



Benign Gynecological Surgeries and the Role of Robotics

Rooma Sinha

Professor, Gynecology Apollo Health Education & Research Foundation, Associate Professor, Macquarie University, Australia, Laparoscopic & Robotic Surgeon, Apollo Hospitals, Hyderabad, India

ABSTRACT

Robotic surgery is the most recent introduction in the field of minimally invasive surgery. In a robotic surgery, the surgeon uses a robotic system to control the instruments for the surgical procedure. Robotics in gynecology could play an important role, where laparoscopic surgery is performed with an advanced computer-assisted technology. Robotic surgical systems have been used in various gynecological surgeries for benign diseases, such as hysterectomy and myomectomy. The robotics technique has various advantages; however, the three major concerns when using robotics are more time required, higher cost involved and more ports to be used. The purpose of this article is to review the current literature and discuss the role of robotics in benign gynecological surgeries.

Key words: Laparoscopy, Robotics, Hysterectomy, Myomectomy

INTRODUCTION

India is the pioneer in gynecological endoscopy in the world, by bringing in and adapting new technologies that have propelled us further in the field of gynecology. The introduction of video laparoscopy and the first laparoscopic hysterectomy (in 1988) have been the game changers in gynecological surgeries. It was difficult to teach and learn at the beginning; however, the introduction of video laparoscopy proved to be a boon in gynecology.

Hysterectomy is performed through various modalities which has progressed over time. For women requiring a benign hysterectomy procedure, it should not be considered challenging to use 2-dimensional options, straight stick laparoscopic skills, etc., and a long learning curve, difficulty in suturing should not be limiting for doctors to perform open surgeries.

With the advent of laparoscopy and having experienced laparoscopic surgeons, performing open gynecological surgeries raises an important ethical question that when laparoscopy is feasible, can all surgeries be done, and can all the surgeons perform gynecological surgeries using laparoscopy. This is the area where robotics in gynecology could play a key role, where laparoscopic surgery is performed with an advanced computer-assisted

technology. The purpose of this article is to review the current literature and discuss the role of robotics in benign gynecological surgeries.

MYOMECTOMY

Minimal access surgeries for myomectomy depend on factors such as the size, number and location of fibroids, and scientific evidence, before proceeding with the surgery. However, myomectomies can be performed using techniques such as laparoscopy, hand-assisted laparoscopy, robotic myomectomy, and hybrid myomectomy techniques.

A study by Sinha *et al.*, presented at the American Academy of Gynecologic Laparoscopists in 2015 compared the outcomes of laparoscopic-assisted myomectomy (LAM) versus robot-assisted laparoscopic myomectomy (RALM) in about 76 patients. The clinical outcomes of RALM suggested that the operative time was high (106 min vs. 101); however, it significantly reduced the length of stay and blood loss as compared to LAM. Furthermore, the weight and number of fibroids were much higher with RALM. Hence, it can be concluded that in complex myomectomy cases, RALM can be successfully used.

ADVANTAGES OF ROBOTICS TECHNIQUE

This technique is used for myoma extraction, uterine reconstruction including myoma bed suturing, and for complex myomectomy.

Corresponding Author:

Dr. Rooma Sinha,
A 402 Aparna Towers, Kondapur, Hyderabad - 500 084, Telangana, India.
E-mail: drroomasinha@hotmail.com

Received: 18-12-2021

Accepted: 25-12-2021

DOI: 10.15713/ins.jgog.28

Myoma Extraction

When compared to general laparoscopy, myoma extraction is much more than traction, counter traction, and suturing in two layers. Intracapsular myomectomy is performed to save the pseudo capsule that consists of the vascular network and the neuroendocrine bundle, thereby mediating inflammation and wound healing. Gentle myomectomy by coagulating and cutting the fibrous bridges constitutes the extraction of myoma from the fibromuscular layer using the PushSpreadToggle technique.^[1] Sharp and simple sutures can help in preserving the endometrium infertile patients.

Uterine Reconstruction

A transmural defect of about 10–12 cm interior wall myoma from the serosa to endometrium cannot be closed in two layers. Furthermore, quick suturing can help in controlling the heavy blood loss as there is continued blood loss while suturing. Hence, sometimes, it may require up to 5 layers of suturing as well.

Robotics offers an advantage of 540° twist of the robotic needle driver that simulates the rotation of a human wrist compared to that of a 45° shoulder movement in laparoscopy with a lap needle holder. Therefore, this technique results in deep bites, precision multilayer closure of the uterine defect in less time.

A study by Chandra *et al.*, compared the laparoscopic versus robotic suturing performance by experts and novices and the results are as mentioned in Table 1.

In conclusion, robotics is an advanced and improved enabling tool for gynecological surgeries.

COMPLEX MYOMECTOMY

Complex myomectomies can be due to fibroids/myoma that are large, multiple in number, at odd location, abnormal capsule, or has multiple pathologies together. A large oddly located myoma, in the lower uterine segment closer to the cervix needs careful evaluation and operation as the bladder is in proximity. In abnormal myoma capsule, we can usually see an alteration in the fibroid tissue texture and a complete loss of the dissection plane making it difficult to locate the myoma.

