

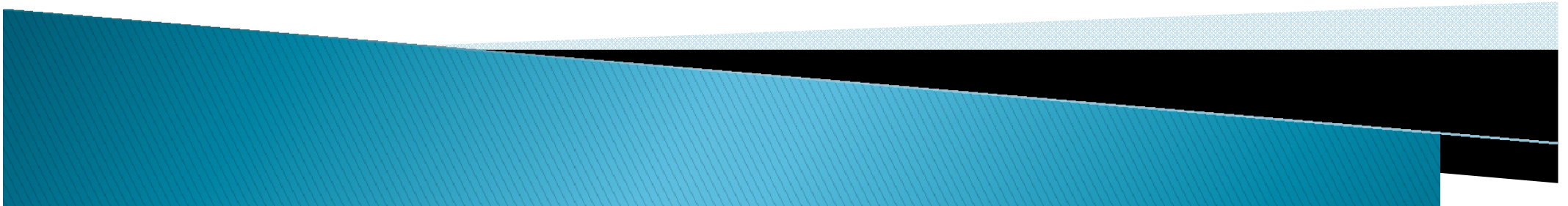
Robotic in Healthcare

Vinay Mahendra

Senior Consultant Urologist

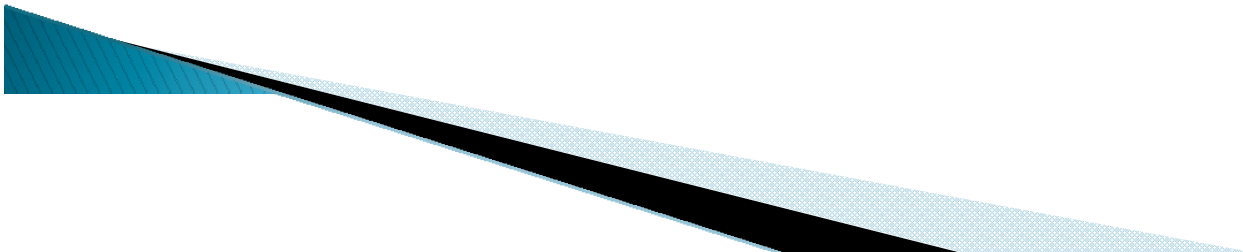
Laparoscopic and Robotic Urological Surgeon

Apollo Gleneagles Hospitals, Kolkata

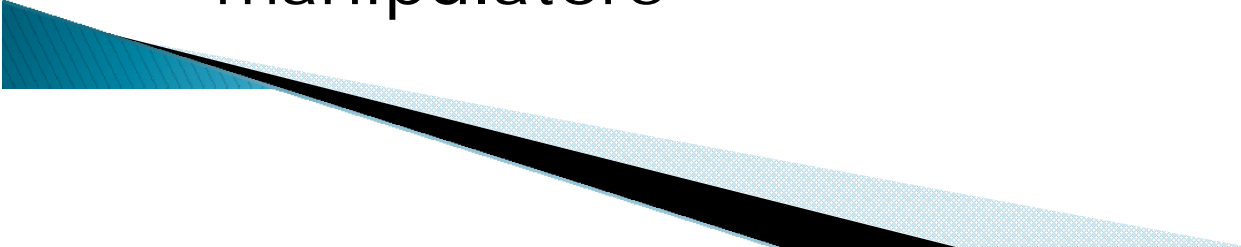


Introduction

- ▶ An antique concept
- ▶ Ancient Greek – Automata
- ▶ Czech – ‘Robota’ – Forced Labor

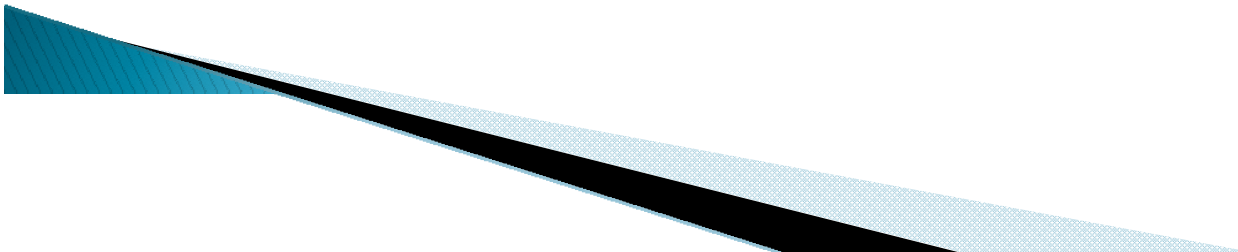


Robotics in Surgery

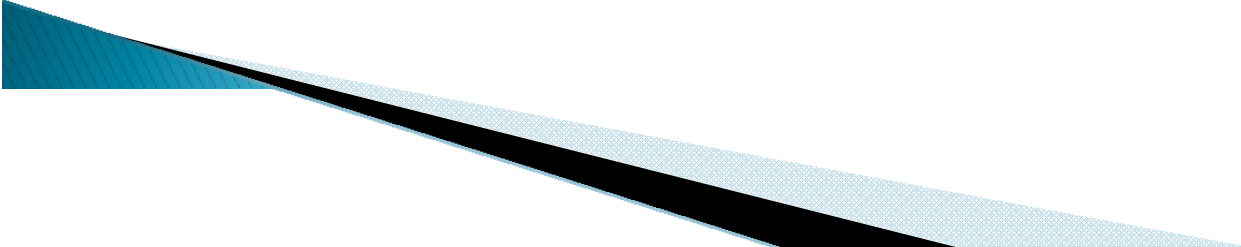
- ▶ Late 1980s – NASA and SRI interest in virtual reality & robotics
 - ▶ Telepresence surgical system – hand microsurgery
 - ▶ Evolution from microscopic to macroscopic surgery
 - ▶ US defense department – SRI Green Telepresence Surgery System – mobile OT with robotic surgical manipulators
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Robotics in Surgery

