

## Background

Our previous study suggest (1) superiority of robot-assisted radical prostatectomy (RARP) over open radical prostatectomy (ORP) in terms of positive surgical margin (PSM) rates and functional outcomes after a learning curve. We aimed to determine whether a high-volume, experienced open surgeon could improve oncological outcomes using a more robust endpoint of biochemical recurrence (BCR) and an updated QOL analysis with a larger sample size and longer follow-up.

(1): Thompson JE et al. *Eur Urol* 2014 Mar;65(3):521-31. doi: 10.1016/j.eururo.2013.10.030.

## Methods

This prospective observational study compared two surgical techniques in 2241 consecutive men.

1520 underwent RARP and 721 ORP from 2006 to 2016, by one surgeon that performed 3,000 prior ORPs.

Demographic & clinico-pathologic data were prospectively collected. The patient-reported EPIC-QOL questionnaire was collected at baseline, 1.5, 3, 6, 12 and 24 months.

Multivariate linear regression modelled the difference in QOL domains against case number; logistic regression modelled the difference in PSM Odds-Ratio and BCR Odds-Ratio.

## Results

A total of 2,206 men were included in oncological- and 1,045 in QOL-analysis. Our previous findings of superior pT2 surgical margin outcomes, superior early and late sexual outcomes and superior early urinary outcomes compared to ORP were upheld and more robust (narrowing of 95% CIs) due to larger sample size and longer follow-up.

Novel finding were:

(i) The odds of BCR were initially higher for RARP but became lower after 191 RARPs and were 35% lower (OR 0.65, 95%CI 0.47 - 0.90) by the 1,520<sup>th</sup> RARP (Figure 1).

The learning curve plateaued after 226 RARPs.

(i) The benefit of lower BCR with RARP was restricted to men with organ-confined cancer (pT2) in which the odds of BCR was reduced by almost half (OR 0.55, 95%CI 0.36 - 0.85) by the 1,520<sup>th</sup> RARP. The learning curve plateaued after 343 RARPs.

(ii) improved late (12-24mo) urinary bother scores for RARP versus ORP was demonstrated after 155 RARPs (mean difference 4.7 points, 95%CI 1.3, 8.0), plateauing after 237 RARPs.