Complex pathological myomas such as bilateral endometriomas, fibroids with coexistent adenomyoma require a strong strategy and means to resolve. For all such cases, robotics techniques will prove to be beneficial.

Table 1: Results from comparison of laparoscopic versus robotic suturing performance

Robot vs. laparoscopy	Lap expert	Lap novice
Smoothness of the task	No difference	Better
Total task time	Better	Better
Instrument path length (Economy of movement)	Improved	Better (Persistent enabling effect)

APPLICATIONS OF ROBOTICS IN THE FOLLOWING CONDITIONS

Robotic Hysterectomy

There are two types of hysterectomy that are prone to conversion – large specimen and endometriosis. For a case with a large fibroid, regular port placement is practiced. Port placement at umbilicus traces the upper pedicles and then moves to the cervix for opening and closing the vault to complete hysterectomy procedure. Robotic instruments with their maneuvering ability help a great deal in such cases. Manipulation becomes difficult in a large specimen with multiple large myomas. Skillful rotation with upward push of colpomotizer makes it easier to handle.

Bladder dissection in certain cases is difficult especially when it is placed in the lower segment scar. A head-on robotics approach is followed with bipolar forceps in the left hand to push the uterus up making space for the bladder dissection easily.

Tacking Uterine Vessels in Large Uterus

Only two instruments are used for tacking the uterine vessels where hot shears are for coagulation and retraction while bipolar forceps are used to hold and stretch. The alternation technique with both the instruments is similar to doing a ballet.

A study by Sinha *et al.*, comparing robotic versus laparoscopic hysterectomy in a large uterus stated that the conversion rate was 4% with robotic surgery as compared to 10.9% with laparoscopic surgery.^[2]

Endometriosis

The adhesive nature of this disease creates favorability for robotic surgery as compared to laparoscopic surgery for adhesiolysis. Robotics offers much precision to tackle endometriosis surgeries, however, the cost factor is higher vis-à-vis laparoscopic procedure.

Robotic Sacrocolpopexy

Dissection of rectum from behind and bladder in front from the vaginal vault is done using robotics. In benign urogynecological cases, dissection and suturing is easy with the help of robotics.

Youssef's Syndrome

This syndrome involves the adherence of the bladder with the lower segment of the uterus with the presence of menouria. The bladder base with the uterus is identified and dissected off the uterine wall with the help of robotics. The bladder is repaired and the uterine scar is fixed with the help of a peritoneal patch to prevent fistula reforming and is sutured in two layers.^[3]

Cervical Cerclage

For preventing pregnancy loss, mersilene tape is used as a suture in all types of surgeries. The precision to using mersilene tape can be slightly better with robotics.

Concerns with Robotic Technology

The three major concerns when using robotics are more time required, higher cost involved, and more ports. Suitable modifications have been suggested to address these concerns.

For myomectomy, the following steps are proposed to make a difference:

- Preoperative magnetic resonance imaging
- Reduced ports and instruments
- Barbed suture (30/45 cm)
- Cold knife morcellation and indigenous bags
- Hybrid myomectomy

As far as time taken for the surgery with robotics is concerned, the clinical outcomes suggest that though robotic myomectomy demands more time, it is performed for complex cases with higher fibroid weights; thereby reducing the length of stay, IV analgesia administration, and blood transfusion.

CONCLUSION

Robotics in benign gynecologic surgery is still evolving. It is expected that in the next 10 years, gynecology as therapy will see a steep rise in the use of robotics as a means to manage various conditions and surgeries. Medtronic also plans to

launch a new soft tissue robot against the existing da Vinci in India.^[4]

Soon, robotic technology will be available at counter side to laparoscopy in gynecology. However, at a point where robotics can be more beneficial to women, it stands a chance to replace the existing laparoscopic techniques.

REFERENCES

1. Tinelli A, Malvasi A, Hurst BS, Tsin DA, Davila F, Dominguez G, *et al.* Surgical management of neurovascular bundle in uterine fibroid pseudocapsule. *JLS* 2012;16:119-29.
2. Sinha R, Bana R, Sanjay M. Comparison of robotic and laparoscopic hysterectomy for the large uterus. *JLS* 2019;23:e2018.00068.
3. Shanmugasundaram R, Gopalakrishnan G, Kekre NS. Youssef's syndrome: Is there a better way to diagnose? *Indian J Urol* 2008;24:269-70.
4. Chiu LH, Chen CH, Tu PC, Chang CW, Yen YK, Liu WM. Comparison of robotic surgery and laparoscopy to perform total hysterectomy with pelvic adhesions or large uterus. *J Minim Access Surg* 2015;11:87-93.

How to cite this article: Sinha R. Benign Gynecological Surgeries and the Role of Robotics. *J Glob Obstet Gynecol* 2021;1(3):127-129.

Source of support: Nil, **Conflict of Interest:** Nil.

This work is licensed under a Creative Commons Attribution 4.0 International License. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in the credit line; if the material is not included under the Creative Commons license, users will need to obtain permission from the license holder to reproduce the material. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/> © Sinha R. 2021