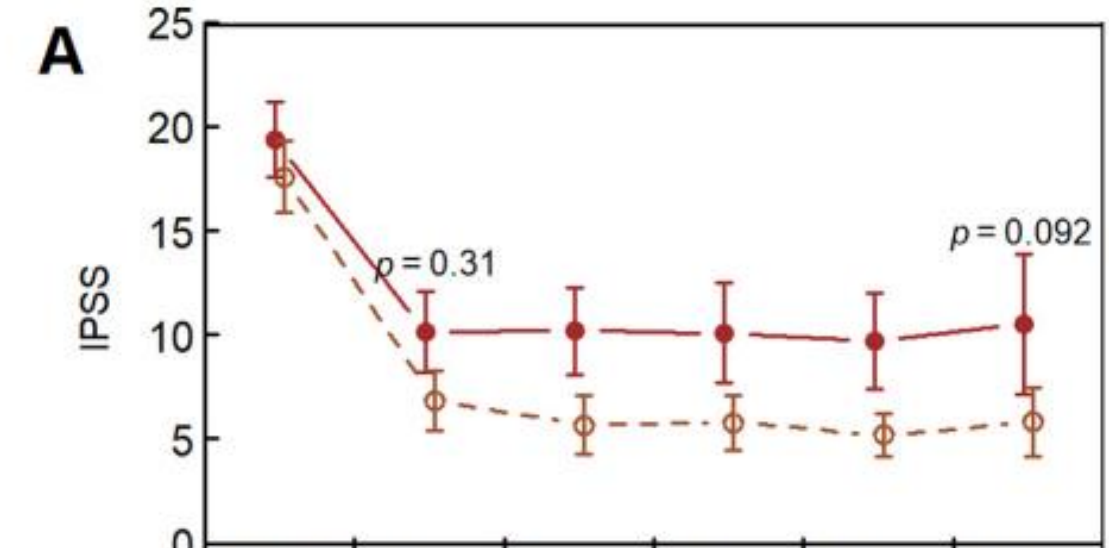
Conclusions and clinical implications: The improvement in LUTS/BPO at 5 yr after PAE was inferior to that achieved with TURP. The limitations of PAE should be considered during patient selection and counselling.

IPSS

- **IPSS** -*International Prostate Symptom Score* bruges til at vurdere graden af symptomer ved **benign prostatahyperplasi (BPH)**
- **IPSS-score skala:**
  - **0–7:** Milde symptomer
  - **8–19:** Moderate symptomer
  - **20–35:** Svære symptomer

IPSS



	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	19.38	10.15	10.19	10.08	9.71	10.50
TURP	17.59	6.82	5.68	5.80	5.19	5.81

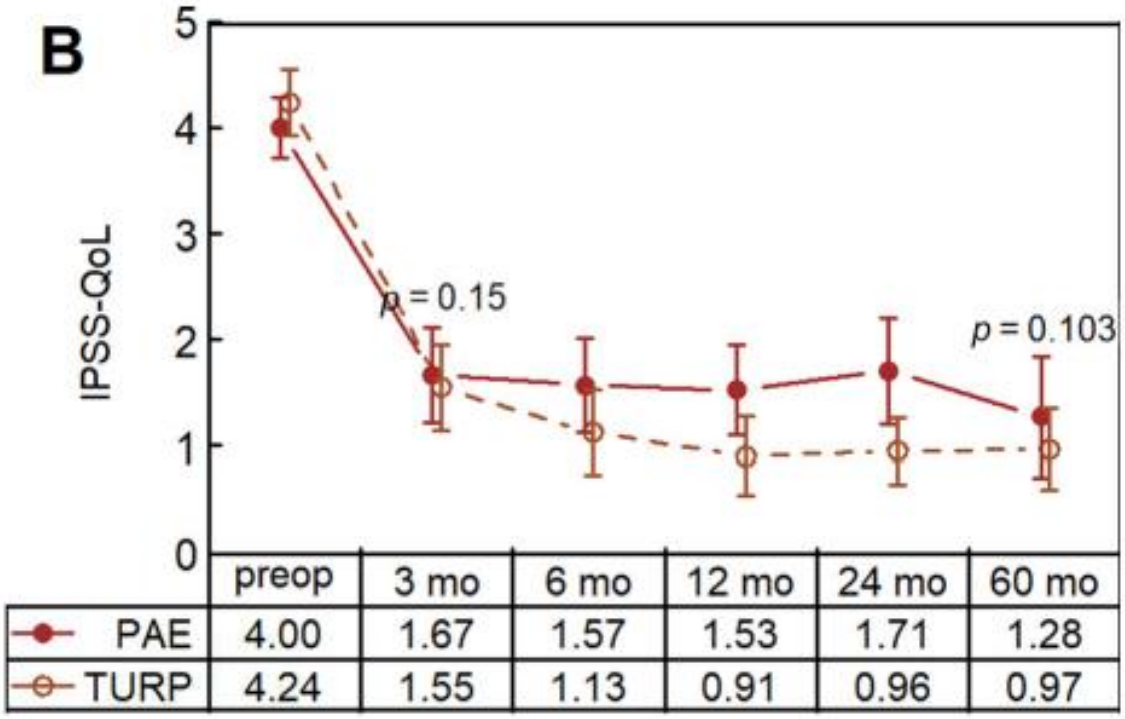
- Improvements in LUTS/BPO were less pronounced after PAE than after TURP, but the difference was not statistically significant. The mean change in IPSS from baseline to 60 mo was −7.78 points after PAE and −11.57 points after TURP (difference 3.79, 95% CI −0.66 to 8.24; $p = 0.092$; Fig. 2A)

IPSS-QoL

IPSS-QoL står for *International Prostate Symptom Score – Quality of Life* og er den **8. del** af IPSS-skemaet. Det måler **livskvalitet i forhold til vandladningssymptomer.**

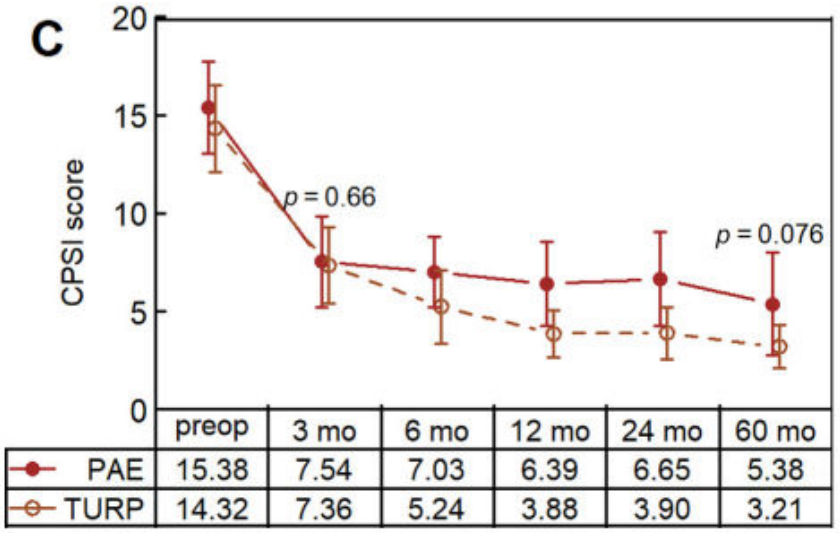
Score	Beskrivelse
0	Helt tilfreds
1	Overvejende tilfreds
2	Både og
3	Mest utilfreds
4	Utilfreds
5	Meget utilfreds
6	Udmattet – kan ikke acceptere tilstanden

