The robot is gaining ground in gynecologic surgery. Should you be using it?

Six experts exchange viewpoints on whether increasing use of the robot is warranted in benign gynecologic surgery

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Watch Dr. Advincula discuss robotics in endometriosis surgery. See page 60.

The publication of a large cohort study of hysterectomy for benign indications revived a debate over robotic assistance in gynecologic surgery.[1] The study—by Jason D. Wright, MD, and colleagues—included 264,758 women who underwent hysterectomy for benign indications in 441 US hospitals from 2007 to 2010, and it produced some dramatic findings:

- The use of robotic assistance increased from 0.5% of all hysterectomies in 2007 to 9.5% in 2010
- Three years after the first robotic procedure in each hospital where robotics were used, robotic-assisted hysterectomy accounted for 22.4% of all hysterectomies
- Laparoscopic hysterectomy increased as well, from 24.3% of all hysterectomies in the first quarter of 2007 to 30.5% in the first quarter of 2010
- The rate of vaginal hysterectomy declined from 21.7% to 19.8% of all hysterectomies during the same time period
- Abdominal hysterectomy decreased from 53.6% to 43.1% of all hysterectomies
- Although robotic-assisted and laparoscopic hysterectomy had similar complication rates, transfusion requirements, and rates of discharge to a nursing facility, the robotic-assisted approach cost $2,189 more.[1]

An editorial accompanying this study opined that physicians and hospitals have a "duty" to make sure patients are aware not only of the benefits and risks of each surgical option but also of its financial cost.[2] The editorialists suggested that cost should be taken into account by the surgeon, as well. When a more expensive treatment proves to be more effective than the conventional approach, there typically is little argument about paying the higher cost. When the new treatment or technology is equally effective, however, as is the case with robotic hysterectomy and the laparoscopic approach, the choice of treatment "should be more straightforward."[2] That is, the lower-cost treatment should be preferred, the editorialists concluded.

The study by Wright and colleagues and the accompanying editorial prompted some important questions:

- Should robotic assistance be offered for patients undergoing hysterectomy for benign indications when it produces outcomes equivalent to laparoscopic hysterectomy but costs one-third more?
- Is the robotic approach justified in other benign gynecologic surgical procedures?

To explore these questions, we invited a roster of experts in minimally invasive gynecologic surgery to share their perspective and experience, including the lead author of the article mentioned above, Jason D. Wright, MD. In this roundtable discussion, these experts discuss the robotic experience at

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their respective institutions, characterize the data to date, and offer valuable suggestions about whether and when to incorporate the robot into your surgical practice.

What is driving the demand?

OBG MANAGEMENT: How much of the demand for the robot do you think is patient-driven? Hospital-driven? Physician- or data-driven?

Cheryl B. Iglesia, MD: With any new technology, there is a honeymoon phase when providers, patients, and hospitals really tout innovation. With its superior optics and 3D vision, the robot certainly enjoyed an extended honeymoon, driven by innovation and a "cool factor." However, as experience, comparative studies, and longer-term outcomes data become known, demand for new technology is tempered and refined. The choice of technology also has to include an acknowledgement of its cost-effectiveness—or lack of it.

Jamal Mourad, DO: I believe that the demand for minimally invasive procedures, including robotic-assisted surgeries, is multifaceted. The public has learned to have certain expectations about the care it receives. In addition, the media have incorporated a tremendous amount of information about minimally invasive surgery and robotic procedures into TV shows, newscasts, newspapers, and many other outlets. This information certainly stimulates, at the very least, curiosity on the part of the patient, which leads, in turn, to more inquiries about the robot during initial consultation with a surgeon.

Rosanne M. Kho, MD: Here at the Mayo Clinic in Arizona, we adopted use of the robot early. Following the lead of Javier Magrina, MD, we started with the Zeus system (Computer Motion) in 2003 and, subsequently, the da Vinci system (Intuitive Surgical) in 2004. At the time, not many data were available on the use of the robot in gynecology. We looked at the experience in urology and saw its applicability in gynecology. At our institution, therefore, our use of the robot was not driven by the market or data. It was primarily

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—Cheryl B. Iglesia, MD

physician-driven and, fortunately, supported by our institution.