- ▶ PUMA – Neurostereotactic surgery – 1st robotic procedure
- ▶ PROBOT
- ▶ ROBODOC

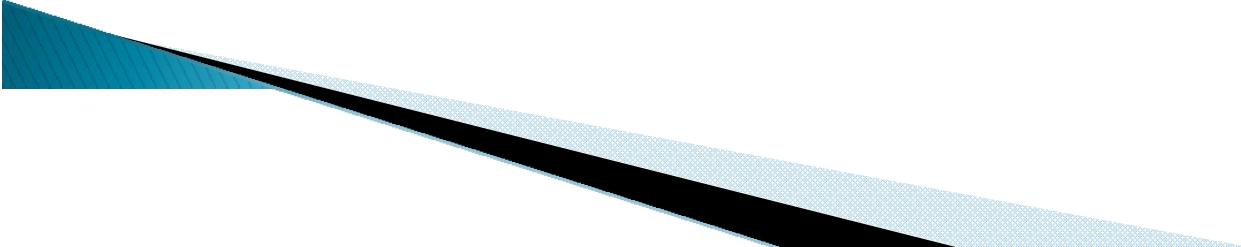


Robotic Systems – Classification

- ▶ Precise Path Systems
 - ▶ Intern Replacement Surgical Robots
 - ▶ The 'Master Slave' Device
- 

Robotic Systems – Classification

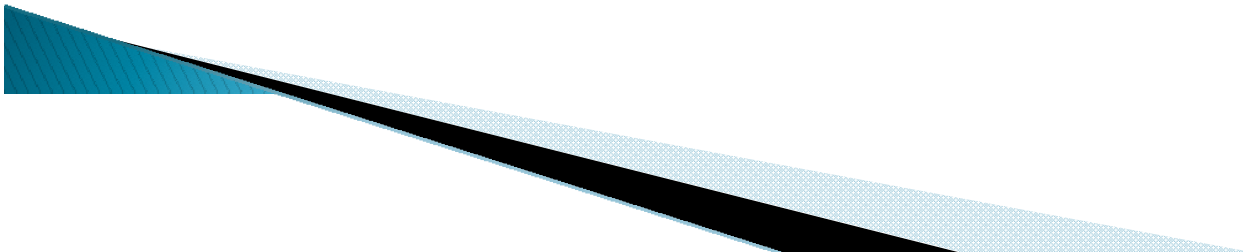
'Precise Path Systems'

- ▶ Preprogrammed mechanical devices
 - ▶ Systematic repetitive predefined movements
 - ▶ "The Surgeon Robot" – Prostatectomy
 - ▶ "PAKY" – PCN
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Robotic Systems – Classification

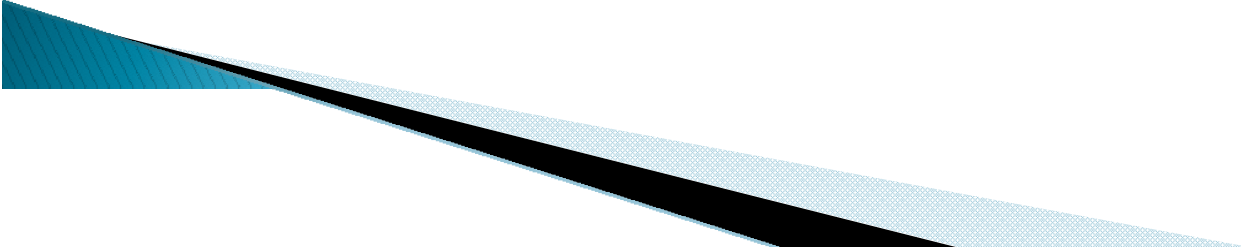
'Intern Replacement Surgical Robots'

- ▶ Substitute to assistant – tasks with dexterity
- ▶ AESOP
- ▶ Endoassist



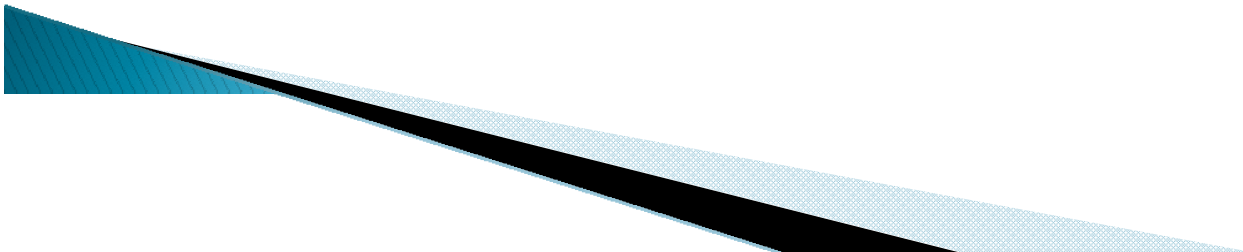
Robotic Systems – Classification

'The 'Master Slave' Device'

