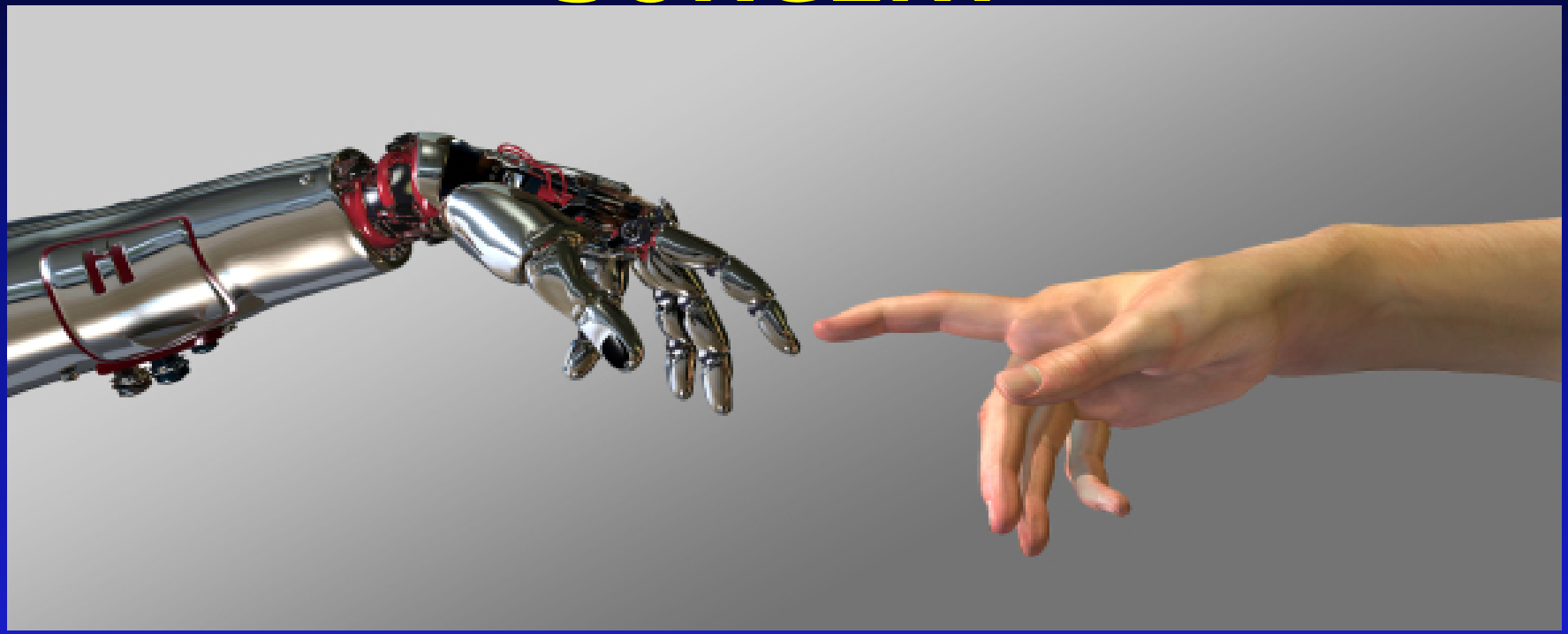
Introduction to ROBOTIC SURGERY



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Reasons to have a Robot

HEALTHLINE NEWS

Is da Vinci Robotic Surgery a Revolution or a Rip-off?

Written by Cameron Scott on August 10, 2016

A robotic surgeon with tiny lights, tiny cameras, and steady hands sounds like a miracle of technology. But what do the results show?

Launching a new Robotic Surgery Program

- Vision of the Institute
- Program design
- Team recruitment
  - Surgeon (Team lead)
  - Team Assistant, Nurses, circulating nurses , technicians
  - Administrative team
- Data maintainance
- Program growth – upgradation of system and presentations in medical fraternity
- Continuaion of the clinical work

- Introduction
- Types of Robot
- System overview
- Advantages and Disadvantages
- Robotic Prostatectomy
- Advances in Robotics

Limitations of Traditional surgery

- Larger incisions
- Longer operation time
- Surgical marks , scars
- Longer recovery time
- Blood loss

Robots are used extensively in industrialized world including automobile industry …

Application in medical field is still limited…

Myth : Robot performs the surgery

Fact : Surgeon is physically present in OT

Introduction

The term “Robot " was coined by the Czech playright Karel Capek in 1921 in his play Rossom's Universal Robots.

In 1985 a ROBOT, the PUMA 560, was used to place a needle for a brain biopsy using CT guidance.

Robots were first introduced in 1987 with the first laparoscopic surgery

Types of Robots

- Passive
  - Retractor system
  - Position the tool and then hold
- Active
  - Robot would actively move the tool upon the surgeons command

- Robotic surgery is Advancement in Laparoscopic surgery

- Where all the disadvantages of laparoscopy are overcome

- Accuracy , Precision and 3D vision are the distinct advantages

Change of trends

Open Surgery

↓

Minimal invasive surgery (Keyhole)

↓

Robotic assisted surgery

Three different robotic systems

- 1. Supervisory controlled Robotic Surgery systems

- 2. Telesurgery systems
  - A. Da Vinci System
  - B. ZEUS
  - C. AESOP

- 3. Shared Control Robotic Surgery systems

Supervisory controlled Robotic Surgery systems

- Most automated
- System follows a specific path and instructions
- Surgeon feeds data as input
- Steps:
  - Planning
  - Registration
  - Navigation

