



UNIVERSITÀ DEGLI STUDI  
DI NAPOLI FEDERICO II

# *Innovazione e appropriatezza: come valutarle e come introdurle*

La Robotica: Potenzialità e Criticità

Prof. **Ciro Imbimbo**  
Napoli 27 Novembre 2018

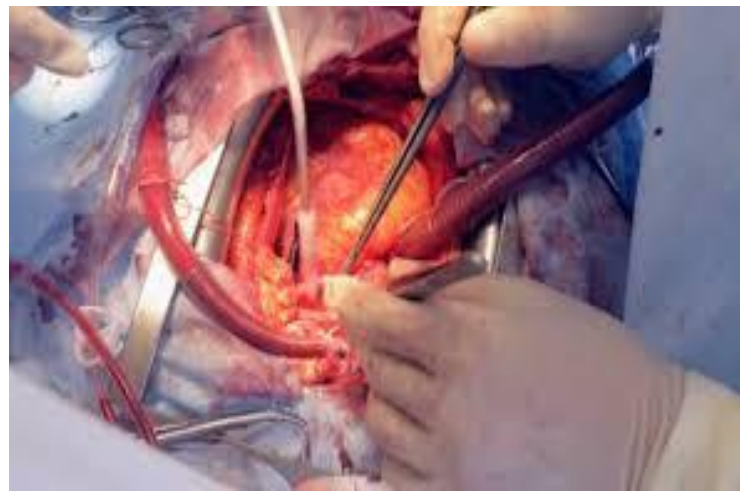
# “YESTERDAY” ....



LAPAROSCOPIA



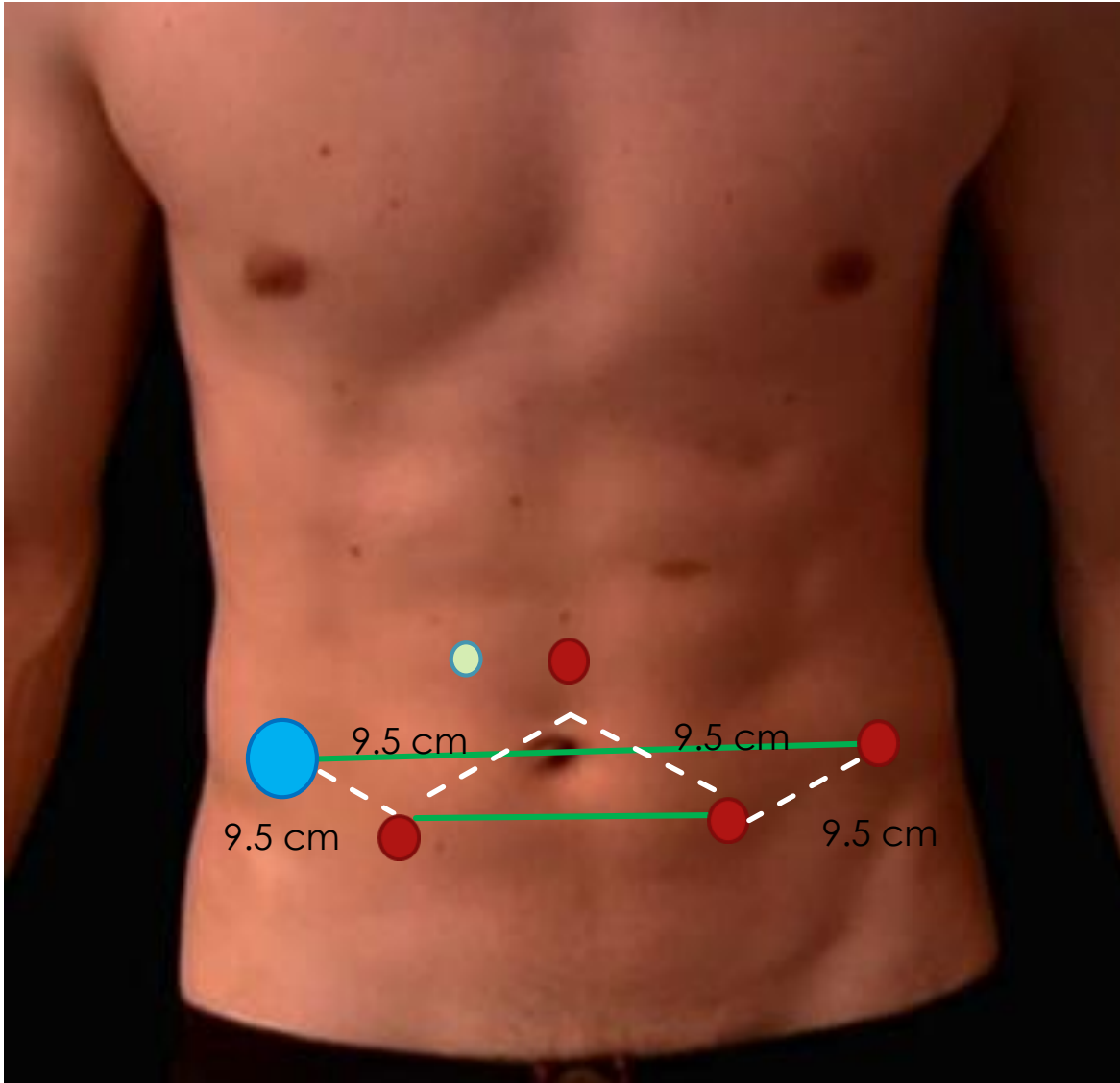
CHIRURGIA OPEN



# TODAY....ROBOT



## - Posizionamento delle porte



- 8 mm robotic trocar
- 12 mm assistant trocar
- 5 mm assistant trocar



# VANTAGGI

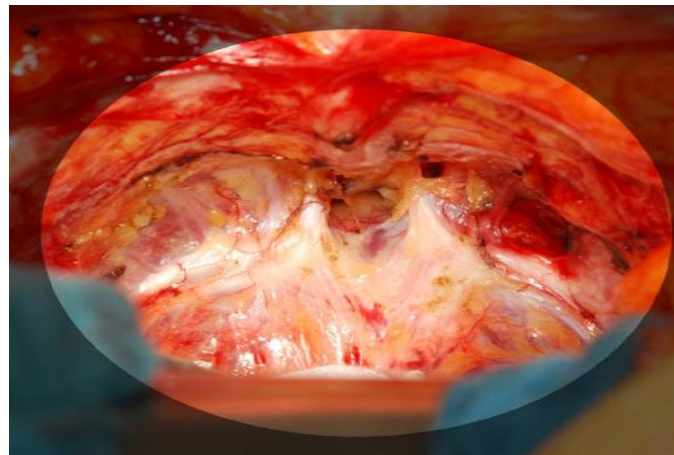
-SOLUZIONE ALLE LIMITAZIONI ERGONOMICHE E VISIVE DEI SISTEMI DI LAPAROSCOPIA

(più gradi di libertà, visione 3D)