- ▶ Robotic tower – 3 to 4 robotic arms
 - ▶ Computer Console
 - ▶ da Vinci Surgical System
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da Vinci Surgical System

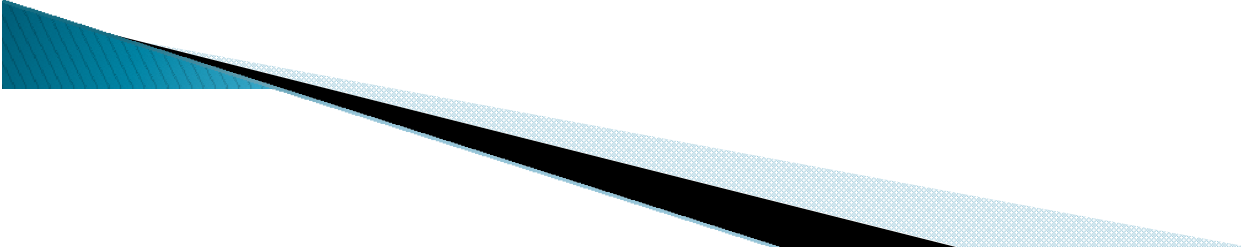
- ▶ Surgeon in charge
- ▶ Essentially laparoscopic surgery
- ▶ Robotic arms – 3 to 4
- ▶ Console – to see and control the robotic arms



da Vinci Robot

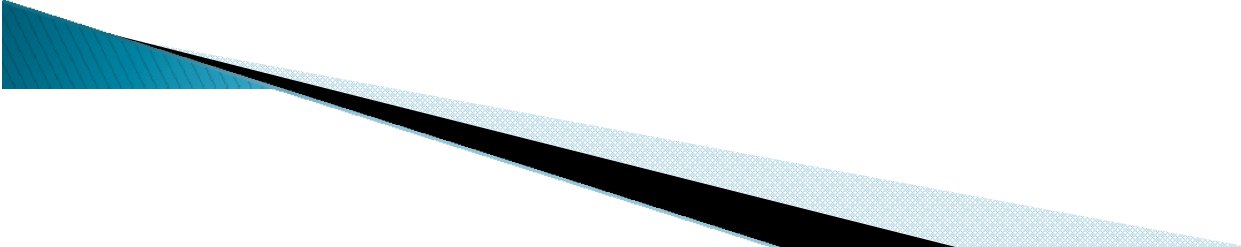


da Vinci Surgical System

- ▶ 3D stereoscopic vision
 - ▶ 10X or 15X magnification
 - ▶ Intuitive movement (Lap – counterintuitive)
 - ▶ 7 DOF (Lap – 4 DOF)
 - ▶ Tremor and fatigue Filtration
- 