IPSS-QoL

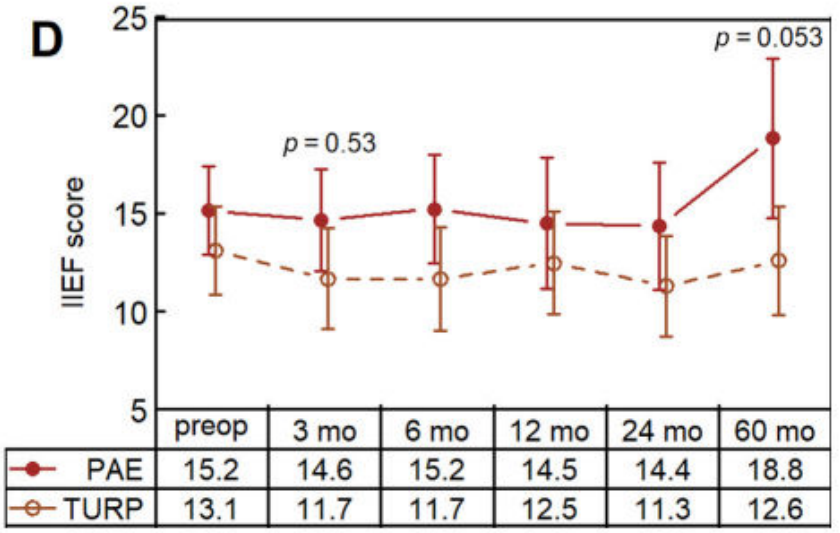


	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	4.00	1.67	1.57	1.53	1.71	1.28
TURP	4.24	1.55	1.13	0.91	0.96	0.97

Consistent with the IPSS data, IPSS-QoL was worse after PAE than after TURP. This difference became statistically significant at 6 mo and persisted until the 24-mo visit [9]. At 60 mo, the difference was no longer significant, with a mean improvement in IPSS-QoL of −2.56 points after PAE and −3.30 points after TURP (difference 0.74 points, 95% CI −0.22 to 1.70; $p = 0.103$; Fig. 2B).



	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	15.38	7.54	7.03	6.39	6.65	5.38
TURP	14.32	7.36	5.24	3.88	3.90	3.21

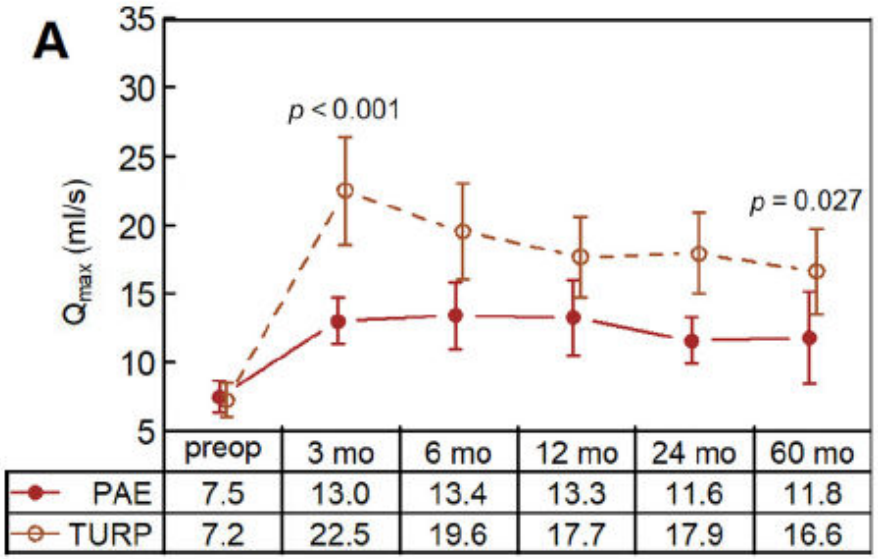


	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	15.2	14.6	15.2	14.5	14.4	18.8
TURP	13.1	11.7	11.7	12.5	11.3	12.6

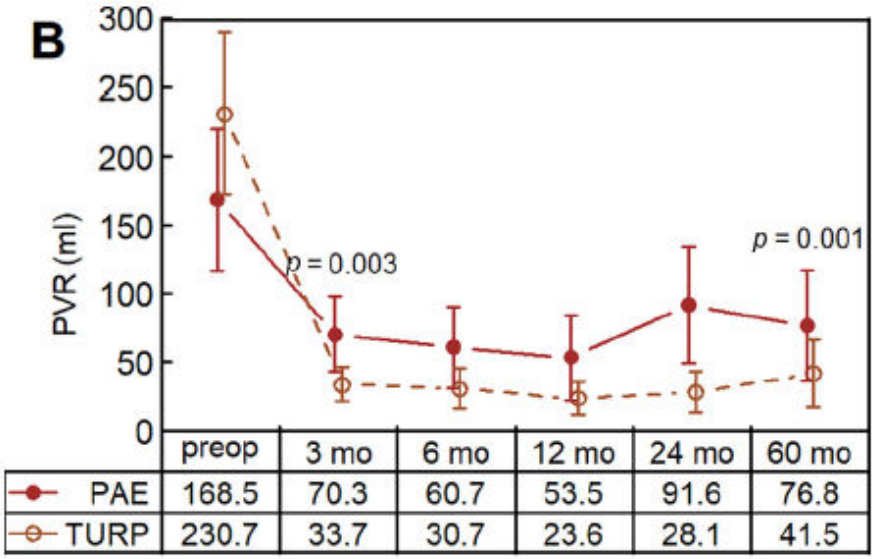
In accordance with the 24-mo data, differences in the reduction in Chronic Prostatitis Symptom Index were not significant (7.53 vs 12.12 points; difference of 4.59 in favour of TURP, 95% CI −0.50 to 9.68; $p = 0.076$; Fig. 2C).

There was a slight increase after PAE and a decrease after TURP in International Index of Erectile Function scores, but the difference was not statistically significant, including the 60-mo visit (1.06 vs −1.50 points; difference 2.56 in favour of PAE, 95% CI −1.67 to 6.80; $p = 0.053$; Fig. 2D).

