THE EDGE

Surgical Excellence through Advanced Robotics

Cutting Edge Surgery

July 2015

UPDATES

K Subhramaniam
In Memoriam

Surgical Robotics

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"Robotic Surgery Symposia"
13th June, New Delhi

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From the CEO's Desk

Friends,

It is under tragic circumstances that I write this message - for K Subrahmaniam, whom each one of you would know very well, is no more with us. KS was instrumental in bringing to India the Robotic surgery movement - with his unbounded energy, unbridled enthusiasm and cheer which cannot be erased from our memories just by him physically not being here. He was a friend and an inspirational spearhead for the organization as well as for the entire robotic surgery community.

I have taken on the mantle of leadership for Vattikuti Technologies and have had the opportunity to meet many of you at various hospitals at Chennai, Bangalore, Hyderabad, Kochi and New Delhi in the last two weeks. I have had the privilege of working with various organizations under the Vattikuti group over the last 15 years, and shared a friendship with KS for the last 40 years and more. I and the entire organization share our continued commitment to the dream that KS had of making India a major player in Robotic surgery and I assure you of the same level of support and service that you have been experiencing in the past.

Welcome to the sixth edition of the Vattikuti Technologies newsletter – 'The Edge'. We are very happy that this initiative has made its presence felt amongst the surgical community and with the hospital administration.

I thank the entire robotic surgery fraternity for your continued support to this enterprise and look forward to provide the latest technologies to help create more successful programs.

Warm Regards,
Gopal Chakravarthy

Dr. Mahendra Bhandari, CEO Vattikuti Foundation

The beginning of the Robotic Surgery movement in India happened with KS and I am so sorry that he is no more. It was very difficult to conceive any major robotic surgery event in India without him as he would diligently be behind the scenes, planning all of them. We should all continue to work towards fulfilling his unfinished efforts. It is very sad to lose him and the vacuum created by him shall remain, as nobody can replace his shoes.

Dr. Catherine Mohr, VP Medical Research, Intuitive Surgical Inc. USA

KS was my ambassador for India and we've had extensive discussions of what we thought of the future of robotic surgery could be in India. He really helped me see the possibilities in this country.

He will be sorely missed but the best way to honour his memory is to continue to move towards his vision for India as a major player in the world of academic surgery and taking its rightful position as being a major contributor. May his soul rest in peace.

Sanjay Mehrotra, Vattikuti Technologies

KS was an inspirational leader who led by example. A powerhouse of energy who would always find solutions to any problem and drive execution with great passion and zeal. KS would make friends for life in an interaction of a few minutes and has left a void in each human being that was touched by his love and affection.

An agent of transformation, KS had in a very short time established strong roots for robotic surgery in India. As a leader, as a great friend and as a good human being, KS will always be remembered.

K Subhramaniam - In Memoriam

S P Somashekhar
Surgical Oncologist, Manipal Hospital, Bangalore

It's with deep sorrow, I have to write about the sad demise of KS. I knew him as a great friend – an ever active, hardworking workaholic who took and completed every assignment with great passion. I shared not just professional relations with a common passion of Robotic surgeries but a great personal friendship too. So his departure is that much more painful for me. I always asked him – "having worked as a CEO of several top companies in various other fields all over the globe, what made him take this assignment at Vattikuti technologies?" He always told me "Somashekhar, this one is not just a job but also a passion towards this amazing technology of minimal invasive surgery by means of Robotics which makes me enjoy this assignment over and above all others". Apart from his sincere, ever smiling and warm friendly nature, I always used to be amazed about the incredible passion he had towards robotics.

Knowing him very well, "Instead of flowers, KS would hope that we ensure his half completed job of popularising Robotics in India in his name". May his soul rest in peace and he knows that we all will miss him.

Arun Prasad
Apollo Hospital, New Delhi

Mr Subhramaniam more popularly known as KS by all of us will be missed by the robotic community. His passion to spread robotic surgery in India went beyond the call of duty. He was available 24X7 and responded to mails and messages at lightning speed. He has single handedly taken robotics to a new level in India (of course with his Indian team support). May God give peace to his soul.

Rooma Sinha
Apollo Hospitals, Hyderabad

In Mr Subrahmaniam we saw a soft compassionate and humble person. His enthusiasm and encouragement in robotic surgery was infectious. Robotic surgery program in India will never be the same without him.

Vivek Bindal
Sir Ganga Ram Hospital, New Delhi

"This sad news came as a great shock to us. I am still not able to believe that such a wonderful and energetic person has left us so soon. He worked tirelessly to take robotic surgery to the place where it is now in India. He shall always be in our thoughts and we shall work to fulfil his dream of taking robotic surgery to the masses. May his soul rest in peace"

Mahesh Desai
Medical Director, MPUH, Nadiad, Gujarat

We are shocked with the sad demise of Mr Subrahmaniam. He was always very helpful,kind and ever dependable. He responded immediately and solved all issues. We will miss him not only as a good human being but also for his liaison with Intuitive. My heart felt condolences to his family and colleagues.

Ajit Saxena
Indraprastha Apollo Hospitals, Delhi

One always remembers K.S as ever enthusiastic, ever supportive and an ever smiling person. On this sad occasion we the robotic surgeons of Indraprastha Apollo Hospitals pledge to fulfil his dreams of making India the global hub for Robotic Surgery. R.I.P.

Ananthakrishnan Sivaraman
Apollo Hospitals – Chennai

One of the most straightforward persons I have met in recent times. Never promised me things that he could not deliver. It was a pleasure working with him because we could always tell that his agenda was to do what was right and integrity was his code. He was pivotal to the success of the robotics program in Chennai. We could call him anytime for anything and he was ready to answer. He will be greatly missed.

Khursheed Guru
Roswell Park Cancer Institute, New York

It's been a shocking development. A good man and had some great time with him working for better robotics in India. RIP !

Parveen Bhatia
Sir Ganga Ram Hospital, New Delhi

"In KS, We have lost a Robotic family man. May God give strength to all to bear this unbearable loss"

Ginil Pooleri
Amrita Institute of Medical Sciences, Kochi

We at Amrita, could not believe the news initially. We had great respect for him as he was always within reach and for the sincerity with which he was bringing up the program. For us Vattikuti meant KS. I don't know if the vacuum left by him can be filled by any person. The loss is not for the organisation alone but for us too as he was so approachable. We share our grief with you and pray for his soul.

Ganesh Bakshi
Tata Memorial Hospital, Mumbai

My deep condolences to the entire Vattikuti family. Having personally interacted with KS several times, I feel the loss as personal. He was a fine person and certainly we should continue his good work. May his soul rest in peace.

Sabhyata Gupta,
Medanta - the Medicity, Gurgaon

Very sad and shocking with this untimely demise of KS. It is indeed a big loss to all of us and very devastating for his family. My heartfelt condolences

Shailesh Puntambekar
The Galaxy Team, Pune

We are shocked with the sudden demise of Mr Subrahmaniam. We at Galaxy had the pleasure of interacting with KS on several occasions. He was a great supporter and proponent of Robotic Surgery in India. The entire Galaxy team shares your grief and loss. May his soul rest in peace.

