



ROBOTIC PROSTATE CANCER SURGERY

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Guys Hospital 21st March 2016

Conflicts of Interest

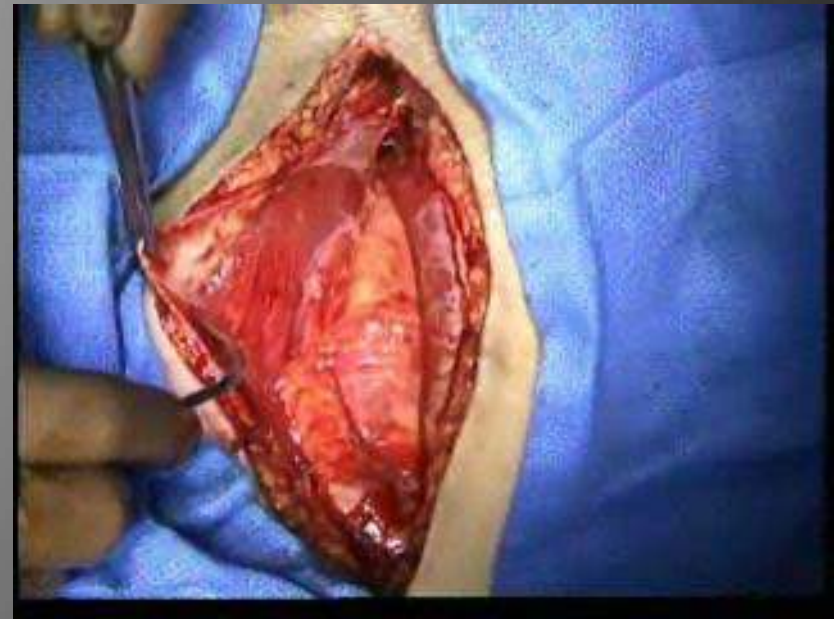
- ▣ Intuitive Surgical
- ▣ Ethicon/J&J
- ▣ GSK
- ▣ Takeda
- ▣ Sanofi
- ▣ Astellas
- ▣ Lilly
- ▣ Prostate Centre

Traditional Surgery

- ▣ [Sir Lancelot.mpg](#)

Open radical prostatectomy

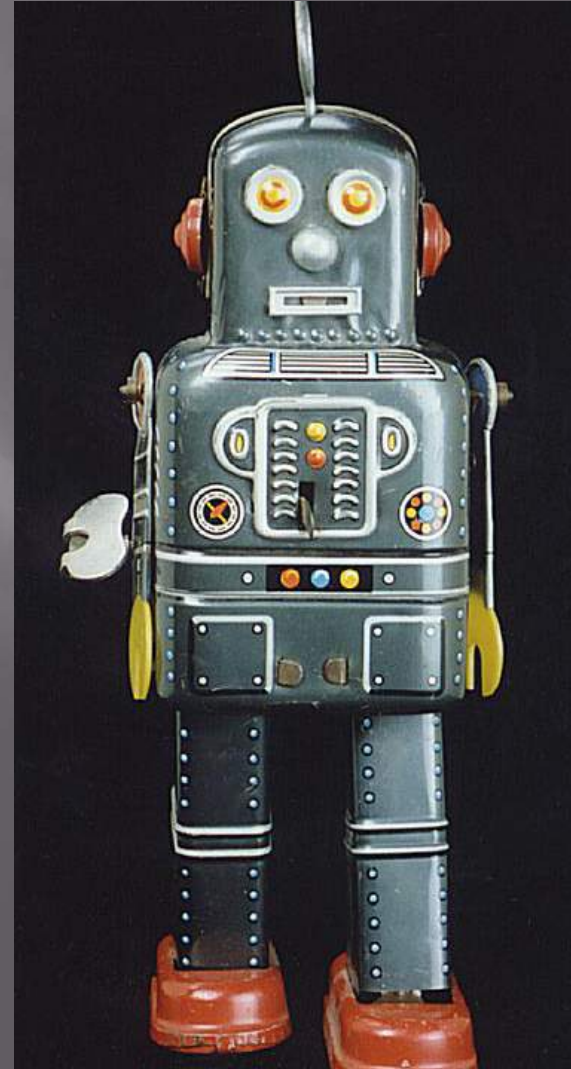
- ▣ Gold standard
- ▣ **Is it MORBID??**
 - Mortality <1%
 - Blood transfusion 20-30%
 - Complications 9-30%
 - Hospital stay 6.4 days
 - Incontinence >10%
 - Erectile dysfunction 14-44%



Judge et al. BJUi 2007
Catalona et al. J Urol 2004
Walsh et al. Urology 2000
Graefen et al Eur Urol 2006

The solution?

**A robot cut
out my
prostate –
and I was
back to
work in days**



**The most dangerous phrase
in the language is “we’ve
always done it this way.”**

Rear Admiral Grace Hopper (1906-1992)





Enhanced Dexterity, Precision & Control

- 4 robotic arms enable Solo Surgery™
- Fingertip control
- 7° of freedom 90° of articulation
- Motion scaling and tremor reduction



da Vinci Surgical System



da Vinci[®] Surgical System

- Superior Visualization
- Enhanced Dexterity
- Greater Precision
- Ergonomic Comfort

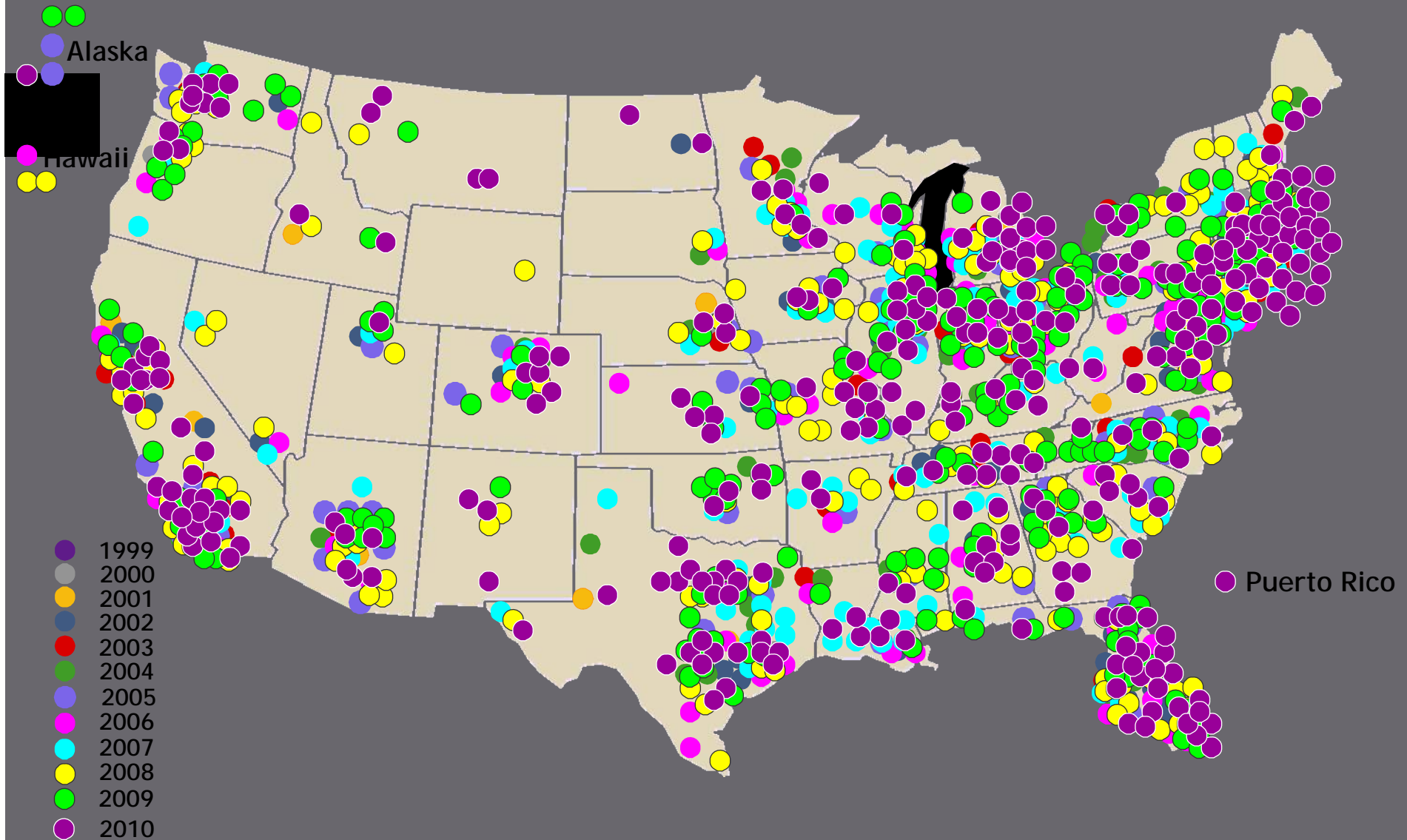


Why might Robotics be better

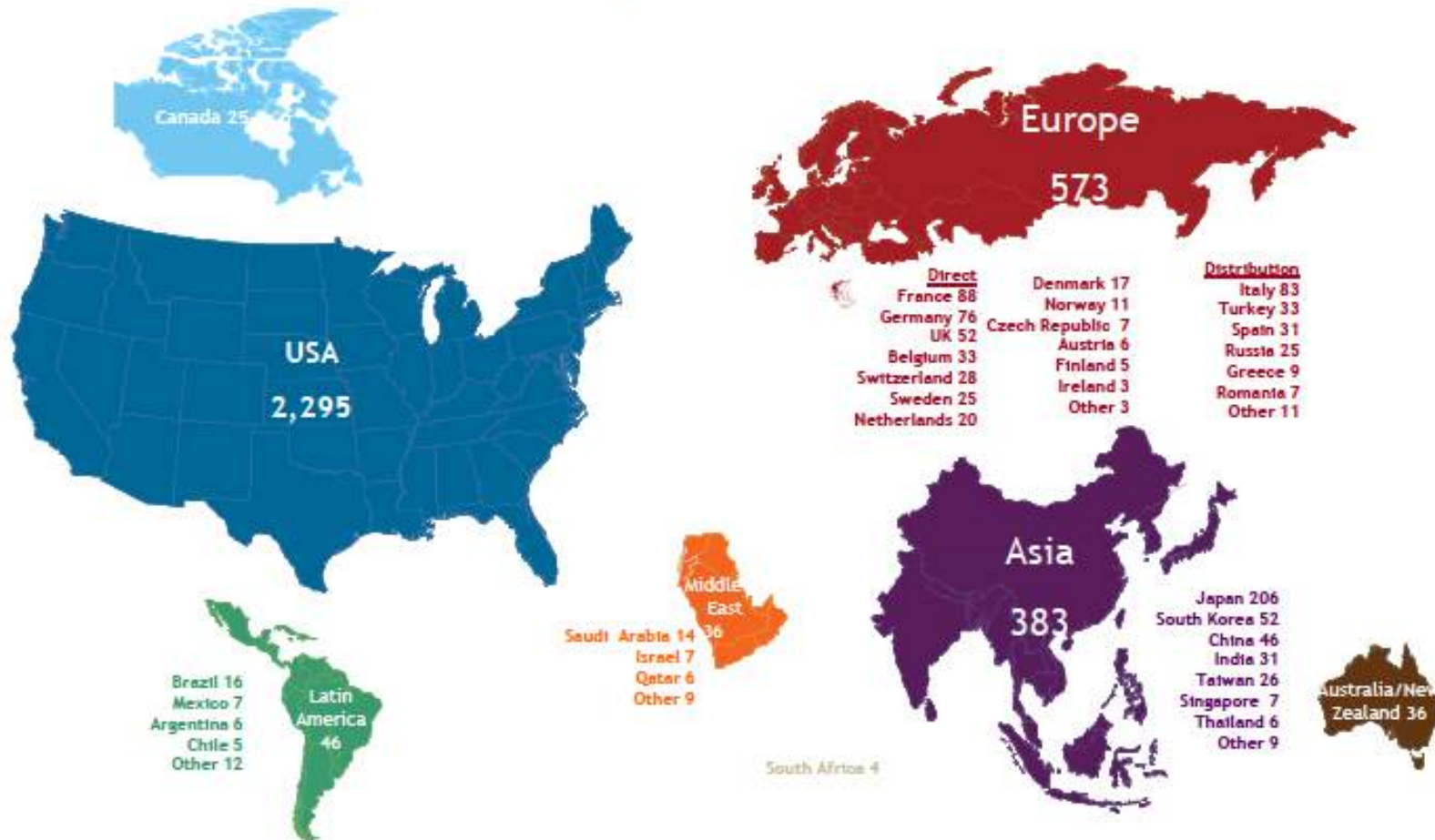
- ▣ Better vision- 3D binocular view
- ▣ Improved magnification, x3, x5, x10
- ▣ 7 Degrees of Freedom of movement
- ▣ Tremor filtering
- ▣ Delicate and precise instruments: ergonomic
- ▣ Teaching: perfect assistant view