Funktion (Q_{max}, PVR)



	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	7.5	13.0	13.4	13.3	11.6	11.8
TURP	7.2	22.5	19.6	17.7	17.9	16.6



	preop	3 mo	6 mo	12 mo	24 mo	60 mo
PAE	168.5	70.3	60.7	53.5	91.6	76.8
TURP	230.7	33.7	30.7	23.6	28.1	41.5

Regarding functional outcomes, advantages of TURP over PAE were found 60 mo after treatment. The mean improvement in Q_{max} after 60 mo was 3.59 ml/s after PAE versus 9.30 ml/s after TURP (difference −5.71 ml/s, 95% CI −10.72 to −0.70; $p = 0.027$; Fig. 3A). The mean reduction in postvoid residual volume (PVR) was 27.81 ml after PAE versus 219.97 ml after TURP (difference 192.15, 95% CI 83.79–300.51; $p = 0.001$; Fig. 3B).

Systematic Review and Meta-analysis Comparing Prostatic Artery Embolization to Gold-Standard Transurethral Resection of the Prostate for Benign Prostatic Hyperplasia

Gabriel M. Knight[1] · Abhinav Talwar[1] · Riad Salem[1,2] · Samdeep Mouli[1,2]

Published online: 19 October 2020

Six studies with 598 patients were included.

TURP was associated with significantly more improvement in maximum urinary flow rate (Q_{max}) (mean difference = 5.02 mL/s; 95% CI [2.66,7.38]; $p < 0.0001$; $I^2 = 89\%$), prostate volume (mean difference = 15.59 mL; 95% CI [7.93,23.25]; $p < 0.00001$; $I^2 = 88\%$), and prostate-specific antigen (PSA) (mean difference = 1.02 ng/mL; 95% CI [0.14,1.89]; $p = 0.02$; $I^2 = 71\%$) compared to PAE.

No significant difference between PAE and TURP was observed for changes in International Prostate Symptoms Score (IPSS), IPSS quality of life (IPSS-QoL), International Index of Erectile Function (IIEF-5), and post-void residual (PVR).

Resultater

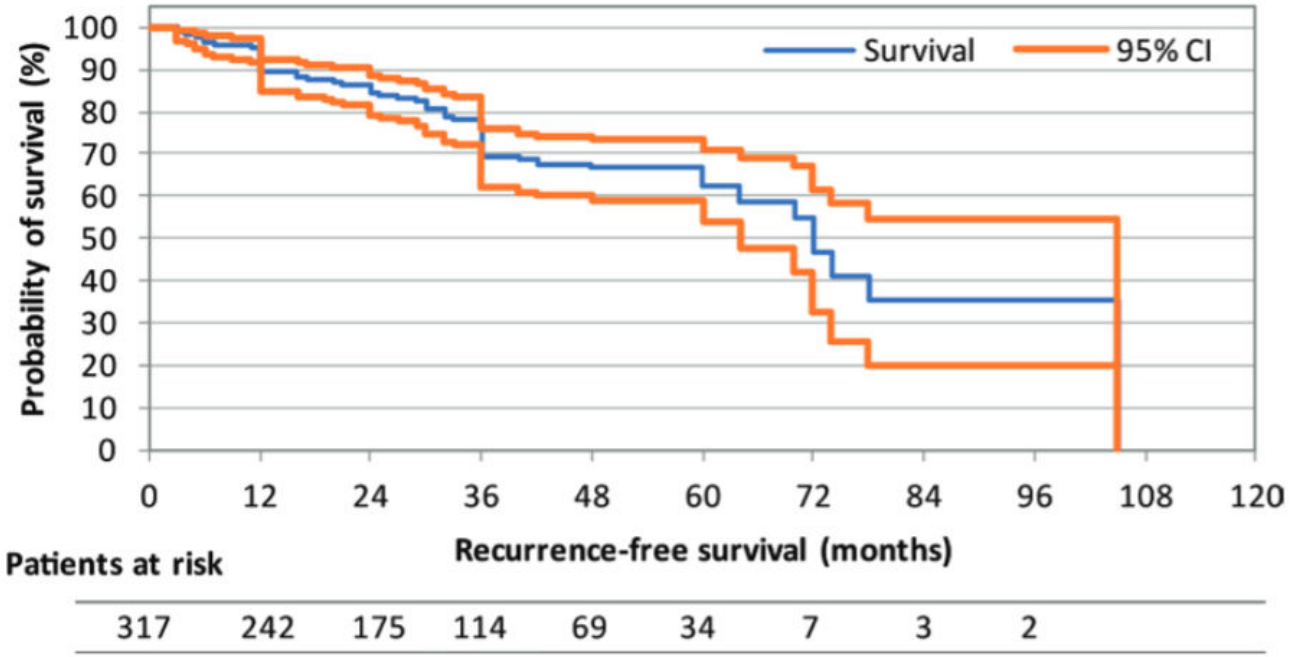
Dropout and retreatment

Twenty patients (41.7%) who initially underwent PAE required TURP between 3 mo and 60 mo after their initial treatment because of unsatisfactory clinical outcomes. Of these, ten were between 3 mo and 24 mo, and the other ten were between 24 mo and 60 mo.

Prostatic Artery Embolisation Versus Transurethral Resection of the Prostate for Benign Prostatic Obstruction: 5-year Outcomes of a Randomised, Open-label, Noninferiority Trial

Gautier Müllhaupt [a,b,], Lukas Hechelhammer [c], Nicole Graf [d], Livio Mordasini [a,e], Hans-Peter Schmid [a], Daniel S. Engeler [a,†], Dominik Abt [a,f,†]*