Shailesh V. Shrikhande, Tata Memorial Centre, Mumbai

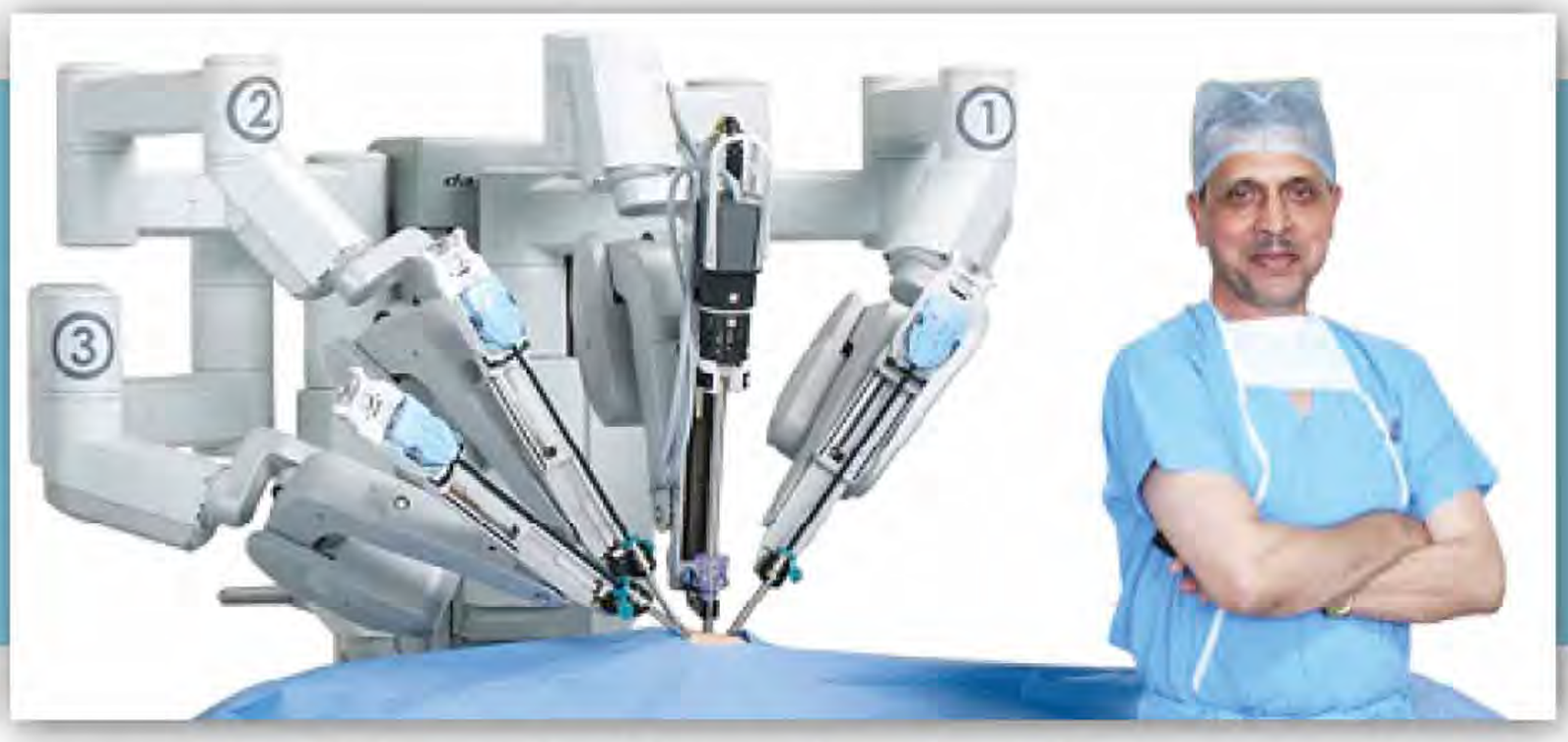
Please accept my deepest condolences. He leaves behind a fantastic legacy and it would be our responsibility to take robotic surgery ahead in the years to come. This would be our tribute to him.

Anil d'Cruz
Director, Tata Memorial Hospital, Mumbai

Please accept my sincere condolences on the untimely passing away of KS. I met him briefly on a few occasions but I totally second that this is a big loss to the healthcare industry

Robotic Chest Surgery in India – The Journey so far & the way ahead

Dr. (Prof.) Arvind Kumar
MS, MNAMS, FACS, FICS, FUICC
General, Laparoscopic, Thoracic,
Thoracoscopic & Robotic Surgeon
Director- Institute of Robotic Surgery
Chairman- Centre for Chest Surgery
Sir Ganga Ram Hospital, New Delhi



The word “Surgery” has traditionally been synonymous with big cuts, blood loss, postoperative pain, numerous postoperative complications including wound infection, several days in the hospital, long time to recovery, prolonged absence from work and in many cases, death also. While many of these were due to the procedure itself, a lot of these problems were due to “opening” made in the body in order to be able to do the surgery. This “opening” or “access” to the target area traditionally required long cuts to go inside, which involved cutting the skin, muscles (as in abdomen) or muscles and bone (as in chest).

Traditionally, surgeons have preferred making “long incisions” for wide exposure and hence the saying, “Big Surgeons Make Big Incisions.” While this has been very comfortable for the surgeons, it inflicted lot of trauma on the patient. The patient does get cured of the disease, but the quality of life did not necessarily improve because of the trauma of access (big incisions).

The development of technology in the field of surgical sciences has always been with two major aims: “Make it easy for the surgeon” & “Make it least invasive for patient.” This led to the concept of “minimal access surgery” where the “same surgery” can be done without the large cuts and its trauma. With these aims in mind, endoscopy (laparoscopy) came on the horizon.

Third Revolution in Surgery

Endoscopy is a method of “peeping” into a body cavity through a telescopic device. When a miniaturized camera is mounted on its eyepiece, the inside picture can be projected on a TV monitor. The availability of these devices in late 80s gave birth to “Minimal Access Surgery” wherein big incisions were replaced by small incisions with surgeon seeing directly at a much clearer and a magnified image of the target organ on a TV monitor. Instead of operating with hands, the same surgery is done by manipulating 5 to 10 mm size long instruments inserted through small incisions. While this meant total relearning of the procedure and extreme complexity for surgeons, this surgery was “kinder” for the patients as it drastically reduced the trauma of “access.” This translated into lesser blood loss, lesser postoperative pain, quicker recovery, reduced incidence of postoperative complications including wound infections, shorter hospital stay and much faster return to normal life. This minimal access approach has rightly been termed as the “Third Revolution in Surgery”(asepsis and anaesthesia being the first and second revolution) and has been applied to problems in abdomen as well as chest. The term “laparoscopy” is used for surgery in abdomen and “thoracoscopy or VATS” for surgery in the chest. While this worked extremely well for patients, it did create a new set of problems for the surgeons because of the surgery being done in a 2D environment with no depth perception. All the movements made by the surgeon using these long instruments became much more complex because they had to be performed in a counter-intuitive manner leading to significant stress to the surgeon. This is whereRobotic surgery came into being with its 3D vision, which provides depth perception (even better than open surgery), intuitive movements of the instruments making suturing as easy as in open surgery. This gave the surgeon the ability to access the inaccessible areas and perform complex manoeuvres with specialized robotic instruments that are as versatile and dexterous as the human hand.