da Vinci® Surgical System U.S. Installed Base 1999 – 2010



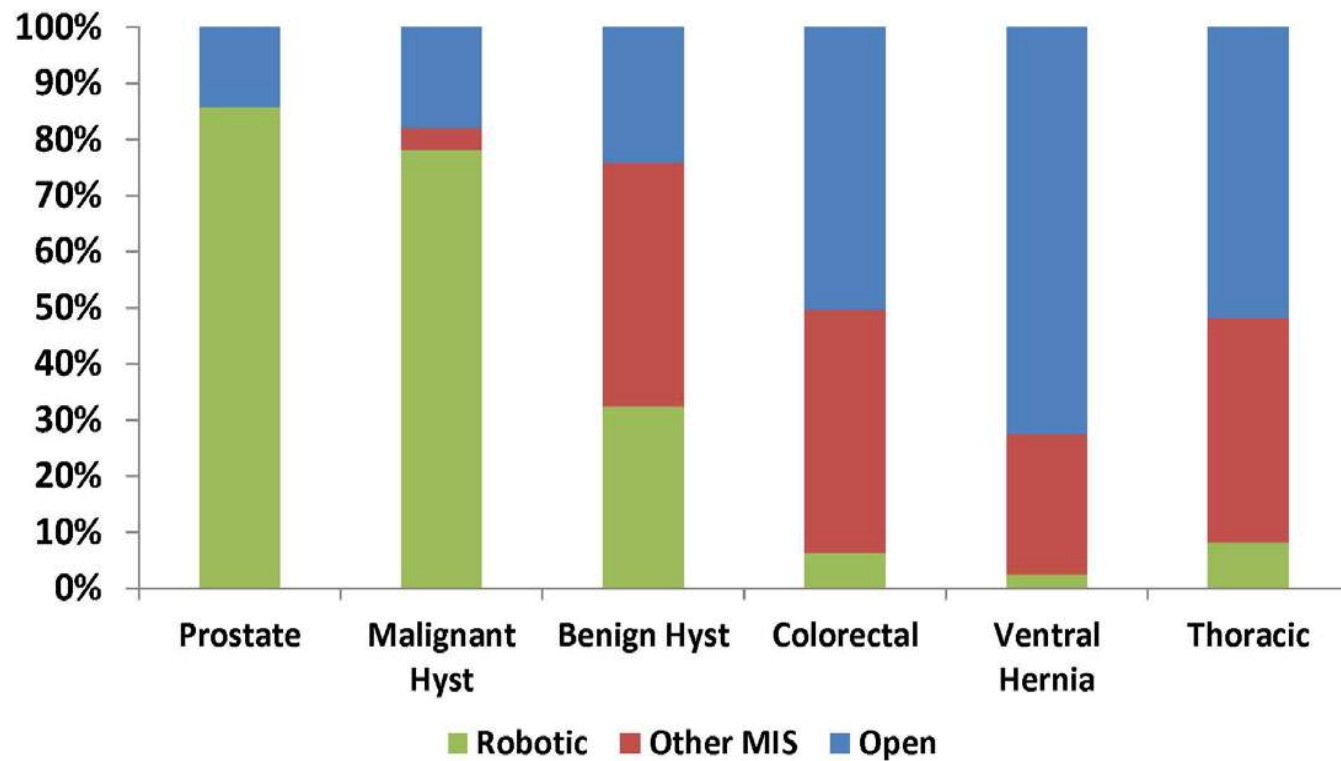
da Vinci® System Installed Base



Intuitive sells directly to customers in the US, Korea, Japan, and the European countries indicated above. Sales are through distributor partners in all other areas of the world including, Canada, Latin America, the Middle East, Asia and Australia.

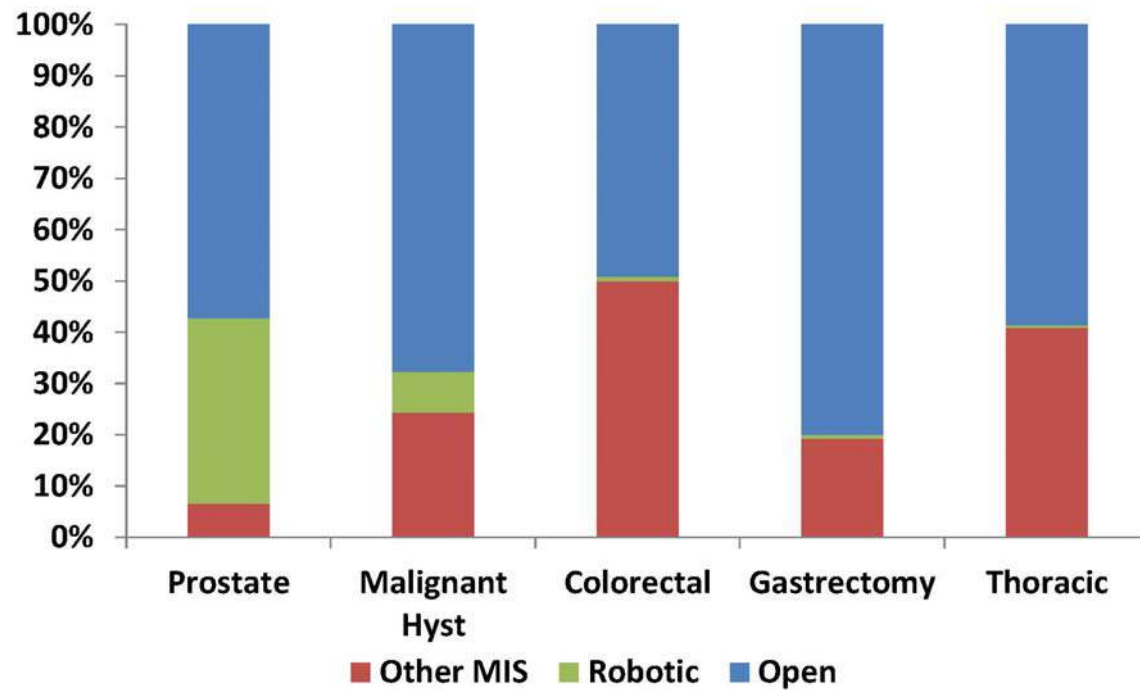
Open Surgery Remains Common – U.S.

Yr: 2014



Open Surgery Remains Common – OUS

Yr: 2014



Source: ISI data as well as estimates. OUS defined as Western Europe, Canada, Australia, South Korea and Japan

da Vinci Surgery

Existing centres

51 Robots

UNITED KINGDOM
IRELAND

SCOTLAND

NORTHERN
IRELAND

ENGLAND

WALES

IRELAND



Robotics in the UK

- ▣ First UK Robot St Mary's Hospital 2001
- ▣ First active robotic programme Guy's 2003
- ▣ BAUS registry estimates 58% robotic penetration in prostatectomy
- ▣ Many charity purchases: haphazard
- ▣ Vast majority in public system
- ▣ IOP Guidance: 50/yr, 5 min/surgeon

Urological Robotic Procedures

- ▣ Radical Prostatectomy +/- EPLND
- ▣ Radical Cystectomy
 - Extracorporeal/Intracorporeal reconstruction:
- ▣ Partial Nephrectomy
- ▣ Dismembered Pyeloplasty
- ▣ Ureteric Re-implant/diverticulectomy
- ▣ RRN, RNU
- ▣ RRPLND

Guy's and St Thomas'

- ▣ 1st Robotic system 2003
- ▣ Da Vinci Si dual console 2010- replacement
- ▣ da Vinci Xi dual console 2015- additional
- ▣ Fellowship programme: 14 independent
- ▣ 300 RARP annually (>3000)
- ▣ 60 RPN (220)
- ▣ 50 RARC (300)
- ▣ 50 other robotic procedures (nephrectomy, nephro-ureterectomy, adrenalectomy)

My Robotics

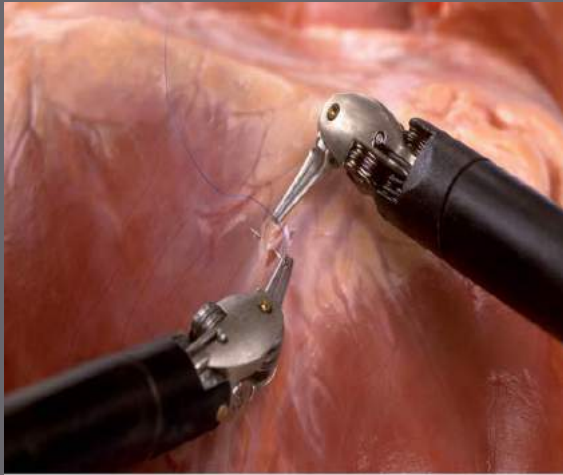
- ▣ Lap prostate training: Declan Cahill 2007
- ▣ Robotic Training Guy's 2008
- ▣ Robotic Fellowship Melbourne Prof Costello 2009
- ▣ Royal Marsden Robotic 2010
- ▣ Guy's and St Thomas 2010-present
- ▣ 500 RARPs, 20 LRPs, 10 ORP
- ▣ 400 Upper Tract robotics: 230 partial nephrectomy
- ▣ Fellowship Director/MDM Lead
- ▣ Martini Klinik/ BAUS courses
- ▣ BAUS Oncology

Dual Console Da Vinci Si HD

Training Dr Pardeep Kumar:
UK 1st Intuitive Robotic Fellow



Approach specific or surgeon specific?

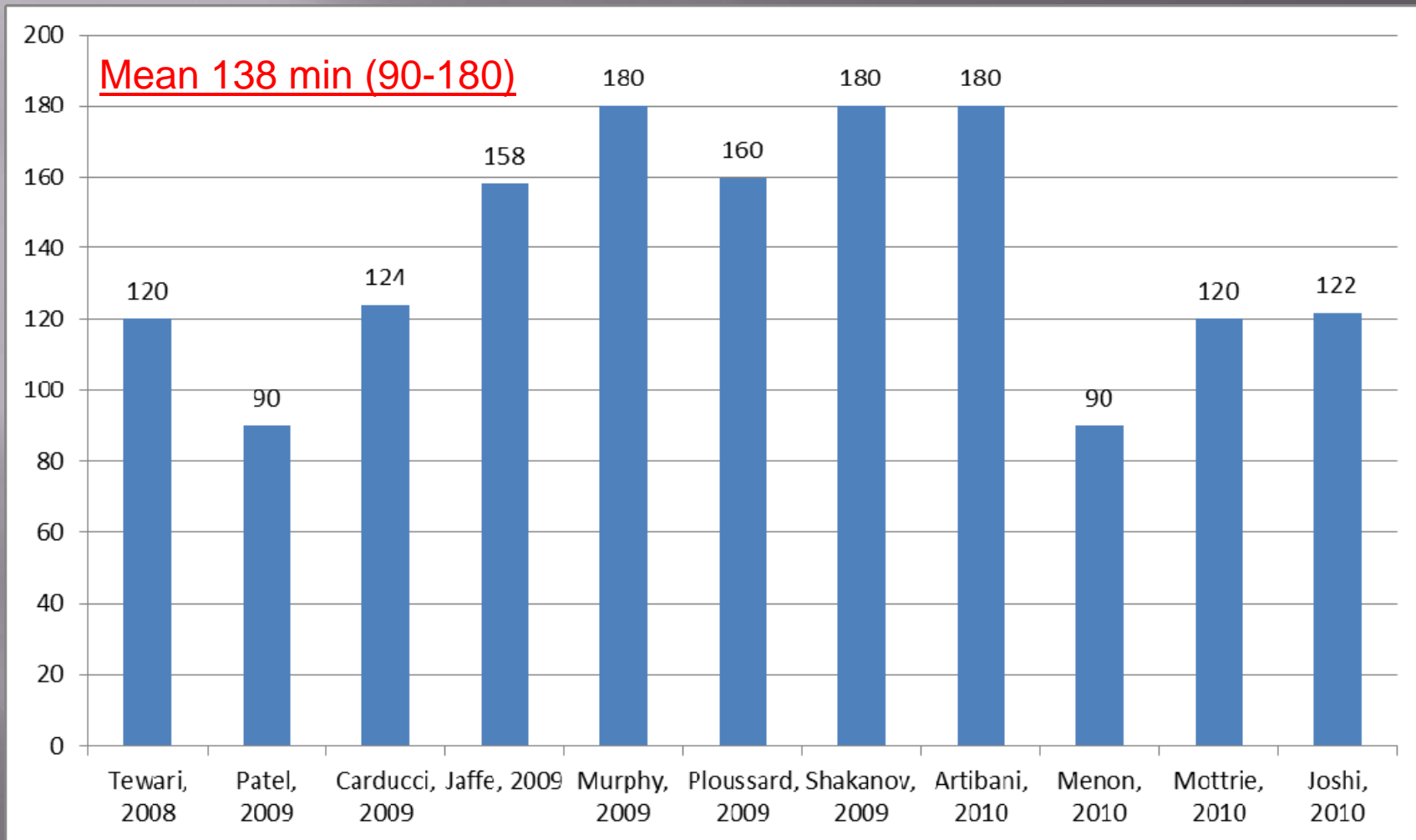


Vickers and Scardino, 2008

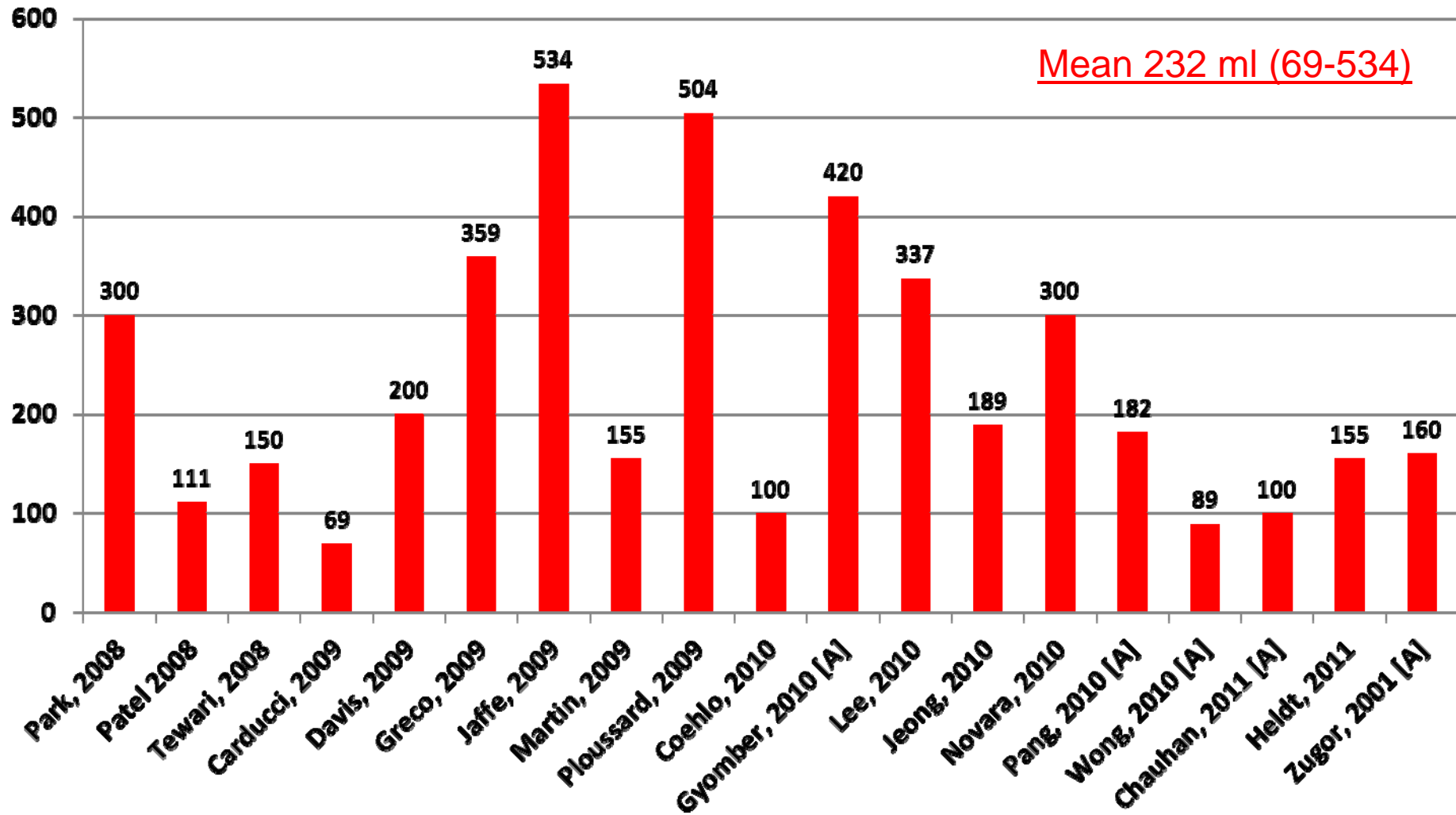
Outcomes evaluated

- **Perioperative**
 - operative time, blood loss, transfusion rate, overall complication rates
- **Oncological**
 - positive surgical margins, bDFS
- **Functional**
 - urinary continence and potency recovery