Resultater



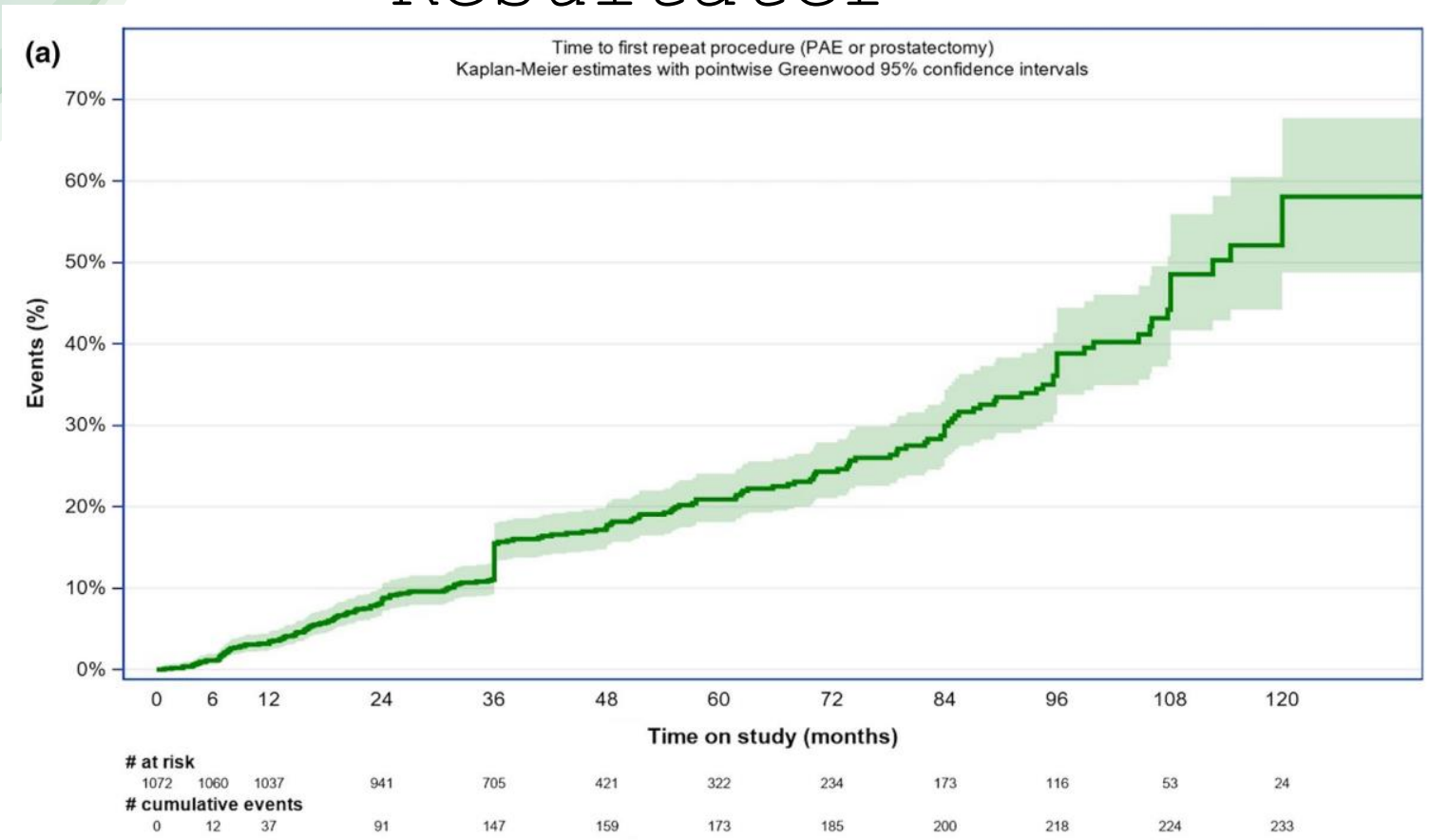
Symptom recurrence occurred in 72 of 317 men (23%). The mean and median time for recurrence was 67.4 months and 72months respectively.

Prostatic Artery Embolization for the Treatment of Lower Urinary Tract Symptoms Due to Benign Prostatic Hyperplasia: 10 Years' Experience

Francisco Cesar Carnevale, MD, PhD • Airton Mota Moreira, MD, PhD • Andre Moreira de Assis, MD • Alberto Azoubel Antunes, MD, PhD • Vanessa Cristina de Paula Rodrigues • Miguel Srougi, MD, PhD • Giovanni Guido Cerri, MD, PhD

Radiology 2020; 296:444–451

Resultater

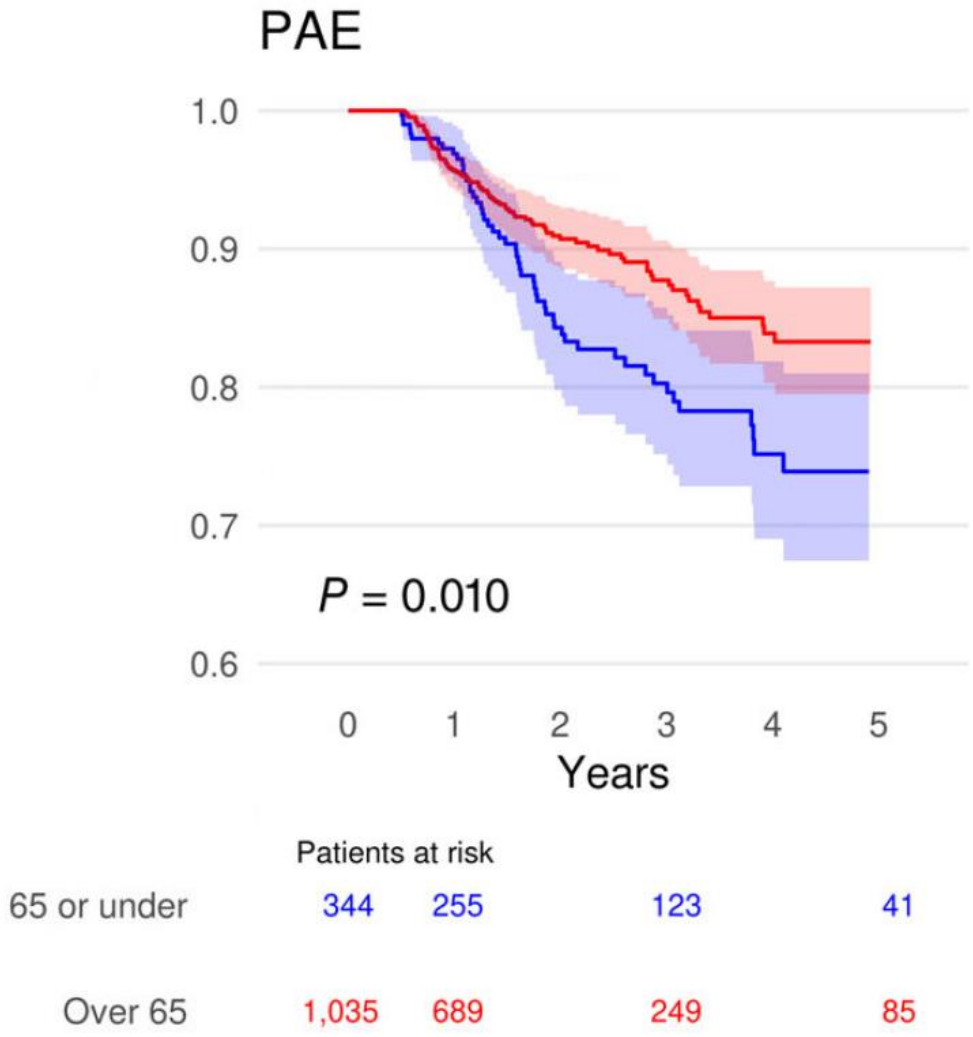


Re-intervention rates were 3.4% at 1 year, 21.1% at 5 years and 58.1% at 10 years.