The Robotic Surgery Revolution

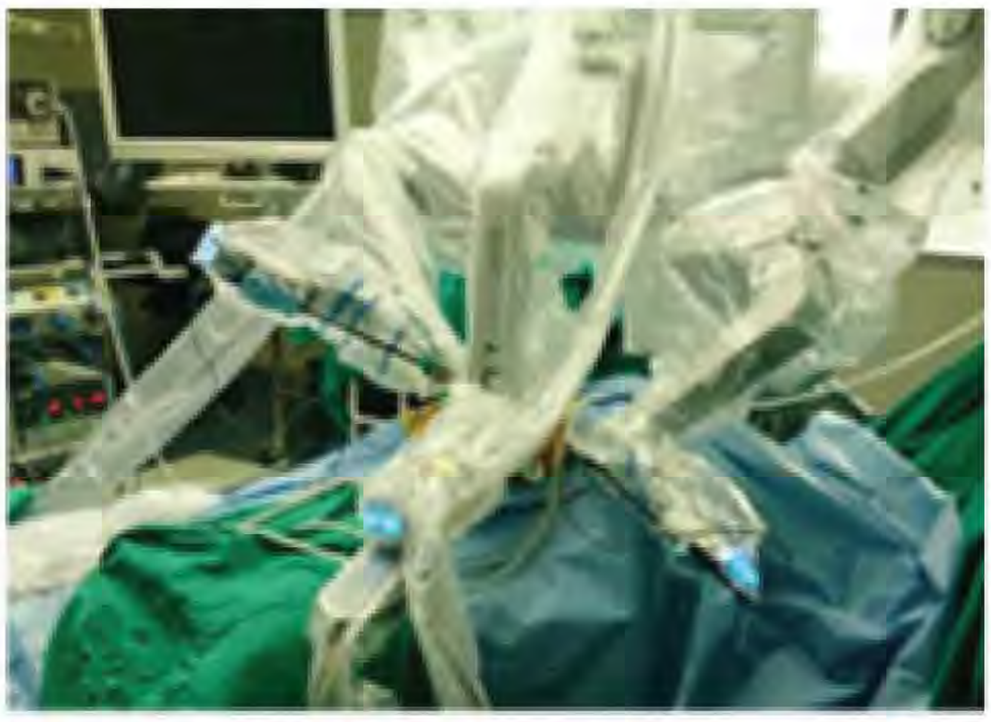
The Robotic surgery revolution started in early 2000s with the performance of robotic radical prostatectomy by Dr. Mani Menon in USA. Thereafter, Robotic surgery spread to other disciplines including Chest Surgery.

The First Application of Robotics in Chest Surgery

The first application of Robotics in Chest surgery was for excision of a small thymoma by Yoshino et al at Fukuoka, Japan in 2001. The same authors reported next year about Robotic excision of a posterior mediastinal tumour. The first Robotic lobectomy was reported by Morgan et al in 2003 and Bodner et al reported the first series of Robotic Chest surgery cases in 2004.

Thoracic Robotic Program in India

In India, the robotic system was initially used for cardiac surgery and thereafter for urology mainly. The "Thoracic Robotic Program" in India was started by our team at the All India Institute of Medical Sciences in the year 2008 under the mentorship of Prof. Jens C. Ruckert, when 8 consecutive thymectomies for myasthenia gravis with or without thymoma were performed. Thereafter, the program continued with over 60 such procedures being performed there till March 2012 when the team moved to Sir Ganga Ram Hospital, New Delhi. The next few months saw expansion of our robotic chest program and procedures like thymectomy for myasthenia gravis and/or thymoma, lobectomy for lung cancer, esophagectomy for esophageal cancer, excision of posterior mediastinal tumours and plication/mesh repair for diaphragmatic eventeration or hernia began to be performed routinely by our team. Another landmark during this period was the performance of "completely robotic aorto-bifemoral bypass for aorto-iliac atherosclerotic obstruction" by the joint effort of the Vascular Surgery & our Robotic Surgery team. We also developed a program of scarless thyroidectomy by trans-axillary robotic approach, which is a huge advantage for patients with thyroid enlargement who want to avoid a scar in the front of the neck. Continuing in our efforts to familiarize more and more chest surgeons in this cutting-edge technology, our group organised "Country's First Live Robotic Chest Surgery workshop" with live transmission of robotic lobectomy for lung cancer by Prof. Robert J. Cerfolio from University of Birmingham, Alabama, USA on 12th February, 2014. It was attended by the Who's Who of the Thoracic Surgical Community of the country. It is a matter of great pride for our country that large volumes of above-mentioned robotic chest procedures are being performed routinely at Sir Ganga Ram Hospital, New Delhi, and also at some other centres in India.



Advantages of Robotic Chest Surgery

Surgeons using Robotic system in chest surgery have to address certain lingering issues in the mind of conventional surgeons doing either open or VATS chest surgery i.e. Robotic surgery oncologically adequate and is it really beneficial? There is no doubt in my mind that in properly selected patients and in expert hands, Robotic Chest Surgery offers a drastic advantage over open surgery. The difference when compared to VATS, as per currently available literature, is subtle at the best. But with improved magnified 3D vision, natural intuitive movements and far superior ergonomics, I strongly believe that any procedure possible by VATS can be done much better by the "Robotic assistance". On a long treacherous road, a sports utility vehicle with 4 wheel drive and a plethora of safety features will definitely be safer than a standard hatch-back. If you do believe in this, then you will have to believe that if cost factor is taken off, all VATS surgeons in due course of time will start using the Robot if and when they can.

Conclusion

Robotic chest surgery is here to stay and will see more and more applications at more and more centres in times to come.

ATM | Annals of Translational Medicine

Ann Transl Med. 2015 Mar; 3(4): 58.

Dr.(Prof.) Ali Zamir Khan

MS, FRCS (Glasgow), FRCS (CTH), FEBTS
PGDM (Clinical Research, UK), CCT (UK), MBA
HOD, Minimally Invasive & Robotic Thoracic Surgery
Medanta - The Medicity, Gurgaon

Introduction

Prof. Ali Zamir Khan is a leader in the field of minimally invasive and robotic thoracic surgery. He trained and worked in United Kingdom as a cardiothoracic surgeon for about 20 years before returning to India to start the Department of Minimally Invasive and Robotic Thoracic Surgery at Medanta—The Medicity. This is one of the premier multispecialty hospitals in India providing cutting edge tertiary care to patients. The minimally invasive surgery program is one of the most successful programs in India.

His special interest is in robotic and video-assisted surgical management in the field of lung surgery (including cancer, tuberculosis, bronchiectasis and aspergilloma), mediastinal surgery (Thymectomy for myasthenia & thymoma and resection of mediastinal cyst and tumors), cosmetic chest wall surgery, endobronchial surgery (lasering & stenting), diaphragm surgery (eventration, hernias and trauma), esophageal surgery (cancer, perforation, benign diseases), sympathetic nerve surgery (hyperhydrosis, intractable Ventricular fibrillation) and lung volume reduction surgery (emphysema).

Interview

ATM: It seems that you prefer robotic surgery much more than VATS surgery. When did you start to conduct robotic surgery? And how many robotic surgeries have been done in your institution so far?

Prof. Khan: I conducted my first robotic surgery in 2009. In my institution, we have done about 3,000 robotic surgeries together, including urology, thoracic surgery and gynecology.

ATM: How about the basic situation of robotic surgery in India? How many robotic cases a year in India?

Prof. Khan: When I first came to my current institute about four years ago from UK, we had one or maybe two centres in India doing robotic surgery. Now we have about 40 centres across the country for robotic surgery and my center is doing the maximum number of robotic surgeries, especially in urology. If you take my center for example, we are doing two and a half to three thousand cases a year. So across the country, probably the number is 4,000 cases a year, which is a continually increasing number.

ATM: How about the techniques of robotic surgery now?

Prof. Khan: Indeed, it is becoming sophisticated. There are a lot of new techniques which we have developed at our centre. We are teaching people. So, I lecture almost every weekend across the country to teach robotic surgery. Therefore, more and more people are learning about robotic surgery and beginning to conduct it at their centres.

ATM: How do you look at the high cost for a robotic surgery?

Prof. Khan: In India, it is quite cheap as compared to Hong Kong or the US. For instance, a lobectomy in US would be about 10,000 dollars and about 20,000 Dollars in Hong Kong. In India the cost of a lobectomy is much cheaper at about 5,500 USD. Robotic surgery is becoming a regular surgery nowadays in India.

