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**Editor : Dr. A. K. Dewan**

## EDITORIAL

### *Robotic Surgery at RGCI & RC – Another Landmark !!*

Robot surgery is a new and exciting emerging technology that is taking the surgical profession by storm. The advances in medical technology have evolved and robotic surgery is here to stay. RGCI has created history in the sense that RGCI is the first and only exclusive cancer Institute in whole of India to offer robotic surgical services in the field of oncology.

The da Vinci Surgical system comprises three components: a surgeon's console, a patient-side robotic cart with 4 arms manipulated by the surgeon (one to control the camera and three to manipulate instruments), and a high-definition 3D vision system. Articulating surgical instruments are mounted on the robotic arms which are introduced into the body through cannulas. The device senses the surgeon's hand movements and translates them electronically into scaled-down micro-movements to manipulate the tiny proprietary instrument. It also detects and filters out any tremors in the surgeon's hand movements, so that they are not duplicated robotically. The camera used in the system provides a true stereoscopic picture transmitted to the surgeon's console. The da Vinci System is FDA cleared for a variety of surgical procedures including surgery for prostate cancer, hysterectomy and mitral valve repair, and is used in more than 800 hospitals in America and Europe.

Robotic technology is in India and will without question grow in the near future. With the use of robots, there is enhanced surgical precision, minimal blood loss, lesser pain, smaller surgical scars, faster recovery and earlier return to work.

The robotic equipment was imported from USA and installed at RGCI in the last week of February 2011. The robotic services commenced on the 28th of February 2011 when the first robotic radical prostatectomy was done at the institute by Dr. Sudhir Rawal, Director Surgical Oncology and Chief of Genitourinary Oncology Services, RGCI&RC. The inaugural session was graced by the presence of the Principal Advisor of the institute Mr. K K Mehta, steering at the robotic console for a while. Ever since various operations in the field of uro-genital oncology have been done.

Future of Robots - Robotic tele-surgical machines have already been used to perform transcontinental cholecystectomy. Voice activated robotic arms routinely maneuver endoscopic cameras as complex master slave robotic systems and FDA approved, marketed and used for a variety of procedures. On September 10th, the Eindhoven University of Technology announced the development of the Sofia surgical system, the first surgical robot to employ force feedback. It remains to be seen however, if history will look on the development of robotic surgery as a preformed paradigm shift or as a bump in the road on the way to something even more important. As scientists seek to improve the versatility and utility of robotics in surgery, some are attempting to miniaturize the robot. A day is not far off when nanorobot may be inserted into people's blood stream to act as diagnosticians, analyzing the problem and sending the information back to the doctor.

**Dr. A. K. Dewan**

Medical Director

**RGCI & RC Newsletter**



## CERVICAL CANCER VACCINE

A basic orientation seminar was organized for mainly female employees / staff at RGCI & RC on the occasion of women's day (08.03.2011). The objective of this talk was to increase the awareness regarding carcinoma cervix - risk factors, screening and primary prevention and disseminate information about cervical cancer vaccine.

Cervical cancer remains the leading cause of cancer (1,32,000 new diagnosed/year) and death amongst Indian women. Human papilloma virus (HPV) is known to cause approximately 99.7 % cases of all cervical cancers. It is a sexually transmitted disease infecting approximately 80 % of female population by the average age of 50. The infection may clear on its own by the immune system or lie dormant in body and hence may not be detected on PAP or HPV test. Hence is the need for regular, repeated screening test (PAP test) even if previous report was normal.

PAP test is an essential part of cervical cancer screening. The test helps in detecting any changes (abnormal cells) in the cervix that pre - date the occurrence of cancer cervix.

It is a very simple, non - invasive yet effective tool for diagnosis of abnormal cervical cells. It should begun at 21 yrs of age or 3 yrs after first inter-course (which ever is earlier) and repeated yearly till 3 negative smears are reported. The guidelines for follow up are fixed and should be followed as advised by the gynaecologist depending upon the indication as well as the result of PAP smear test.

Vaccination against HPV has proven to be most effective in prevention of the dreadful disease. There are over 15 to 20 types of oncogenic HPV that infect human.

## TOTAL FEMUR REPLACEMENT

While the conventional treatment of primary malignant bone tumors has been amputation, limb salvage surgery is now the standard of care for such tumors. It is now established that limb salvage gives a far superior psychological and functional outcome, without compromising on the survival of the patient. The main factors responsible for the establishment of limb salvage as a standard modality of care are the advancements in surgery, imaging, pathology, prosthetics, chemotherapy and radiotherapy.