Long-Term Outcome of Prostatic Artery Embolization for Patients with Benign Prostatic Hyperplasia: Single-Centre Retrospective Study in 1072 Patients Over a 10-Year Period

Tiago Bilhim[1,2,3] · Nuno Vasco Costa[1,2,3] · Daniel Torres[1,2,3] · Luís Campos Pinheiro[2,3] · Erik Spaepen[4]

Resultater

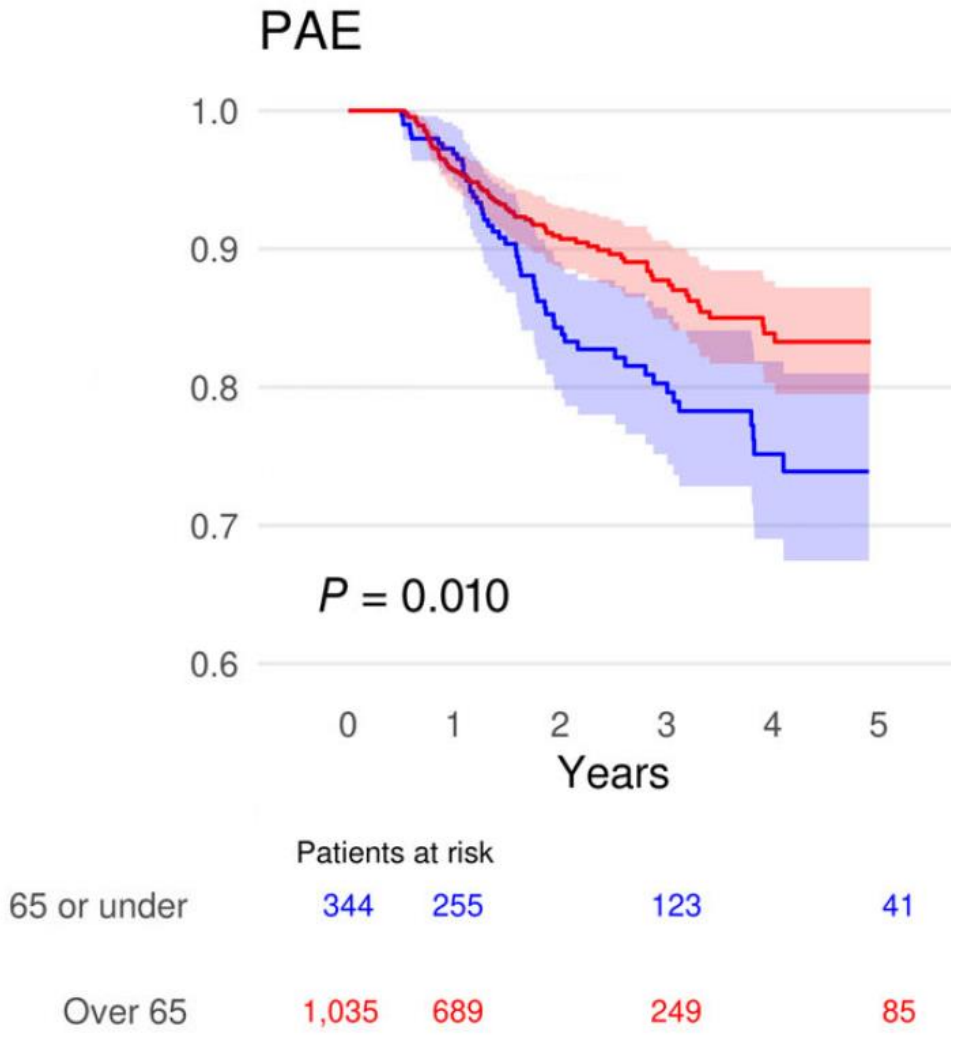


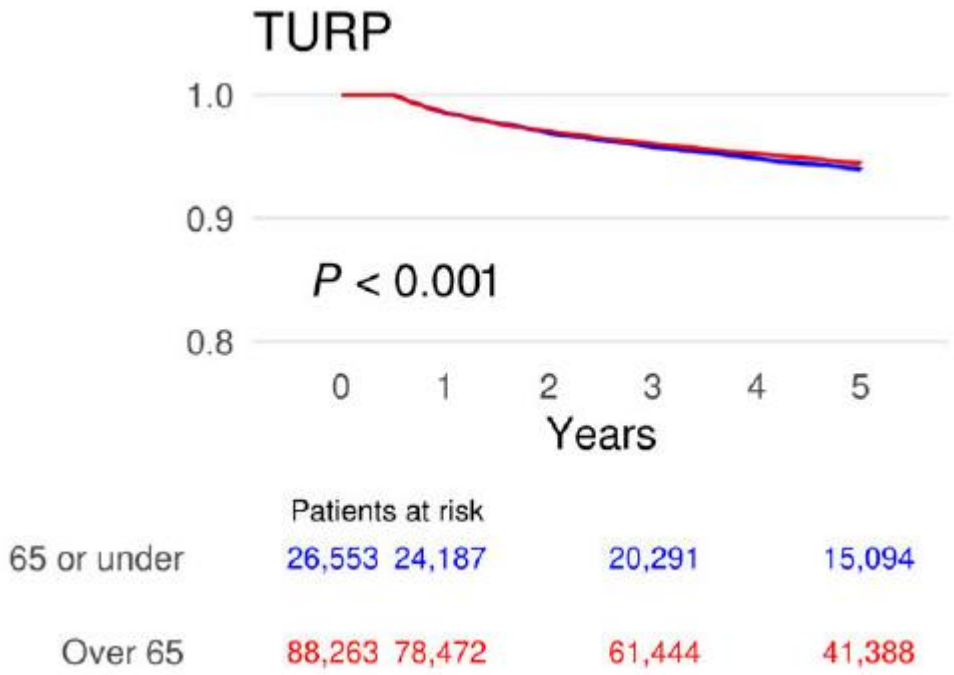
The 5-year re-intervention rates varied across different modalities, ranging from 3.9% for HoLEP to 19.6% for PAE.

Surgery for benign prostate enlargement in England: 10-year retrospective study of 155 874 patients

Toby Page[1,2], Edward O'Toole[1], Kim Keltie[1,2], Yehia Abdelmotagly[1], Hayley Richardson[1], Rosalyn Parker[1] and Andrew J. Sims[1,2]

Resultater





Surgery for benign prostate enlargement in England: 10-year retrospective study of 155 874 patients

Toby Page[1,2], Edward O'Toole[1], Kim Keltie[1,2], Yehia Abdelmotagly[1], Hayley Richardson[1], Rosalyn Parker[1] and Andrew J. Sims[1,2]

Bivirkninger / komplikationer?

PAE was associated with fewer adverse events – 39.0% vs. 77.7%; ($p < 0.00001$) and shorter hospitalization times (mean difference = −1.94 days; $p < 0.00001$), but longer procedural times (mean difference = 51.43 min; $p = 0.004$).