The actual problem is not the cost of the robotic surgery, but the cost of the robot. It consumes about 1 million to buy the machine, so it is expensive to start a robotic surgery program. But in the long term, it is not expensive. There is a study done in my center which shows that VATS lobectomy is cheaper than open lobectomy. But more importantly, robotic lobectomy is also cheaper than open lobectomy. Most people think that open surgery is a cheap option, but actually it isn't. If we analyze in terms of less hospital stay, quicker recovery, less need for pain killers, earlier return to work, then VATS lobectomy is cheaper than open surgery. Similarly robotic lobectomy is also cheaper than the open approach, because in open surgery the patient stays in the hospital for 7-8 days but in robotics or VATS patient gets discharged on second day following surgery. Hence, the hospital stay reduces significantly. More patients can have surgery because bed spaces get available to the hospital. So if we look at the overall picture, robotic surgery turns out to be a cheaper alternative.

ATM: As to the patients, do you know how they like robotic surgery?

Prof. Khan: Patients love it, because my patients get admitted in the morning, and have surgery in the afternoon. The next morning on the ward round I take the drain out, and they are discharged by evening. So they are home within maximum 2-3 days. It makes a lot of difference to these patients if we can reduce the hospital stay. Less pain, less cuts and quicker recovery ensures that they can get back to work faster. In India, it is important for the patients to return to work early as they may not have many paid sick leave.

Robotic Mediastinal Tumour

ATM: How to cope with the complications when you are doing the robotic surgery?

Prof. Khan: In robotic surgery, I am on the robotic console but another experienced surgeon is next to the patient. If there is a complication the assisting surgeon at patient's side can cope with it. Most of the time, you just need to convert from robotic to VATS. You do not need to open the chest, and by VATS you can tackle most of the complications. Occasionally, in life-threatening situations, you can convert to open surgery. It doesn't matter. The most important thing is that patient outcome should not be compromised.

ATM: Regarding the training in robotic surgery, would you like to share some training experience in your country?

Prof. Khan: I think it has multiple levels of training. I call it preceptorship model. You first come to an animal lab to learn how the robot works, i.e., the basic steps of the robot. In the second step you learn the basic surgery by observation that is you come to my theater and watch me operate. The third step is that you go to your own theater and you operate under my supervision and finally do it independently. The same steps are repeated for learning any complex surgery. So it is a step-by-step training. It is called preceptorshjp. I am the mentor and they are the trainees. We have training courses in India where you get a certificate of competence to use the robot after you have done the training course.

ATM: What changes does robotic surgery bring to the multidisciplinary treatment?

Prof. Khan: Multidisciplinary treatment is a very common practice. We do have a tumor board discussion before operation, a multidisciplinary meeting where different specialist's meet and decide the treatment protocol. Another advantage of robotic surgery is that because healing is faster due to smaller cuts, the patient becomes fit for receiving adjuvant chemotherapy or radiotherapy within 2-3 weeks as opposed to open surgery when you need to wait at least 6 weeks before giving adjuvant chemo or radiotherapy.

ATM: What do think of the future development of the robotic surgery?

Prof. Khan: A new development in robotic surgery is the ability to do this operation through a single port. The spider robot is a single device through which multiple hands come out after entering the body. These hands differentiate into a camera and multiple working instruments. Hence you do not need to make 3-4 holes as we currently do.

We also have the availability of giving patients fluorescent dye prior to surgery and by using laser techniques the dye lights up the blood supply of the organ, thereby making the surgery technically more accurate.

They are also working on miniaturization of the robotic platform so that in future we may have natural orifice surgery i.e., entering through the natural opening of the body and performing surgery without any cuts. That is the future.

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Articles from Annals of Translational Medicine are provided here courtesy of AME Publications

Also see at: http://vfrsi.vattikutifoundation.com

Disclosure: The author declares no conflict of interest.

Role of Simulators in Robotic Surgical Training

Dr. Gagan Prakash
MS, DNB (Genitourinary Surgery)
Asst. Professor - Urologic Oncology
Tata Memorial Hospital, Mumbai

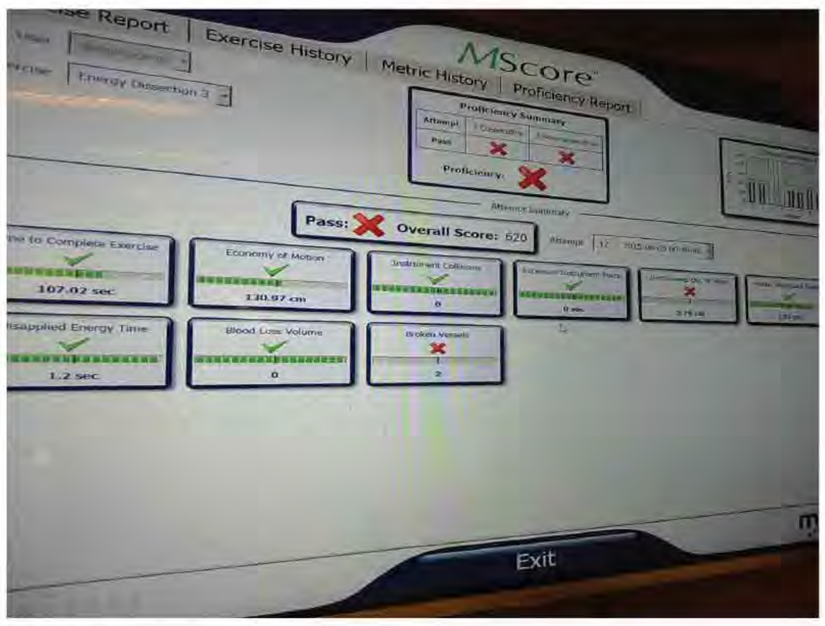
The da Vinci Xi system was installed at Tata Memorial Hospital in September 2014 and we are fortunate to have a double console system along with the da Vinci Skills Simulator (dvSS) back packed to one of the consoles. During the initial days I would spend time on the simulator system but was not very sure how much this would help me in my robotic training. At the VGR 2015 held at New Delhi earlier this year, there was almost an entire session dedicated to robotic training and the role of simulators. This encouraged me to read more about simulators and make a better utilization of this add on. Also during my travel for Intuitive surgical lab training I got a chance to visit the Mimic Technologies office at Seattle. This write up comes from my understanding of the role of simulator in robotic surgical training.

Lessons from Pilots

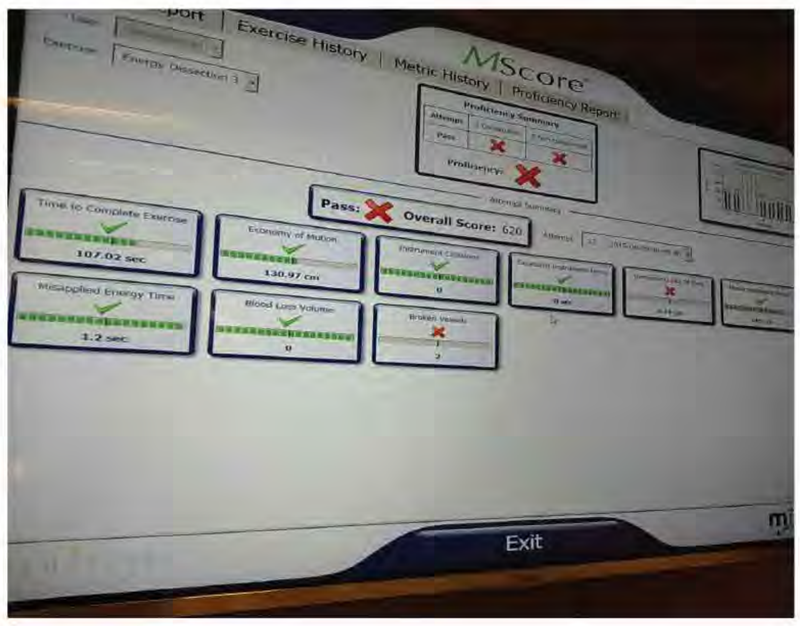
Simulation is the imitation of the operation of a real-world process or system over time. Though the concept of simulation is very common in education and training in various disciplines, its use by pilots is especially inspiring for surgeons as a pilot's job involves handling machinery where the stakes are very high. Also they are often in problematic situations that they have encountered for the first time. Similar is the scenario for a robotic surgeon during initial learning.