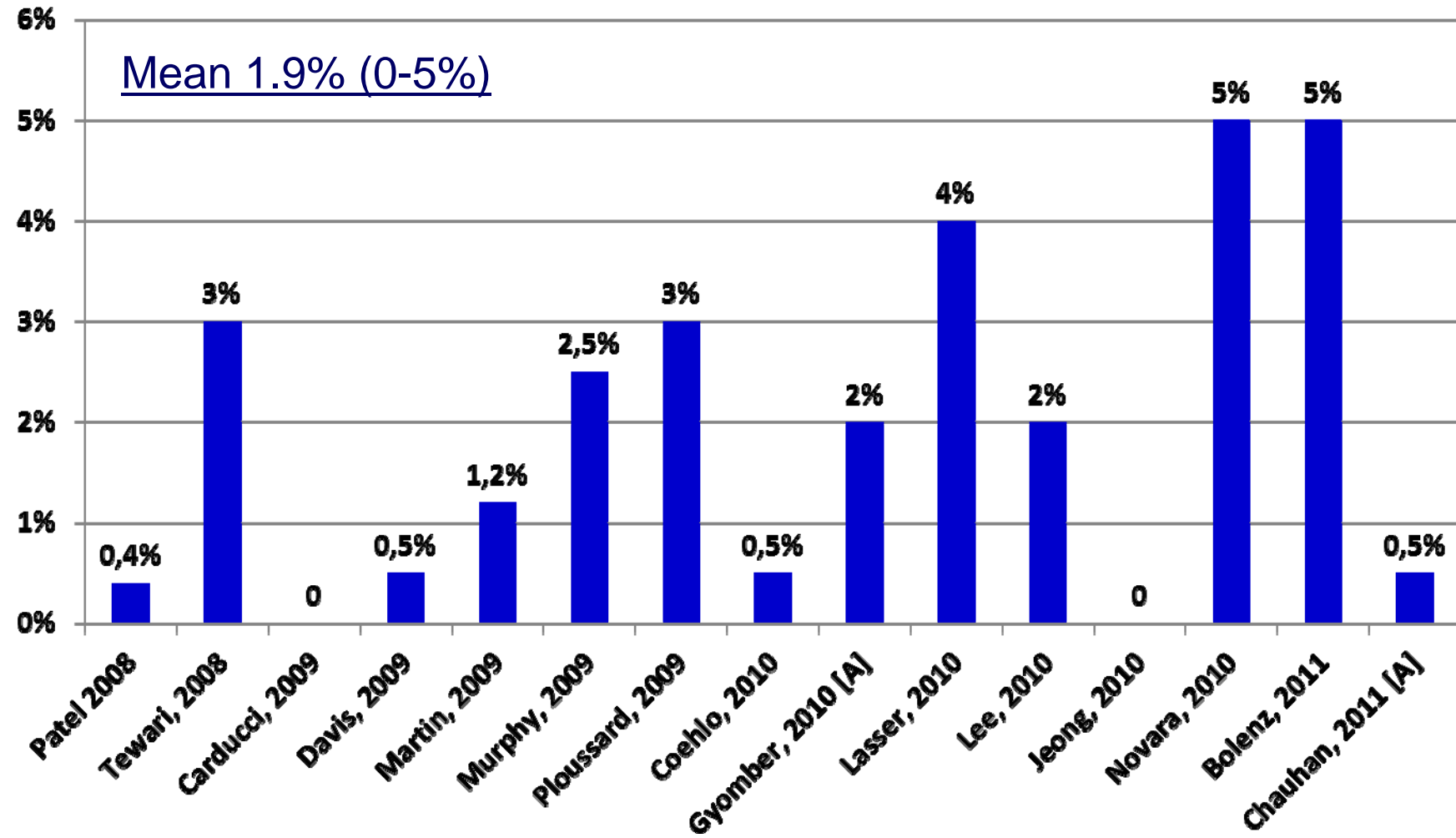
Operative time: RARP series



Blood loss: RARP series

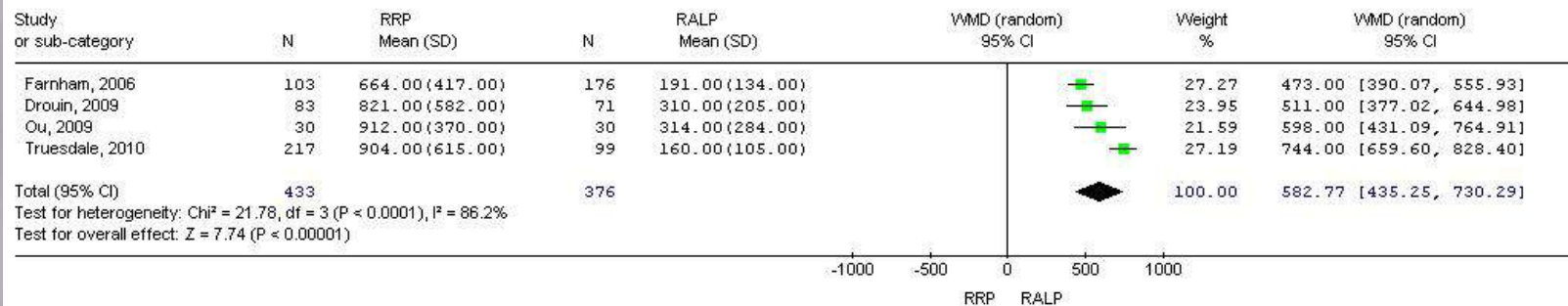


Transfusion rate: RARP series

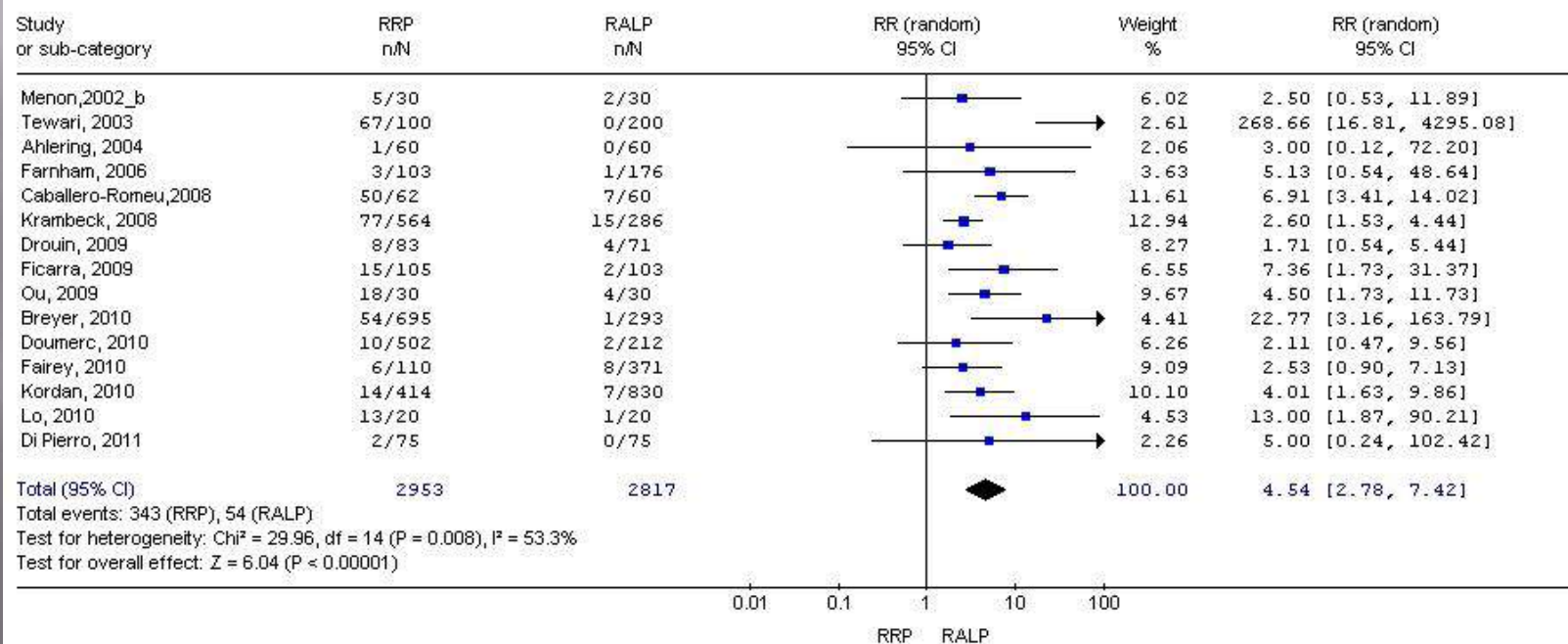


Blood loss and transfusion rate: RARP Vs RRP

Review: Radical prostatectomy: comparisons of different approaches
Comparison: 02 Blood loss
Outcome: 03 Blood loss: RRP vs. RALP

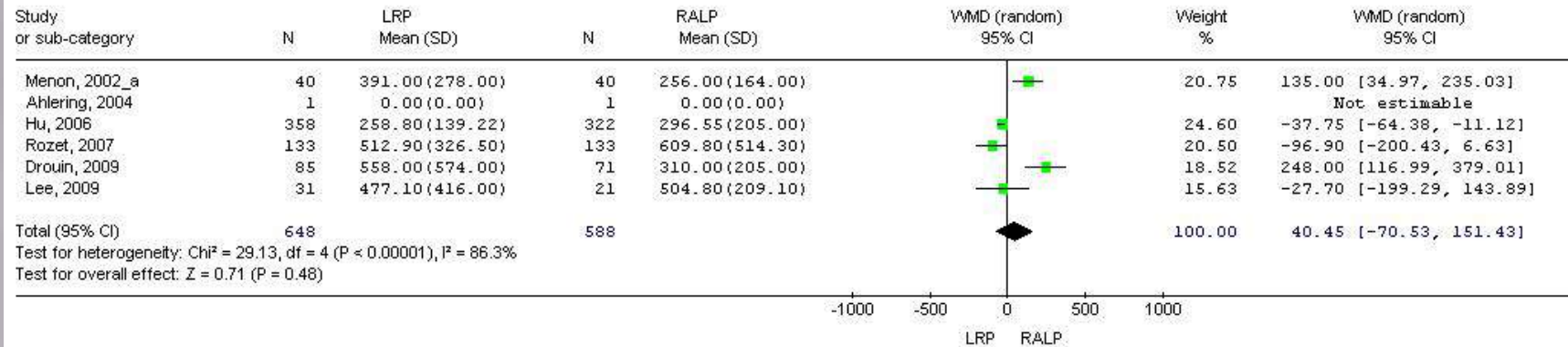


Review: Radical prostatectomy: comparisons of different approaches
Comparison: 03 Transfusion rate
Outcome: 03 Transfusion rate: RRP vs. RALP