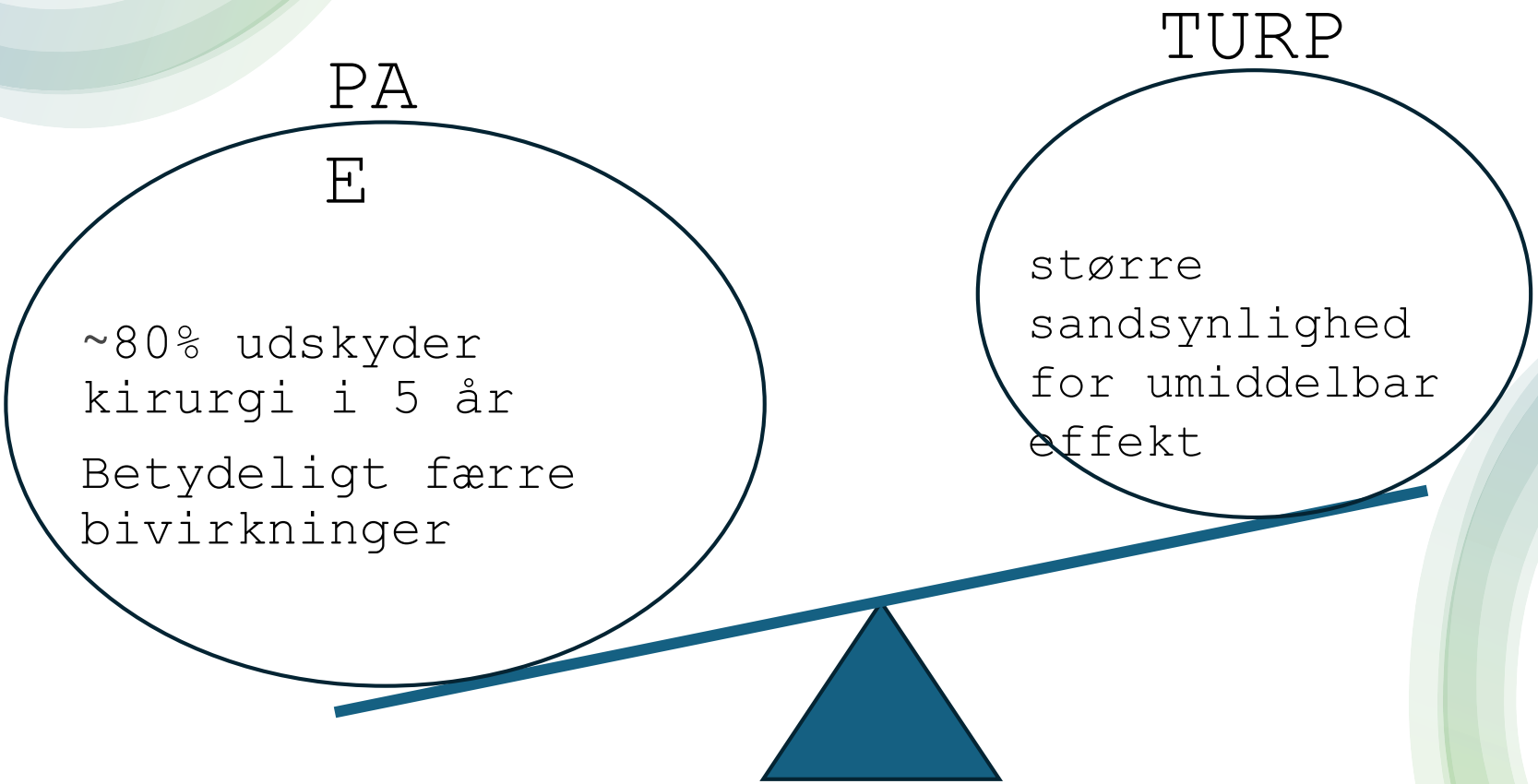
Systematic Review and Meta-analysis Comparing Prostatic Artery Embolization to Gold-Standard Transurethral Resection of the Prostate for Benign Prostatic Hyperplasia

Gabriel M. Knight[1] · Abhinav Talwar[1] · Riad Salem[1,2] · Samdeep Mouli[1,2]

Published online: 19 October 2020

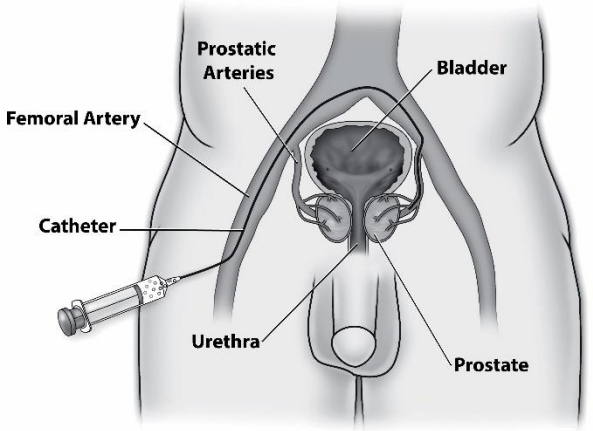
PAE vs TURP?

PAE vs TURP?


PAE
~80% udskyder kirurgi i 5 år
Betydeligt færre bivirkninger
TURP
større sandsynlighed for umiddelbar effekt

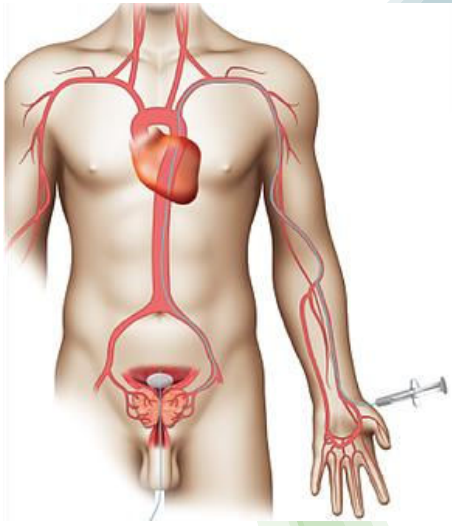
Det
sjovere…

Adgang og utensiler (AUH opskri



- Femoral adgang:
  - Imager II Bern (Boston), (+/- Waltman loop)
  - Davis 3 (URSA), 5Fr, 40cm
  - 0.035” hydrofil guide

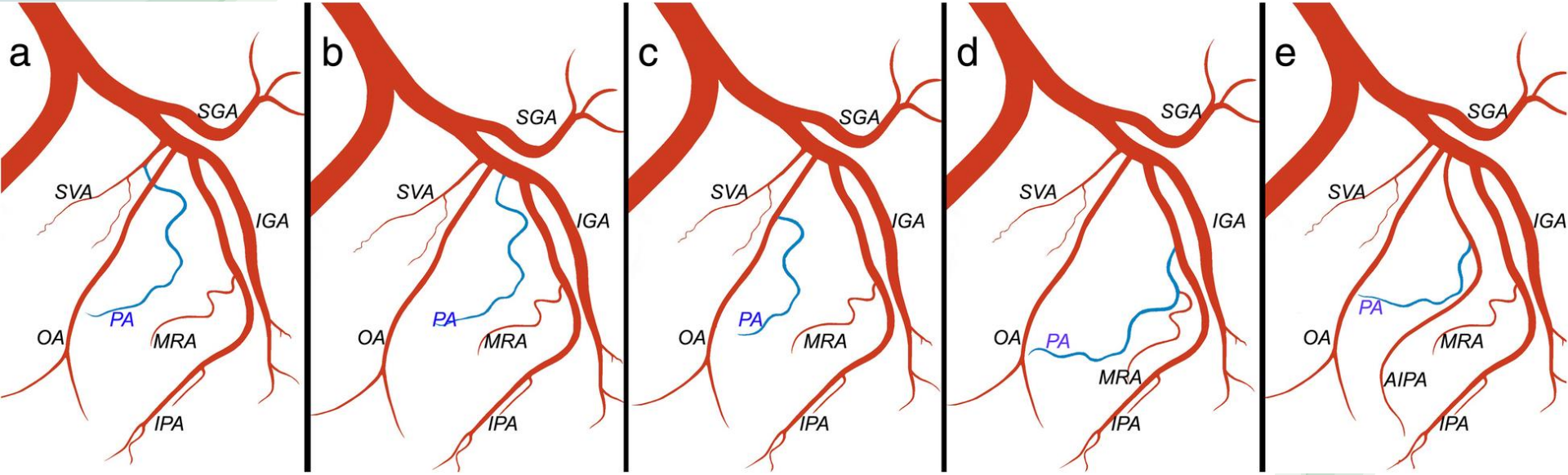
- Venstre radial adgang:
  - Performa Bern (Merit), 5Fr, 1
  - 0.035” 180 cm hydrofil guide