Jason D. Wright, MD: Demand for the robot stems from four different sources, in my opinion. Approximately 25% is patient-driven, 25% is surgeon-driven, 25% is hospital-driven, and let's not forget industry—the makers of the robot—which accounts for 25% of demand. There is a delicate balance between all four buckets that is dynamic and always in flux. A shift too heavily in one direction can lead to problems, especially if variables such as proper infrastructure, outcomes data, or indications, just to name a few, are missing.

Marie Fidela R. Paraiso, MD: Many have criticized the marketing of robot-assisted surgery straight to the consumer. In fact, some investigators have found the claimed benefits of robotic surgery touted in marketing efforts by most hospitals to be unsubstantiated.[3,4] That being said, hospitals market the robot to justify its cost and increase patient volume. And many surgeons who lack sufficient training or skill in advanced traditional laparoscopic surgery have embraced and marketed the robot platform as they have enhanced their surgical practices, converting open surgeries to minimally invasive procedures in the process. Patients are attracted to "new" procedures and equate them with "better" when they are choosing a physician or a procedure.

The demand for the robot is also physician driven. In my surgical armamentarium, I use this technology to do complex, multiprocedure pelvic floor repairs that require deep pelvic dissection and suturing or the addition of rectal prolapse procedures or retropubic space anti-incontinence procedures, with or without paravaginal repair.

What do the data show?

OBG MANAGEMENT: What do the data reveal about robotic-assisted gynecologic surgery?

Marie Fidela R. Paraiso, MD: For benign conditions, data on robot-assisted laparoscopy are sparse and show no significant benefit, with higher cost and greater operative time than conventional laparoscopy in randomized trials.[5,6] A Cochrane review and a large retrospective analysis support these findings.[7,8] Another large retrospective study shows that robotic-assisted laparoscopy is associated with a shorter hospital stay, recovery

The OBG MANAGEMENT expert panel

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time, postoperative time, and lower cost.[9]

Robotic surgery has proved to be beneficial in gynecologic oncology and has increased the use of minimally invasive access in gynecology, especially among novice or inexperienced minimally invasive surgeons. It also has helped some surgeons develop skills in advanced traditional laparoscopy.

Rosanne M. Kho, MD: Over the past 10 years in benign gynecology, retrospective comparative studies have found similar complication rates between the robotic approach and conventional laparoscopy. However, operative time and costs are higher in robotics.

One major *advantage* of the robot, demonstrated in multiple studies, is that the laparotomy rate for hysterectomy has declined in many centers and by as much as 14%, as Dr. Wright and his colleagues found, once the robotic platform becomes available.[1]

Are you using the robot more?

OBG MANAGEMENT: Has use of the robot increased at your institution?

Rosanne M. Kho, MD: With close to 10 years of experience with the robot, our utilization in gynecology is now stable—it's neither increasing nor decreasing.

Cheryl B. Iglesia, MD: Yes, use of the robot at my institution has increased as more specialties have adapted the approach, including thoracic surgeons; ear, nose, and throat specialists; and colorectal surgeons. However, the majority of cases are either urologic or gynecologic in nature (urogynecology and gynecologic oncology).

Arnold P. Advincula, MD: This question is difficult to answer because, at Florida Hospital Celebration Health, we are a bit of an outlier. I function within a Global Robotics Institute that is dedicated to the safe and proper use of robotic technology by emphasizing optimal patient outcomes, teaching best practice techniques, and innovating future surgical platforms. Access is allowed for a limited number of surgeons in the various disciplines who are recognized pioneers and for high-volume surgeons with a proven track record of surgical outcomes. Our utilization across all disciplines, including gynecology, always has been high because of this infrastructure.

Jamal Mourad, DO: I have seen a steady, progressive growth in the number of robotic procedures performed at our institution. Initially, the urology department used our robotic equipment to perform prostatectomies. Shortly after that, quick acceptance by several departments, including gynecology, oncology, general surgery, colorectal surgery, and pediatric surgery, led to widespread use and acceptance.

OBG MANAGEMENT: Does increasing use of the robot make it more likely that it will be used in hysterectomy for benign indications?

Rosanne M. Kho, MD: Our primary approach to the simple hysterectomy for benign conditions (including nulliparous women, those with a uterus larger than 12 weeks' size, and women who have undergone previous pelvic surgery) is still vaginal. Patients with pelvic pain, known endometriosis, and suspicious adnexal masses are approached laparoscopically or robotically.