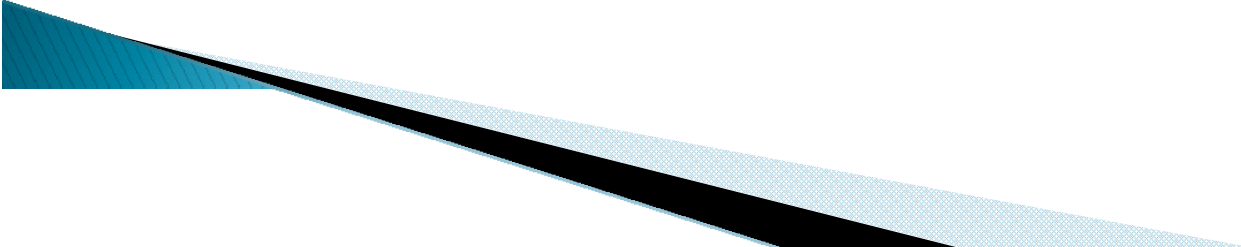
Robotic Surgery – Applications

Radical Prostatectomy

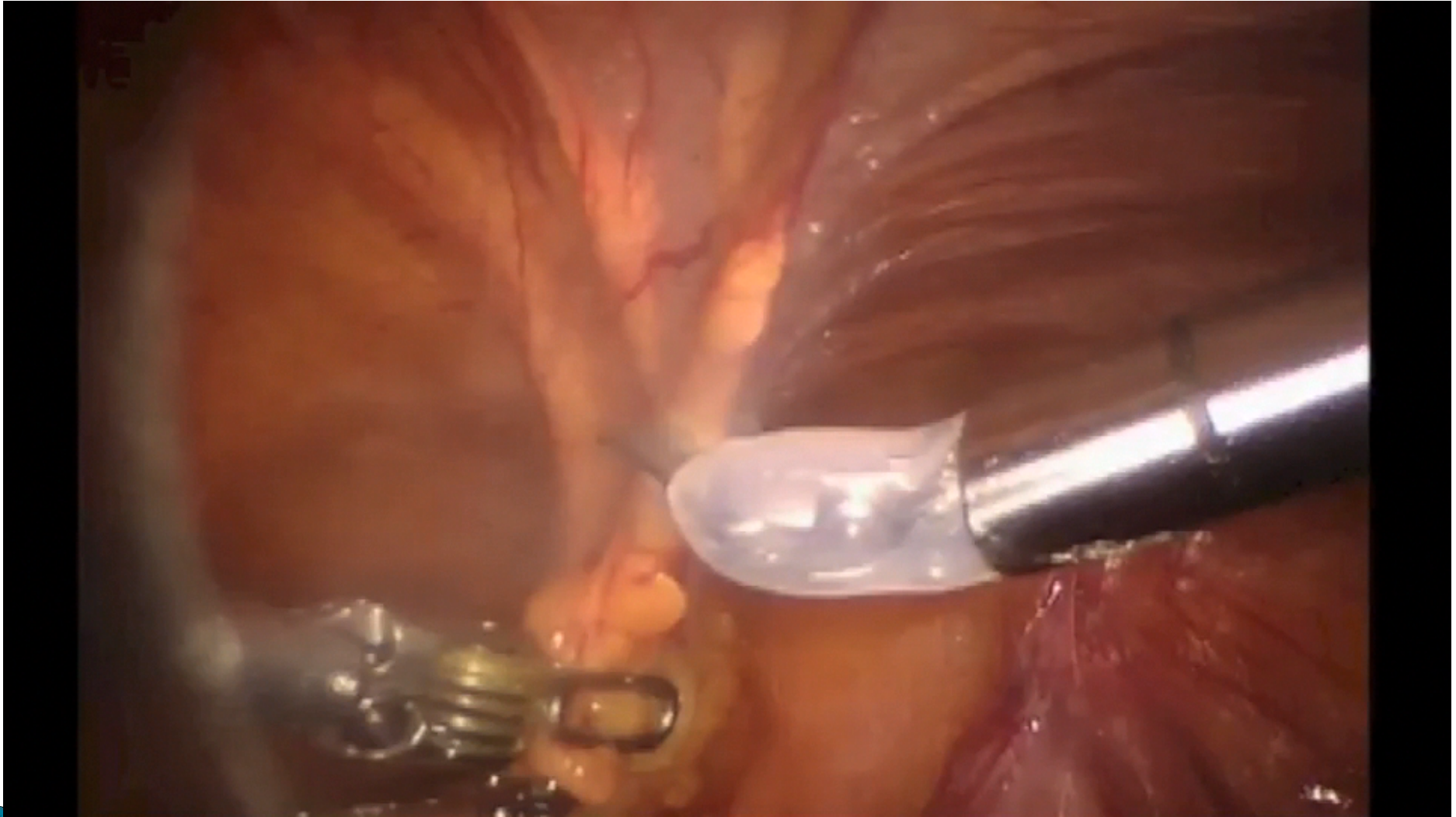
- ▶ Scary
 - ▶ Prostate – deep seated
 - ▶ Dorsal Vein Complex – Bleeding
 - ▶ Urethrovesical anastomosis – Difficult
- 

Robotic Surgery – Applications

RARP

- ▶ Not a new operation
 - ▶ New way to do the established operation with much more precision
 - ▶ Less morbidity
 - ▶ Better results
 - ▶ Without compromising oncological outcome
- 