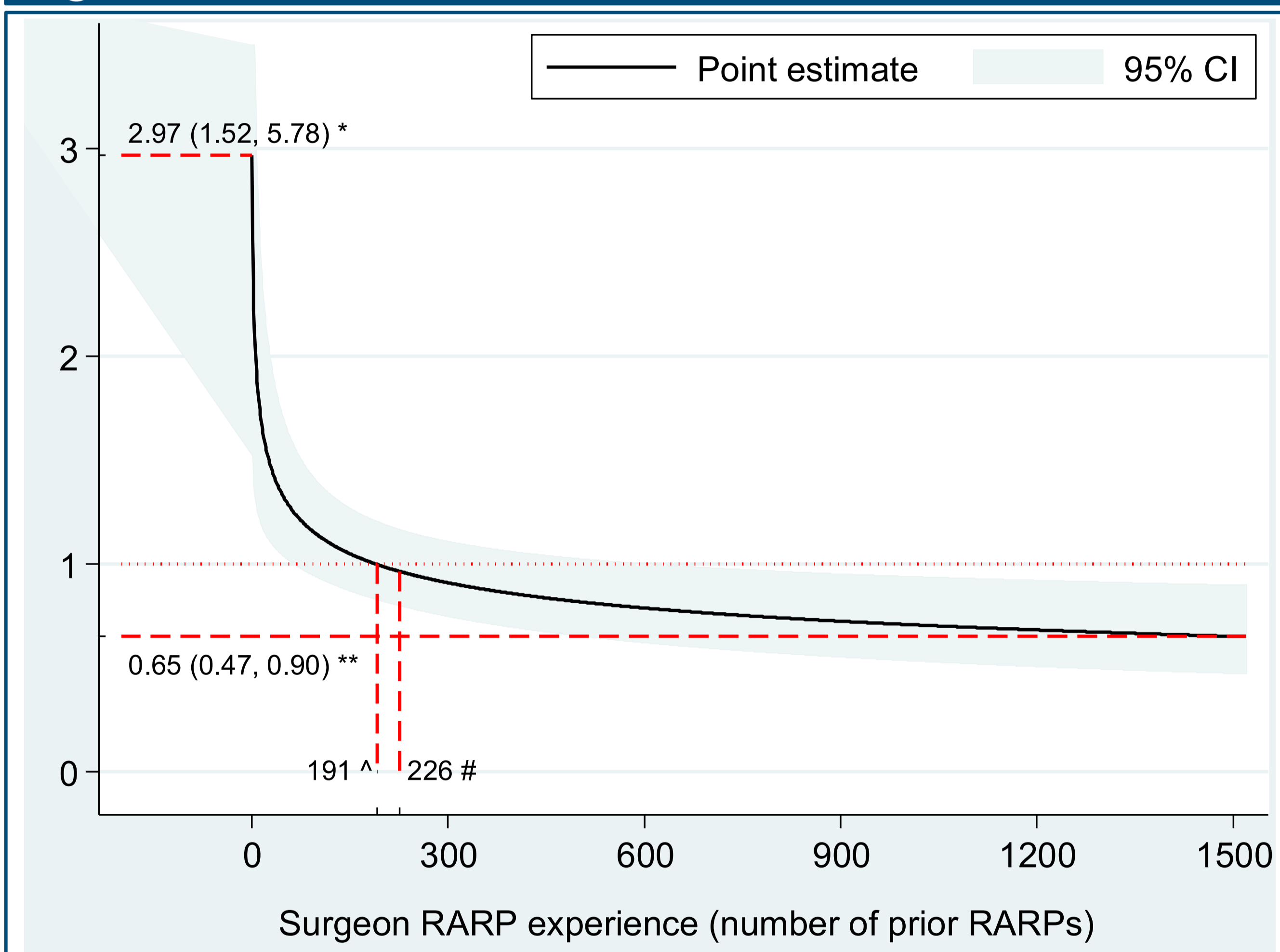
(iii) improved late urinary irritative-obstructive scores for RARP versus ORP was demonstrated after 70 RARPs (mean difference 3.8 points, 95%CI 0.9, 5.6), plateauing after 118 RARPs.

Limitations include single surgeon & centre data, observational data and short follow-up.

## Patient Characteristics

	ORP (n=263)	RARP <200 (n=108)	RARP 200+ (n=674)	p
<b>HRQoL analysis</b>				
<b>Age at surgery, ys</b>				
38-54	51 (19%)	16 (15%)	101 (15%)	0.031
55-59	55 (21%)	21 (19%)	141 (21%)	
60-64	73 (28%)	41 (38%)	167 (25%)	
65-77	84 (32%)	30 (28%)	265 (39%)	
Median	61	61	62	
<b>PSA at baseline</b>				
<4 ng/ml	32 (12%)	23 (21%)	146 (22%)	<0.001
4-10 ng/ml	167 (63%)	74 (69%)	455 (68%)	
>10 ng/ml	64 (24%)	11 (10%)	73 (11%)	
Median	6.5	6.0	5.7	
<b>Pathologic stage (%)</b>				
pT2	140 (53%)	73 (68%)	420 (62%)	0.011
pT3-pT4	123 (47%)	35 (32%)	254 (38%)	
<b>Gleason score on biopsy (%)</b>				
<7	17 (6%)	20 (19%)	47 (7%)	<0.001
7	200 (76%)	79 (73%)	538 (80%)	
>7	46 (17%)	9 (8%)	89 (13%)	
<b>NVB score (%)</b>				
0, 0.5	19 (7%)	5 (5%)	16 (2%)	<0.001
1, 1.5	76 (29%)	19 (18%)	80 (12%)	
2	168 (64%)	84 (78%)	578 (86%)	
<b>PSM and BCR analysis</b>				
<b>Age at surgery, ys</b>				
38-54	134 (18%)	25 (13%)	219 (17%)	0.003
55-59	172 (23%)	46 (24%)	262 (20%)	
60-64	194 (26%)	65 (34%)	311 (24%)	
65-77	233 (32%)	54 (28%)	491 (38%)	
Median	61	61	62	
<b>PSA at baseline</b>				
<4 ng/ml	90 (12%)	34 (18%)	263 (20%)	<0.001
4-10 ng/ml	462 (63%)	131 (69%)	880 (69%)	
>10 ng/ml	181 (25%)	25 (13%)	140 (11%)	
Median	6.7	6.2	5.7	
<b>Pathologic stage (%)</b>				
pT2	407 (56%)	129 (68%)	761 (59%)	0.007
pT3-pT4	326 (44%)	61 (32%)	522 (41%)	
<b>Gleason score on biopsy (%)</b>				
<7	76 (10%)	42 (22%)	99 (8%)	<0.001
7	512 (70%)	132 (69%)	1018 (79%)	
>7	145 (20%)	16 (8%)	166 (13%)	
<b>NVB score (%)</b>				
0, 0.5	49 (7%)	10 (5%)	34 (3%)	<0.001
1, 1.5	206 (28%)	39 (21%)	167 (13%)	
2	478 (65%)	141 (74%)	1082 (84%)	