Compared with conventional laparoscopy, we have found the robot particularly useful in obese patients and in cases requiring extensive dissection and suturing, such as in benign complex gynecology (involving endometriosis, ovarian remnant syndrome), urogynecology (for prolapse and fistulas), and all aspects of gynecologic oncology.

In our hands, the robot has been a facilitating tool, allowing us to perform complex procedures that would otherwise have been difficult to perform with conventional laparoscopy.

Which benign conditions are being addressed robotically?

OBG MANAGEMENT: What benign procedures in gynecologic surgery is the robot used for at your institution, Dr. Advincula?

Arnold P. Advincula, MD: It's used for the entire gamut of benign procedures in gynecologic surgery, ranging from complex hysterectomy to reproductive surgical cases such as myomectomy and endometriosis resection to pelvic reconstructive surgery. Our success with such a broad range of applications is

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—Rosanne M. Kho, MD

very much attributable to the infrastructure that we have in place that allows us to use the robot safely and efficiently.

OBG MANAGEMENT: What makes the robot so attractive?

Jamal Mourad, DO: Robotic technology allows for much-improved visualization, better dexterity and maneuverability, and near total control of the surgical field. I have found that the combination of these advantages permits predictable and reproducible procedures, less tissue trauma, less blood loss, a shorter hospital stay, and fewer conversions to laparotomy, even in very difficult and challenging situations, such as cases involving dense adhesions, a large uterus, or deep infiltrating endometriosis.

Cheryl B. Iglesia, MD: At my institution, the robot is used for sacrocolpopexy, some myomectomy and endometriosis cases (although haptic feedback for these tough endometriosis cases often makes laparoscopy more useful), and, rarely, fistulas (vesicouterine, ureterovaginal).

Jamal Mourad, DO: There are several experienced minimally invasive surgeons at my institution. In addition to hysterectomy, we perform sacrocolpopexy, myomectomy, and resection of severe endometriosis using the robot.

Marie Fidela R. Paraiso, MD: We use the robot for hysterectomy, myomectomy, sacrocolpopexy, Burch colposuspension, paravaginal repair, tubal reanastomosis, endometriosis resection, ureterolysis, and cerclage.

Jason D. Wright, MD: At my institution, robotic surgery for benign indications has been used predominately for hysterectomy and myomectomy, as well as sacrocolpopexy. Given the lack of data to guide implementation of robotic surgery in gynecology, it is difficult to determine which patients derive the most benefit from robotic-assisted procedures.

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Should the robot be used for benign hysterectomy?

OBG MANAGEMENT: Do you believe use of the robot is justified in hysterectomy for benign indications?

Cheryl B. Iglesia, MD: No, I believe that most hysterectomies should be done vaginally. If, for some reason, the vaginal approach is not feasible, then laparoscopic hysterectomy is the next best choice and more cost-effective than robotic hysterectomy. Comparative studies and Dr. Wright's *JAMA* article seem to concur.[1] Open abdominal hysterectomy should be the last option.

Rosanne M. Kho, MD: I do believe that the robot is justified for use in hysterectomy for benign indications. It has provided many patients with the benefits of minimally invasive surgery, as studies have shown.[1,9] In an ideal world, simple hysterectomies would be performed vaginally first and, as Dr. Iglesia noted, laparoscopically second. We do know, however, that not only are the learning curves for the vaginal and laparoscopic approaches steep, it is a challenge to teach these approaches effectively. The robotic platform has overcome these challenges with the 3D view, articulation of instruments, and a simulation and teaching console.

Marie Fidela R. Paraiso, MD: I agree with Dr. Iglesia. I do not think that use of the robot is justified for benign indications unless it is shown to be cost-effective and results in the same cure and complication rates, or if a surgeon does not have the skills or training in traditional laparoscopy and desires to offer his/her patients minimally invasive abdominal surgery. So far, two prospective trials have demonstrated that robotic-assisted hysterectomy for benign disease requires longer operative time and is, therefore, more costly in centers where there are surgeons who specialize in advanced laparoscopy.[5,6] We still have not defined the subset of patients who would benefit from robotic-assisted laparoscopy if all things are equal.

Jason D. Wright, MD: I think we need more data on robotic surgery for benign gynecologic disease. To date, the majority of the data are retrospective, with most studies unable to demonstrate an advantage of robotic surgery over laparoscopy. These studies have shown that robotic-assisted surgery is substantially more costly, however. I think there are groups of patients who are likely to benefit from

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robotic surgery, but we need to better define this group of women.