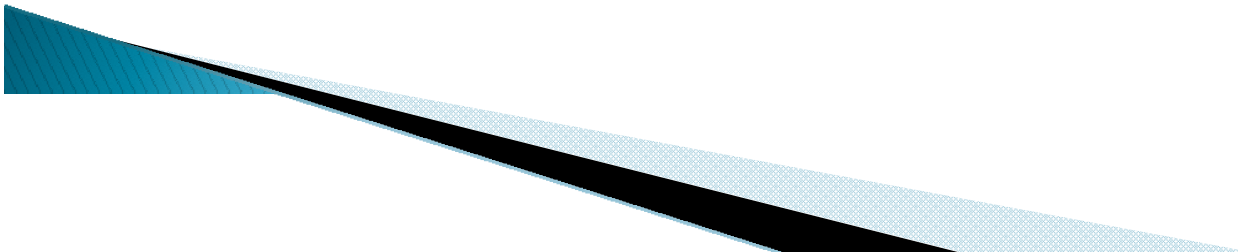
RARP



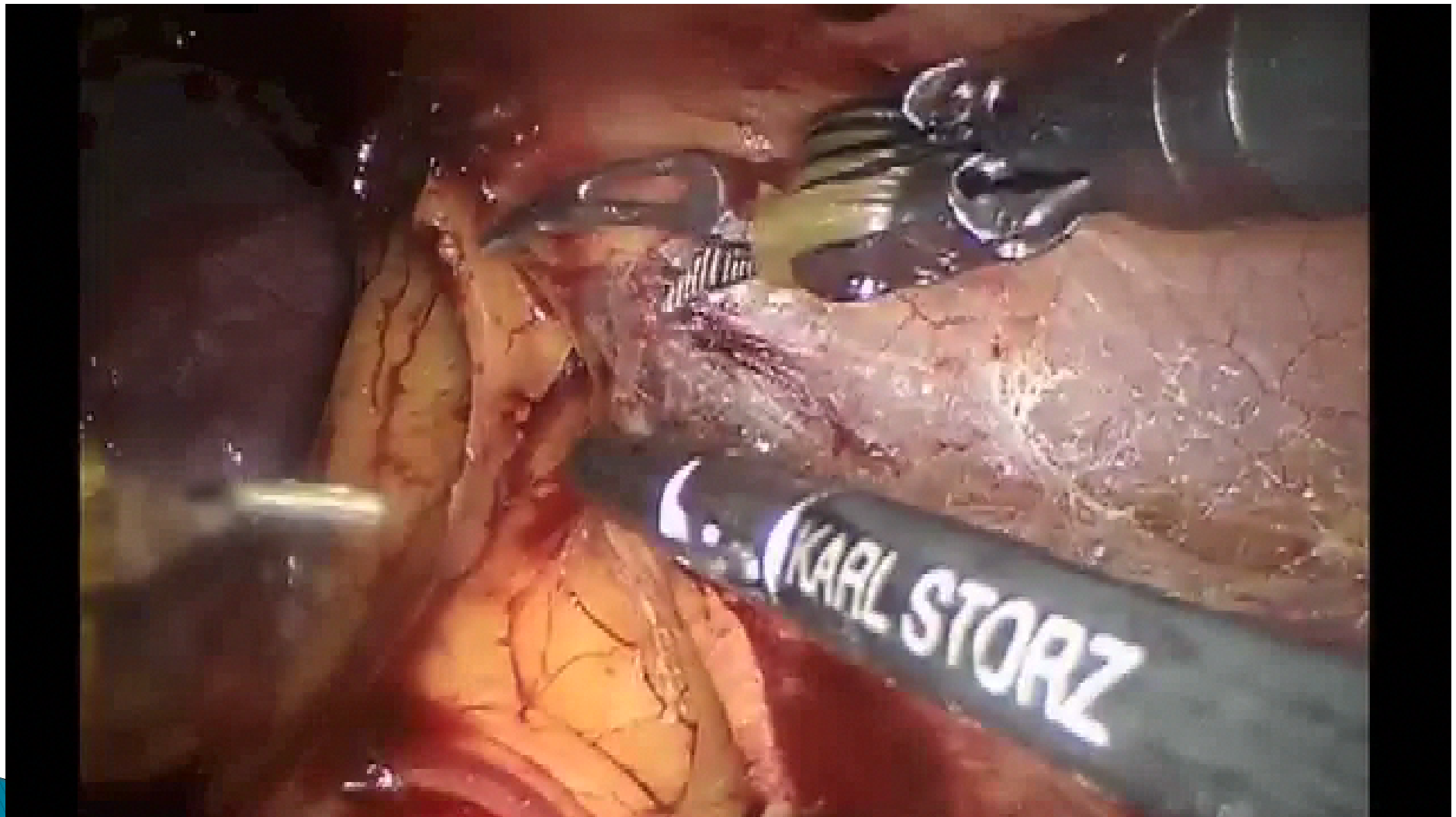
Robotic Surgery – Applications

Partial Nephrectomy

- ▶ Excision of tumour with prior vascular control
- ▶ Renorrhaphy



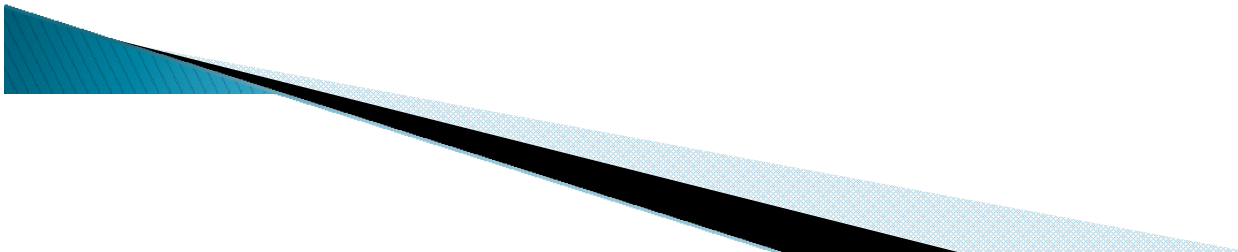
Robotic Partial Nephrectomy



Robotic Surgery – Applications

Radical nephrectomy

- ▶ Vascular control
- ▶ Renal vein thrombus removal
- ▶ RPLND



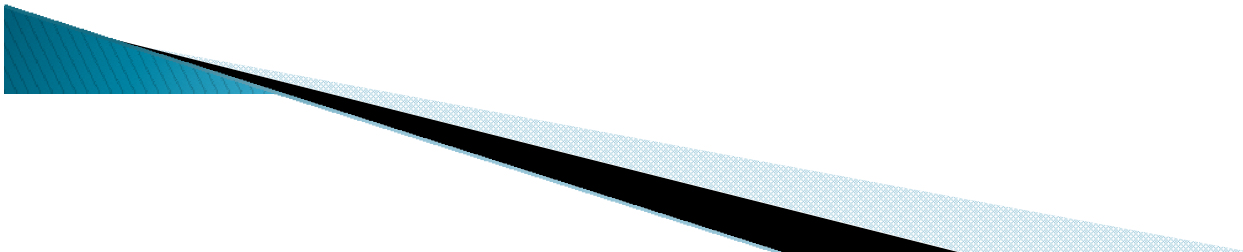
Robotic Surgery – Applications

- ▶ Donor Nephrectomy
 - ▶ Radical and Partial Cystectomy
 - ▶ Adrenalectomy
 - ▶ UPJO
 - ▶ Ureteric Reimplantation
 - ▶ VVF repair
 - ▶ Pyelonephrolithotomy
 - ▶ Ureterolithotomy
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Robotic Surgery – Applications