There are certain situations where the indications for limb salvage surgery are relative and we have to "walk that extra mile" to save the limb while providing adequate oncological clearance. Following is the report of one such patient, where the whole femur had to be replaced to save the limb.

Mrs BD, a middle aged female, presented to us with the complaint of pain in the left thigh for 1 year duration. She had a history of a fracture in the subtrochanteric region being treated by intramedullary nailing about 5 years back.

Two types of vaccines are available and FDA approved and both protect against the high risk oncogenic HPV virus infection. Gardasil is a quadrivalent vaccine and protects against Cervical / vaginal cancer caused by HPV 16, 18. Also it protects against HPV type 6, 11, causing Genital Warts and against precancerous lesion (intra epithelial lesion for Vulva/vagina/cervix).

### Vaccine Schedule:

	GARDASIL	CERVARIX
<b>Schedule</b>	0,2,6 months	0, 1, 6 months
<b>Route</b>	IM (Deltoid region)	IM (Deltoid region)

### AGE recommendation :

- **ACIP**  
Vaccination from 11-25 yrs.
- **FDA**  
Vaccination from 09 - 45 yrs

### Absolute Contradiction:

- Severely sick patient
- Female planning conception,
- Pregnant female.
- History of allergy

WHO proposes that routine HPV vaccination should be included in (NIP) National Immunization Programme.

Vaccine cannot replace PAP test as it will not protect against all HPV types, hence screening with PAP test remains essential.

**DR. RUPINDER SEKHON**  
MBBS, DGO, MD (PGIMER)  
(Consultant - Gynae Oncology)

The surgeon had sent some curetted material for histopathological examination, the report of which turned out to be "Cartilaginous tumor". There was recurrence of the swelling and pain about 1 year back. The fresh X ray showed an interlocked nailing having been done, and the radiological diagnosis was obviously chondrosarcoma (Figure 1).. The intramedullary nail spanned the whole femur upto the distal metaphysis. She was investigated with a CT scan of the thigh and the chest and a bone scan, which was found to be non metastatic. The main issue to be addressed here was that the whole of the bone was contaminated with tumor following previous intramedullary nailing. After a detailed discussion of the options, she was taken up for total femur resection and replacement with total femur modular megaprosthesis.

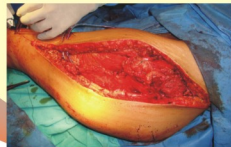
After isolation of the neurovascular structures, the whole femur with a cuff of normal tissue all around (enclosing the old surgical scar in the incision) was resected (Figure 2). The limb was reconstructed with a modular total femur replacement prosthesis with a modular bipolar cup (Figure 3, 4), followed by meticulous capsular and soft tissue repair (Figure 5). The patient recovered well and has been mobilized with a hip abduction brace.



**Figure 1 -** X ray showing chondrosarcoma proximal femur with nail in situ



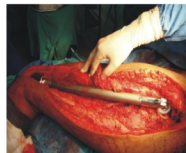
**Figure 2 -** Resection in progress with wide margins



**Figure 5 -** Meticulous soft tissue reconstruction over final prosthesis



**Figure 3 -** Resected specimen with trial total femur prosthesis by side



**Figure 4 -** Final total femur prosthesis in place

This case highlights the importance of an accurate diagnosis by imaging and biopsy prior to treatment of any "pathological" fracture. Besides, the case report highlights how limbs can be saved even in borderline situations.

**Dr. Akshay Tiwari**

Orthopedic Oncologist

**Dr. S. M. S. Zaidi**

Surgical Oncologist

**Dr. Kapil Kumar**

Senior Consultant Surgical Oncology

## Robotic Oncological Surgery: Technology That's Here to Stay!!



Over the past decades, surgery has also transitioned from the open approach, where the surgeon can directly touch and feel the tissue, to an intermediate state - laparoscopic surgery - where the surgeon moves the tip of the instruments, but the visual feedback is provided through the electronic image of the organs on the monitor, to robotic surgery (RS), where the image (information) at the surgeon's console represents the real surgical workspace. During RS, the surgeon is immersed and in control of a computer generated environment (so called 'virtual reality') sending electronic signals from the joysticks of the console to the tip of the instruments, which mimic the surgeon's hand movements.