The 'beginner' issues

Robotic surgery in India has been growing fast over the last decade. In addition to corporate hospitals, more and more teaching hospitals are acquiring the da Vinci system. However the number of centers providing fellowship / training in robotic surgery in India are not many. Also it is not feasible to go for long duration of training once professional commitments are already in picture. Learning curve for various urological surgeries has been described in literature but achieving those numbers would generally take a long time especially if one is doing open and laparoscopic surgery as well. Alternative methods that can help ease robotic training are needed. Simulator based training is being evaluated as a tool to improve the proficiency of robotic surgeons. The finesse involved in robotic surgery is often a combination of endowrist manipulation, camera movement, spacing of instruments, range of movements, etc. When beginners are performing real time surgery, their attention is focused on surgical steps and they may not appreciate how well they are controlling the console. The simulator allows them to do that. Most simulator systems have an integrated metric scoring that allows you to improvise upon each control independently and also gives an objective feed back of your proficiency at the end of each task (Figure 1).



(Figure 1)



Types of Robotic Surgical Simulators

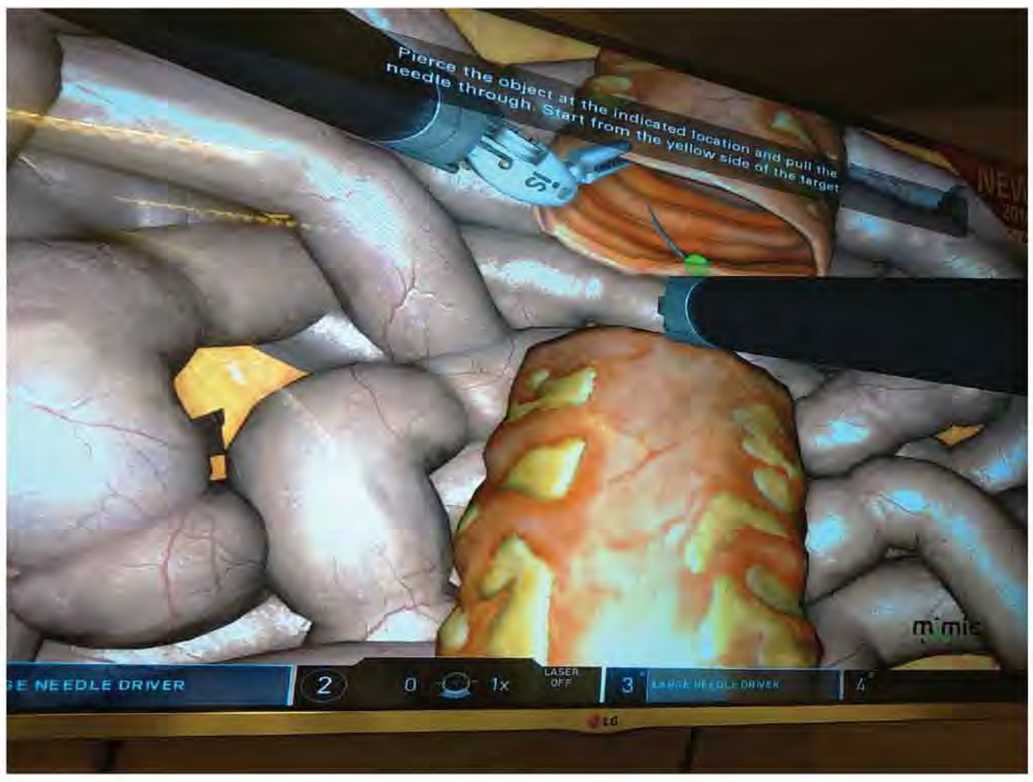
By design simulators are of two types. Mechanical, where exercises can be performed within a box trainer under video-scopic guidance and Virtual Reality (VR), where exercises can be performed within an artificially made environment using a computer based platform. The VR simulator could be a standalone system (RoSS™, Mimic dV-Trainer™, SEP Robot™) or a back pack that can be fitted on the robotic console (da Vinci Skills Simulator™). Currently there is no evidence to suggest that one type of simulator is better than the other.

Are simulators actually helpful – what does the evidence say?

Abboudi et all have recently reviewed the validation status of four robotic simulators and concluded that at present simulators can be used as an adjunct to the initial phase of robotic training.[2] They did not find any one simulator more effective than the other in training. How beneficial can simulators be beyond the initial phase of learning curve is a question yet to be answered. A Randomized trial has concluded that laparoscopic skills are improved in real setting with simulators.[3] However this is yet to be proven with robotic simulators and trials, evaluating the transferability of skills acquired during robotic simulator training to real patient setting are needed.

Bridging Gaps

With growing indications of robotic surgery, the da Vinci system is used by various cancer subspecialties in our hospital. This however means a reduced console time for individual surgeons and consequently a slower opportunity to improvise skills. Identifying one's deficiency during actual surgery, correlating the step with a particular exercise on the simulator and focusing on improvising the step in a more objective manner using the metric system is what I found it to be useful. For instance after my first Robotic prostatectomy I realized the clumsiness of my needle driving during urethrovesicle anastomosis. The 'Tubes' exercise allows one to drive the needle at various clock positions very similar to the movement that is required during the anastomosis. I practiced the exercise on many occasions and that definitely made me more comfortable during the next anastomosis (Figure 2). Similarly the 'Endowrist manipulation' made me more comfortable during pelvic lymph node dissection.



(Figure 2)

Future Directions

Augmented reality based simulators are the next step forward. These would use procedure specific software that would let the surgeon perform a particular surgery step by step on the simulator. The Maestro ARTM (Mimic Technologies, Seattle) has developed simulator programs for partial nephrectomy and hysterectomy that helps trainees identify anatomy, anticipate tissue retraction and predict region of dissection during the exercise.[4]

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Scope of Robotics in Thoracic Surgery