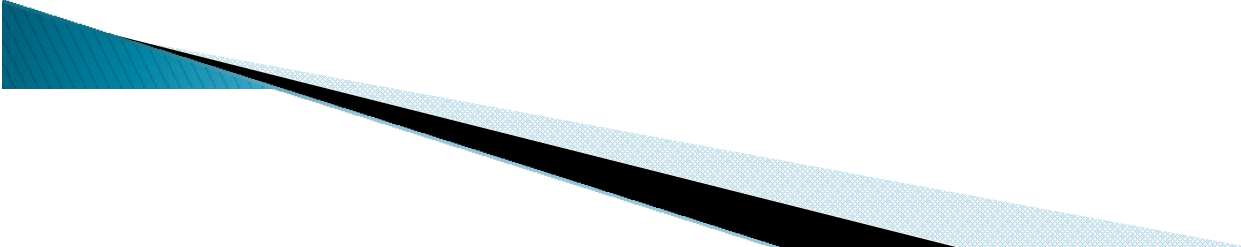
Gynaecology

- ▶ Hysterectomy
- ▶ Myomectomy
- ▶ VVF repair



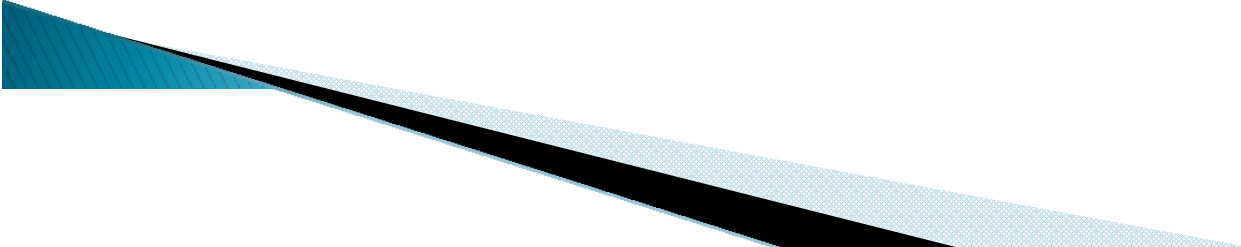
Robotic Surgery – Applications

General and Bariatric Surgery

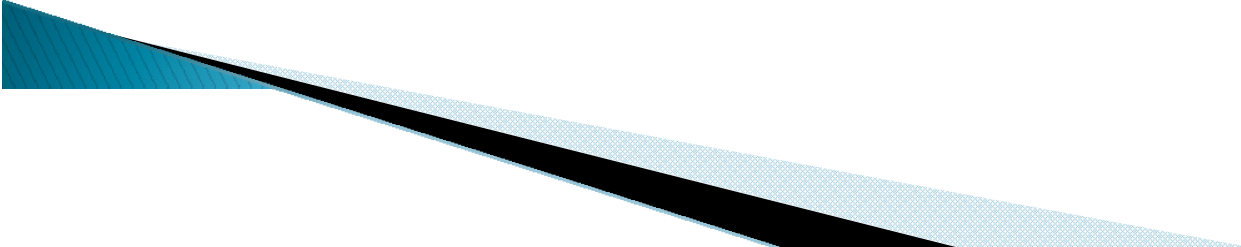
- ▶ Cholecystectomy
 - ▶ Gastric Bypass
 - ▶ Gastric Banding
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Robotic Surgery – Applications

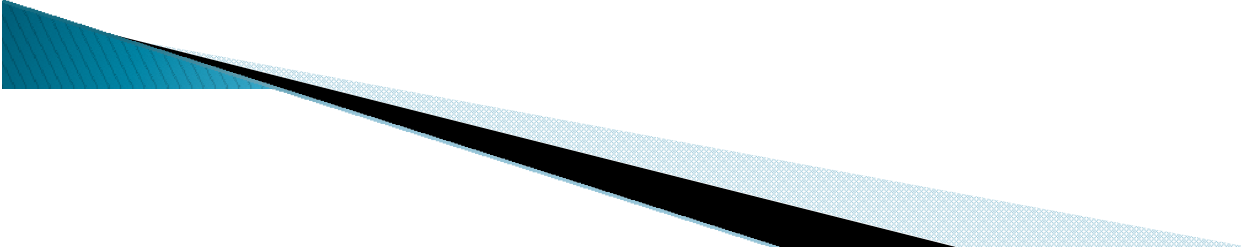
Surgical Oncology

- ▶ Gastrectomy
 - ▶ Hemicolectomy
 - ▶ Total Proctocolectomy
 - ▶ APR
 - ▶ Whipples
- 

Robotic Surgery – Applications

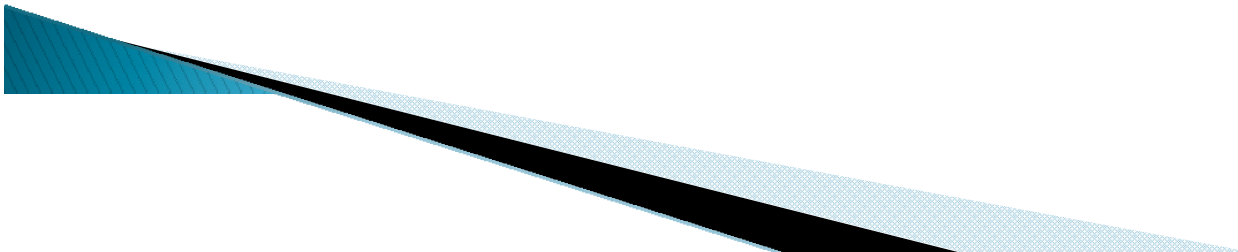
- ▶ Gastroenterology
 - ▶ ENT
 - ▶ Neurosurgery
 - ▶ Cardiovascular Surgery
 - ▶ Thoracic Surgery
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Robot – Other Scopes