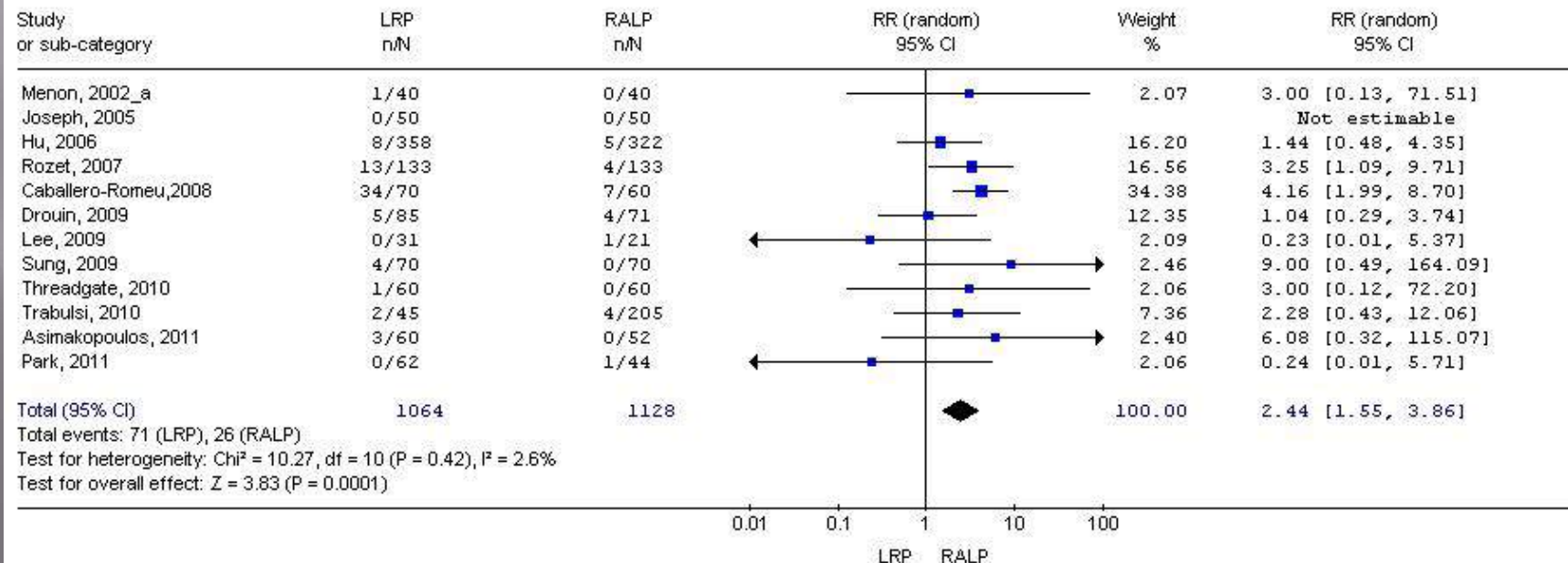


Blood loss and transfusion rate: RARP Vs LRP

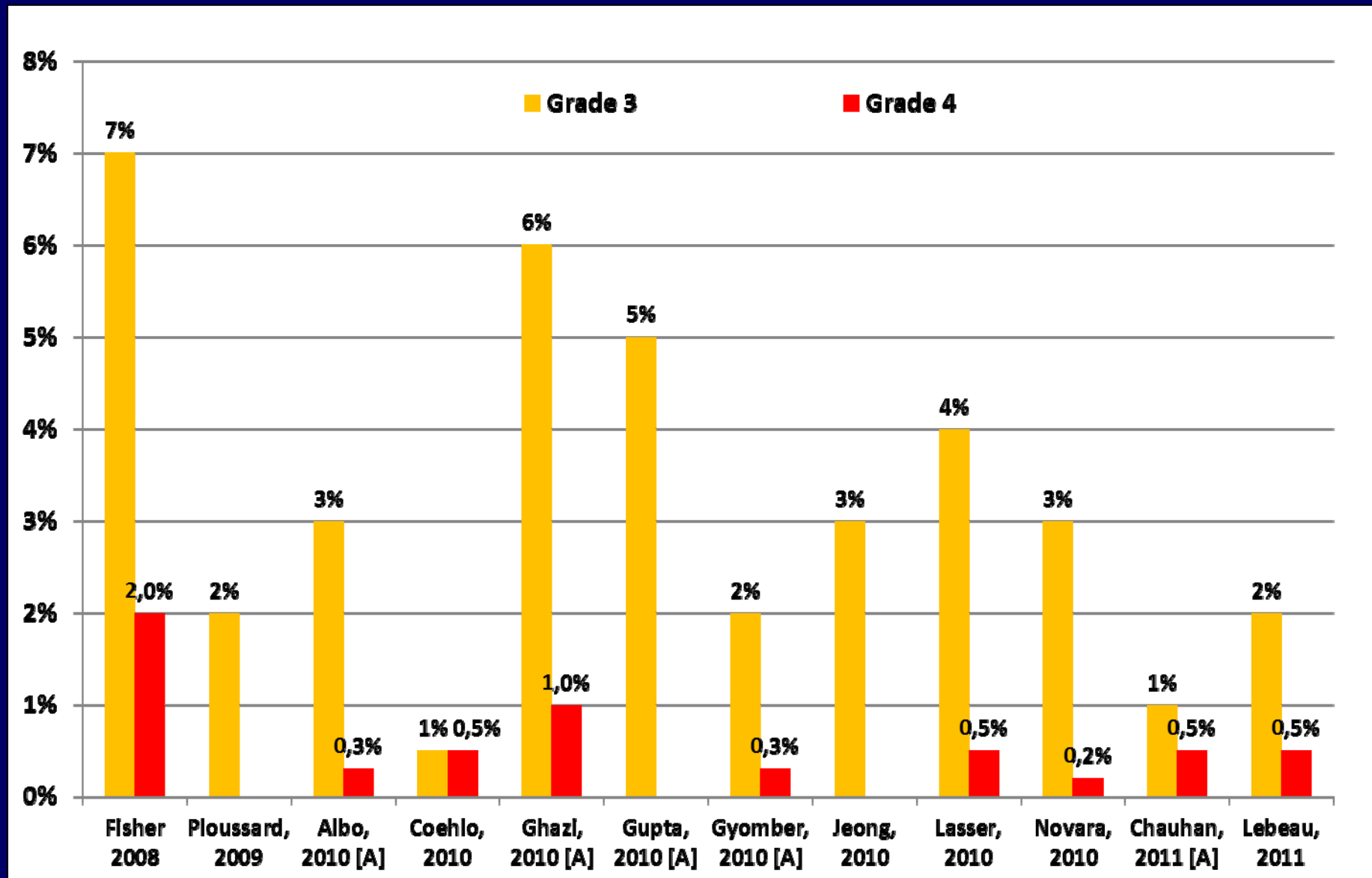
Review: Radical prostatectomy: comparisons of different approaches
Comparison: 02 Blood loss
Outcome: 04 Blood loss: LRP vs. RALP



Review: Radical prostatectomy: comparisons of different approaches
Comparison: 03 Transfusion rate
Outcome: 05 Transfusion rate: LRP vs. RALP

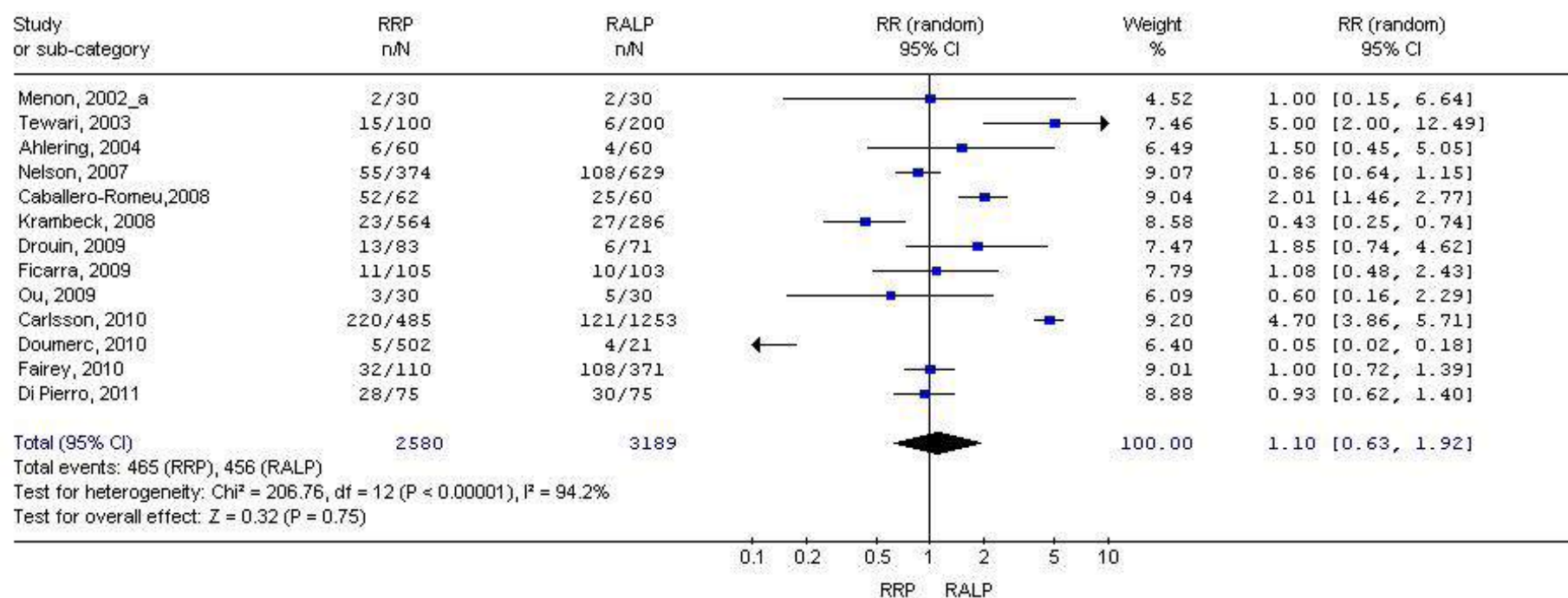


Overall complications: RARP series



Overall complications: RARP Vs RRP

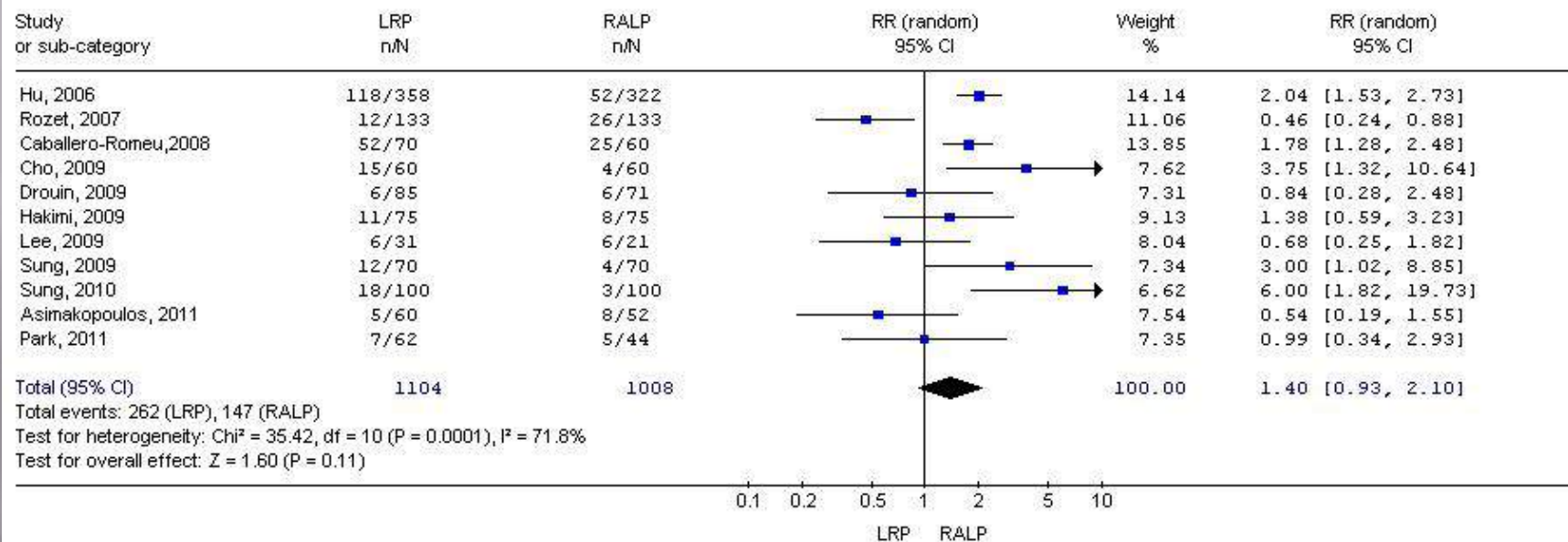
Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 04 Complication rate
 Outcome: 03 Overall complication rate: RRP vs. RALP



Novara G, Ficarra V. et al (unpublished data)

Overall complications: RARP Vs LRP

Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 04 Complication rate
 Outcome: 05 Overall complication rate: LRP vs. RALP



Novara G, Ficarra V. et al (unpublished data)

Outcomes evaluated

- Perioperative

- operative time, blood loss, transfusion rate, overall complication rates

- Oncological

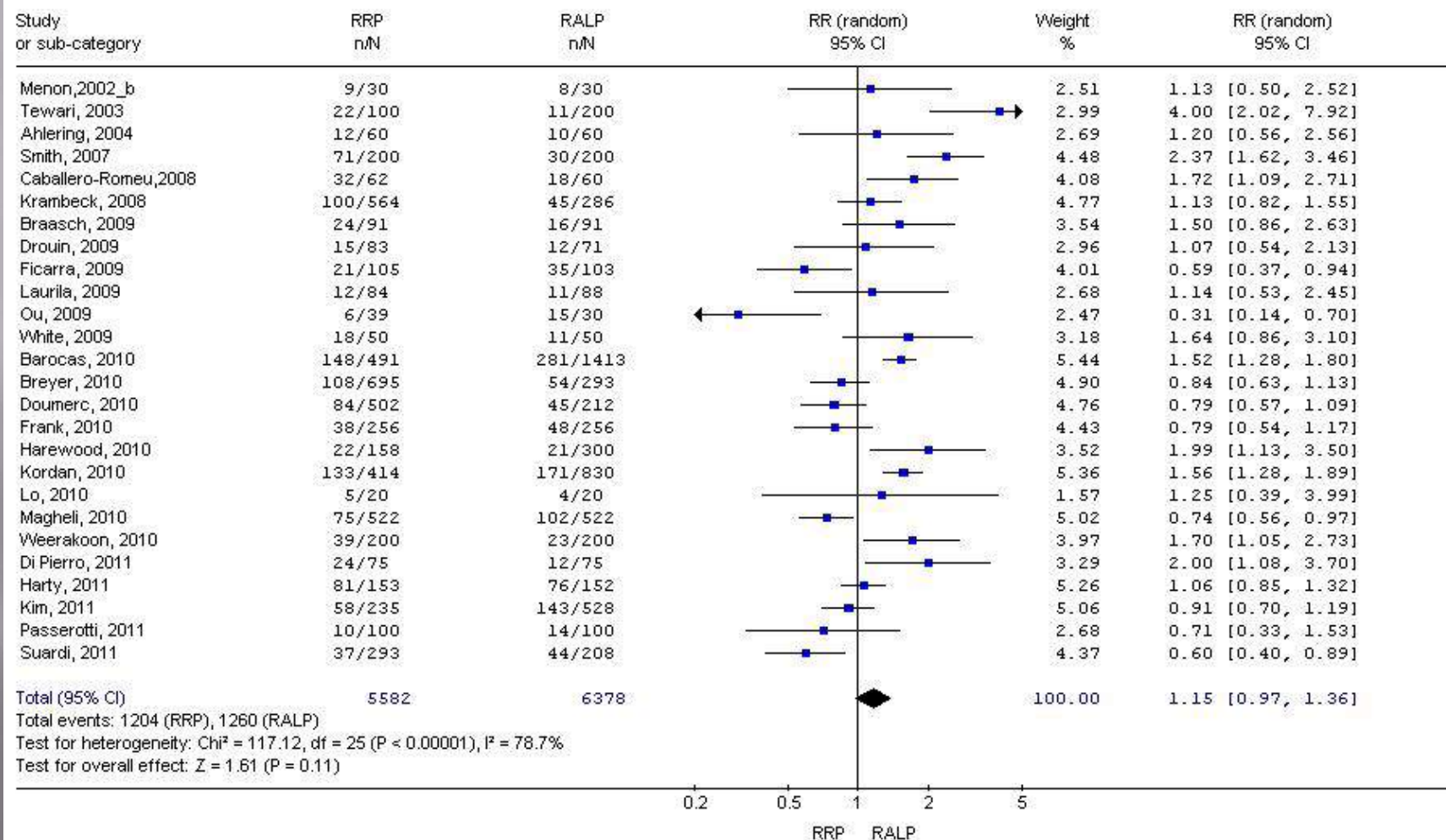
- positive surgical margins, bDFS, OS and CSS