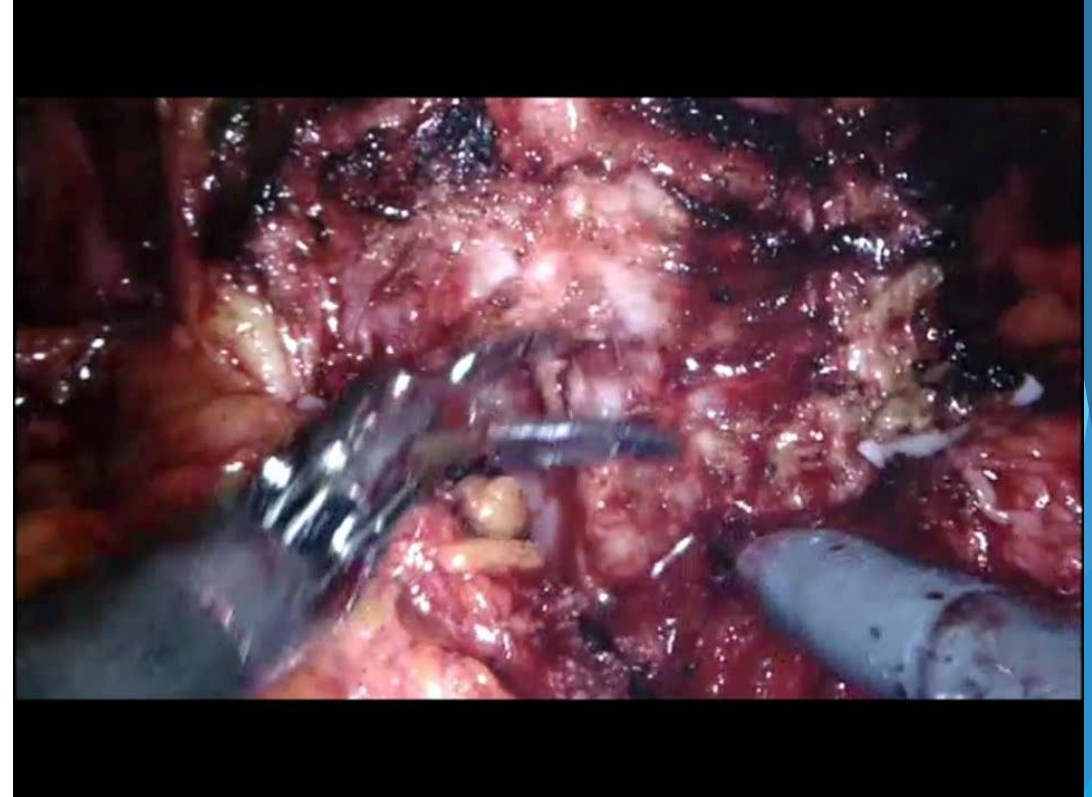
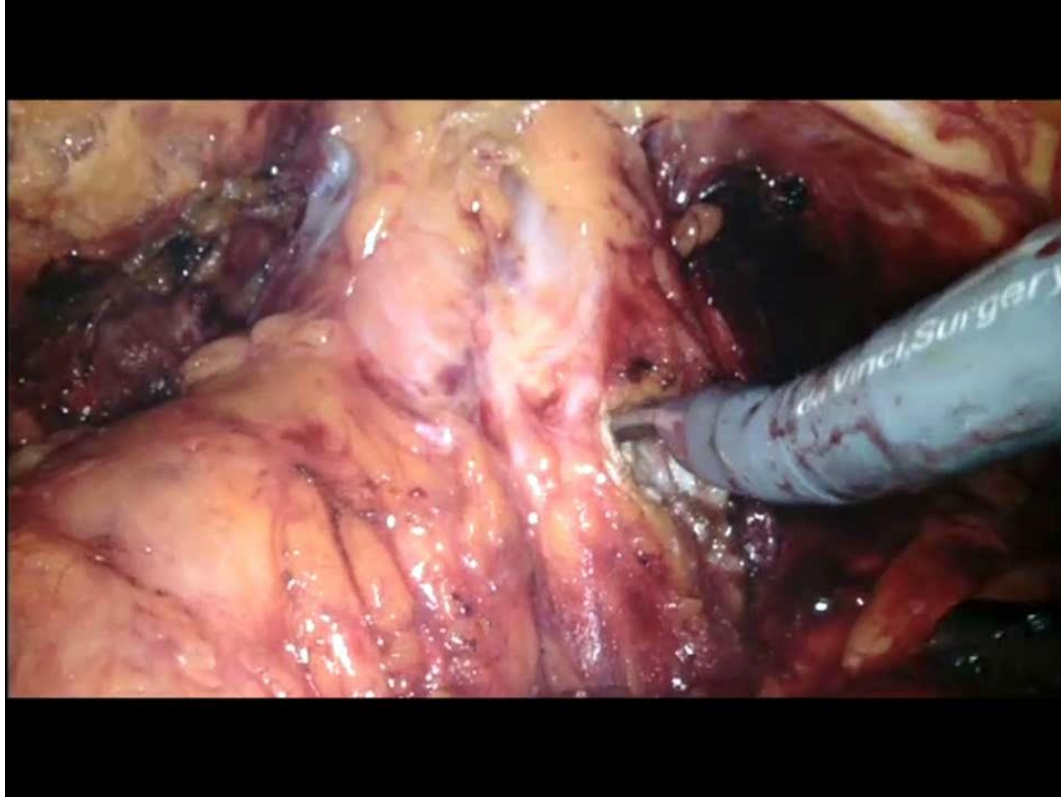
-PRECISIONE DEI MOVIMENTI

(filtraggio del tremore, motion scaling)

-PRECISIONE DELLA DISSEZIONE ANATOMICA



# VANTAGGI



-PRECISIONE DELLA DISSEZIONE ANATOMICA

-RIDOTTA INVASIVITA'