Shared control Robotic system

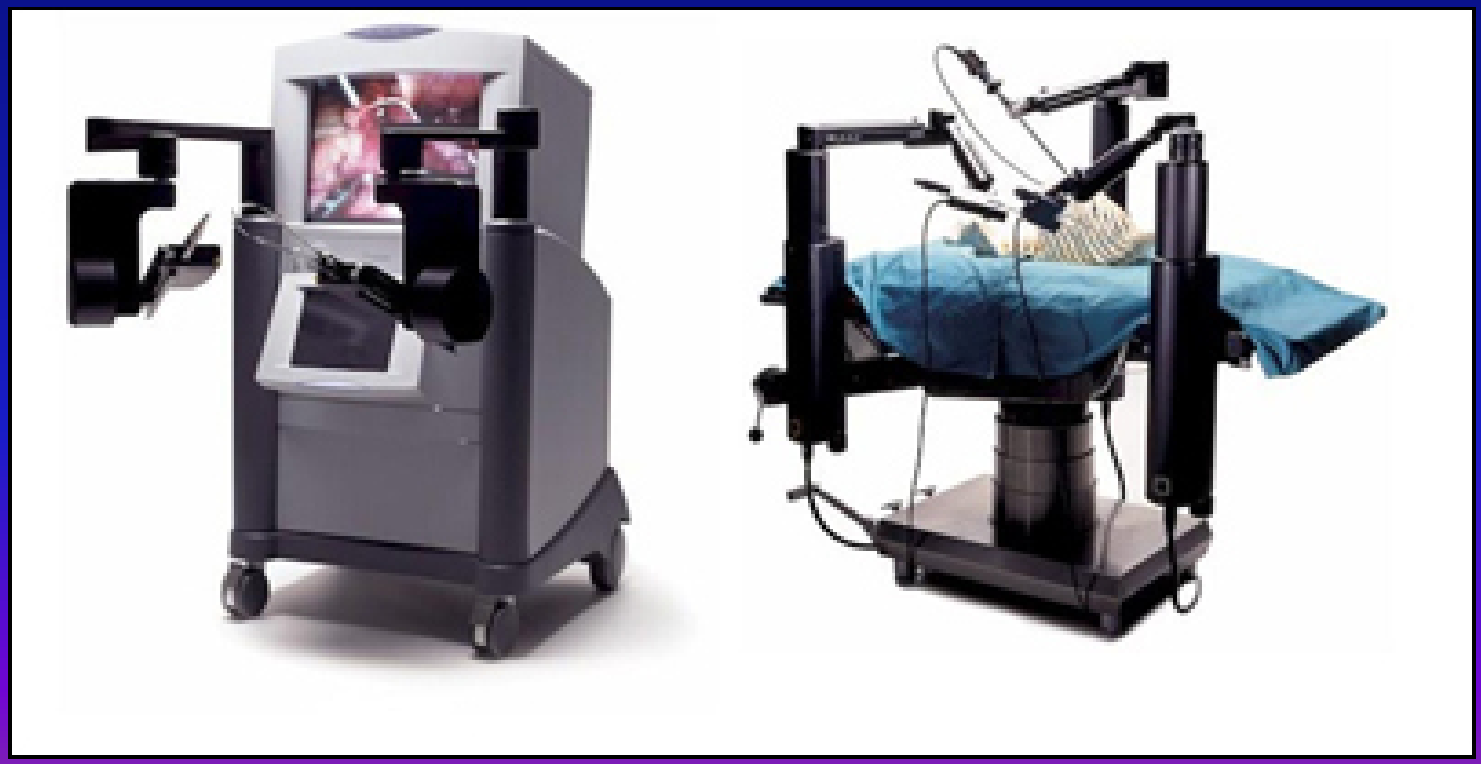
- Use of concept active constraints
- Defining regions : safe , close , boundary
- Surgeons concentrate on safe margins

Three different Telesurgery Surgical Robot systems

- Da Vinci Surgical system
- ZEUS Robotic surgical system
- AESOP Robotic system

ZEUS Surgical system

- Ergonomic surgeon control console
- Three table mounted Robotic Arms



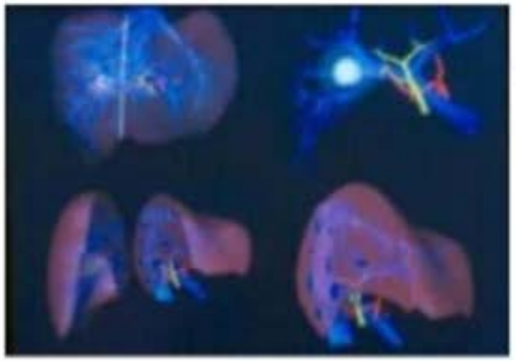
AESOP

- AESOP employes the assistance of Automated Endoscopic System for optical system

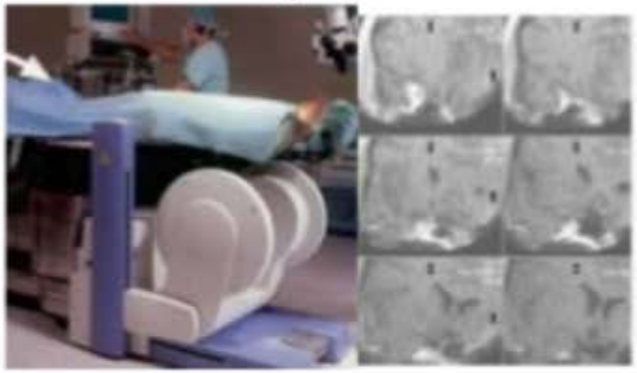
Total Integration of Surgical Care

Remote Surgery

Minimally Invasive
& Open Surgery



Pre-operative planning
Surgical Rehearsal



Intra-operative navigation

Simulation & Training
Pre-operative Warmup

Legal / Ethical issues in Robot

- Time lag between surgeons commands and action of Robot could harm the patient
- Loss of electricity / power failure
- Robots doesnt replace human intelligence , skill and experience
- Robots are costlier