- Functional

- urinary continence and potency recovery

Positive surgical margins: RALP Vs RRP

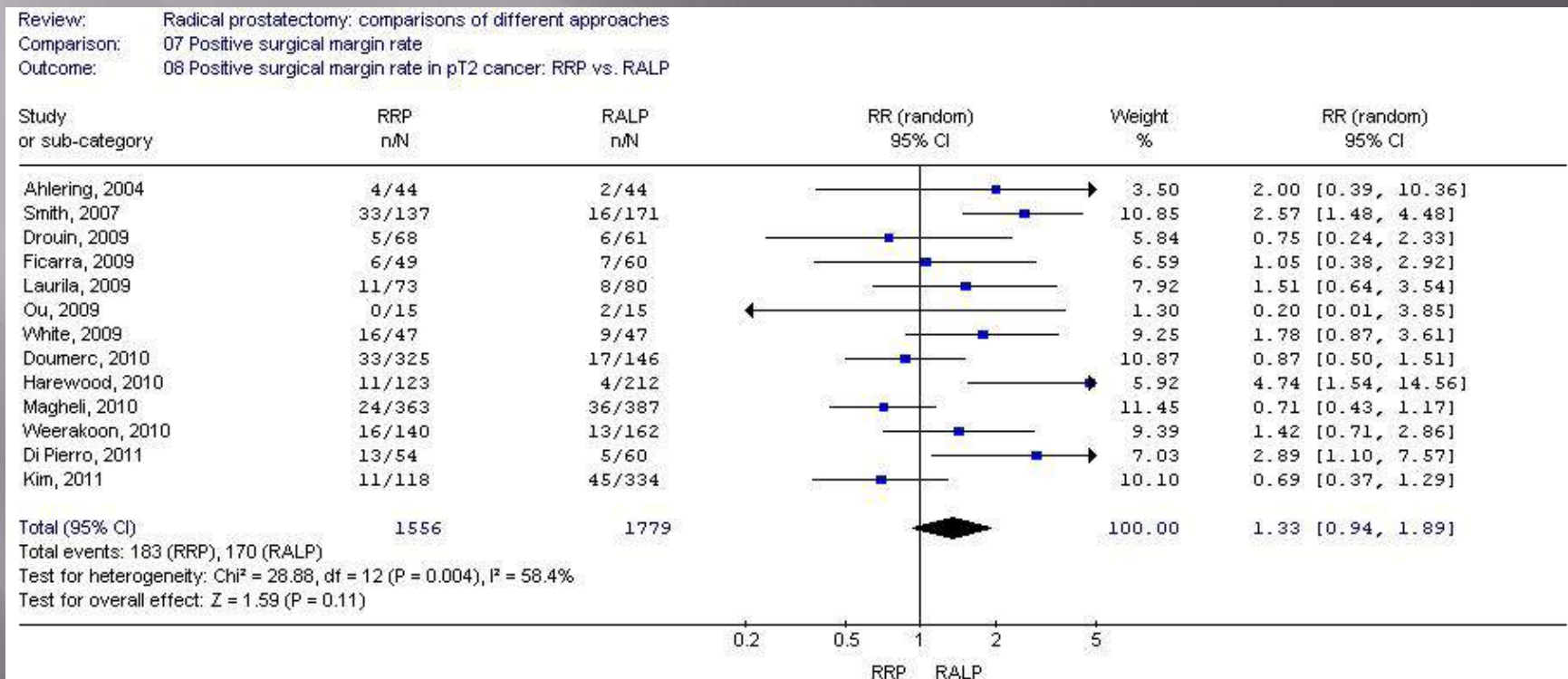
Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 07 Positive surgical margin rate
 Outcome: 03 Positive surgical margin rate: RRP vs. RALP



Novara G, Ficarra V.. et al (Eur Urol 2012)

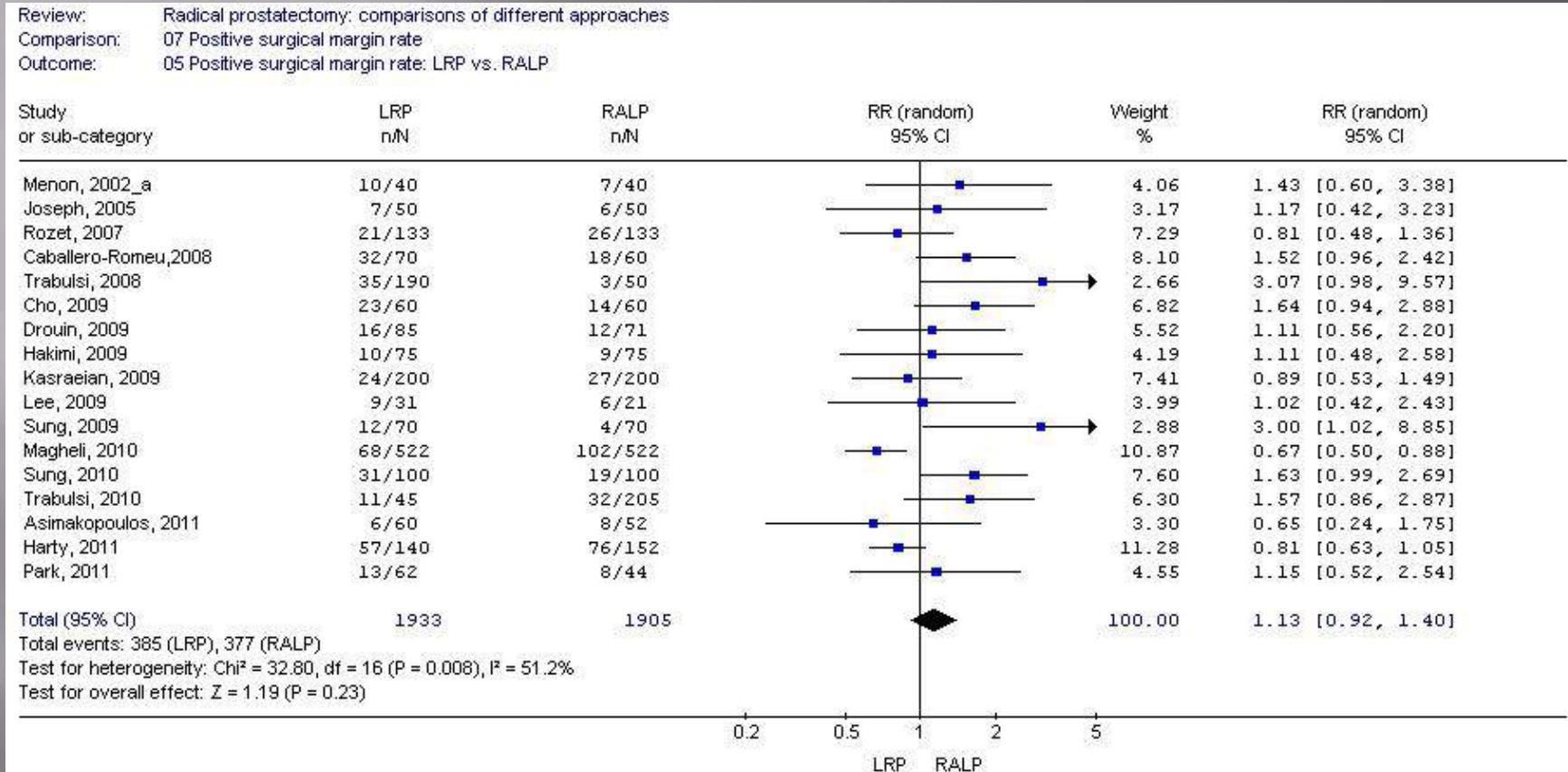
Positive surgical margins: RALP Vs RRP

Sensitivity analysis in pT2 prostate cancers

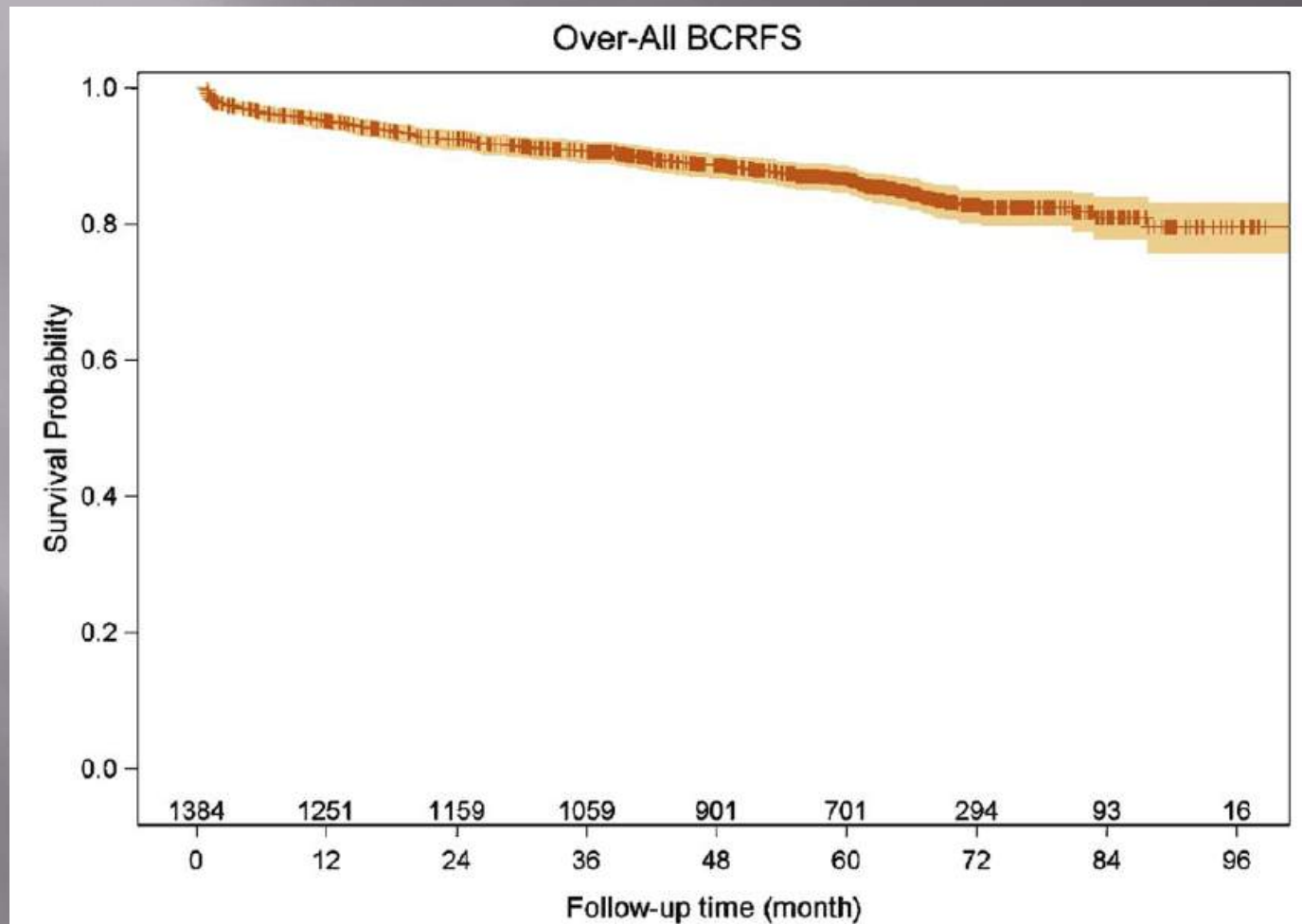


Novara G, Ficarra V. et al (Eur Urol 2012)