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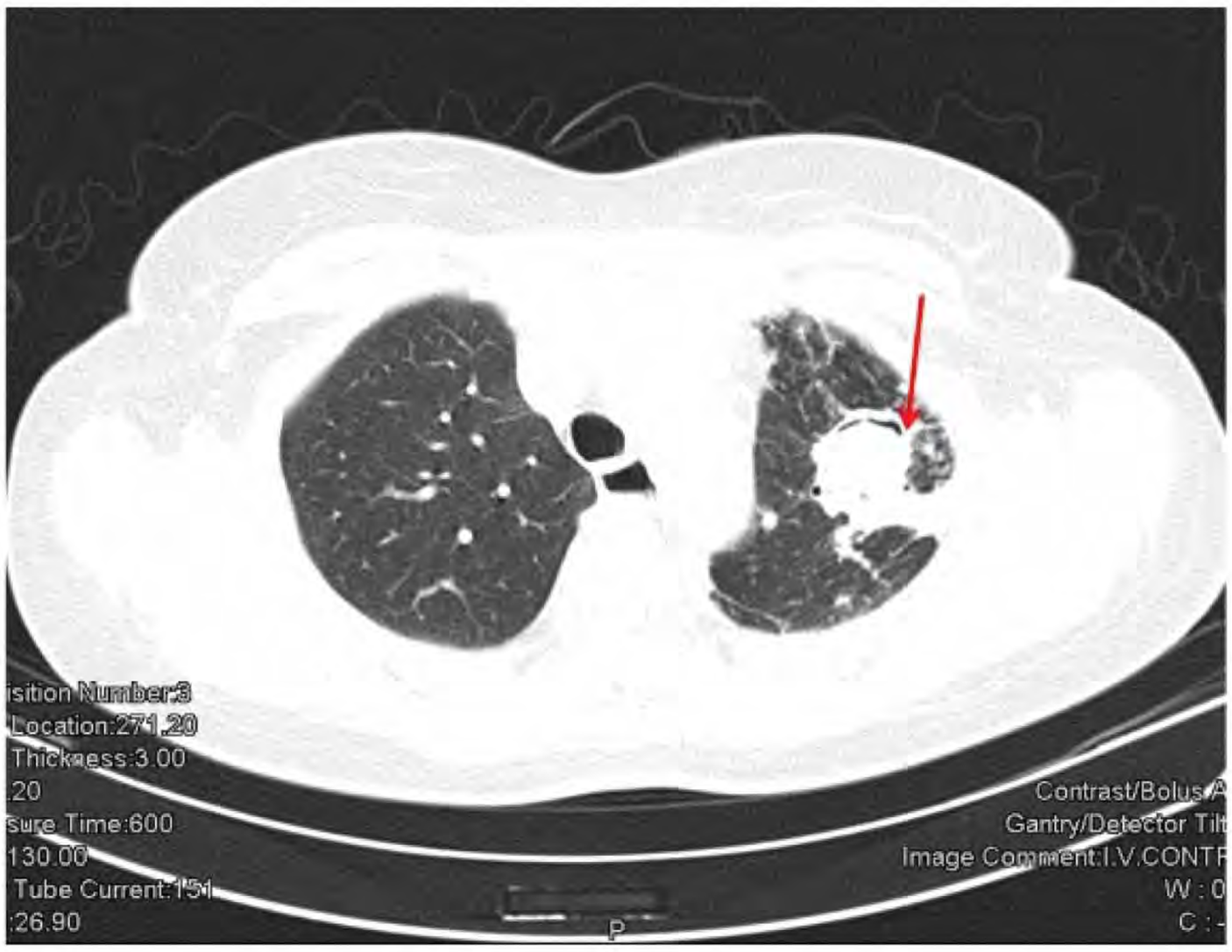
Minimally invasive surgery has progressed to heights in this modern era and thoracic surgery is no exception. The first thoracoscopic procedure was performed by Jacobeus in 1903. Since then it has taken ninety years for the development of techniques of Video Assisted Thoracoscopic Surgery (VATS). This is now gaining acceptance in the modern thoracic surgery practice. VATS offers the obvious advantages of better cosmesis and lesser postoperative pain. There is enough evidence suggesting better pulmonary functions after VATS. This reduces the incidence of postoperative complications combined shorter hospital stay with quicker return to work.

The chest wall is a rigid structure with narrow intercostal spaces, hence the maneuverability of instruments is difficult. There is a higher incidence of intercostal nerve injury as the point of leverage of instrument is the rib. Robotics has the advantage that the fulcrum of movement moves from the chest wall to the endowrist and hence theoretically should cause lesser intercostal neuralgia.

Robotics has emerged as an advancement over VATS in thoracic surgery. In thoracic surgery the use of robotic technology is increasing. Robotic technology was first used in chest for lung resection in 2001. We started our thoracic robotic program using the da Vinci Si HD system in 2011 after an established experience of the VATS program. The thoracic robotic program was initiated to address the limitations of conventional VATS. The da Vinci surgical system provided a magnified three dimensional high definition image in comparison to 2D image of VATS. The 360 degrees of rotation and 7 degrees of movement of the endowrist allows the surgeon to achieve complex movements, hence suturing is more intuitive akin to VATS.



Left upper lobe Aspergilloma

We are now very experienced in Robotic Thoracic surgery. Our experience includes robotic lobectomy and segmentectomy for lung cancer and other benign conditions like aspergilloma, bronchiectasis. We have the largest series in the world for robotic resection of aspergilloma. This is a very complex procedure even by open surgery. The use of robot reduces blood loss from the chest wall. The robot proved to be very helpful to perform finer dissection and suturing to do a sleeve lobectomy. Robotic left sided pneumonectomy was performed in a patient of lung cancer who had received neoadjuvant CT/RT.

In mediastinum we have performed thymectomy for myasthenia gravis, resection of various tumors and cysts (thymoma, thymic carcinoma, neurogenic tumors, parathyroid adenoma, Castleman's disease, bronchogenic cyst, thymic cyst, esophageal duplication cyst and pericardial cyst). The endowrist gives additional ability to lean over the thoracic outlet and dissect the tumor off the underlying important structures like subclavian artery, vein and brachial plexus. This is not possible by VATS.

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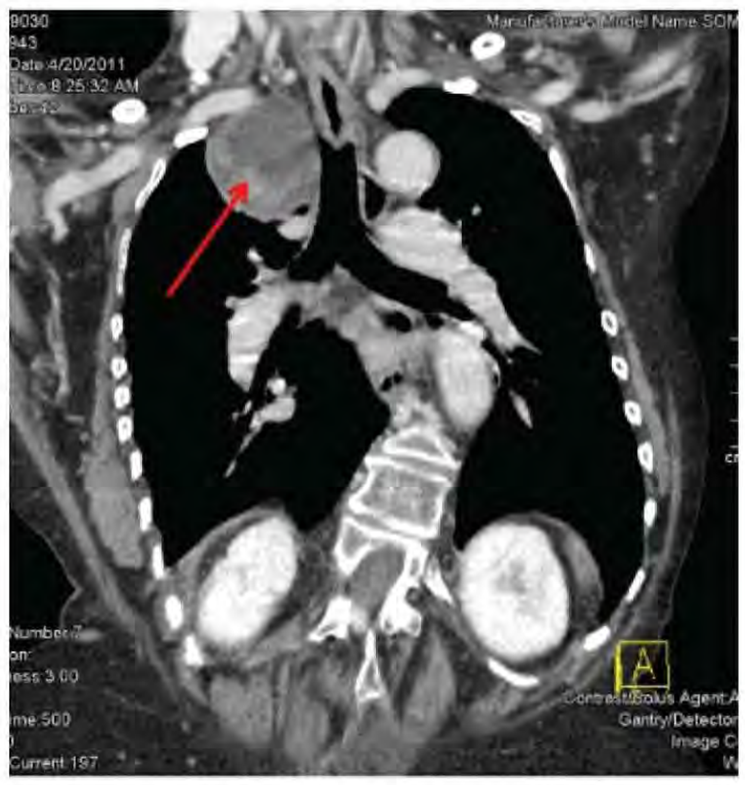
Right sided thoracic outlet tumor