Adgang og utensiler: mikrokateter

- Femoral:
  - Progreat Lamba (Terumo) triple angled, 1.9Fr, 130 cm
  - Direxion Bern (Boston) 2.1Fr, 130 cm
  - GT (Terumo) 45° 0.016” guidewire
  - Fathom (Boston) 0.016” guidewire
- Radial:
  - Progreat Lamba (Terumo) triple angled, 1.9Fr, 150 cm

Anatomi



30%
15%

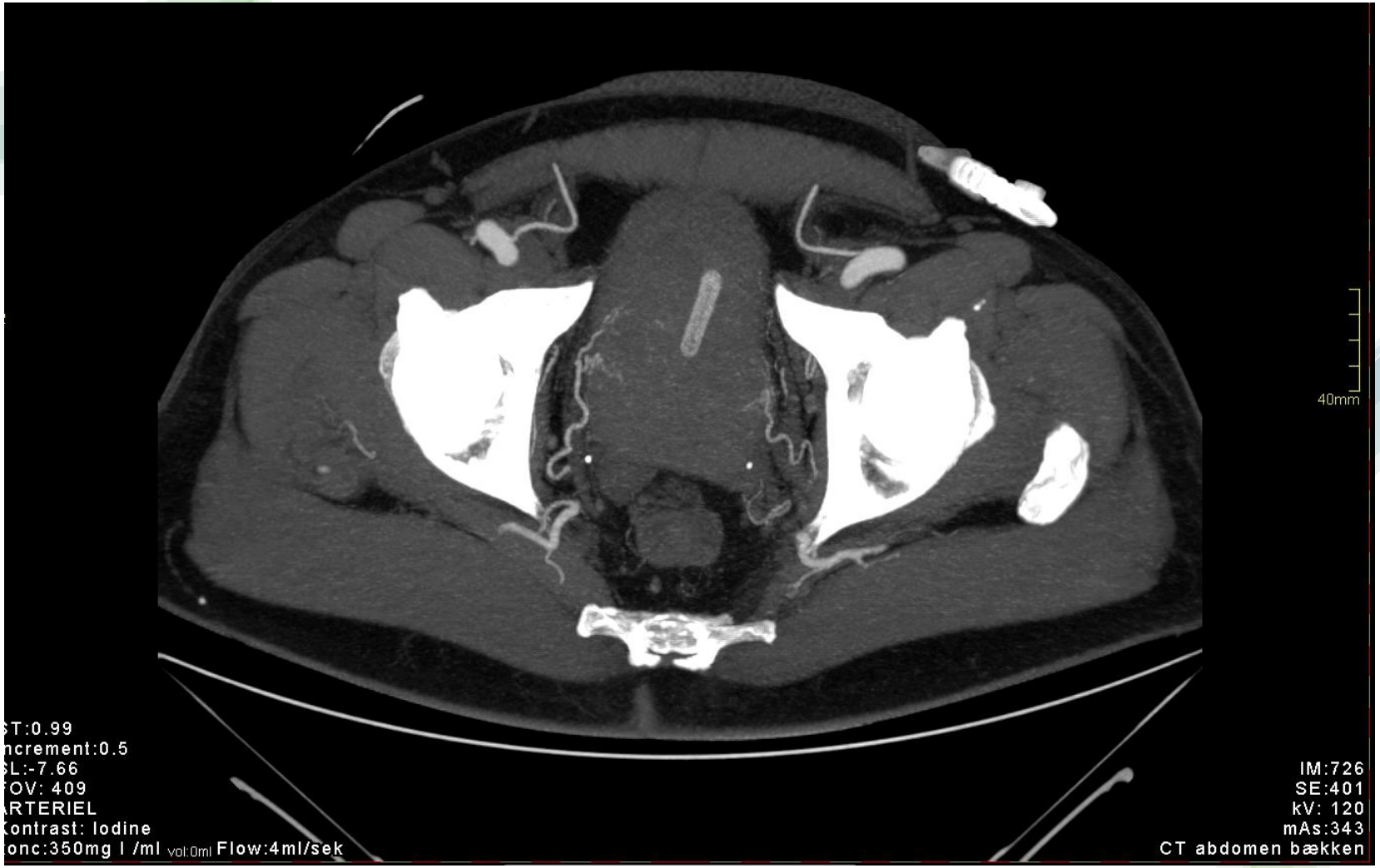
15%

10%

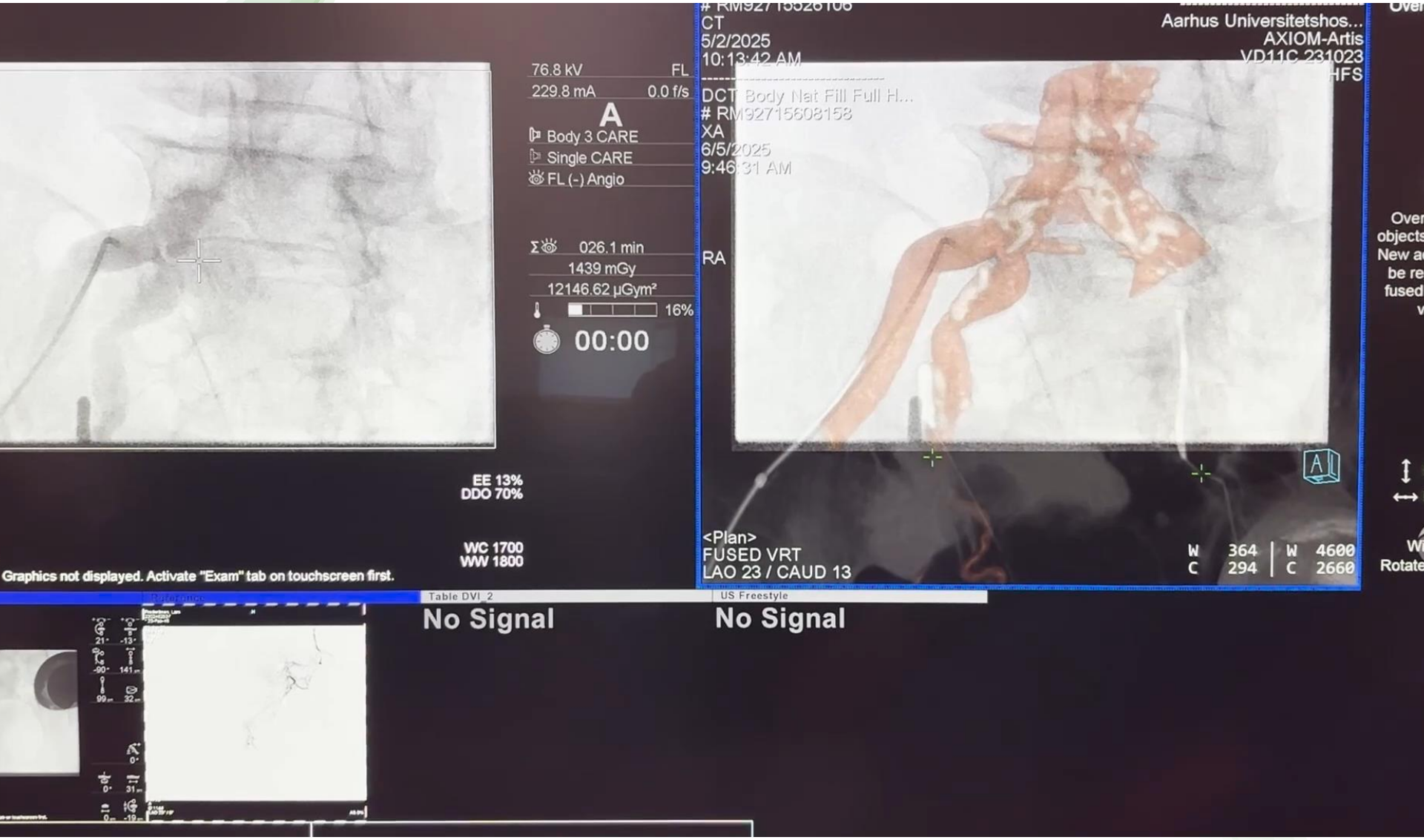
30%

de Assis and Carnevale (de Assis et al. 2015)

Præ- billeddiagnostik



Intraprocedural billeddiagnostik - 'CT overlay'



Intraprocedural billeddiagnostik - CT overlay

Intraprocedural
billed

Intraprocedural billeddiagnostik - DSA

- A.iliaca interna:
  - 6ml, 3ml/sek
  - Ipsilateral 35°, 0-10° kraniokaudalt
- Prostata arterie:
  - 5ml, 2ml/sek
  - Ipsilateral 35° / AP

Intraprocedural billeddiagnostik – ConeBeam-CT

Afgørende for:

- Bekræftelse af korrekt kateterposition i prostataarterien
- Vurdering af prostataopladningen
- Identifikation af fraværende eller accessoriske prostataarterier.
- Grundig evaluering af kollaterale med henblik på at minimere risikoen for non-target embolisering.

Intraprocedural billeddiagnostik – ConeBeam-CT

The numbers of PA origins and anastomoses, respectively, that could be identified were significantly higher with cone-beam CT (301 of 318 [94.7%] and 65 of 67 [97.0%]) than with DSA (237 [74.5%] and 39 [58.2%], *P*< .05).

Cone-beam CT provided essential information that was not available with DSA in 90 of 148 (60.8%) patients.

Benign Prostatic Hyperplasia: Cone-Beam CT in Conjunction with DSA for Identifying Prostatic Arterial Anatomy

Mao Qiang Wang ✉, Feng Duan, Kai Yuan, Guo Dong Zhang, Jieyu Yan, Yan Wang

Published Online: Jul 28 2016

Intraprocedural billeddiagnostik - ConeBeam-CT (AUH opskrift)

- PA

Intraprocedural billeddiagnostik – ConeBeam-CT (AUH opskrift)

- IIA

Anatomiske varianter

- Ingen anastomoser – 60%
- Anastomoser – 40%
  - Rektum
  - Blære
  - Penis
  - Ect.

Emboliserings materiale

~ 400 (300-500) µm mikropartikler

ELSEVIER

Journal of Vascular and Interventional Radiology

Volume 30, Issue 5, May 2019, Pages 638-644

Clinical Study

Prostatic Artery Embolization for Benign Prostatic Hyperplasia: Prospective Randomized Trial of 100–300 µm versus 300–500 µm versus 100- to 300-µm + 300- to 500-µm Embospheres

Daniel Torres MD [a c], Nuno V. Costa MD [a c d], João Pisco MD, PhD [a], Luis C. Pinheiro MD, PhD [b], Antonio G. Oliveira MD, PhD [e], Tiago Bilhim MD, PhD, EBIR, FSIR, FCIRSE [a c]