Positive surgical margins: RALP Vs LRP



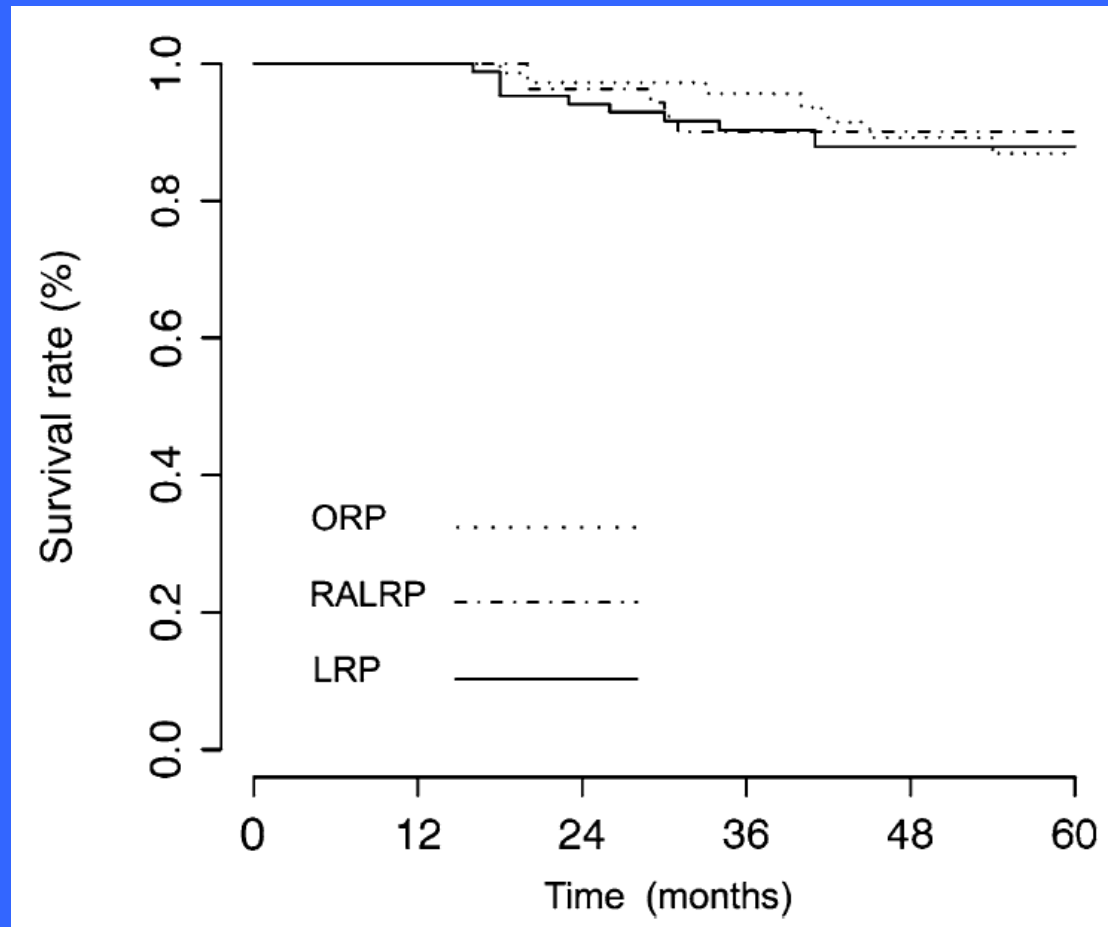
Oncological Results: 5-year bDFS



Menon M et al Eur Urol 2010; 58: 838-846

Oncological Results: 5-year bDFS

239 patients having RRP, LRP or RARP at Pitie-Salpetriere, Paris



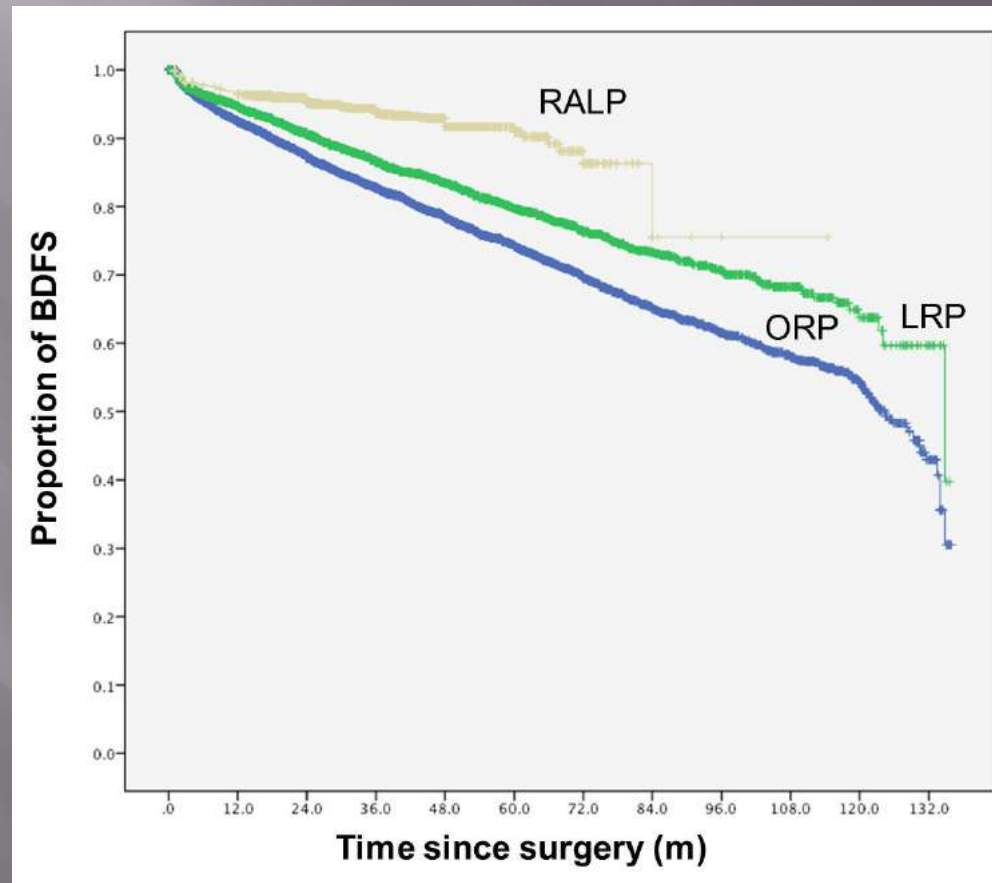
Drouin SJ et al World J Urol 2009; 27: 599-605

Oncological outcomes of robotic-assisted radical prostatectomy after more than 5 years.

Billia M1, Elhage O, Challacombe B, Cahill D, Popert R, Holmes K, Kirby RS, Dasgupta P. WJ Urol 2014

Oncological Results: bDFS

20,166 patients having surgery in 15 Centers



Sooriakumaran P. et al J Urol 2011; 165: 4 (suppl 1); e 263

Outcomes evaluated

- Perioperative

- operative time, blood loss, transfusion rate, overall complication rates

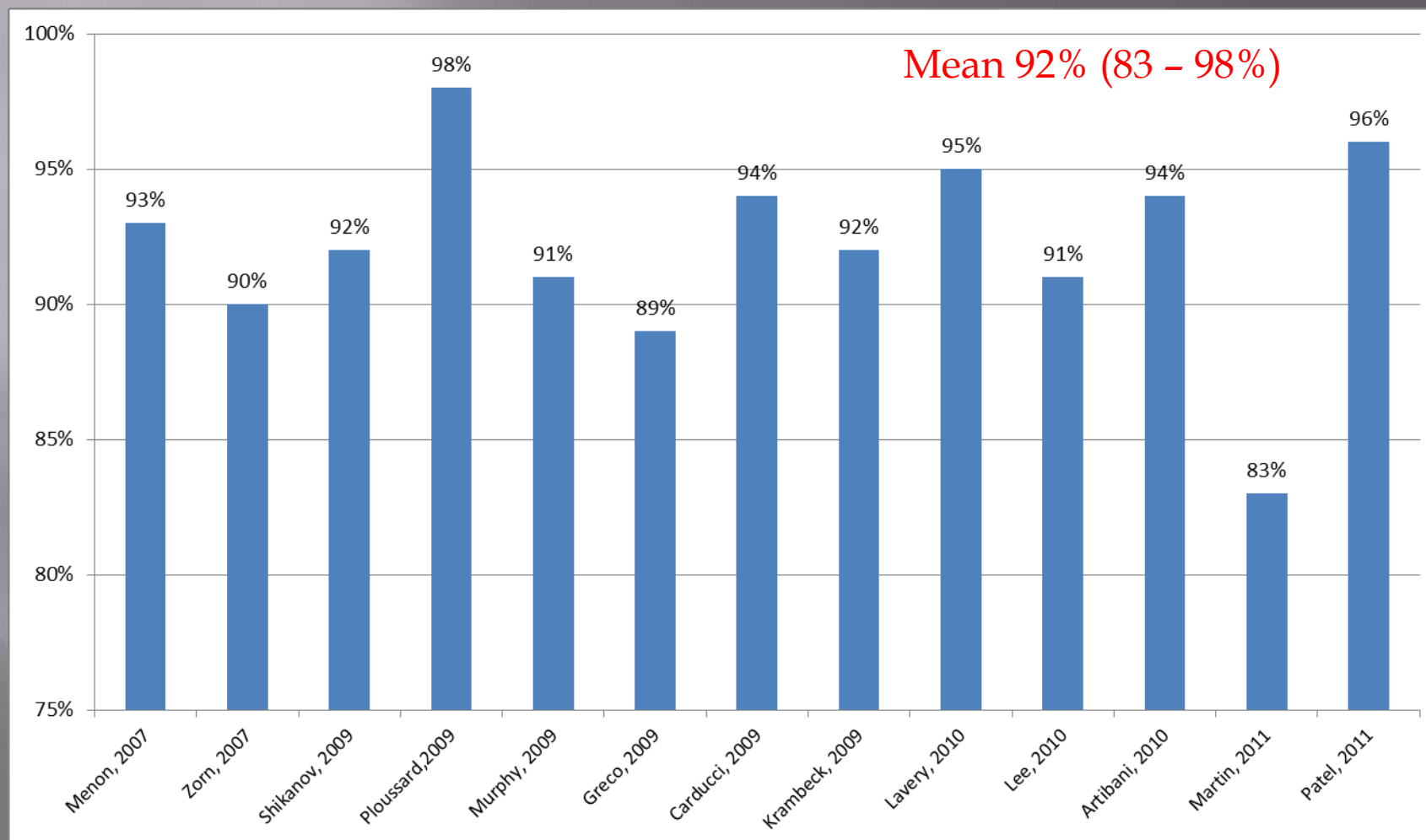
- Oncological

- positive surgical margins, bDFS, OS and CSS

- Functional

- urinary continence and potency recovery

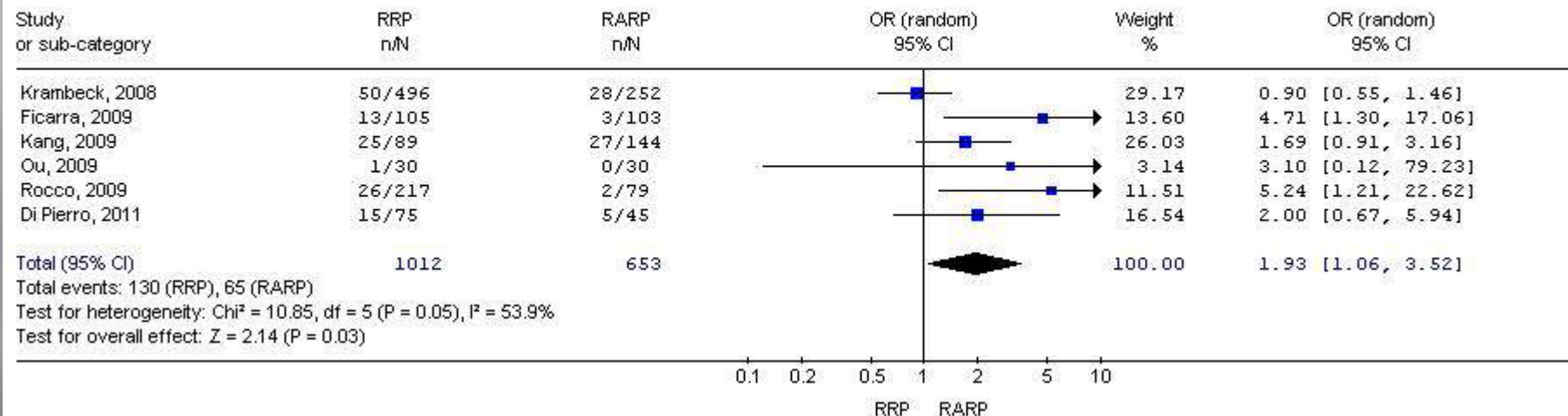
Urinary continence recovery: non comparative RALP series



Urinary continence: RARP Vs RRP

12-mo continence rate

Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 06 Continence rate
 Outcome: 07 12-month continence rate: RRP vs. RARP

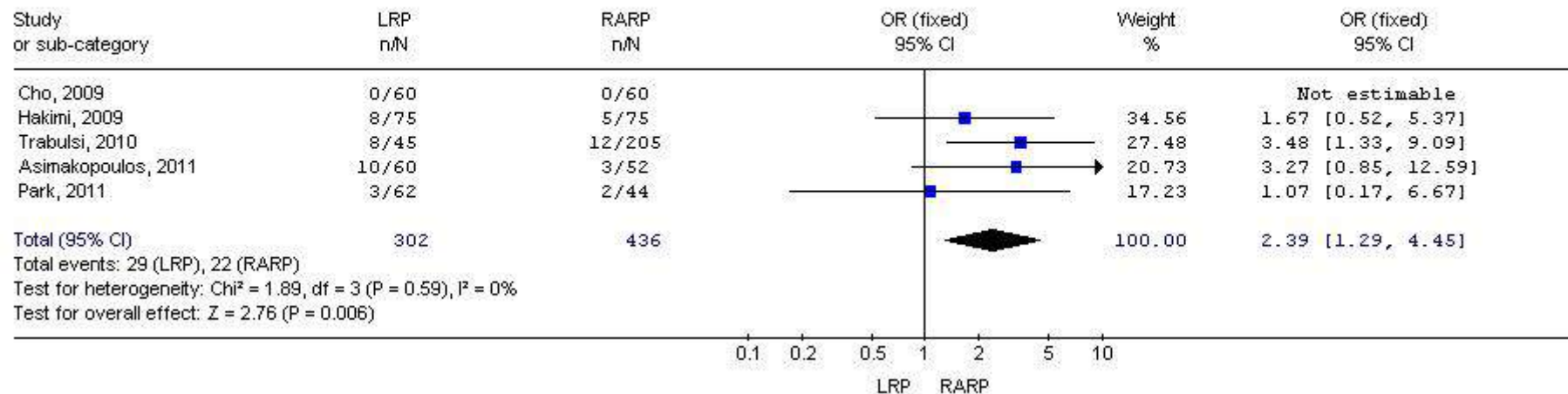


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Urinary continence: RARP Vs LRP