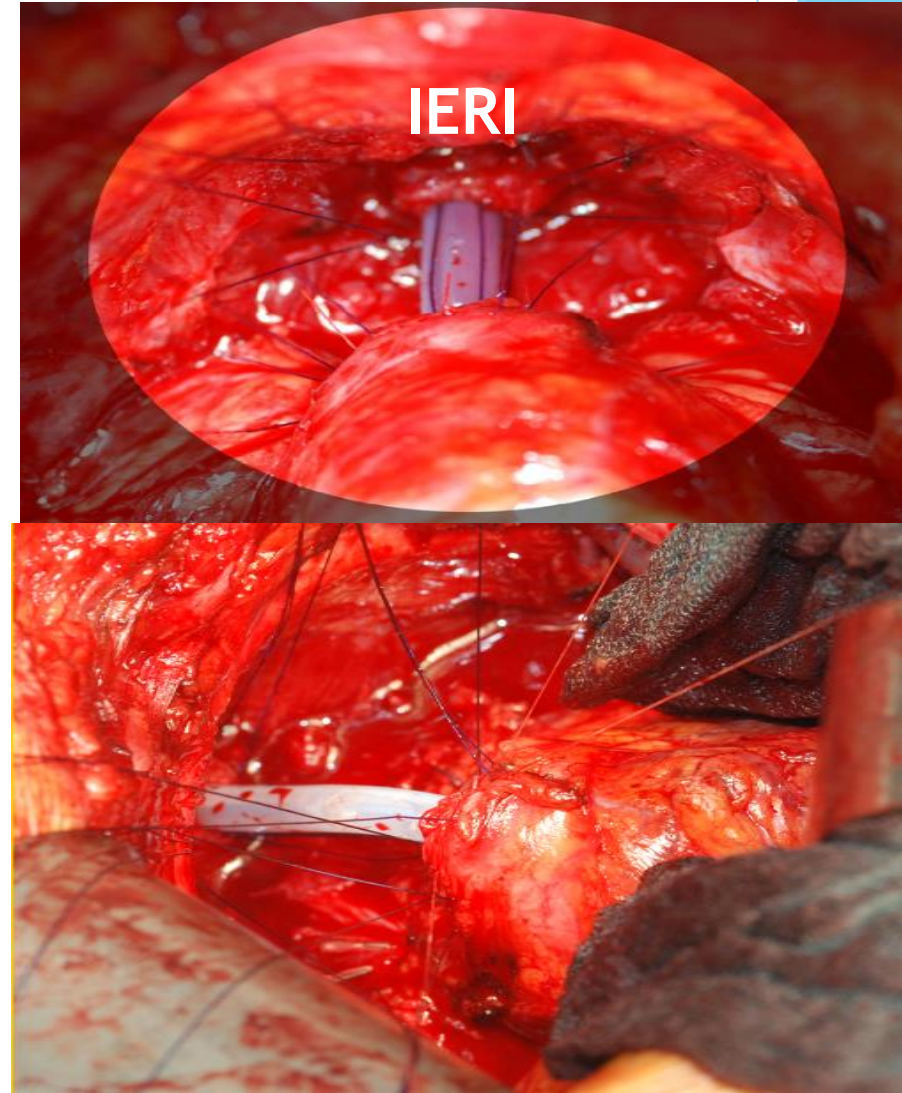
-RIDUZIONE DELLE PERDITE DI SANGUE

# VANTAGGI

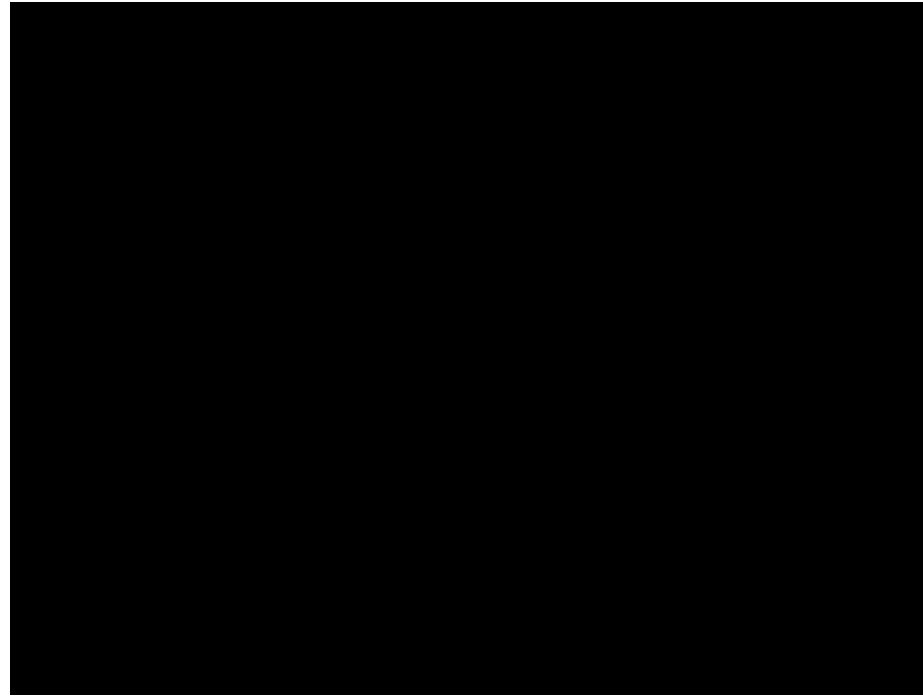
-MINOR IMPIEGO DI PERSONALE DI  
SALA OPERATORIA

-MIGLIORE ACCESO A SEDI ANATOMICHE  
(retroperitoneo-angoli costofrenici)

-ACCURATEZZA DELLE SUTURE

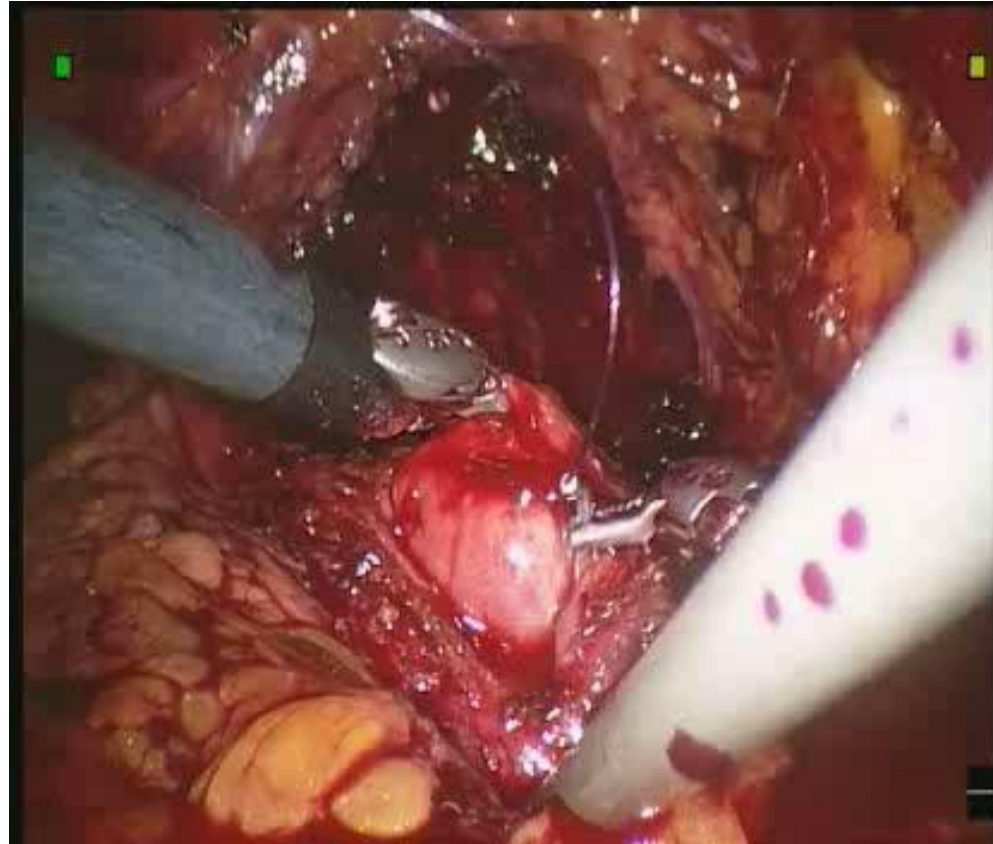


# Linfadenectomia

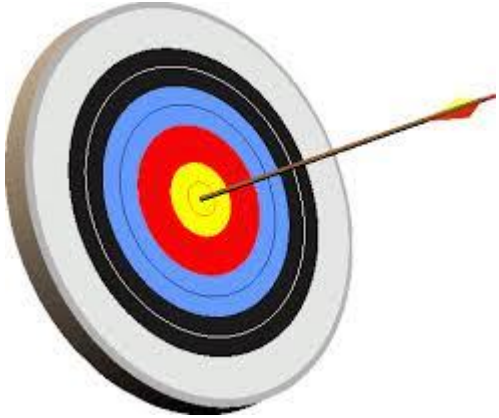




# ANASTOMOSI



# VANTAGGI



- PROCEDURE DI NERVE SPARING
- MIGLIORE PRECISIONE NEL CONFEZIONARE ANASTOMOSI
- MAGGIORE PRECISIONE NELLA LINFOADENECTOMIA
- MINIMIZZAZIONE COMPLICANZE POST OPERATORIE  
(continenza urinaria, potenza sessuale)
- RIPRESA RAPIDA DELLA FUNZIONE INTESTINALE