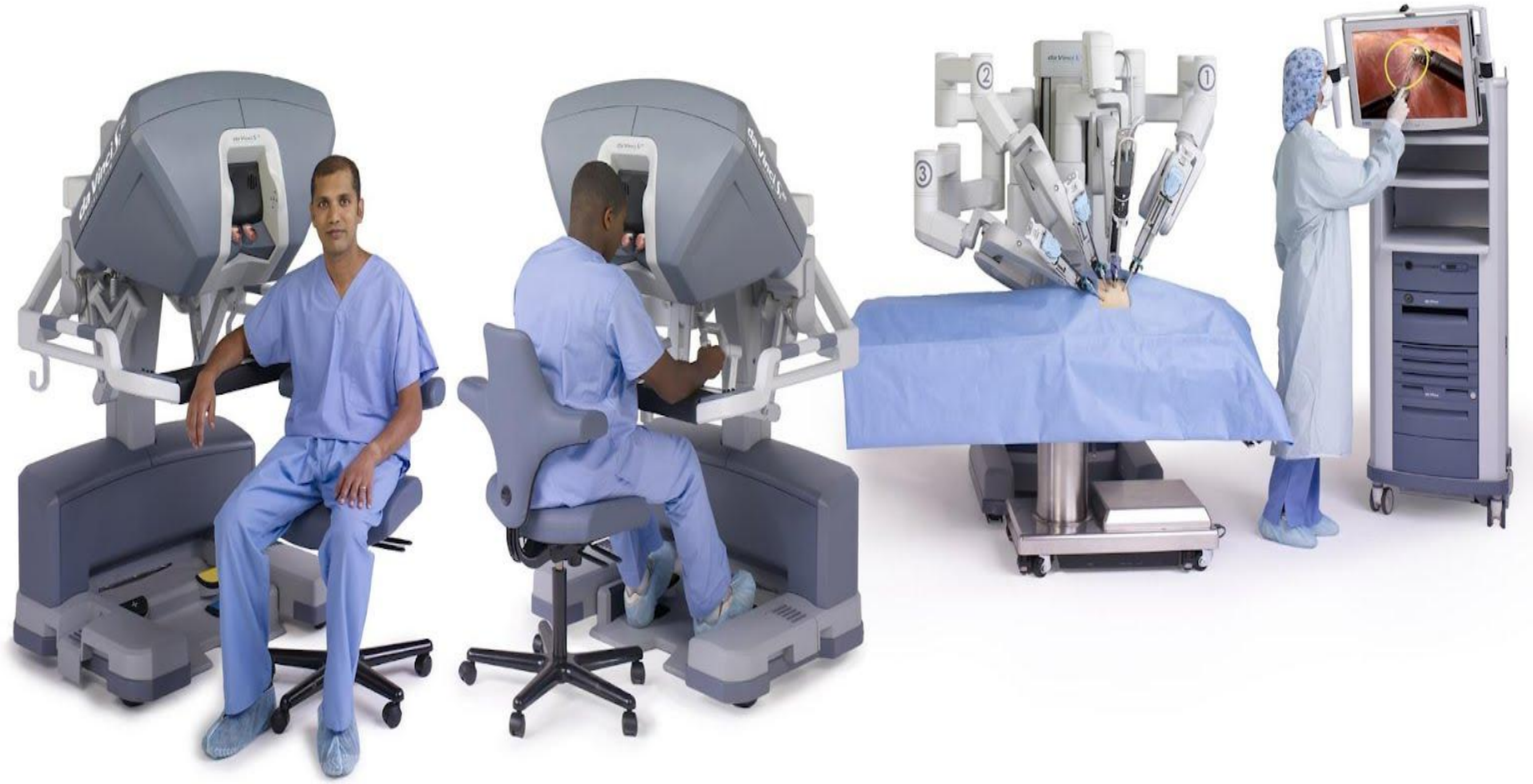
Da Vinci Standard

Da Vinci S

Da Vincl Si

Da Vinci Xi

Robotic Surgery Setup



Overview of Robotic system- video

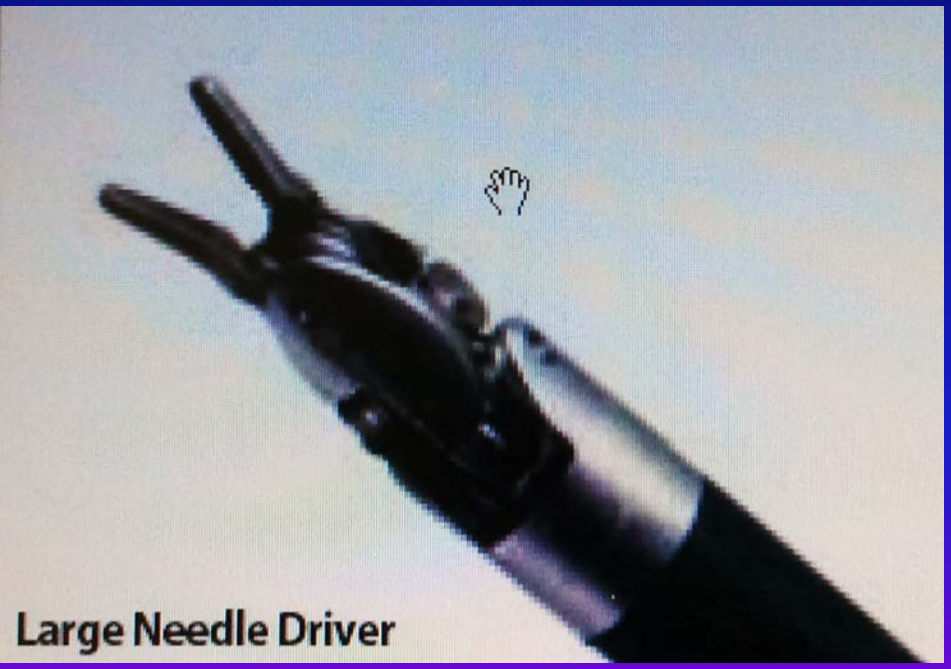
What is Robotic surgery?

- Man behind the machine.
- An advanced MIS technique.
- Latest with cutting edge technology.
- da Vinci Si Surgical Robotic system with Simulator.
- First in Mumbai.