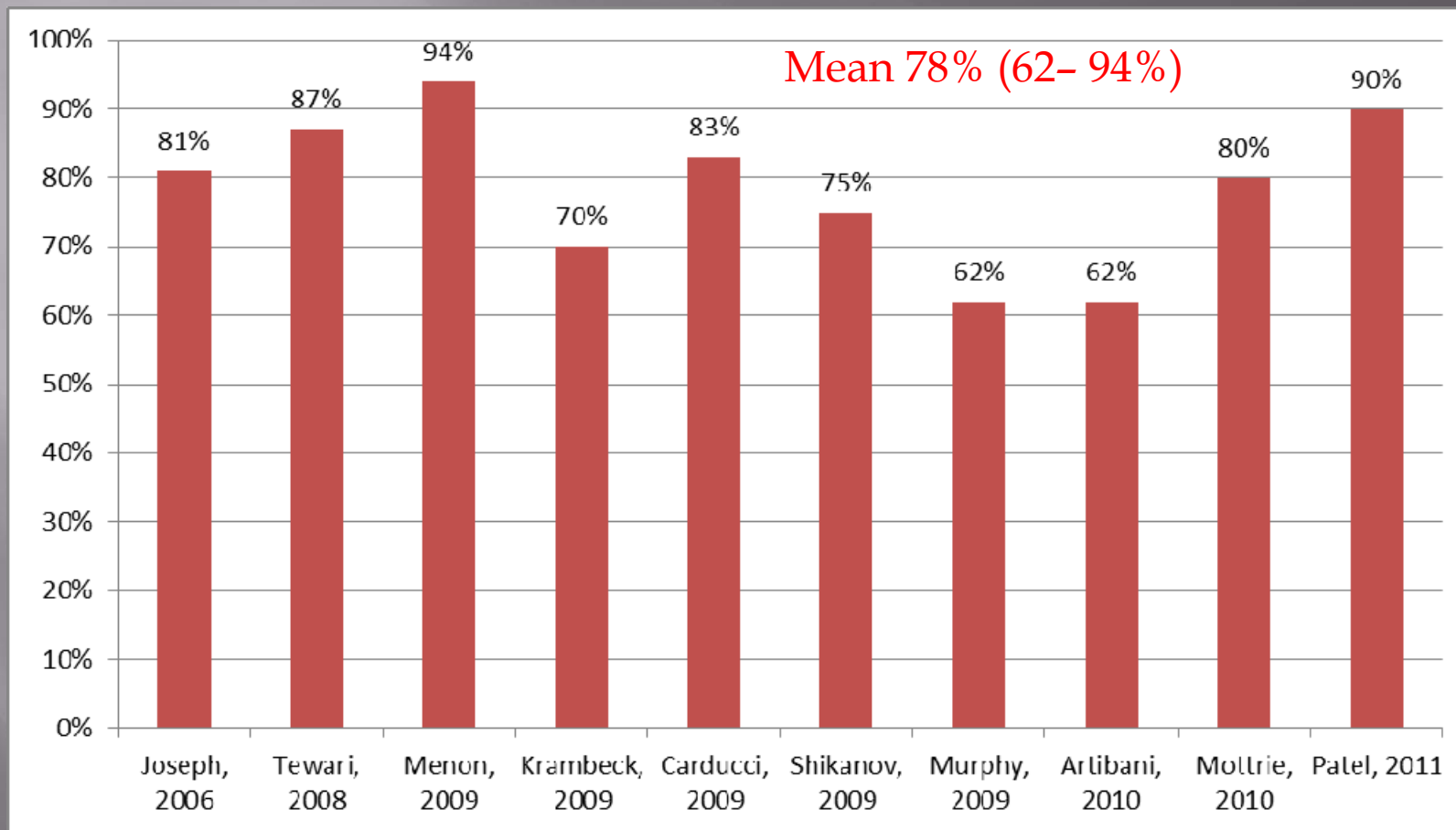
12-mo continence rate

Review: Radical prostatectomy: comparisons of different approaches
Comparison: 06 Continence rate
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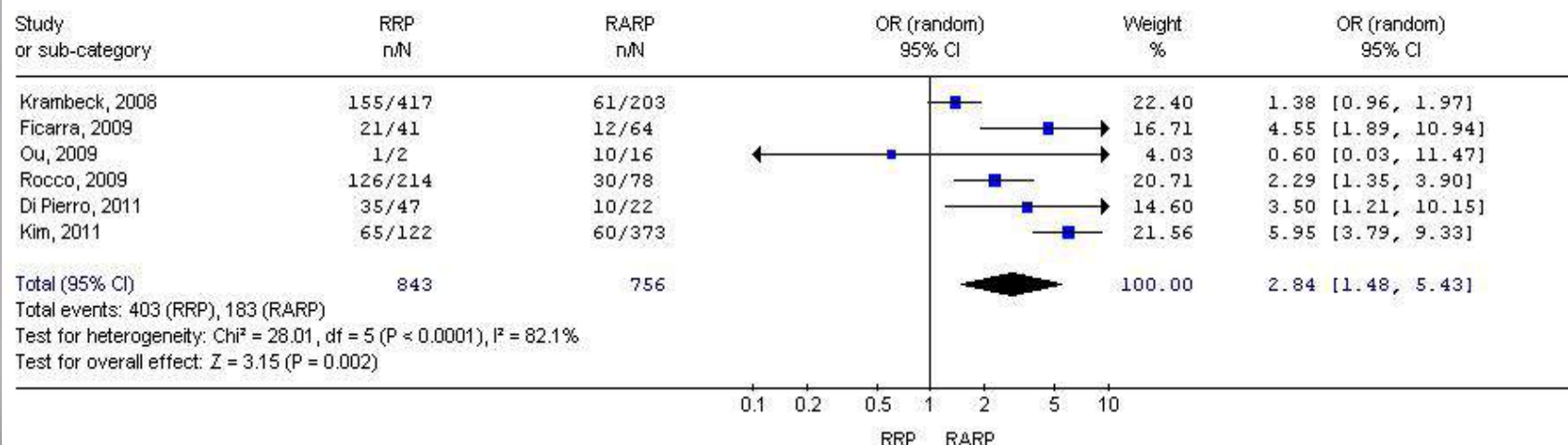
Novara G, Ficarra V., et al (unpublished data)

Potency recovery: non comparative RALP series

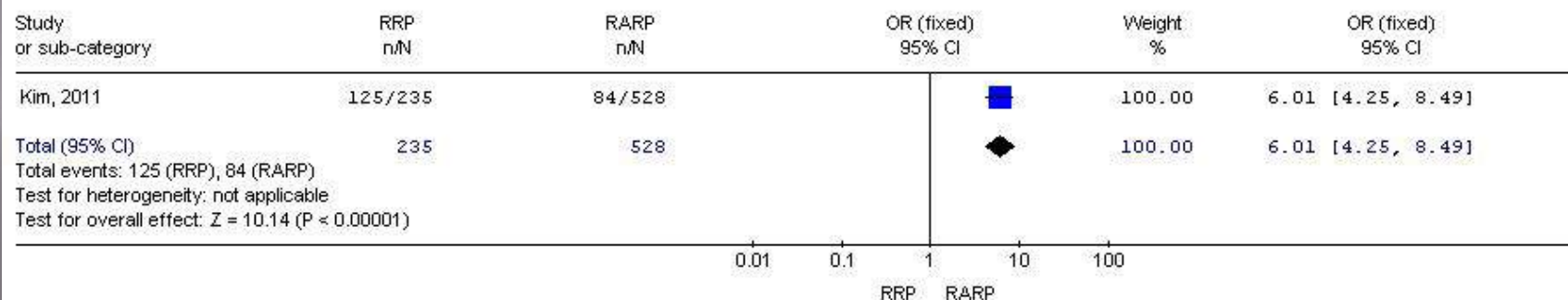


Potency recovery: RARP Vs RRP

Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 11 Potency rate
 Outcome: 01 12-mo potency rate: RRP vs RARP

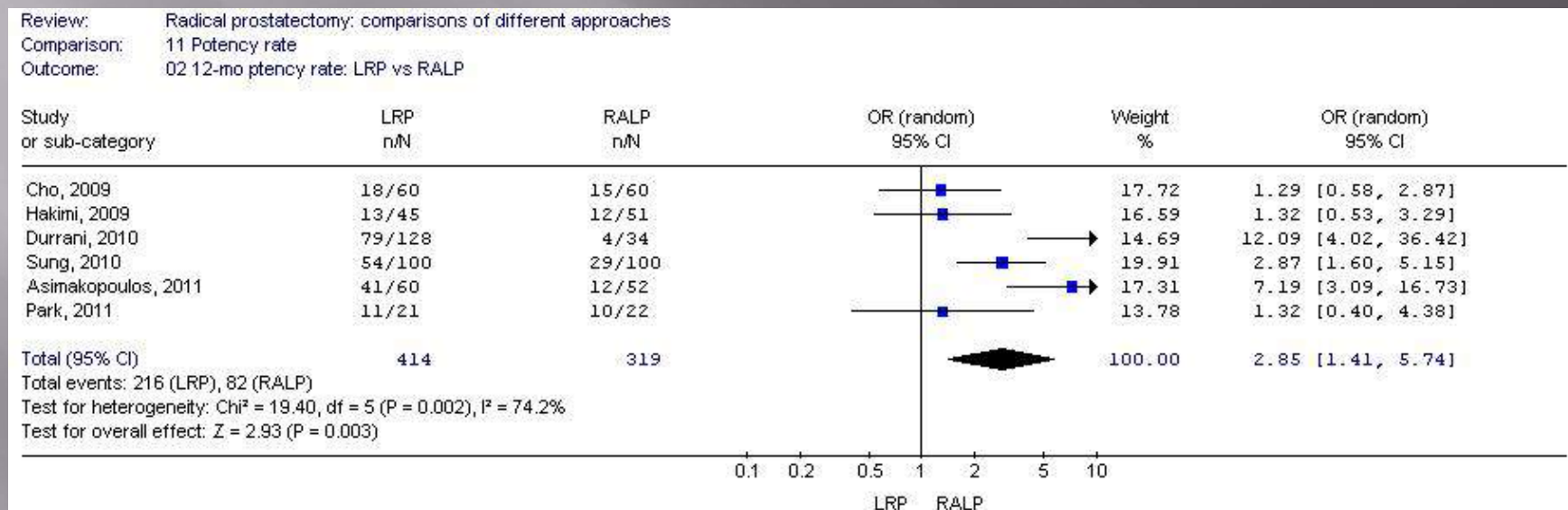


Review: Radical prostatectomy: comparisons of different approaches
 Comparison: 11 Potency rate
 Outcome: 03 24-mo potency rate: RRP vs RARP



Potency recovery: RARP Vs LRP

12-mo potency rate



Functional Outcomes limitations

- **Major methodological and surgical issues may affect continence rates (definition, use of questionnaires, time of assessment, surgical details)**
- **Most of the available studies do not report erectile function recovery in the appropriate way**

EBM for RARP: where are we?

- Excellent (better than RRP) perioperative
 - ▣ outcomes
- Equivalent (early and intermediate) oncologic
 - ▣ outcomes
- Significantly better functional (continence and
 - ▣ potency) outcomes

Randomised controlled trial comparing laparoscopic and robot-assisted radical prostatectomy.

- ▣ Porpiglia
- ▣ Eur Urol 2013
- ▣ 60 vs 60 pts
- ▣ 3/12 Continence 80% RARP group & 61.6% in LRP group ($p=0.044$)
- ▣ 1 yr continence rate 95.0% & 83.3%, respectively ($p=0.042$)
- ▣ Erection recovery was 80.0% and 54.2%, respectively ($p=0.020$)

NICE

- ▣ National Institute for Health Care and Excellence
- ▣ UK Body
- ▣ Initial Prostate Cancer Guidance 2008
 - contentious
- ▣ New Prostate Cancer Guidance 2014

Prostate cancer: diagnosis and treatment

Issued: January 2014

NICE clinical guideline 175

guidance.nice.org.uk/cg175

Prostate cancer: diagnosis and treatment

- ▣ Commissioners of urology services should consider providing robotic surgery to treat localised prostate cancer. [new 2014]

Cost Effectiveness

- ▣ QALY (quality adjusted years) threshold for NHS/NICE £30,000, for 10 year timespan.
- ▣ Incremental cost per QALY for RARP <£30,000
- ▣ Provided number procedures/year >150.
- ▣ When 100/yr £47,822
- ▣ When 50/yr >£66,000

NICE Implications

- ▣ Centralisation
 - For cost effectiveness
 - For quality
 - For trials
- ▣ First time robotics recognised by a national body.
- ▣ Based on health economic study showing reduced positive margins in RARP vs LRP.
- ▣ 12 robots installed in 6/12
- ▣ Now acquisitions stopped.

BAUS AUDITS

Nephrectomy



Open/keyhole, partial/total removal of the kidney (\pm ureter), first published in Jul 2013 ... [View the current data](#)

Percutaneous Nephrolithotomy (PCNL)



Keyhole removal of stones from the kidney (or upper ureter), first published in Jul 2015 ... [View the current data](#)

Stress Urinary Incontinence (SUI)



Open surgery for stress leakage of urine in women, first published in Jul 2015 ... [View the current data](#)

Radical Prostatectomy



Open, keyhole or robotic removal of the prostate gland (\pm lymph nodes) for cancer, first published in Sep 2015 ... [View the current data](#)

Urethroplasty



Open repair of urethral narrowing by grafting/patching or by excision & re-joining ... Data available in Nov 2015

Radical Cystectomy



Open, keyhole or robotic removal of the bladder for cancer with urinary diversion ... Data available in 2016



Patients

Radical Prostatectomy Outcomes Data

- ▣ 1/1/14- 31/12/14
- ▣ 6161 cases
- ▣ 5814 England
- ▣ HES- England 6,651 cases (87%)
- ▣ 147 consultants, 62 sites
- ▣ 58.5% Robotic assisted
- ▣ 26.7% Laparoscopic
- ▣ 13.4% Open