The use of robotics in Medicine dates back 75 years, but only during the past 10 years has its potential been recognized around the world. In 1985 a robot, the PUMA 560 was used to place a needle for a brain biopsy under CT scan guidance. In 1988, the PROBOT was used to perform prostatic surgery (Institute of Urology, University College London). The ROBODOC from Integrated Surgical Systems was introduced in 1992 and is a robot to ream out precise fittings in the femur for hip replacement surgery. Furthermore, in the orthopaedic field the ACROBOT has been used for knee surgery developed at University College Hospital. Further development of master-slave robotic systems was carried out by Intuitive Surgical with the

introduction of the da Vinci Robot and Computer Motion with the AESOP and ZEUS robotic surgical systems.

Since the first reported robot assisted surgical procedure performed in 1985, the technology has dramatically evolved and currently multiple surgical specialties have incorporated RS into their daily clinical armamentarium.

Oncological surgery involves large open incisions (laparotomy, thoracostomy, lumbarotomy). There is an associated blood loss, longer recovery period and painful postoperative period that requires more analgesia. Laparoscopic surgery avoids most of the side effects of open surgery while maintaining oncological integrity. Furthermore robotic surgery maintains the advantages of laparoscopic surgery but reduces some of its limitations such as learning curve.

Robotic oncological surgery is a targeted therapy, focused on tumour treatment avoiding the general side-effects of open surgery. The recent development of robotics in surgery has demonstrated that it is a feasible and reliable therapeutic approach for cancers.

Robotic Uro-oncology is an expanding field, particularly as an option for the treatment of localized prostate cancer. The da Vinci robot with three-dimensional visualisation is helpful for preserving bladder neck and neurovascular bundles and at the same time the endowrist





allows simplification when performing of the urethral vesicle anastomosis. In most of the studies the robotic procedure appeared to be safer, less bloody and required shorter hospitalization and catheterization. The oncological and functional results were favourable in patients undergoing robotic prostatectomy. The robotic surgery modality is also being applied to renal cancer, bladder cancer and retroperitoneal lymph node dissection in testicular cancer.

The feasibility of performing low anterior resections and abdomino-perineal surgery has attracted the attention of colorectal surgeons. Similar to robotic prostatectomy for urologists, limited visibility during these procedures when performed open is a major obstacle and RS can allow for improved visualization and excellent rectal dissection.

Regarding the robotic abdominal surgery for cancer, an extraction of esophageal tumor, a distal gastrectomy for gastric cancer, an ileocecal resection for cecal cancer, a left hemicolectomy for descending colon cancer, a sigmoidectomy for sigmoid colon cancer, a thymectomy for thymoma and an extraction for retromediastinal tumor have all been performed successfully. As a result, almost all types of tumors or cancers may therefore be indicated for robotic surgery

Various studies of Robotic radical hysterectomy for uterine and cervical cancer has highlighted the advantage of using robotic assistance within a confined space (extended hysterectomy with pelvic lymph-node dissection).

PROCEDURES IN ROBOTIC ONCOLOGICAL SURGERY	
SPECIALITY	OPERATION
Abdominal Malignancies	Esophagectomy, gastrectomy, gastric resection, colon resection sigmoidectomy, low anterior resection, liver biopsy.
Gyne-Oncology	Radical Hysterectomy
Neuro-Oncology	Gamma knife (brain surgery without incision), resection of neoplasm, beam biopsies, cavernous malformation, microvascular surgery.
Thoracic Malignancies	Thymectomy, lobectomy, sympathectomy, esophagectomy
Uro-Oncology	Nephrectomy for renal tumour partial nephrectomy, nephroureterectomy, adrenalectomy, pelvic lymphadenectomy radical prostatectomy, radical cystectomy retroperitoneal lymph node dissection.

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Although still in its infancy, RS is a cutting-edge technology that has already demonstrated far-reaching implications. By improving precision and dexterity, RS has allowed surgeons to expand the horizons of minimally invasive surgery, leading to a fast market penetration and widespread adoption of RS into multiple surgical specialties. Currently robotic surgery has a role in oncological surgery as a minimally invasive technique, avoiding the general side-effects associated with open surgery and minimizing the challenge of some oncological laparoscopic procedures.

**Dr. Sudhir Rawal**  
Chief of Uro-Geneto-Oncology



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