Figure 1. Odds of biochemical recurrence



Outcome measure	Baseline <sup>^</sup>			6 month follow-up			24 month follow-up		
	ORP	RARP <200	RARP 200+	ORP	RARP <200	RARP 200+	ORP	RARP <200	RARP 200+
Erection suf. for intercourse (potent)	100%	100%	100%	16.5%	19.2%	32.3%	40.7%	40.8%	58.8%
Erections suf. for intercourse (all)	76.0%	74.8%	73.5%	12.5%	14.3%	24.7%	32.4%	30.5%	33.6%
Sexually function (>60); %	53.3%	63.9%	61%	9.8%	6%	19.5%	24.9%	20.6%	33.6%
Urinary bother; mean	85.1	86.2	85.0	85.3	87.1	89.1	88.7	86.4	90.4
Urinary irritative obstruction; mean	86.9	87.7	87.0	89.4	92.2	93.0	91.9	91.5	93.7
Pad-free continent (continent)	100%	100%	100%	81%	74%	89.7%	93.3%	90.6%	93.6%
Pad-free continent (all)	99.2%	100%	97.6%	80.7%	74%	89.1%	93.3%	90.6%	92.6%
Strict continent; ¥ %	84.2%	90.7%	83.4%	48%	44%	56.2%	62.9%	51.5%	62.8%
Positive surgical margin; %									
- PT2	8.6%	9.3%	5%						
- PT3/4	33.7%	41%	33.3%						
- Overall	19.8%	19.5%	16.5%						
Biochemical recurrence; * %									
- PT2	0%	0%	0%	16.2%	25.6%	6.0%	24.0%	37.4%	10.5%
- PT3/4	0%	0%	0%	28.7%	23.4%	9.6%	42.7%	42.2%	23.6%
- Overall	0%	0%	0%	21.7%	24.9%	7.4%	32.2%	38.9%	15.8%

## Legend

ORP = open radical prostatectomy; RARP = robot-assisted radical prostatectomy; RARP<200 = robot-assisted radical prostatectomies performed when surgeon had less than 200 operations experience; RARP200+ = robot-assisted radical prostatectomies performed when surgeon had 200 or more operations experience

<sup>^</sup>Baseline measurements represent measurements taken shortly before surgery, except for surgical margins which represent measurements from tissue taken during the operation, and biochemical recurrence which is defined as negative immediately after prostatectomy.

¥ Continent was defined as Expanded Prostate Cancer Index Composite questionnaire responses to Q12 = 0 and Q8 = 5 (no pads required and rarely or never leak urine)

\* Biochemical recurrence was defined as the first PSA measurement more than 4 weeks after prostatectomy that was  $\geq 0.1$

## Conclusion

RARP had a long learning curve with initially inferior outcomes, progressing to superior sexual, urinary, PSM and BCR outcomes.

This updated analysis demonstrates superior BCR and late urinary outcomes.

This learning curve suggests that RARP is worthwhile for high-volume surgeons. Further studies are required to determine whether it will be justifiable for late-career or low-volume surgeons.

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