- ▶ Prevention and Diagnosis
 - ▶ Rehabilitation and Day to day living
 - ▶ Nursing Assistants
 - ▶ Pharmacy
 - ▶ Housekeeping
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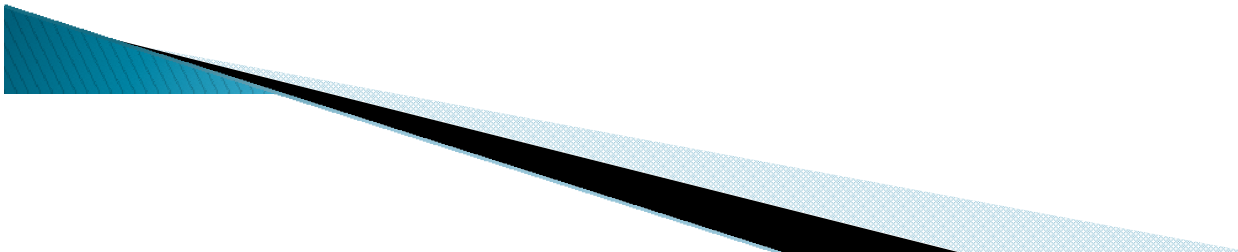
Prevention and Diagnosis

- ▶ Health Checks – High risk population

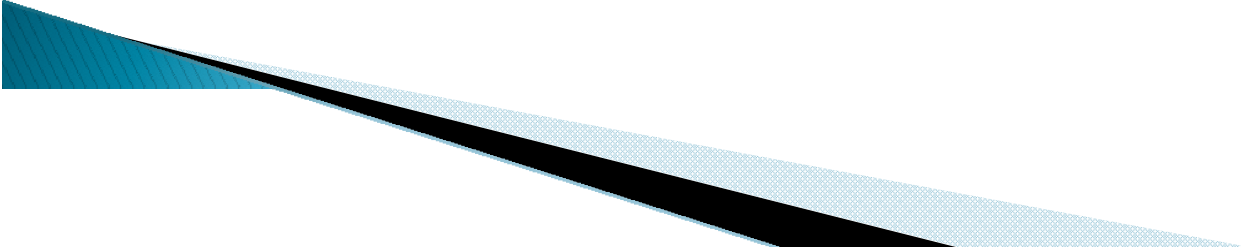


Robot – Rehabilitation

- ▶ Prosthesis – (Controlled robotic prosthesis) with motor sensory input - biologically accurate gait
- ▶ Ambulation – Robot assisted gait training (stroke patients)
- ▶ Help for elderly at home

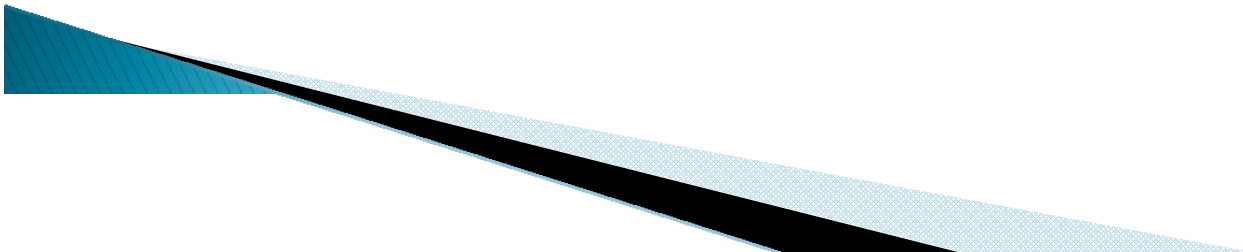


Robot – Nursing Assistant

- ▶ Vitals monitoring
 - ▶ Early warning
 - ▶ Patient mobilisation
 - ▶ Patient transfer
 - ▶ Intelligent Robot Nurse
- 