The JOY -Sticks

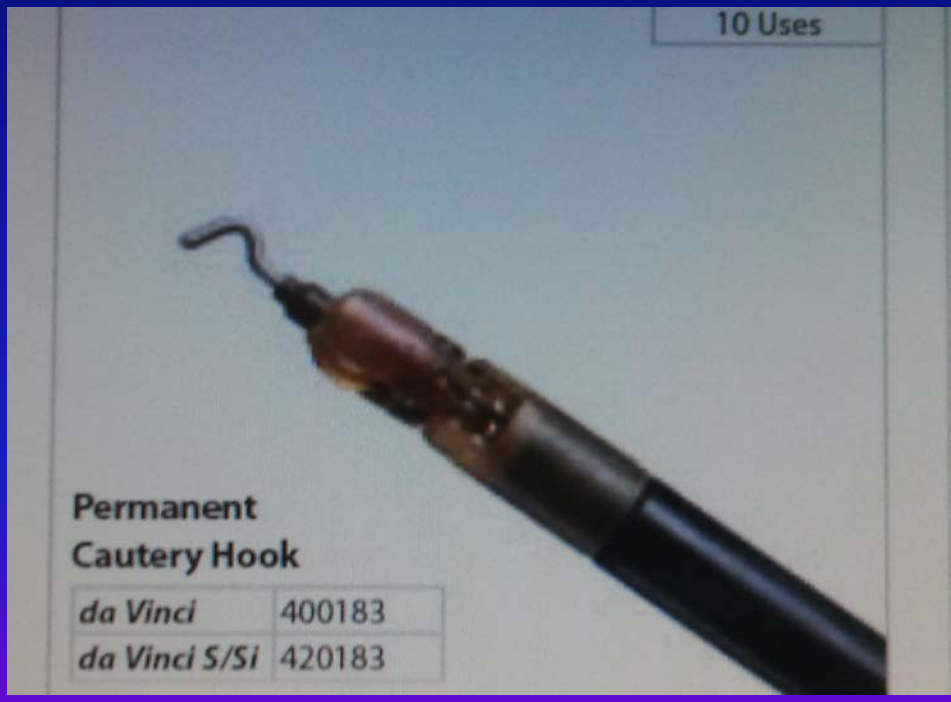
Endo wrist instruments

Instruments



Instruments

Instruments



Patient side cart

Operation Trolley

Telescope and Drape

Vision cart

Console

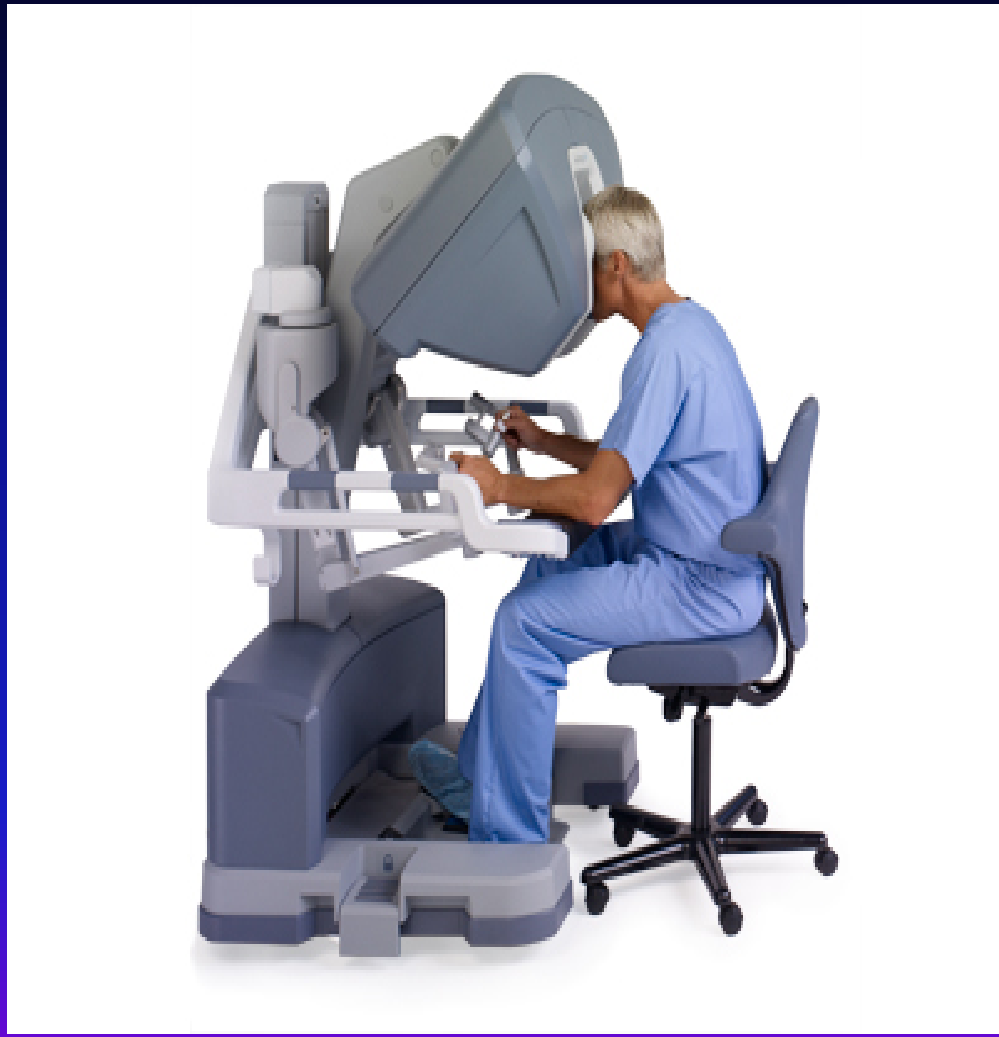
Advantages for Patients

- Deep / superficial reach.
- Smallest incision - minimal scar with superior cosmetic outcome
- Minimum blood loss – less / No blood transfusion
- Less pain / Trauma.
- Faster recovery – reduced hospital stay.
- Early resumption of normal life.

Advantages For Surgeons

- Magnified Vision
- Increased Precision
- Better Control
- Dexterous movement

- 3D Vision
- Tremor Filteration



Robot Assisted Surgeries

- Our data:
- Total Robotic surgeries : 372
- Robotic Radical Prostatectomy : 340
- Robotic Radical Nephrectomy : 15
- Robotic Radical Cystectomy : 4
- Robotic Partial nephrectomy : 4
- Robotic Bladder diverticulectomy : 1
- Robotic Hysterectomy : 8

Preoperative management

- Screened for any medical co-morbidities
- Admitted one day prior to surgery
- Liquid diet and antibiotic preparation
- Trendelenberg position with Allen stirrups
- Anastomosis with braided suture (V Lock)
- 20 F foley’s catheter

Results: Robotic Prostatectomy

No. Of Patients	252
Age	64
PSA	12
Preoperative staging	**T2c(T1a to T3c)**
Preoperative Gleason's score	**7 (6 to 10)**
Mean Blood loss	**160 ml**
ICU stay	**5 patients**
Mean Da Vinci time	**155 min**
Blood transfusion	**0 (9 cases 1 avg)**
Average catheter duration	**8 days**
Average Hospital stay	3 Days