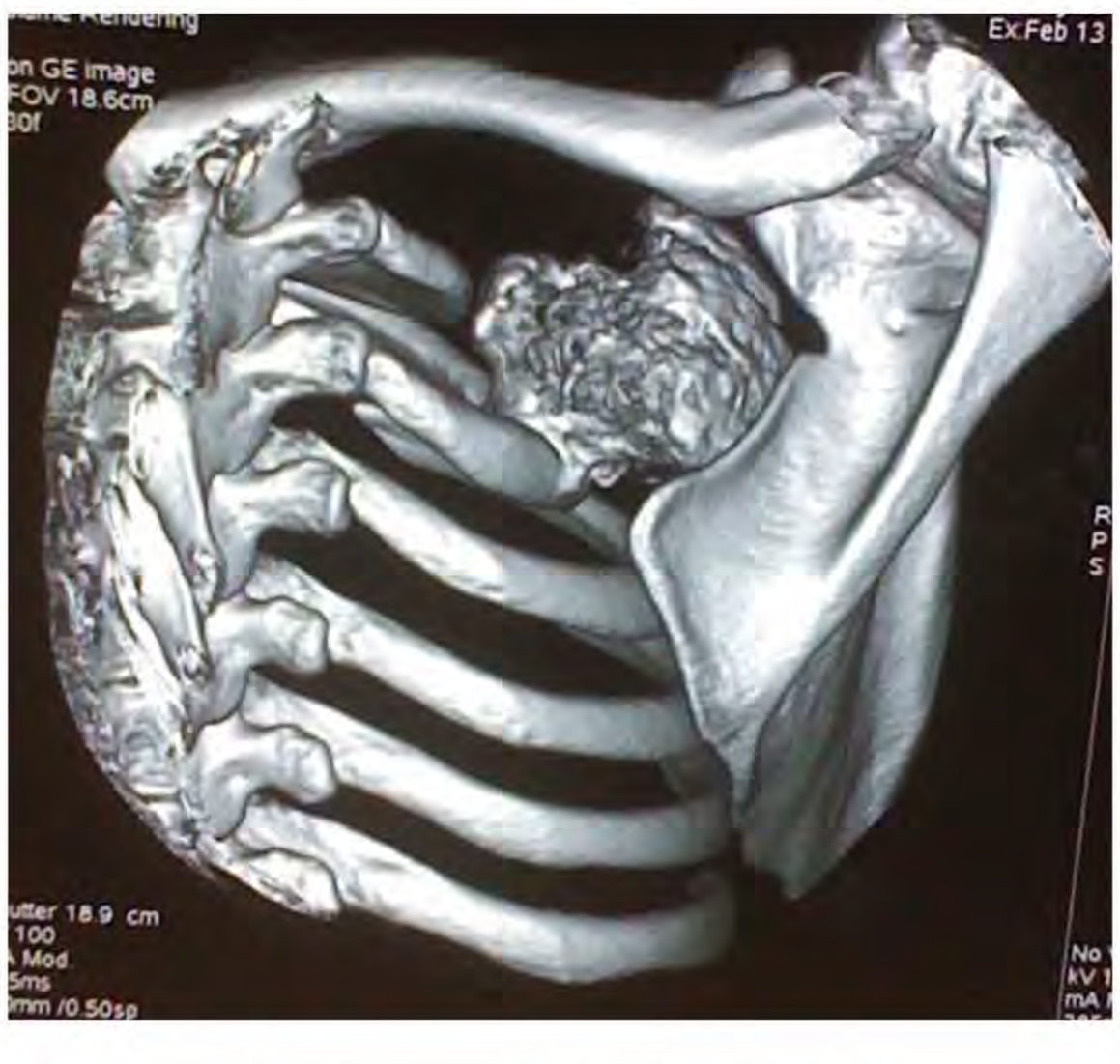


Parathyroid adenoma in Superior Mediastinum

Ligation of thoracic duct at the aortic hiatus followed by pleurectomy resulted in successful management of patients with chylothorax. The ability of the robot to operate in the deep recesses around esophagus and aorta and to be able to suture makes ligation of thoracic duct easy. The procedure was also performed in a patient with situs inversus.

Intracorporeal suturing for plication of diaphragm was done in patients with symptomatic diaphragmatic paralysis. The ease of suturing with robotics is magnified in these cases.

We have devised a technique to perform resection of rib tumor by robotics. Our patient had a big osteochondroma arising from right second rib. This patient was a naval candidate and would not have passed the medical as resection by open surgery needed a big cut on the chest wall. The use of robotics allowed intrathoracic resection of tumor. We are pleased to inform that this patient has cleared the medical and has joined the Indian navy.



Osteochondroma arising from the Second rib

Robotic anaesthesia is a specialized technique. Two anaesthetists are required. The patient is turned with anaesthesia equipment at foot end. Emergency undocking drills have to be performed. An expert surgeon is needed for assistance at the table to manipulate the staplers across vital structures like pulmonary artery, pulmonary vein and bronchus.

The training paradigm for robotic surgeons is beginning to be established. Robotic systems with dual consoles do, however, facilitate having the mentor and trainee operate together in order to learn in a stepwise fashion.

Robotic technology is evolving at a very rapid pace and the number of robotic instruments is increasing. With experience the feasibility and efficacy of the robotic procedures are established. There is a need for developing dedicated robotic units for thoracic surgery as the diaspora of the Asian diseases is different from the rest of the world. We are in process of setting up a multicentric trial to compare outcomes in robotics and VATS. We still continue to perform VATS procedures, which may enable comparative studies in the upcoming years.

We strongly believe that robotics is the way of future. With application of single incision robotic surgery and fluorescence imaging technology the intricacies of robotic surgery will increase. Now as the patients are well informed about the benefits of robotics more and more of them will choose robotic surgery over VATS.

Surgical Robotics

The Global Robotic Surgery market, according to an analysis from TechNavio, forecasts surgicals to grow at a CAGR of 11.65 percent over the period 2013-2018.

Intuitive Surgical's (ISRG) da Vinci surgical robot platform is the granddaddy of medical robots. Originally developed for telesurgery in the battlefield, the da Vinci robot was approved for adult and paediatric use by the FDA in 2000 with urologists and gynaecologists among the early adopters.

Since then however, robotic surgery via da Vinci system has become widespread.

An estimated 200,000 surgeries were conducted using the robot in 2012, mostly for hysterectomies and prostate removals (prostatectomies).

Approximately 4 out of 5 radical prostatectomies in the United States are performed using the da Vinci system, giving Intuitive a huge lead in the market. The robot was used in nearly 523,000 surgeries nationwide last year—triple the number just four years earlier.

The da Vinci system is not an autonomous robot. Instead, the da Vinci is a master-slave system, in which the surgeon uses controls located outside the patient's body to perform surgery using instruments inserted into the body through a series of small incisions.

While surgical robots like the da Vinci can be operated from remote locations, a typical configuration sees the surgeon controlling the robot in the operating theatre and in close proximity to the patient.

In April 2014, Intuitive launched the Xi model of the da Vinci robot. Optimized for complex procedures, the new robot includes an instrument arm architecture that's designed to facilitate anatomical access from virtually any position.

It also includes a new endoscope digital architecture that creates a simpler, more compact design with improved visual definition and clarity. Meanwhile, smaller and thinner arms promise a greater range of motion than ever before, while longer instrument shafts provide surgeons with greater operative reach.

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Excerpts taken from: rbr industry special report
www.roboticsbusinessreview.com

Robotic assisted laparoscopic repair of a caesarean section scar defect

Mohamad S. Mahmoud, MD, FACOG, Farr R. Nezhat, MD, FACOG, FACS

Published Online: June 09, 2015

Abstract

Study Objective

To describe our technique for the repair of a caesarean section uterine scar defect following the removal of an ectopic pregnancy from the scar in a patient desiring future pregnancies.

Design

Step-by-step explanation of the procedure using video.

Setting

Uterine scar dehiscence/defect is one of the known complications of multiple caesarean deliveries. It can result in abnormal bleeding, infertility, and caesarean scar ectopic pregnancy. With the rise of the number of caesarean sections performed in the United States, we are witnessing an increasing number of this complication. Nonetheless, there are currently no standardized surgical treatment guidelines available to manage this pathology in a minimally invasive approach.

Interventions

In this video we describe our technique for the surgical management of a symptomatic caesarean section scar defect. We performed a robotic assisted laparoscopic repair of the defect in a 40 years old G4P3013 who recently had a caesarean section scar ectopic pregnancy that was previously managed by endometrial curettage and who had subsequently persistent abnormal vaginal bleeding. A repeat ultrasound revealed a low uterine segment defect consistent with dehiscence. She was referred to us as she desired a conservative treatment given her hope of future pregnancies. The defect was localized by hysteroscopy and laparoscopy after developing the bladder flap. The scar tissue around the defect was resected and the freshened edges defect closed using delayed absorbable suture. Chromopertubation confirmed water tightness of the repair.