# Planning preoperatorio

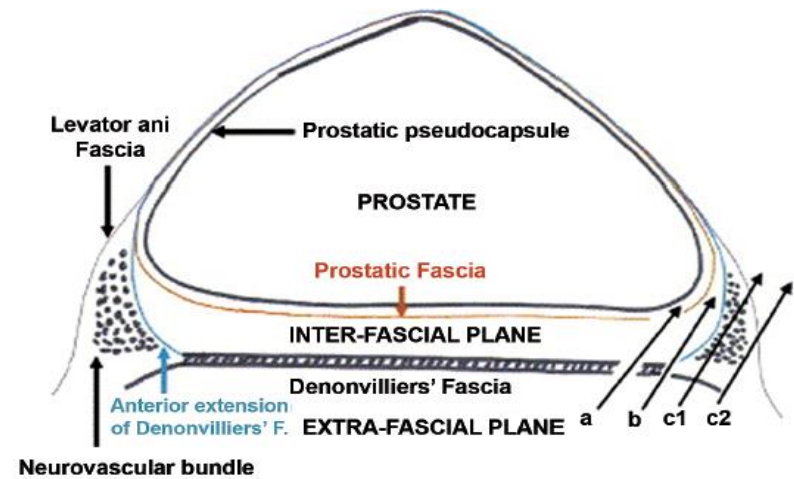
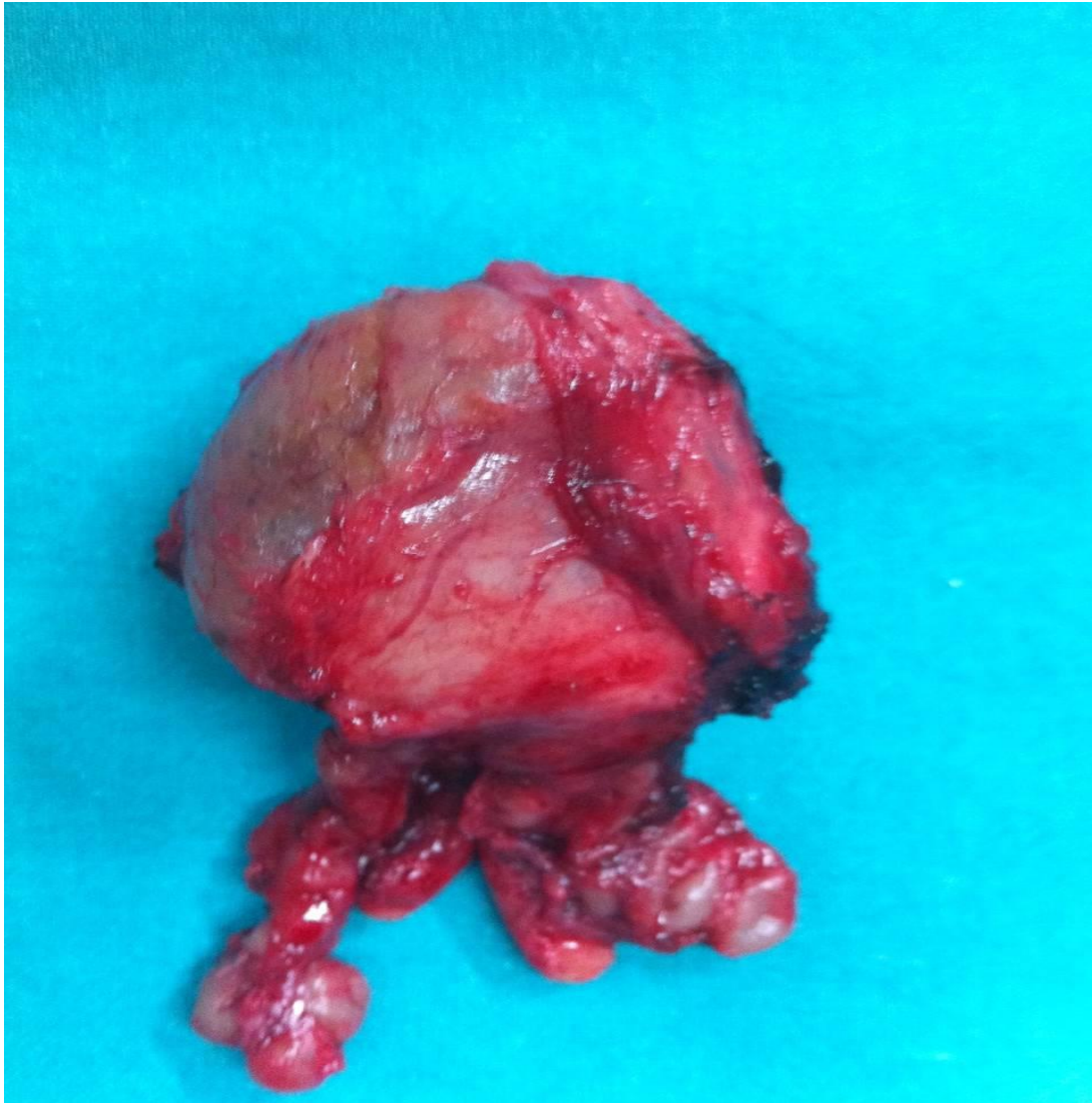
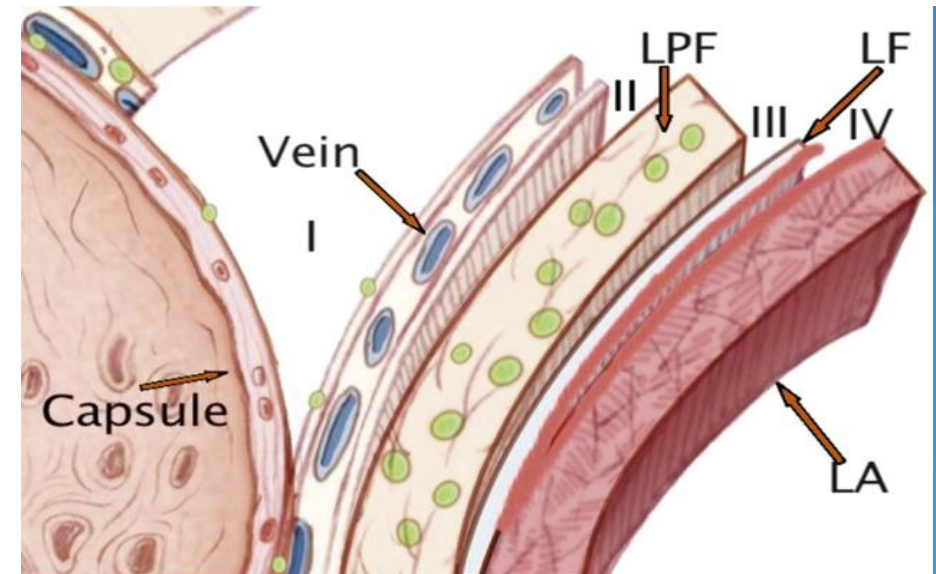


Figure 2 – Axial view of prostatic fascial anatomy. a = intrafascial plane; b = interfascial plane; c1 = extrafascial plane with partial preservation of neurovascular bundle; c2 = extrafascial plane with no preservation of neurovascular bundle. (9) (with permission from Elsevier publishing).



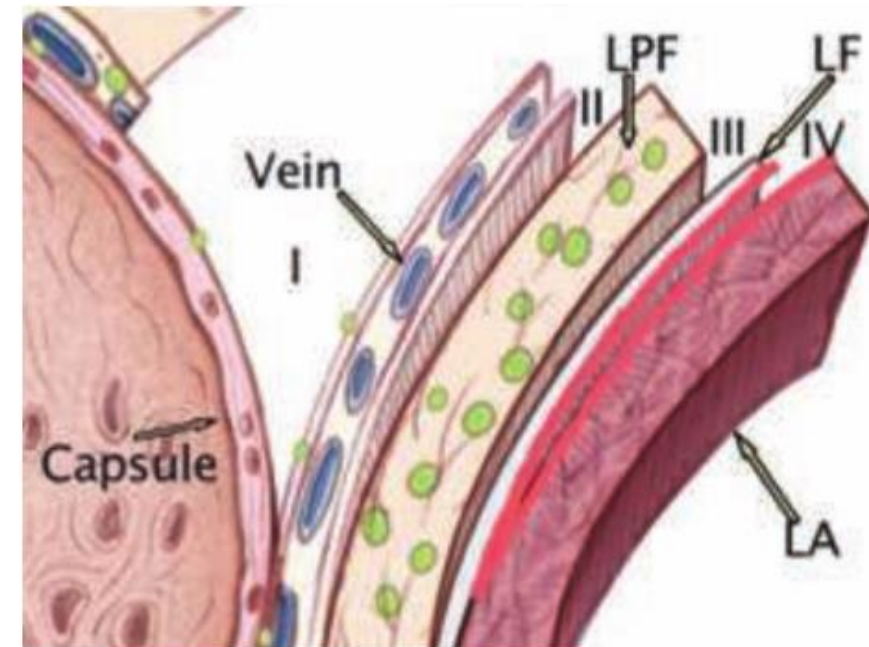
# 8 - Nerve-sparing

## ANATOMY

According to Tewari et al., **four grades** of nerve-sparing are recognized:

- ✓ **Grade 1**: incision of the Denonvilliers and lateral pelvic fascia (LPF) is taken just outside the prostatic capsule.
- ✓ **Grade 2**: incision through the Denonvilliers (leaving deeper layers on the rectum) and LPF is taken just outside the layer of veins of the prostate capsule.
- ✓ **Grade 3 (partial/incremental)**: incision is taken through the outer compartment of the LPF (leaving some yellow adipose and neural tissue on the specimen), excising all layers of Denonvilliers' fascia.
- ✓ **Grade 4 (non-NS)**: a wide excision of the LPF and Denonvilliers' fascia containing most of the periprostatic neurovascular tissue is performed.