Complications

Complications	
Early	
Bleeding	8 (>600ml)
Osteitis pubis	3
anastomotic stricture	2
Late Persistent	
SUI	13

Post operatively

- Monitored for vitals signs, urine output, abdominal distention, bowel activity

- Average duration of hospitalization was 3 days

- Average catheter duration was 8 days

- The blood loss was approximately 160 ml
- The drop in Hb was approximately 1.4 gm
- No open conversion

Trendelenberg position

Robotic Prostatectomy video

Post TURP RARP

- Twenty six out of 308 patients had H/o TURP prior to RARP.
- Bladder neck reconstruction was needed in 6 patients out of 26.
- Blood loss, Operative time and Recovery are more as compared to Non TURP RARP

RARP modifications

- Use of Gauze
- Finger in Rectum
- Trendelenberg position

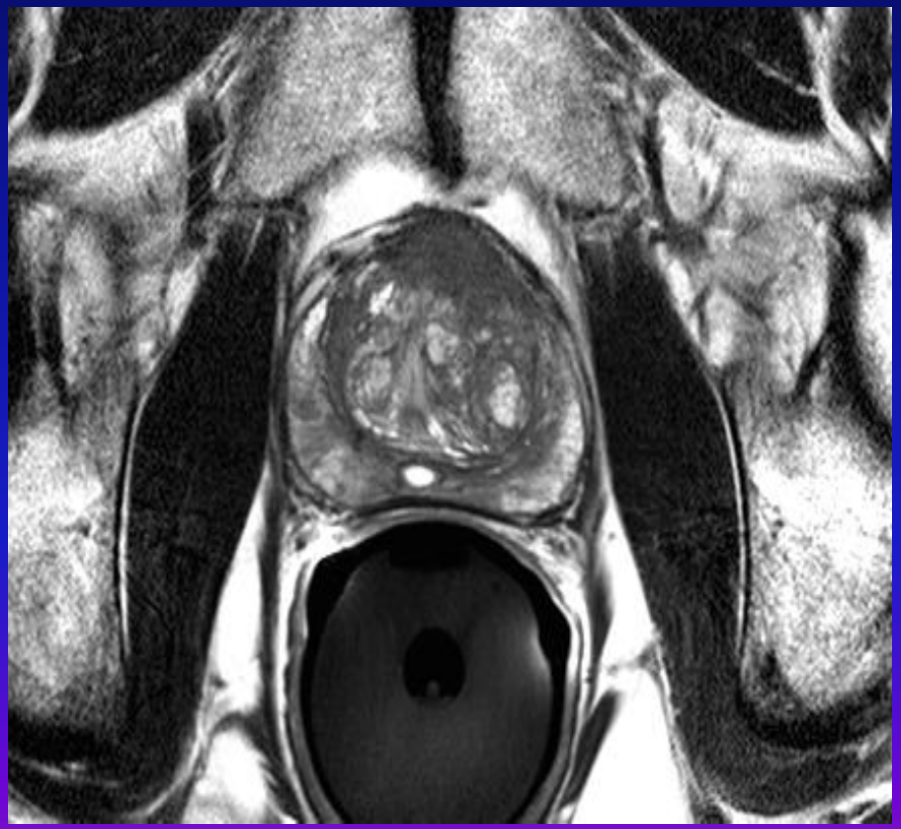
Clinical presentations

Ca Prostate :

- LUTS :Frequency, Urgency, Hesitancy, Incomplete Emptying
- Raised PSA : Normal 0-4 ng/ml

  > 10 ng /ml is worrisome
- USG KUB: Enlarged prostate, Thickened bladder wall, Significant PVR
- DRE: palpation of prostate

Prostate enlargement



Symptoms of enlarged prostate

- Difficulty in initiating the stream of urine
- Urgency to pass urine
- Sensation of incomplete emptying
- Straining during urination
- Frequency, Nocturia
- Slow stream, Dribbling

Prostate specific antigen (PSA)

- Normal range: upto 4ng/ml
- Sometimes elevated due to infection
- Raised PSA: Prostate Biopsy

Kidney tumors

Clinically:

- Hematuria
- Pain in abdomen
- Fever
- Lump in abdomen
- Asymptomatic(Detected on USG)

- CT abdomen : Heterogenously enhancing mass in kidney

Ca Bladder

Clinically:

- Hematuria (Painless)
- Pain in abdomen
- Asymptomatic(Detected on USG)

- USG KUB: mass lesion in bladder

- CT abdomen pelvis: mass lesion in bladder

- Cysto TURBT: Visualization and resection of mass : muscle invasive

SPECIALTIES WHERE ROBOTIC SURGERIES CAN BE PERFORMED

- UROLOGY
- SURGICAL ONCOLOGY
- CVTS
- GYNECOLOGY
- ENT
- GENERAL SURGERY

UROLOGY

Pyeloplasty
Radical Prostatectomy
Radical Cystectomy with continent pouch
Vesico vaginal fistulae
Radical Cystectomy with ileal conduit
Cystolithotrity large / multiple
Bilateral orchidectomy
Pyelo and Nephrolothotomy
Radical cystectomy
Extended pyelolithotomy
Radical Nephrectomy
Ureteral reimplantation
Nephrectomy
Augmentation Cystoplasty
heminephrectomy
Bilateral Ureteric Reimplantation
Complex reconstructive urology services
Transvesical prostatectomy with removal of bladder stones