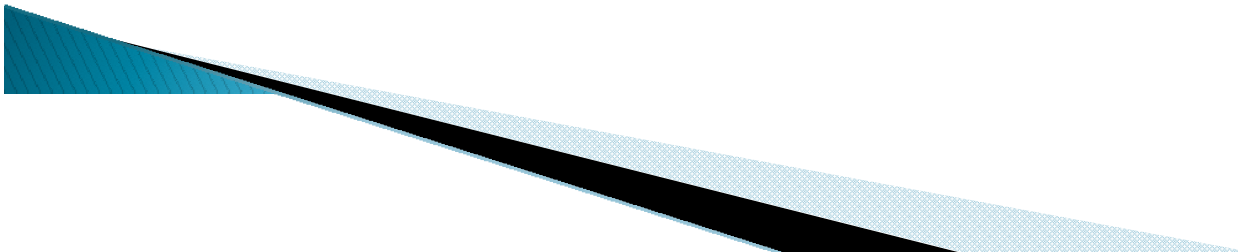
Robot – Pharmacy

- ▶ Maintaining Logs
- ▶ Restocking the Pharmacy
- ▶ Dispensing medications

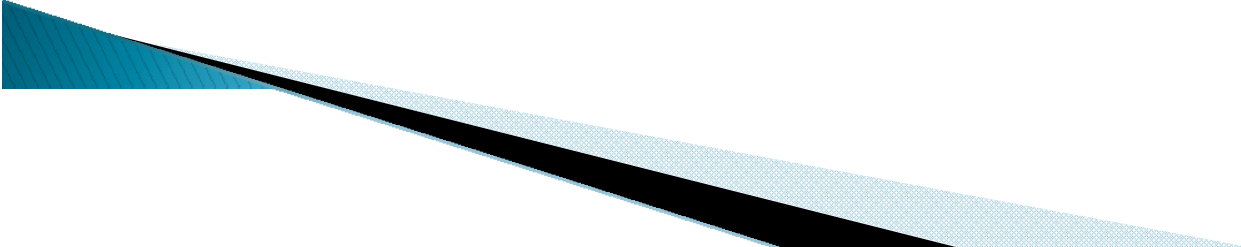


Robot – Housekeeping

- ▶ Patient transfer
- ▶ Transport of samples and medications
- ▶ Hospital Cleaning

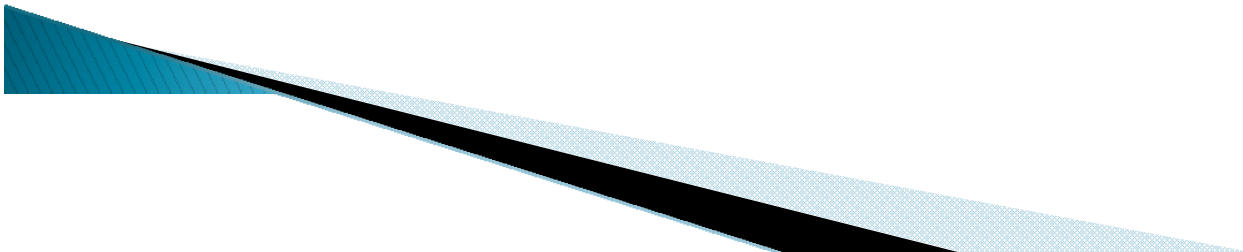


Robotic Surgery – Future Directions

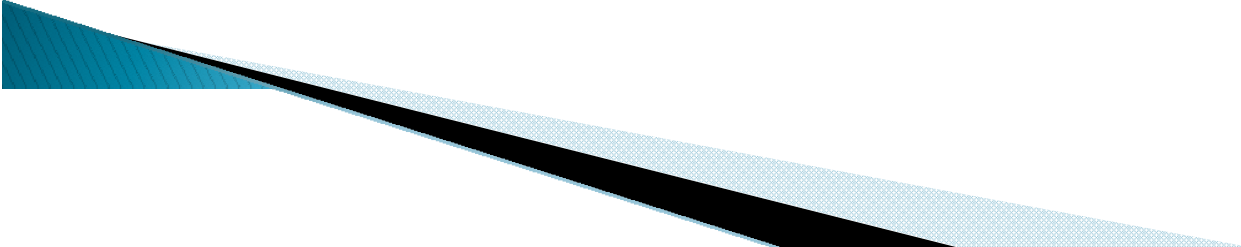
- ▶ Cost reduction
 - ▶ Microscopic Robots (Nanorobot) –
Chemotherapy, Targeted gene therapy
 - ▶ Smallest controllable robot developed – 250 * 150
micron
 - ▶ 10 years – 50 micron nanorobot
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Conclusions

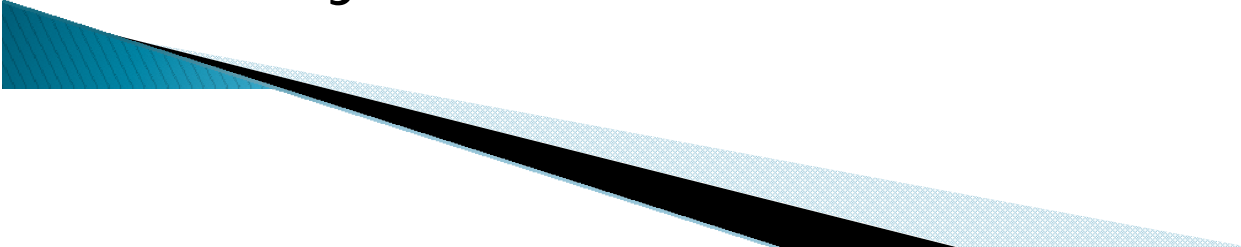
Robot aids the doctors to perform activities that are either difficult or cannot be done by the humans



Conclusions

- ▶ Better patient care at bedside and at home for rehabilitation
 - ▶ Substitute for support staff ???.....
 - ▶ Substitute for Doctor ?????..... may be
- 

Conclusions

- ▶ Robots are to help surgeons achieve better results for patients and to make complex procedures easier
 - ▶ **Robotics in Urology and other specialties is NOT THE FUTURE, but is PRESENT for many procedures**
 - ▶ Because of the advantages, robotics is here to stay
- 

Can robot Replace Surgeon ?

Probably YES