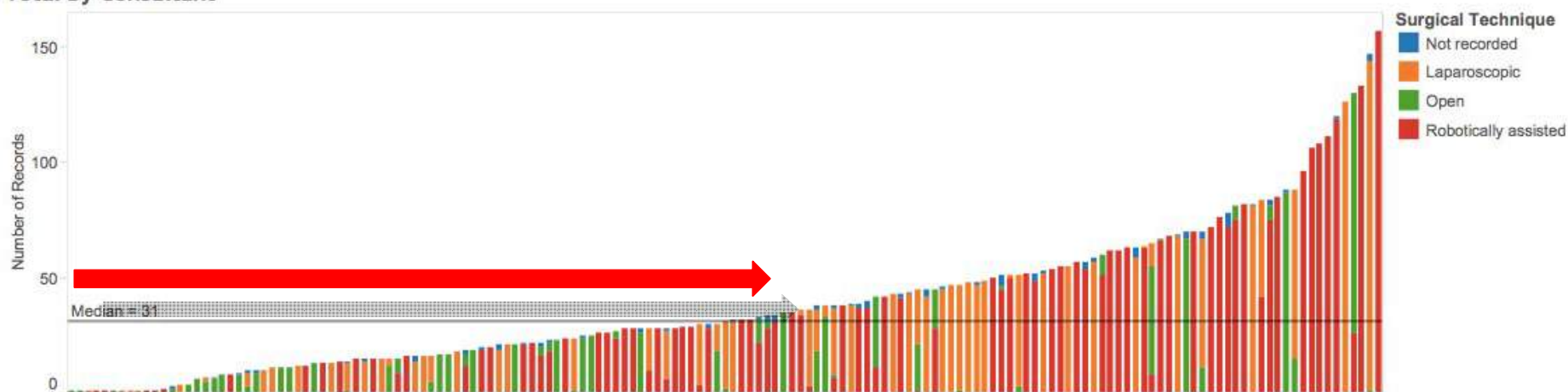
BAUS Audit 2014

- ▣ Median no of cases/consultant: 32 (range 1 - 157)
- ▣ Median no of cases/centre: 85 (range 1 - 250)
- ▣ Transfusion rate was 2.7% -
- ▣ 5,174 of the entries recorded whether there had been adverse events. The total post-operative complication rate was 9.5% (491 / 5174).
- ▣ Of these 491 cases, 364 recorded the Clavien Grade:
 - $\geq 3 = 1.6\%$

RPs by consultant

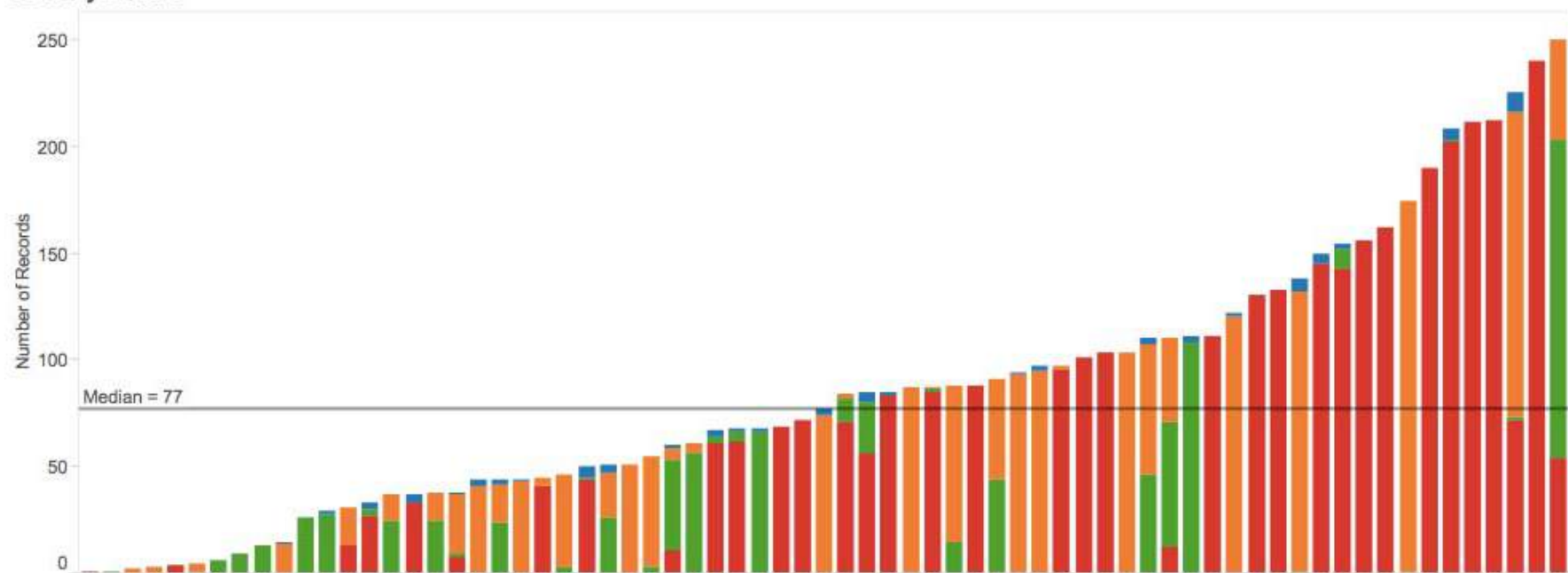
2014 Radical Prostatectomies -6161 cases reported by 157 consultants from 71 sites
(including 292 private cases from 43 consultants)

Total by Consultant



RPs by Centre

TotalbyCentre



Surgical Technique

Surgical Technique	N	% Total
Open	849	13.8%
Laparoscopic	1,796	29.2%
Robotically assisted	3,427	55.6%
Not recorded	89	1.4%
Grand Total	6,161	100.0%

Lymph Node Dissection

Lymph Node Dissection	N	% Total
None	3,295	53.5%
Extended	1,065	17.3%
Obturator fossae	1,321	21.4%
Not recorded	480	7.8%
Grand Total	6,161	100.0%

Tranfusions by Surgical Technique

Blood Units Transf..	Open		Laparoscopic		Robotically assisted		Grand Total	
	N	% Total	N	% Total	N	% Total	N	% Total
Nil	652	76.80%	1,530	85.19%	3,076	89.76%	5,258	86.59%
Minor (<3 units)	33	3.89%	7	0.39%	16	0.47%	56	0.92%
Moderate (3-6 units)	11	1.30%	5	0.28%	75	2.19%	91	1.50%
Major (>6 units)	1	0.12%	1	0.06%			2	0.03%
Not recorded	152	17.90%	253	14.09%	260	7.59%	665	10.95%
Grand Total	849	100.00%	1,796	100.00%	3,427	100.00%	6,072	100.00%

Duration of Operation by Technique

Duration Of ..	Surgical Technique							
	Open		Laparoscopic		Robotically assisted		Grand Total	
	N	% Total	N	% Total	N	% Total	N	% Total
<2.0 hours	178	20.97%	224	12.47%	621	18.12%	1,023	16.85%
2.0-3.9 hours	540	63.60%	1,209	67.32%	1,835	53.55%	3,584	59.03%
4.0-5.9 hours	47	5.54%	163	9.08%	281	8.20%	491	8.09%
>6.0 hours	4	0.47%	18	1.00%	13	0.38%	35	0.58%
Not recorded	80	9.42%	182	10.13%	677	19.75%	939	15.46%
Grand Total	849	100.00%	1,796	100.00%	3,427	100.00%	6,072	100.00%

LOSbyTechnique

Surgical Technique	N	% Total	Median Length Of Stay	Min. Length Of Stay	Max. Length Of Stay
Open	849	13.8%	3	0	96
Laparoscopic	1,796	29.2%	2	0	84
Robotically a..	3,427	55.6%	1	0	547
Not recorded	89	1.4%	2	1	14
Grand Total	6,161	100.0%	2	0	547

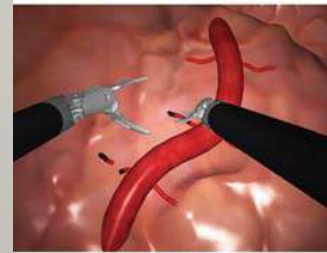
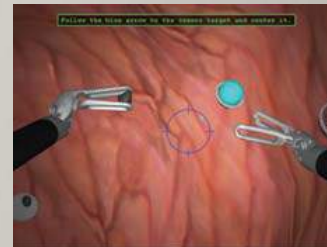
T2 Margins

pT2 Margins by Technique

Surgical Technique	Margins (group) 1					
	Negative		Positive		Grand Total	
	N	% of Total	N	% of Total	N	% of Total
Open	321	80.45%	78	19.55%	399	100.00%
Laparoscopic	659	80.17%	163	19.83%	822	100.00%
Robotically assisted	1,282	86.39%	202	13.61%	1,484	100.00%
Not recorded	33	84.62%	6	15.38%	39	100.00%
Grand Total	2,295	83.64%	449	16.36%	2,744	100.00%

Robotic Training

- ▣ Easier does not mean easy!
- ▣ Simulation
- ▣ Observing
- ▣ Assisting
- ▣ Modular console training
- ▣ Fellowship?
- ▣ Full Console surgeon



Fellowship Training



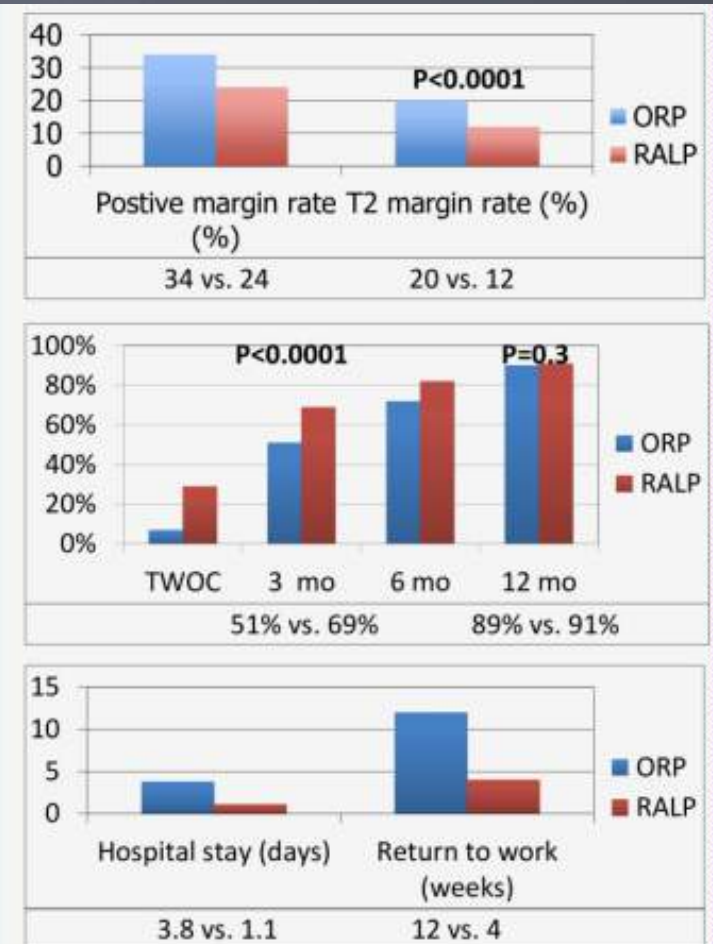
Melbourne, Australia 2008, supported by TUF grant

Robotic Weaknesses

- ▣ Only One system, one company
- ▣ Others in evolution
- ▣ High Cost in NHS
- ▣ Non-technical skills
- ▣ RCT provable outcomes?
- ▣ Availability

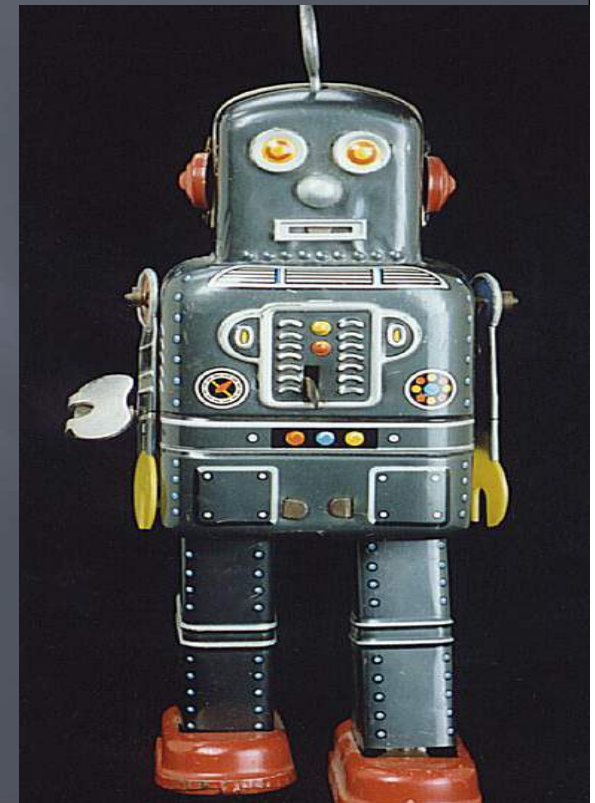
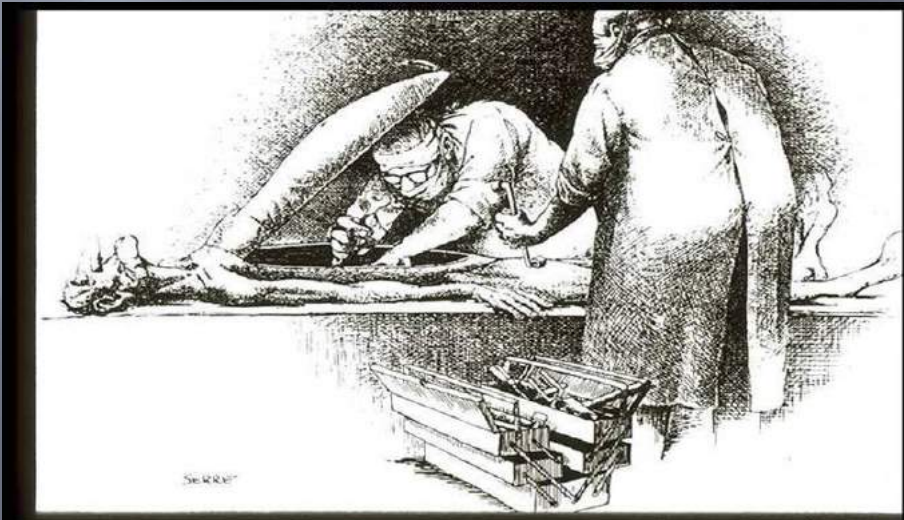
The Robotic Future

- ▣ 50 UK systems → 6-10 Irish systems
- ▣ High Volume Centres offering all treatments
 - Access to trials
 - Imaging access: MRI, PSMA PET
 - MDM: specialist radiology/pathology
 - Pre-surgical briefing
 - Data collection: measurement → I
- ▣ Structured Training and Mentorship



Is robotics the future?

- ▣ Robotics in urology has raised the bar
- ▣ Patients demand it
- ▣ High volume results excellent
- ▣ Can we afford it?
- ▣ Can we afford not to?



Childsplay?



Don't
— BE —
AFRAID
— OF —
Change

@benchallacombe