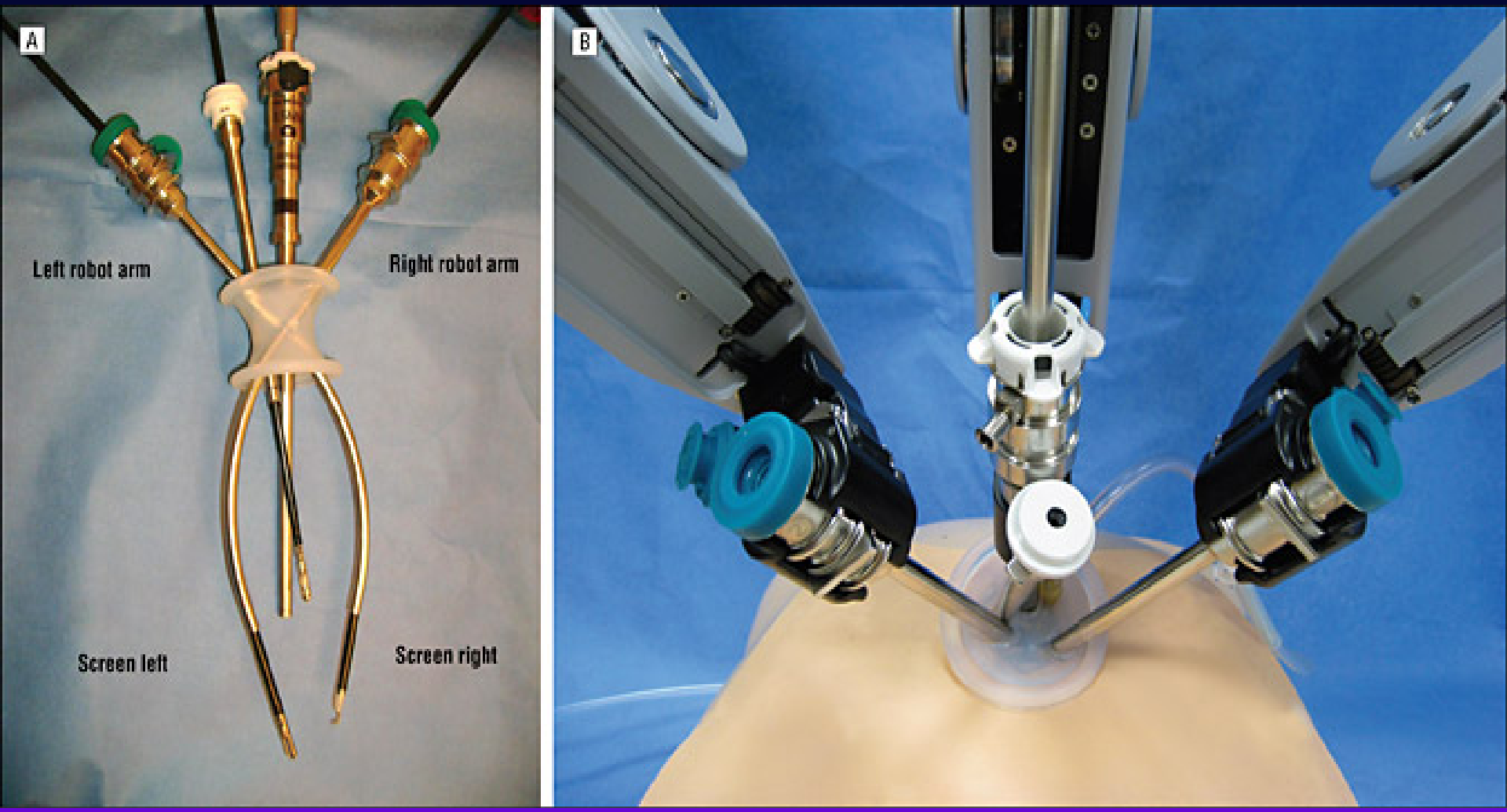
Uretero vaginal fi
Diverticulectomy
Millins Prostatect
Ureteral stricture repair
Bilateral Varicocoelectomy
Adrenalectomy
Pyleolithotomy
Ileal conduit
Renal cyst excision
Varicocele ligation
Ureterolithotomy
Decortication of renal cyst
Upper pole