*FIG. 4. Layers of fascia enveloping the prostatic capsule, showing the planes of dissection for differing NS grades (1–4). LPF, lateral pelvic fascia medial layer, i.e. the prostatic fascia; LF, lateral pelvic fascia lateral layer, i.e. the levator fascia; LA, levator ani.*



# Tutto questo si traduce in.....

RISULTATI CLINICI SUPERIORI

RIDUZIONE DEL RISCHIO DI COMPLICAZIONI

PERIODO DI RECUPERO PIU' RAPIDO

PICCOLE INCISIONI

CICATRICI MINIME

RIDUZIONE DEL DOLORE POST OPERATORIO

RAPIDO RITORNO ALLE ATTIVITA' QUOTIDIANE



# VANTAGGI



**-FACILITA' DI INSEGNAMENTO**

**BREVE LEARNING CURVE (20-30 casi)**

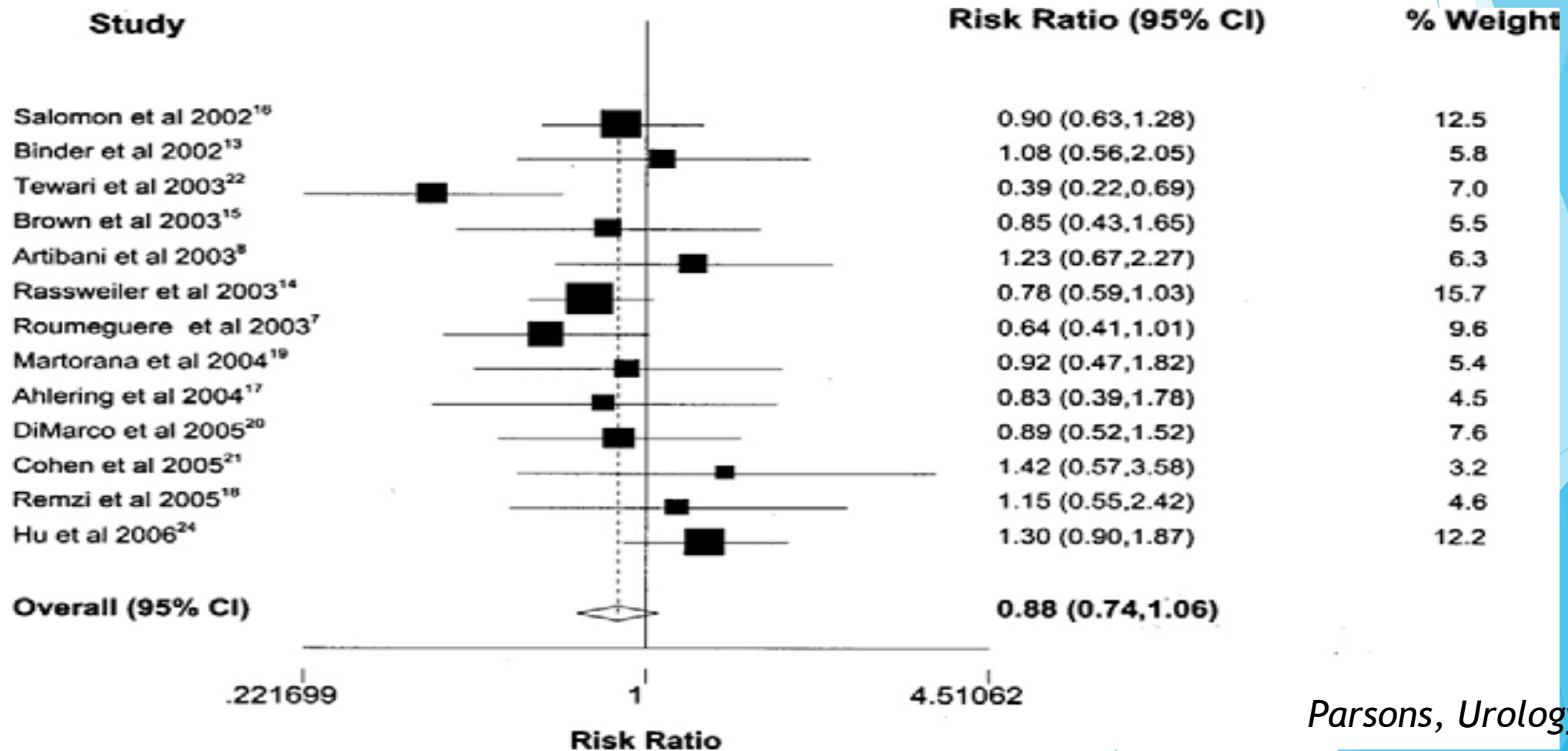


## PENTAFECTA

- ▶ Oncological results
- ▶ Continence
- ▶ Potency
- ▶ Pain , Qol and Cosmetics
- ▶ Costs

# Positive Surgical Margins

Thirteen studies 3039 patients → no difference







Platinum Priority – Review – Prostate Cancer  
*Editorial by Peter C. Albertsen on pp. 365–367 of this issue*

## Systematic Review and Meta-analysis of Studies Reporting Oncologic Outcome After Robot-assisted Radical Prostatectomy

Level of evidence	First author	Cases, n	Overall PSM, %	pT2 PSM, %
3	Ficarra, 2009 [77]	105 RRP	21	12
		103 RARP	34	12
	Di Pierro, 2011 [78]	75 RRP	32	24
		75 RARP	16	8
	Kim, 2011 [79]	235 RRP	25	9
4	Caballero-Romeu, 2008 [80]	528 RARP	27	13
		62 RRP	52	–
	Drouin, 2009 [81]	60 RARP	31	–
		83 RRP	18	7
	Laurila, 2009 [82]	71 RARP	17	10
		84 RRP	14	15
	Ou, 2009 [83]	88 RARP	12	10
		30 RRP	20	0
	White, 2009 [84]	30 RARP	50	3
		50 RRP	36	34
	Breyer, 2010 [85]	50 RARP	22	19
		695 RRP	16	–
	Barocas, 2010 [86]	293 RARP	18	–
		491 RRP	30	–
	Doumerc, 2010 [87]	1413 RARP	20	–
		502 RRP	17	10
	Lo, 2010 [88]	212 RARP	21	12
20 RRP		25	–	
Magheli, 2011 [89]	20 RARP	20	–	
	522 RRP	14	7	
		522 RARP	20	9

**Comparative studies suggests that PSMs rates are likely to be similar regardless of the different possible surgical approaches**

# Impact of surgical technique on pathological and biochemical outcomes



open vs laparoscopic vs robotic

1500 Pz

pT3 → LRP and RARP had higher positive surgical margins

Pathological stage	Surgical group				<i>P</i> *
	SM	RRP	LRP	RARP	
pT2 <i>n</i> (%)	SM positive	24 (6.6)	29 (6.7)	36 (9.3)	0.264
pT3 <i>n</i> (%)	SM positive	51 (32.1)	39 (43.8)	66 (48.5)	0.013
All patients <i>n</i> (%)	SM positive	75 (14.4)	68 (13.0)	102 (19.5)	0.010