Bivirkninger

Postemboliserings syndrom:
Ømhed, utilpashed, kvalme, feber
10%

Urinblære:
Vandladningstrang, spasmer 42%
Hæmaturia 12%

Rectum:
Spasmer, proktit, forstoppelse, hæmatochesia
6%

Prostata/urethra:
Retropubisk/prostatisk ømhed, brænding
17-20%

Vesica seminalis:
Hæmatospermia
16%

Prostate Artery Embolization - Adverse Events and Peri-Procedural Management

Nainesh Parikh, MD,* Vedant Acharya, BS,† and Shivank Bhatia, MD‡

Tech Vasc Interventional Rad 23:100692

Efficacy of High-Dose Dexamethasone in Reducing the Symptoms of Postembolization Syndrome Following Prostatic Artery Embolization: Results of a Double-Blind Randomized Controlled Trial

Petra Svarc[1,2] · Hein Vincent Stroomberg[3,4] · Mikkel Taudorf[1,2] · Klaus Brasso[2,3] · Lars Lonn[1,2] · Andreas Røder[2,3]

Received: 10 September 2023 / Accepted: 11 December 2023 / Published online: 17 January 2024

Conclusions: Twenty-four milligrams of dexamethasone bolus is safe but does not reduce postembolization syndrome following prostatic artery embolization.

Komplikationer (0,1%)

- Nekrose af rektumvæg
- Nekrose af blærevæg
- Iskæmi eller nekrose af penis

- Vaskulær adgangskomplikationer (f.eks. hæmatom eller pseudoaneurisme)
- Infektioner (lokale eller systemiske)

“…patients submitted to protective embolization in the present study - 12.8% was lower than the 26.2% and 20.0% reported by Bhatia et al.[14] and Amouyal et al.[13], respectively. ”

Protection of nontarget structures in prostatic artery embolization

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Impact on Sexual Function of Protective Coil Embolization of Penile Collaterals During Prostatic Artery Embolization

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Conclusion: Adjunct coil embolization of penile collaterals during PAE for preventing nontarget embolization has no adverse effect on erectile or ejaculatory function.

FOX29 PHILADELPHIA

6 senior citizens arrested for allegedly having sex in public in local park

By Austin Williams | **Published** August 21, 2019 4:49pm EDT | Unusual | Fox TV Stations |

The suspects, ranging in age between 62 and 85, were arrested as part of a surveillance operation conducted by the Fairfield Police Department and were charged with breach of peace and public indecency.

….det sjoveste!

Tak for opmærksomhed!