RPLND

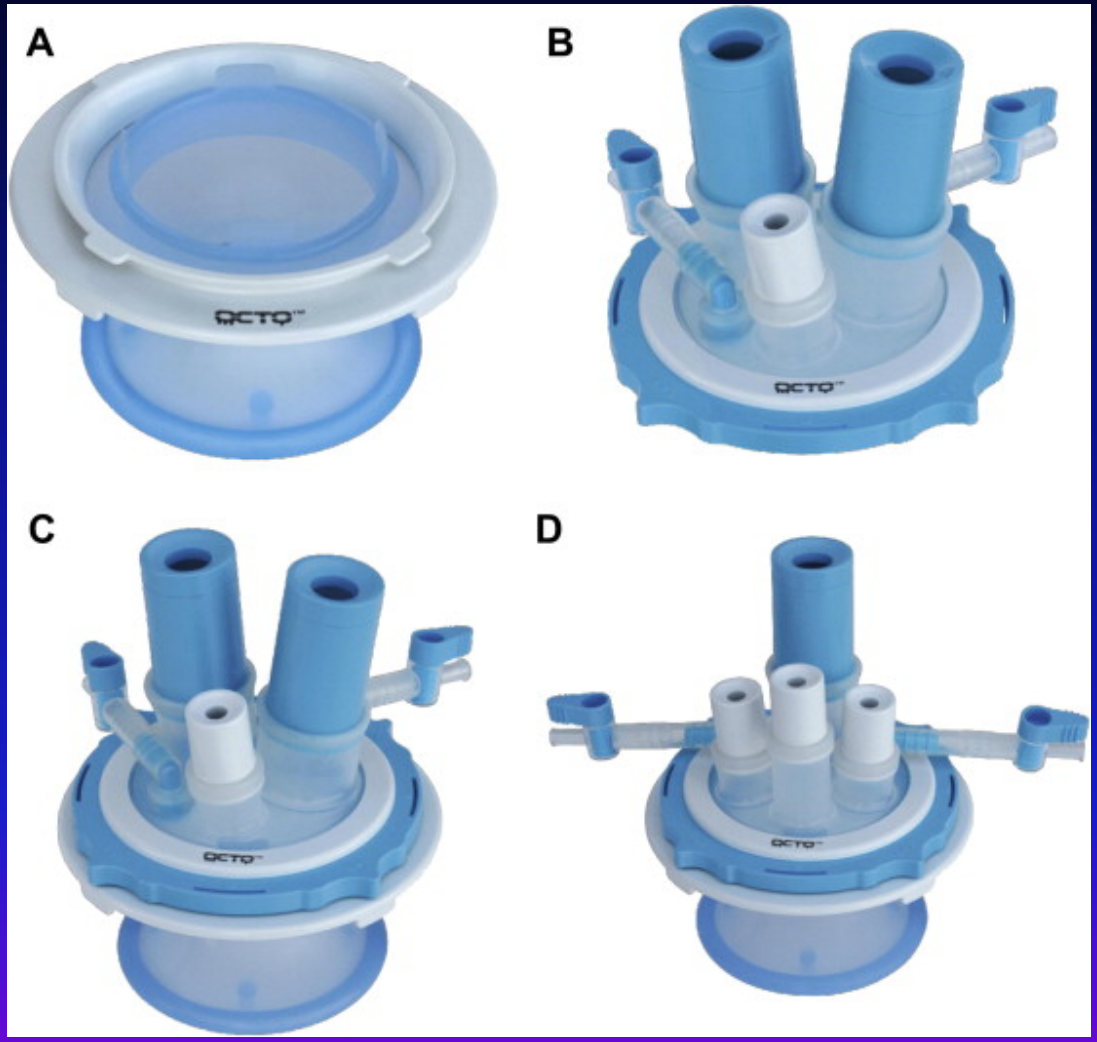
The Robotic Dance

The Advances in ROBOTICS...