Arnold P. Advincula, MD: I disagree. Despite some controversy, I believe that use of the robot is justified in hysterectomy for benign indications. In fact, it is in situations like the frozen pelvis from endometriosis, or the scarred anterior cul-de-sac from previous cesarean deliveries, that the robot adds value. Several studies speak to the feasibility, safety, and reproducibility of the robot under those circumstances.[10,11] Of course, more recently, studies have challenged the use of robotics in benign gynecologic surgery, particularly hysterectomy. Those studies must be viewed with a critical eye. Individuals often can be swayed by the findings of randomized, controlled trials, but such studies are difficult to perform in surgery and there is really no way to be an expert in both conventional laparoscopy and robotic-assisted laparoscopy. As a surgical tool, a surgeon must commit to developing expertise with one or the other.

An often forgotten aspect that is critical to the success of both conventional laparoscopic surgeons and robotic surgeons is the presence of a well-run infrastructure and team to support the surgery. Without that, costs go up and patient outcomes go down for both approaches.

Jamal Mourad, DO: I agree. I believe there is a definitive justification for the use of the robot in benign gynecology. Most of the nearly 600,000 hysterectomies performed each year in the United States are still done by the open abdominal approach despite recognition that a minimally invasive approach (vaginal or laparoscopic) is the standard of care for benign hysterectomy. I incorporated robotic technology into a very busy laparoscopic practice in 2005. I continue to use laparoscopy as a very important tool in my armamentarium for minimally invasive surgery. As I mentioned earlier, robotic technology allows better visualization, dexterity, maneuverability, and control of the surgical field.

Ultimately, it is about taking care of our patients. Cost and efficiency are extremely important, but the patient is more important. The goal is excellence, not average care!

"A well-run infrastructure and team to support the surgery are critical to the success of both conventional laparoscopy and robotic surgery"

—Arnold P. Advincula, MD

How should a surgeon proceed?

OBG MANAGEMENT: How would you advise clinicians about when to use the robot in gynecologic surgery?

Rosanne M. Kho, MD: Until the cost of robotic procedures declines (soon, I hope), clinicians need to be vigilant in the use of measures and techniques that help them remain efficient and work safely while performing robotic procedures. Such measures include training a dedicated robotic OR team (including a bedside assistant), optimizing trocar placement and docking time, reducing operative or console time, and minimizing the number of robotic and disposable laparoscopic instruments used per case. There are multiple excellent robotics courses that utilize simulation and cadaveric models that clinicians can make use of to advance their skills.

Cheryl B. Iglesia, MD: I would first advise surgeons to get appropriate training using modules, labs, or a robotic simulator—or all three—that is consistent with institutional and other guidelines.[12] Second, get appropriate proctoring for your first few cases. Third, think vaginal first and laparoscopic second for straightforward hysterectomies. Robotic assistance has advantages if a lot of sewing is required (as in myomectomy or sacrocolpopexy) or a lot of dissection in small spaces is needed (such as in lymph node dissection in gynecologic oncology).

It is likely true that robotic training can be enabling technology and can improve a surgeon's straight-stick laparoscopic skills. Mastering fundamentals of vaginal and laparoscopic surgery is the core to the foundation of gynecologic surgery. Robotic use can be narrowed to certain situations. I am not sure where single-port robotics will lead, but surgeons will need to assess that new technology as well. Most important, volume matters. High-volume surgeons and high-volume centers have the most experience with the fewest complications, as proven in multiple surgical subspecialties—not just gynecology.

Jason D. Wright, MD: I think gynecologic surgeons need to be aware of the lack of data

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for robotic gynecologic surgery and carefully choose which patients and procedures they utilize the robot for. Unfortunately, many of the claims of benefit of the robot are not supported by high-quality research.

Although the added costs of robotic surgery may not have an immediate impact, in the long term these costs will almost certainly be passed on not only to patients and hospitals but also to physicians.