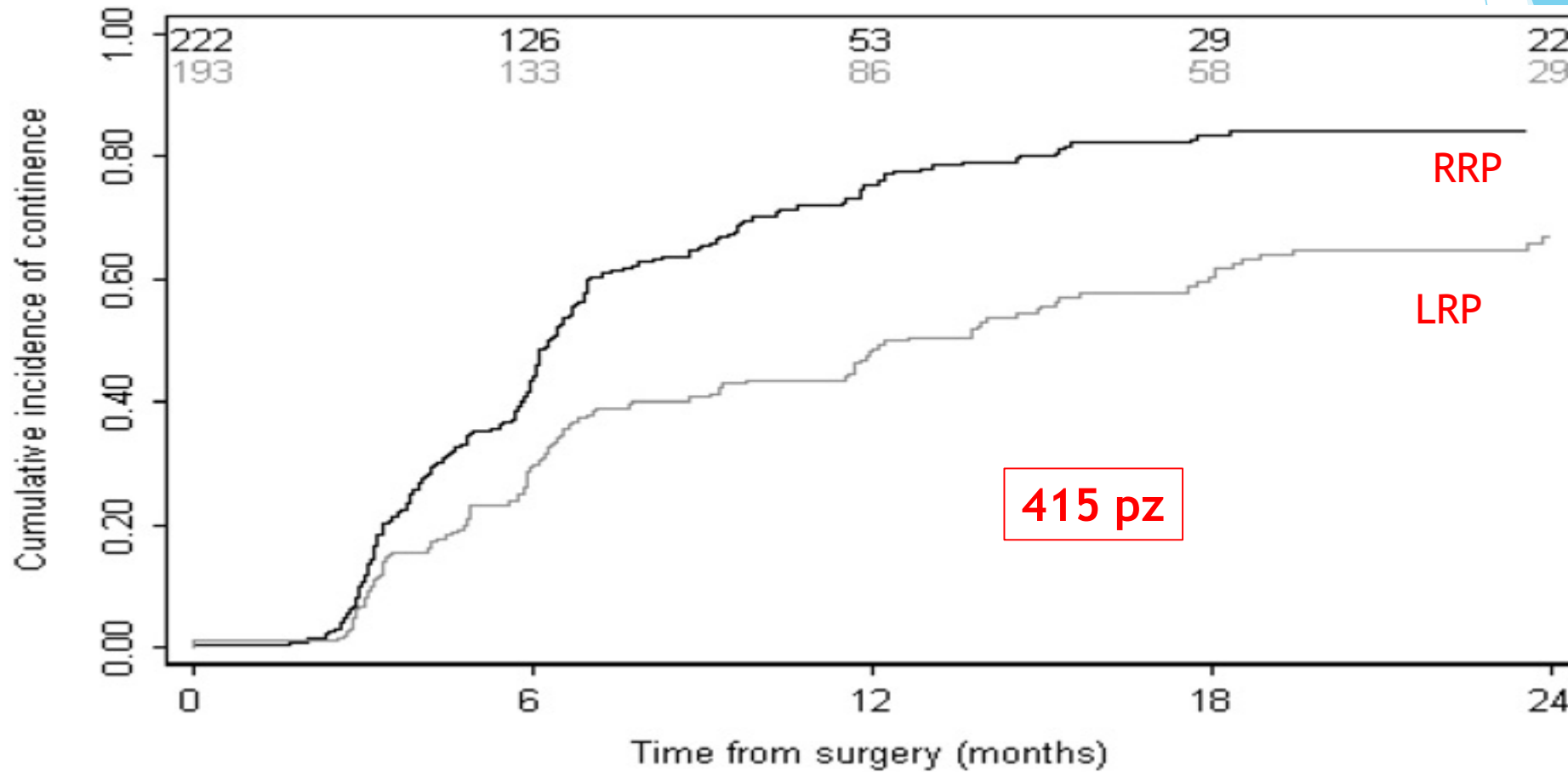
**Tactile Feedback**



## PENTAFECTA

- ▶ Oncological results
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- ▶ Pain , Qol and Cosmetics
- ▶ Costs

# Continence



**Statistically significant difference in favour of RRP**

# Continence

## RALP vs RRP

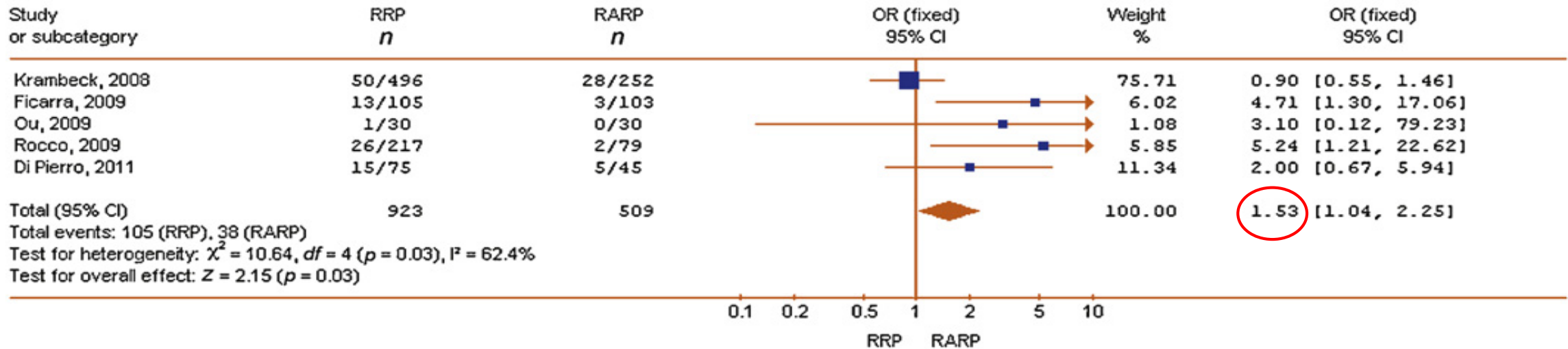
Complication	RARP	RRP	P
Continence at 1 year†			0.344
N	252	496	
With continence	224 (91.8)	446 (93.7)	
No pads	199 (81.6)	419 (88.0)	
Security pad only	25 (10.3)	27 (5.7)	
Without continence	20 (8.2)	30 (6.3)	
1-2 pads/day	17 (7.0)	23 (4.8)	
3 pads/day	3 (1.2)	7 (1.5)	
Previous incontinence	1	6	
Unknown	7	14	

882 Pz

At 1-year → no significant difference in continence

# Continence

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



The cumulative analysis showed a statistically significant advantage in favor of RARP

# Continence

First author	Cases, n	Study design	Continence definition	Data collection	Urinary continence recovery, %	
					6 mo	12 mo
Tewari, 2003 [11]	RRP, 100 RARP, 200	Prospective comparison	0 pad	Interview	Median: 160 d Median: 44 d	
Ficarra, 2009 [44]	RRP, 105 RARP, 103	Prospective comparison	0 pad	Validated questionnaire	–	88 97
Di Pierro, 2011 [45]	RRP, 75 RARP, 75	Prospective comparison	0 pad	Institutional questionnaire	–	80 89
Kim, 2011 [46]	RRP, 235 RARP, 528	Prospective comparison	0 pad	Validated questionnaire	Median: 4.3 mo Median: 3.7 mo	
Krambeck, 2008 [47]	RRP, 564 RARP, 286	Retrospective, contemporary series	0 pad	Institutional questionnaire	–	93.7 91.8
Ou, 2010 [48]	RRP, 30 RARP, 30	Retrospective contemporary series	0 pad	Unspecified	83 97	97 100
Caballero, 2008 [49]	RRP, 62 RARP, 60	Historical control	0 pad	Unspecified	54 40	–
Rocco, 2009 [50]	RRP, 240 RARP, 120	Historical control	0–1 safety pad	Interview	84 93	88 97

RARP = robot-assisted radical prostatectomy; RRP = retropubic radical prostatectomy.

Urinary continence may be influenced by the patient's preoperative condition

Available studies do not provide an adequate comparison of postoperative continence rates in patients treated by RARP versus RRP.



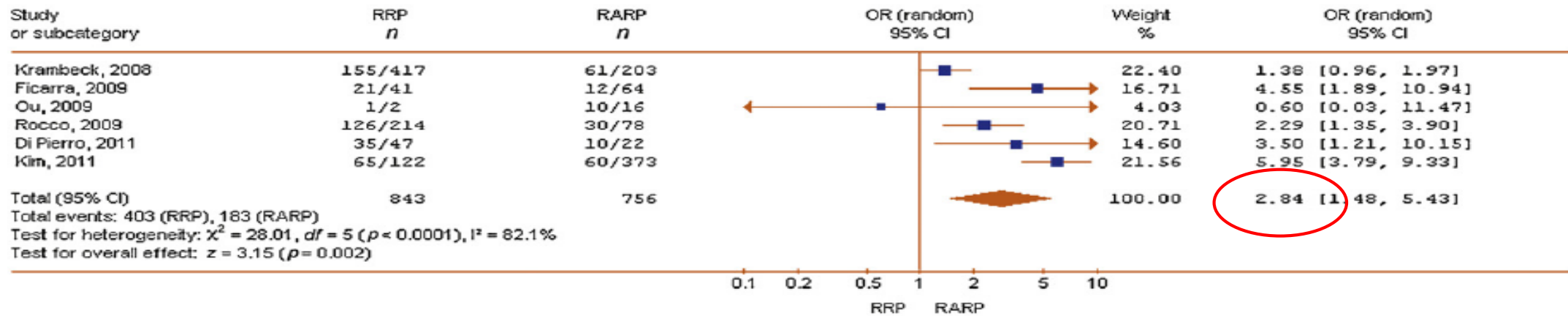
## PENTAFECTA

- ▶ Oncological results
- ▶ Continence
- ▶ Potency
- ▶ Pain , Qol and Cosmetics
- ▶ Costs