Conclusion

Robotic assisted laparoscopic repair of caesarean section scar defect is a feasible and safe procedure when done with respect to anatomy and following sound surgical technique. With the increasing number of caesarean sections, gynaecologists will be dealing with this pathology more frequently and need to get more familiar with different techniques that can be helpful to perform such a repair.

http://www.jmig.org/article/S1553-4650%2815%2900425-2/abstract

Robotic shaving technique in 25 patients affected by deep infiltrating endometriosis of the rectovaginal space

Antonio Pellegrino, MD, Gianluca Raffaello Damiani, MD, Claudia Trio, MD, Paolo Faccioli, MD, Paolo Croce, MD, Fulvio Tagliabue, MD

Published Online: June 09, 2015

Abstract

Aim

Minimally invasive surgery represents the gold standard for the management of deep infiltrating endometriosis (DIE) involving the rectovaginal septum (RVS). This analysis aimed to evaluate the feasibility of Robotic-assisted laparoscopy (RAL) and clinical outcomes in terms of long-term complications, pain relief and recurrence rate, for the treatment of DIE of the RVS.

Methods

A prospective cohort study of robotic procedures was performed between October 2010 and July 2014, including removal of endometriotic nodules from the RVS with rectal shaving alone or in combination with accessories procedures. In all the cases the rAMRS (Revised American Society for Reproductive Medicine system for endometriosis) score was > 40points, (Stage IV).

Results

25 consecutive patients underwent RAL, with a successful complete nodule debulking by wall shaving technique. Pathology confirmed the adequacy of the surgical specimen and the median largest endometriotic nodule was of 21 mm (10-60), with free margins in all cases. The median operative time from skin opening to closure was 174 minutes (range: 75-300) and Blood loss was near 0 ml. Median revised Enzian score for A location (RVS) was 2 (range 1-3). The more frequent Enzian Class was A2B0C0 (48%), followed by A3B0C0 (12%). In 3 cases (12%), partial vaginal resection was required to remove endometriotic nodules of the RVS in class A3B0C1FI, A3B0C0FO, A3B0C0 respectively. No Intra-operative complications occurred.

Conclusion

This series has a median long term follow up of 22 months (range: 6-50) currently available with an optimal operative time, demonstrating good long-term outcomes and it helps to promote robotics as a safe and attractive alternative to accomplish a comprehensive surgical treatment of DIE.

http://www.jmig.org/article/S1553-4650%2815%2900426-4/abstract

Dr. Catherine Mohr, VP, Medical Research, Intuitive surgical inc, USA
("The Future of Intervention and Surgery")

Dr. Sherry Wren, Professor of Surgery, Stanford School of Medicine
("minimally Invasive Surgery and Role of the Robot")

Dr. Mahendra Bhandari, CEO - Vattikuti Foundation
("Robot Assisted Surgery in India and its Future")

Dr. Sudhir K Rawal, Director Surgical Oncology, RGCI
("Special felicitation on completing 1000 Robotic Surgeries")

Panel Discussion on Robotic Surgery: "My recipe for success"

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K Subhramaniam - In Memoriam

Santosh Shetty
Executive Director & COO
Kokilaben Dhirubhai Ambani Hospital, Mumbai

"One of the finest business leaders that I have met, our relationship was beyond a vendor buyer one. Extremely articulate, Subrahmaniam would hold his ground without hurting the other side. In his untimely death, we have lost a partner who was instrumental in helping us develop the Robotic surgery program."

Sujit Chatterjee
CEO, Hiranandani Hospital, Mumbai

Please accept heartfelt sympathy from all at Dr L H Hiranandani Hospital. On a personal note I am saddened with this loss. I had the opportunity of meeting Mr K Subrahmaniam in Mumbai many moons ago and found him to have a vision for healthcare in India and not only limited to robotic surgery. May his soul rest in peace

Joy Chakraborty
COO, Hinduja Hospital, Mumbai

I feel very sorry about his sudden demise! Please accept my condolence. May his soul rest in peace.

Mahendra Narwaria
Chairman, Asian Bariatrics Pvt. Ltd., Ahmedabad

KS was more a friend than a professional. I had great affection for him and I know nobody can replace him. I pray his soul rests in peace and wish Vattikuti Technology and Foundation all the best. I am always there for any help to fulfil the dreams of KS.

Naresh Shetty, President, MS Rammaiah Hospital, Bangalore

It is indeed sad and especially when it happens so unexpectedly.
At this difficult time we wish god gives enough strength to the family to get over this terrible grief. To his team, I hope you all continue to uphold the values he had always believed in.

Jaideep Gupta
MD, Indraprastha Apollo Hospitals, New Delhi

Heartfelt condolences to the family and colleagues of Mr Subrahmaniam. He was indeed a valuable partner to us at Apollo in the development of robotic surgery and we will miss him tremendously.

Sabyasachi Bal, Fortis Hospital,
Vasant Kunj, Delhi

This was a traumatic news. Although only an aspiring robotic surgeon, I was always touched by KS's generosity and understanding. I am sure that the great Lord above will happily take him under his wings. May God bless his soul.

Mudit Saxena, COO, Health Care Global, HCG Bangalore

Our condolences to the family and to your organization. KS was a strong willed man with great determination
May God give strength and courage to all of you to bear this loss
May his vision drive you to strive continuously to deliver better healthcare services.

Harish Pillai, CEO, Aster DM Healthcare Pvt Ltd.
Kochi, Kerala

It's a profound shock and I just cannot believe it still. KS was a fire brand professional with a missionary zeal to spread the concept of Robotics across the land- a hard boiled nuts and bolt's person with a kindred spirit who had the gentle touch to ease nervous anxieties in start-up ventures. He will be sorely missed.
On behalf of my entire team and on behalf of Aster DM Healthcare we convey our deepest condolences. May his soul rest in peace.

DLL Group

Gagandeep Grover
VP and Head, Commercial,

We at DLL India share our heartfelt condolences for your loss. We will truly miss the leadership and energy of Mr. K Subrahmaniam.

Geert Kraak
Director / Country Manager

We'll continue to work closely with Vattikuti Technologies to ensure Robotic Surgery finds its way to hospitals and clinics in India as well.

Bakthavathsalam
Chairman, KG Hospital, Coimbatore

KS was a noble soul and his sudden passing away is a great and irreparable loss to all of us. Please accept my heartfelt condolences. May his soul rest in peace.

George Karimundackal, Founder at Redstart Solutions Pvt. Ltd. Bangalore

Heartfelt condolences. He will be a great loss. Will always remember him as a man of great energy, vision and a trouble shooter par excellence

Yogesh Sareen
CEO & MD, Max Healthcare

This was a very sad news indeed and we pray to almighty to rest his soul in peace. We all at Max Healthcare, offer our heartfelt condolences on this untimely death.

Chinnababu Sunkavalli
Apollo Cancer Institute, Hyderabad

It is indeed a great loss for the Robotic community in India. It was the proactive nature of KS which pushed us to embrace Robotics.
Deep condolences

Navin Bhambhani
Jupiter Hospital, Thane

Sincere condolences on the sad demise of KS. May his soul rest in peace. Always a supporter for modernisation of medical treatment in India, we will be there to realise the dream.

Santhanam, CEO, Breach Candy Hospital, Mumbai

I can't believe KS is no more. Such a wonderful human being apart from everything else. May his soul rest in peace.

Abraham Peedicayil
CMC, Vellore

We regret the sudden demise of Mr KS. He was very keen that we get robotic surgery started in Vellore. Condolences to his family, friends and colleagues.

(Join Us @ Robotic Surgeons Council Meet)

12-13 September 2015

Amrita Institute of Medical Sciences & Research Centre, Kochi

International Faculty:
Dr. Mario M. Leitao, Jr., MD, FACOG, FACS,
Department of Gynecologic Surgery
Memorial Sloan-Kettering Cancer Center

Feedback: vtnewsroom@vattikutitechnologies.com Your Feedback is valuable

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