Jamal Mourad, DO: Despite the clear advantages of laparoscopic hysterectomy, most surgeons still perform laparotomy as their preferred route for hysterectomy because of the complex skills needed to perform straight-stick laparoscopy. The FDA approved the da Vinci surgical system for gynecologic procedures in 2005. Since then, the number of minimally invasive hysterectomies has increased dramatically.[13] The American College of Obstetricians and Gynecologists and AAGL recognize and endorse a minimally invasive approach (vaginal, laparoscopic) to the majority of hysterectomies.[14] Despite this recognition, the total number of vaginal and laparoscopic hysterectomies has remained stagnant for the past 25 years. Since the introduction of the robotic platform into our specialty, the total number of laparotomies has decreased significantly, due in large part to acceptance of robotic-assisted procedures.

Arnold P. Advincula, MD: This question—how to advise surgeons—is complicated because it involves so many moving parts. The bottom line: As long as surgeons have the appropriate rationale and indications for its use, proper training with subsequent credentialing and privileging, and the infrastructure to allow for safe and efficient use of the technology with outcomes tracking, then I think the robot is justified for interested clinicians who truly believe it will enhance their performance and care of patients. If some pieces of this equation are missing, then I would caution surgeons about incorporating robotics into their surgical armamentarium. I feel very strongly that many of the issues we see today surrounding robotics are the result of disregarding these very important requirements for the adoption of technology in medicine. We have seen similar issues with transvaginal mesh. Let's not let history repeat itself in the arena of robotics.

Jamal Mourad, DO: I agree. We need to do what is right. First, do no harm, then do what you would want done to you!

"I think gynecologic surgeons need to be aware of the lack of data for robotic gynecologic surgery"

—Jason D. Wright, MD

References

1. Wright JD, Ananth CV, Lewin SN, et al. Robotically assisted vs laparoscopic hysterectomy among women with benign gynecologic disease. JAMA. 2013;309(7):689–698.
2. Weissman JS, Zinner M. Comparative effectiveness research on robotic surgery. JAMA. 2013;309(7):721–722.
3. Schiavone MB, Kuo EC, Naumann RW, et al. The commercialization of robotic surgery: Unsubstantiated marketing of gynecologic surgery by hospitals. Am J Obstet Gynecol. 2012;207(3):174.e1–e7.
4. Kaunitz AM. Examining the Evidence. Are hospital claims about the robotic approach to gynecologic surgery based on reliable data—or mostly hype? OBG Manage. 2012;24(11):55–56.
5. Sarlos D, Kots L, Stevanovic N, et al. Robotic compared with conventional laparoscopic hysterectomy: A randomized controlled trial. Obstet Gynecol. 2012;120(3):604–611.
6. Paraiso MFR, Ridgeway B, Park AJ, et al. A randomized trial comparing conventional and robotic-assisted total laparoscopic hysterectomy [published online ahead of print February 8, 2013]. Am J Obstet Gynecol. doi:pii:S0002-9378(13)00144-0.
7. Paraiso MF, Jelovsek JE, Frick A, Chen GC, Barber MD. Laparoscopic compared with robotic sacrocolpopexy for vaginal prolapse: A randomized controlled trial. Obstet Gynecol. 2011;118(5):1105–1113.
8. Liu H, Lu D, Wang L, Shi G, Song H, Clark J. Robotic surgery for benign gynaecological disease. Cochrane Database Syst Rev. 2012;2:CD008978.
9. Pasic R, Rizzo J, Fang H, Ross S, Moore M, Gunnarsson C. Comparing robot-assisted with conventional laparoscopic hysterectomy: Impact on cost and clinical outcomes. J Minim Invasive Gynecol. 2010;17(6):730–738.
10. Payne TN, Dauterive FR. A comparison of total laparoscopic hysterectomy to robotically assisted hysterectomy: Surgical outcomes in a community practice. J Minim Invasive Gynecol. 2008;15(3):286–291.
11. AAGL. Route of hysterectomy to treat benign uterine disease. J Minim Invasive Gynecol. 2011;18(1):1–3.
12. American Urogynecologic Society. Guidelines for privileging and credentialing physicians for sacrocolpopexy for pelvic organ prolapse. Female Pelvic Med Reconstructive Surg. 2013;19(2):62–65.
13. Payne TN, Dauterive FR, Pitter MC, et al. Robotically assisted hysterectomy in patients with large uteri. Outcomes in five community practices. Obstet Gynecol. 2010;115(3):535–542.
14. Boggess JF, Gehrig PA, Cantrell L, et al. Perioperative outcomes of robotically assisted hysterectomy for benign cases with complex pathology. Obstet Gynecol. 2009;114(3):585–593.

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