# Potency

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



# Potency

Lack of well-controlled prospective studies of functional outcomes

- level of surgeon experience,
- institutional volume of surgery
- means of outcome assessment
- patient's preoperative condition
- postoperative rehabilitation

} varied considerably between studies



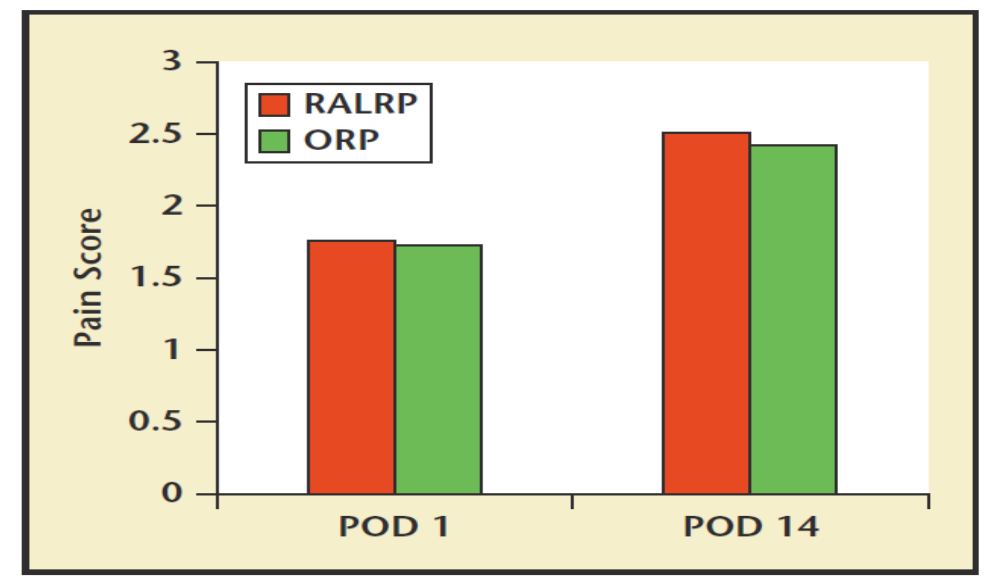
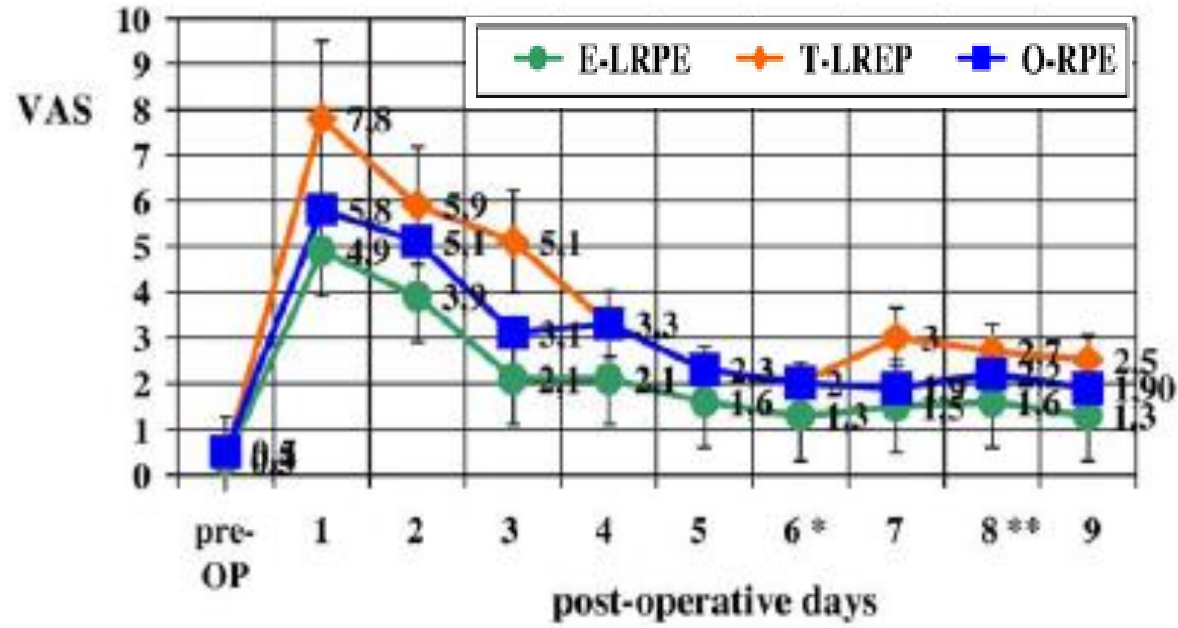
Goal should be a return to a patient's presurgical level



## PENTAFECTA

- ▶ Oncological results
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- ▶ Costs

# Pain



# Cosmetics

## RRP

Incision (4 - 6 Inches)



## RALP

4 incisions → surgical instruments (1 Inch each ones)

1 Incision → infraumbilical (2 Inches)

Tot. 4 - 6 Inches





Prostate Cancer

# Satisfaction and Regret after Open Retropubic or Robot-Assisted Laparoscopic Radical Prostatectomy

400 pz

84% satisfied

18 % regretted

Table 4 – Characteristics of nonregretful and regretful patients

	No regret		Regret		p
	No. (%)	Median (IQR)	No. (%)	Median (IQR)	
Type of procedure					0.031*
RRP	177 (85.1)	–	31 (14.9)	–	
RALP	132 (75.9)	–	42 (24.1)	–	

Patients who underwent RALP were more likely to be regretful and dissatisfied, possibly because of higher expectation of an “innovative” procedure.

**It's show business !**

ROBOTIC-ASSISTED SURGERY  
MADE ME FAMOUS  
BRINGING IT TO BRIGHTON  
MAKES ME PROUD

DR. INGOLF TUERK  
CHIEF OF UROLOGY

St. Elizabeth's  
Medical Center  
A CARETAG FAMILY HOSPITAL

CLEAR CHANNEL

The billboard features a stylized, high-contrast portrait of Dr. Ingolf Tuerk, a man with a friendly expression, wearing a blue surgical cap with a headlamp. The background is a solid blue color. The text is arranged in a clear, hierarchical manner, with the main headline in large, bold, white letters and the doctor's name and title in smaller white text. The St. Elizabeth's Medical Center logo and name are positioned to the right of the doctor's portrait. The Clear Channel logo is visible at the bottom left of the billboard structure.



# CRITICITA'





# Costi.....



-SPESA DI ACQUISTO DELLA MACCHINA

-COSTO ANNUO DI ESERCIZIO LEGATO AL CONSUMO DEGLI STRUMENTI

-COSTO LEGATO ALL'ASSISTENZA TECNICA

-TEMPI DI SALA OPERATORIA PIU' LUNGI

## MA....

-RIDUZIONE DELLA MORBILITA' PERIOPERATORIA

-DEGENZE MEDIE OSPEDALIERE BREVI

-UTILIZZO MULTIDISCIPLINARE DEL ROBOT



Ed ancora....

-MANCANZA DI FEEDBACK TATTILE  
(sebbene stupefacente, rimane una grossa limitazione della robotica).

**SOTTOSTADIAZIONE**

pT3 → LRP and RARP had higher positive surgical margins

Open vs laparoscopic vs robotic

1500 Pz

Pathological stage	Open group	LRP	RARP	P*
pT2 n (%)	SM positive 36 (9.3)		36 (9.3)	0.264
pT3 n (%)	SM positive 51 (32.1)			0.13
All patients n (%)	SM positive 75 (14.4)	68 (13.0)	102 (13.0)	



**Tactile Feedback**

Ed ancora....

**-NECESSITA' DI TEMPI LUNGHI IN CASO DI EMERGENZA PER PASSARE ALL'INTERVENTO  
OPEN**



# Appropriatezza

Massimo beneficio

Paziente con malattia organo confinato con buona funzione sessuale.