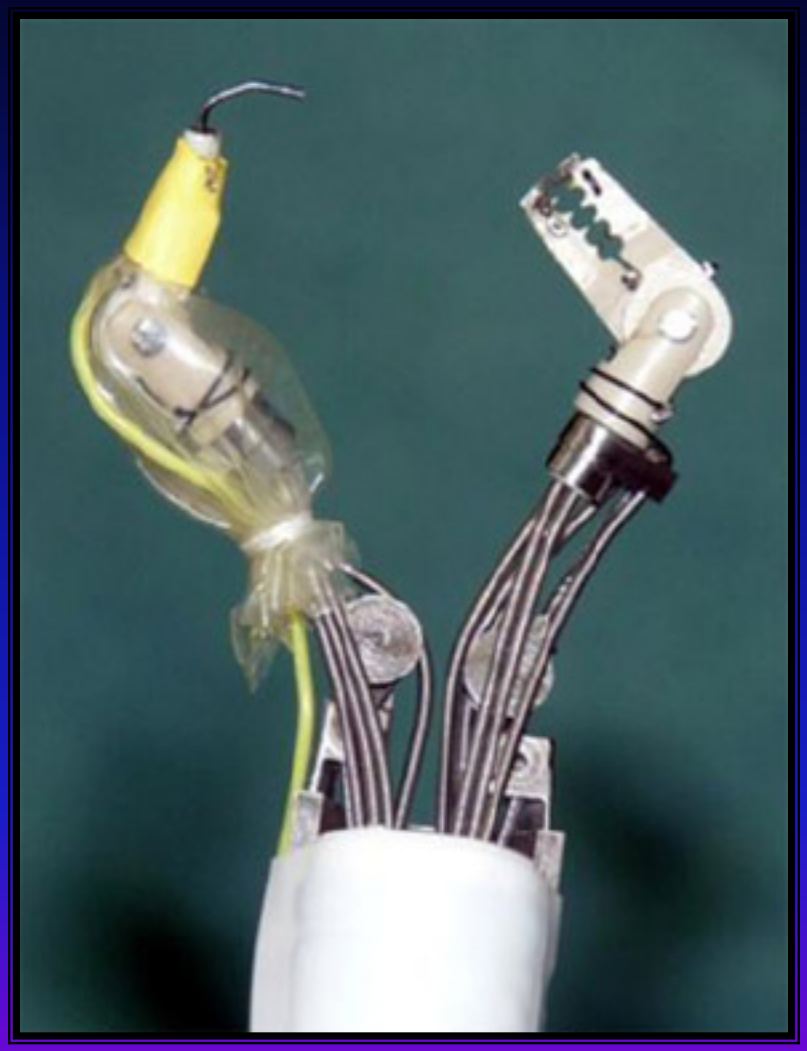
Single port ROBOTIC SURGERY



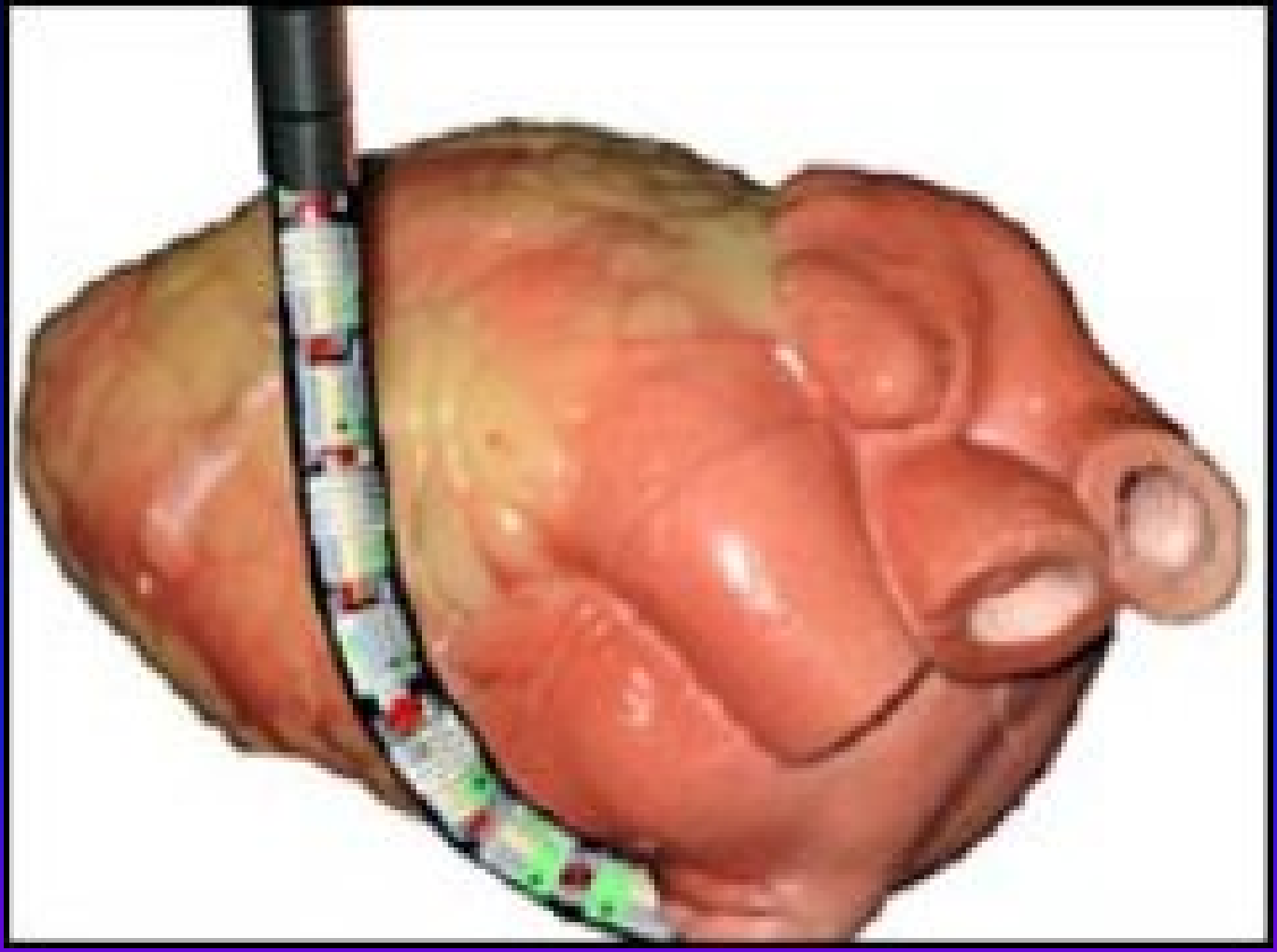
Single port ROBOTIC SURGERY



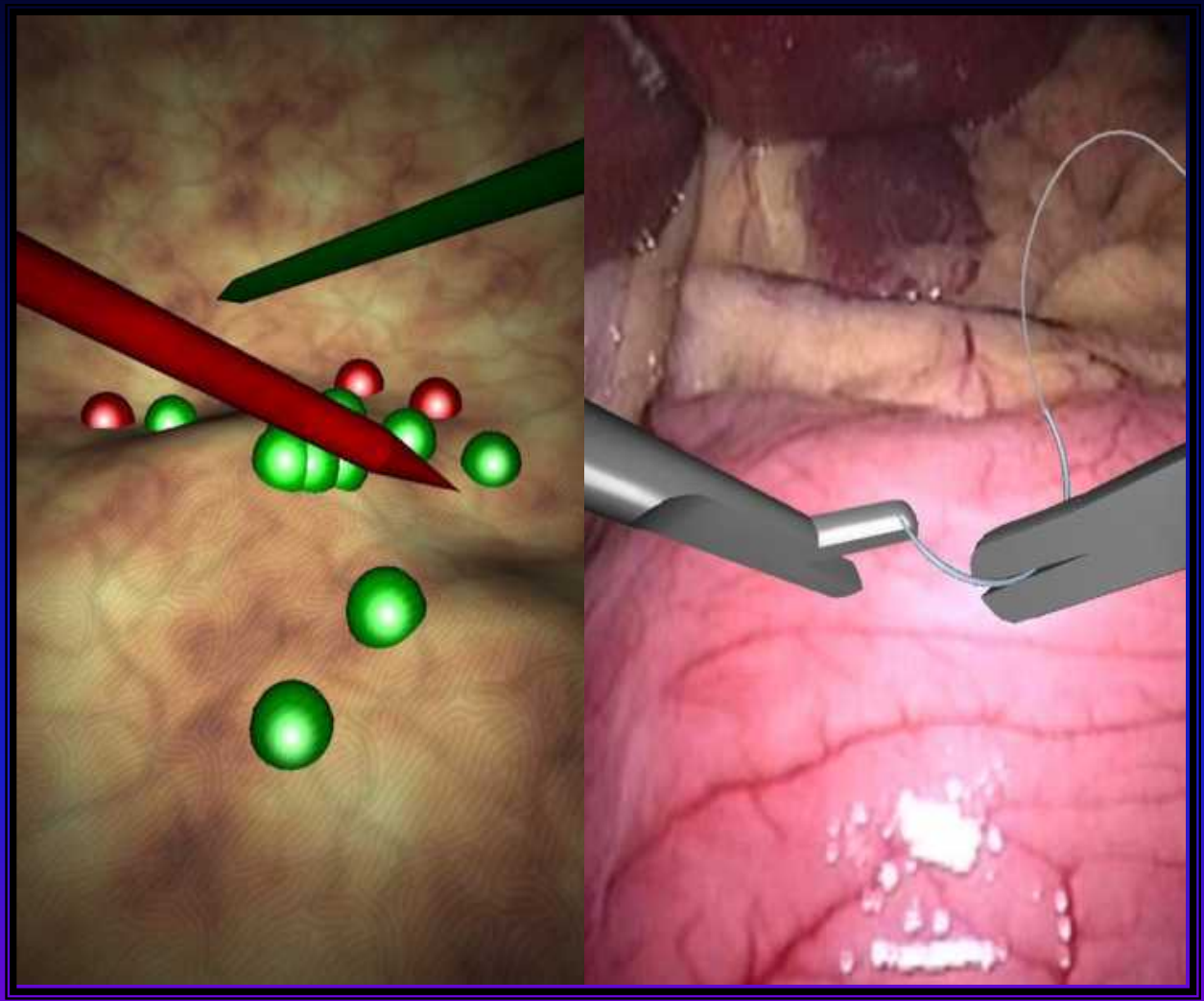
Flexible Robotics



The i-Snake



Robotic Simulators



Robotic Rounding

Robotic Scrub Nurse "Penelope"

Robotic Scrub Nurse

Future Operation Theatre

Conclusions:

- Initiating a new surgical program with help of Robotic Surgery is
  - helpful to the patients , But
  - challenging to the Surgeons
- My initial experience: Robotic RP is safe and effective.
- Robotic surgery is beneficial to patients with
  - least blood loss,
  - hospital stay and pain index.

In India, Robotic Surgery may replace laparoscopic surgery provided the cost comes down.

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