Minimo beneficio

Paziente con malattia localmente avanzata

# Ma soprattutto.....

**-ADEGUATA FORMAZIONE DEL PERSONALE DI SALA**

**-INTEGRAZIONE E SINCRONISMO DELL'EQUIPE**



## Review Article

ICUrology 2016;57:75-83.  
http://dx.doi.org/10.4111/icu.2016.57.2.75  
pISSN 2466-0493 • eISSN 2466-054X

INVESTIGATIVE AND CLINICAL UROLOGY  
**ICUROLOGY**

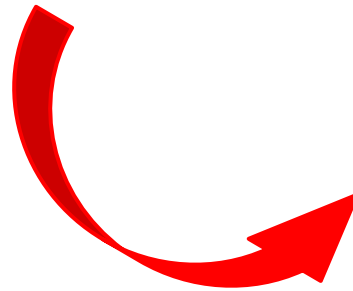


# Past, present and future of urological robotic surgery

Wooju Jeong, Ramesh Kumar, Mani Menon

*Vattikuti Urology Institute, Henry Ford Health System, Detroit, MI, USA*

The first urologic robotic program in the world was built at the Vattikuti Urology Institute, Henry Ford Hospital D in 2000 under the vision of surgical innovator, Dr. Mani Menon for the radical prostatectomy. The robot-assisted r: tomy continues being modified with techniques to improve perioperative and surgical outcomes. The application cal technique has since been expanded to the bladder and upper urinary tract surgery. The evolution of surgical t expansion of application will continue to improve quality, outcome parameters and experience for the patients.



## CONCLUSIONS

Minimally invasive surgical techniques have been expanding the boundary of application on urologic surgeries, because of the decreasing rate of perioperative outcomes and similar oncological results. Due to intuitive movements with advanced wrist movements, 3-dimensional vision and surgeon's ergonomics, the robotic surgical technique has replaced the laparoscopic technique in many urological applications. Robotic surgery continues to evolve into newer techniques and refine the past techniques.

The market growth and the competition of newer surgical systems should translate to improvement of surgical technique and clinical outcomes.

L'EVOLUZIONE DEL SISTEMA

## DA VINCI SINGLE PORT



Unico braccio con i tre strumenti e l'ottica per l'acquisizione di immagini 3D

Diametro di soli 2,5 cm con notevole riduzione rispetto ai precedenti  
Braccio completamente mobilizzabile con angolo di rotazione di 360°

Strumenti che possono addentrarsi fino a 24 cm in profondità dal sito di ingresso, raggiungendo virtualmente qualsiasi organo o apparato

Stessa console che non richiede nuovo training ai chirurghi



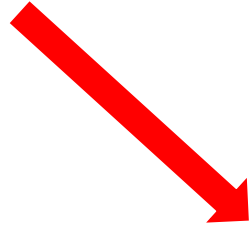
## NEW TECHNIQUES AND TECHNOLOGIES

### Initial experience with the new da Vinci single-port robot-assisted platform<sup>☆</sup>



R. Ballesterro Diego\*, S. Zubillaga Guerrero, D. Truan Cacho, C. Carrion Ballardo,  
G. Velilla Diez, P. Calleja Hermosa, J.L. Gutierrez Banos

*Servicio de Urología, Hospital Universitario Marqués de Valdecilla, Santander, Spain*



**DISCUSSION:** In our initial experience with the da Vinci device, R-LESS surgery was feasible and safe. There are still a number of limitations in its use, which require new and improved R-LESS platforms.



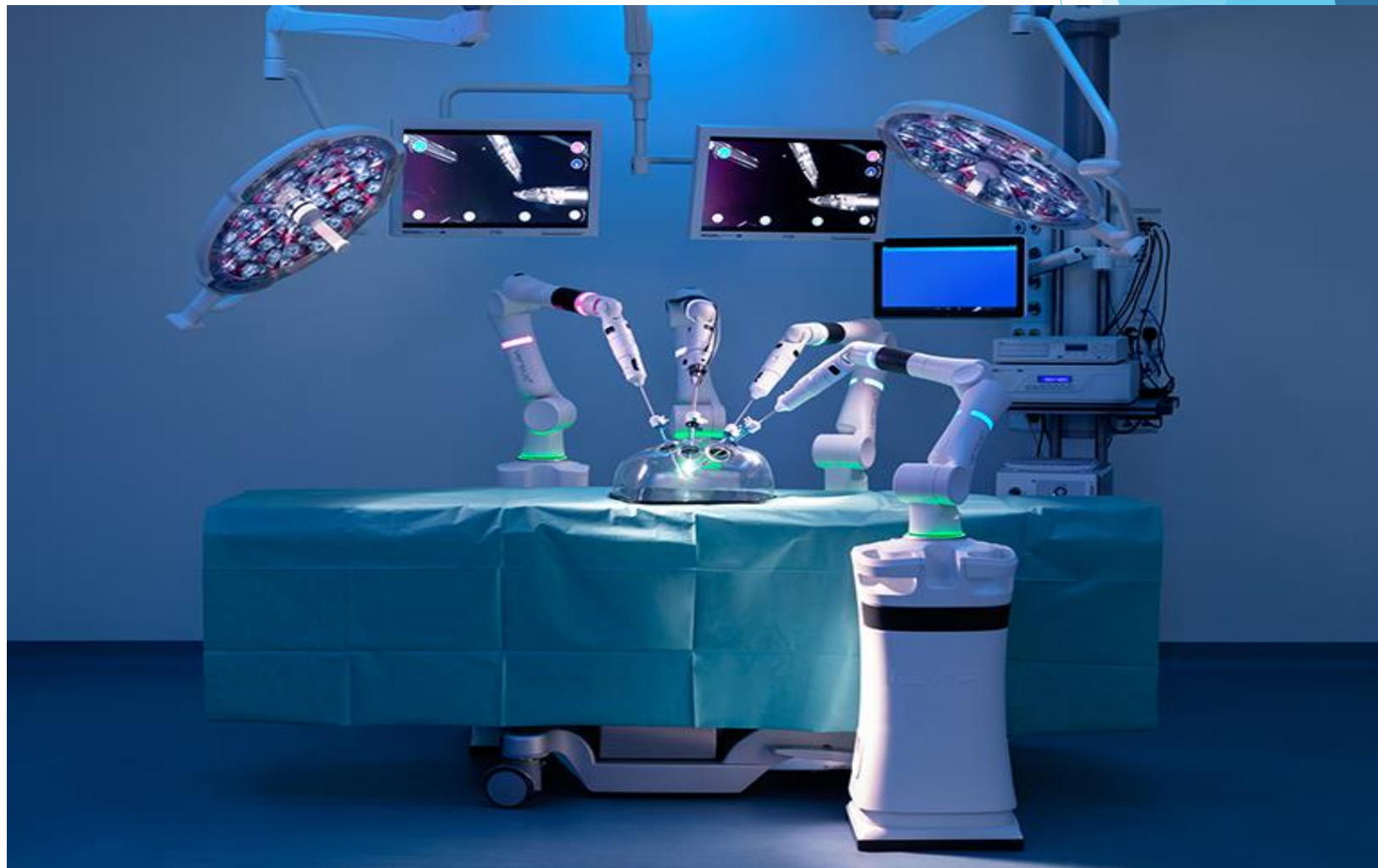
# VERSIUS

Robot multifunzionale, facile all'uso, ergonomico, modulare

Più economico del suo "fratellone" Da Vinci

Ridotto tempo di apprendimento

Movimenti su 4 assi di 540 gradi



# Biopsie prostatiche più precise con il robot “Mona Lisa”

iSR'obot™ Mona Lisa

- capacità di fusione di RMI-ultrasuono,
- visualizzazione ottimale della regione di interesse (ROI).
- il medico crea un piano su ordinazione di biopsia



Il sistema robot :

- guida il posizionamento e la profondità dell'ago di biopsia
- ottimizzazione accurata aiuta i medici ad individuare presto il carcinoma della prostata
- fiducia per iscrivere il paziente al programma attivo di sorveglianza.

# TO BE CONTINUED.....



I futuri sviluppi:

Miglioramento delle caratteristiche degli strumenti .

Nuove indicazioni agli interventi chirurgici.

Sviluppo di nuove tecnologie.