

Robotic Gynecologic Surgery in Pakistan: Challenges and Local Realities

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Abstract

Robotic-assisted gynecologic surgery is increasingly used worldwide for complex pelvic procedures, but its adoption in Pakistan remains limited. Robotic platforms may facilitate minimally invasive surgery in select complex cases, but their high cost and resource requirements raise concerns about value and equity. For many routine gynecologic procedures, conventional laparoscopy offers comparable outcomes at lower cost. This short communication discusses the evolving role of robotic gynecology in Pakistan and emphasizes the importance of selective use, structured team training, and outcome monitoring to ensure that technological advancement improves women's surgical care without widening existing disparities.

Introduction

Robotic-assisted surgery has transformed the practice of gynecology over the past two decades, particularly in developed countries where it is now routinely used for both benign and oncologic pelvic procedures. Since its initial years of use, in the early 2000s, robotic technology has been promoted as part of minimally invasive surgery, offering enhanced visualization, instrument articulation, and improved surgeon ergonomics in complex anatomical settings.^{1,2} These attributes have been especially valuable in procedures such as deep infiltrating endometriosis excision, complex hysterectomy, sacrocolpopexy, and re-operative pelvic surgery.³

In Pakistan, robotic gynecologic surgery is relatively recent. Access is largely confined to a small number of private-sector hospitals and tertiary academic institutions, resulting in less exposure among gynecologists and restricted availability for the general population. Interest in robotic platforms is increasing, driven by global trends, patient perceptions, and institutional aspirations to introduce advanced surgical technologies. Pakistan is at an important decision point

where robotic gynecology could either strengthen advanced minimally invasive care or worsen existing inequities and cause a financial strain within an already constrained healthcare system.

The rationale for this short communication is threefold. First, the introduction of robotic gynecologic surgery in Pakistan has occurred in the absence of nationally defined indications, credentialing pathways, or outcome reporting mechanisms. Second, internationally robotic surgery is used without considering local cost structures, surgical volume, and training capacities. Third, there is a growing risk that robotic technology may be perceived as a “premium” service in Pakistan, accessible primarily to self-paying patients, thus widening disparities in women's surgical care. Addressing these issues requires a more evidence-informed discussion focused on value, equity, and governance.

Main Text

Robotic surgery and the evolution of minimally invasive gynecology

The global shift towards minimally invasive surgery has been a critical innovation in gynecology, with laparoscopic and vaginal approaches consistently demonstrating superior outcomes compared with open surgery, including reduced postoperative pain, shorter hospital stay, and faster return to normal activity.⁴ Robotic surgery emerged as a response to some of the technical limitations of conventional laparoscopy, especially in pelvic procedures requiring fine dissection and advanced suturing.

Several large comparative studies and systematic reviews have shown that, for many benign gynecologic procedures, robotic and laparoscopic approaches yield similar clinical outcomes.^{5,6} The primary benefit of robotics does not lie in replacing laparoscopy for routine cases, but rather in facilitating minimally invasive, technically demanding surgeries that might otherwise require laparotomy. This distinction is critical for healthcare systems such as

Pakistan's, where resource optimization and avoidance of unnecessary costs are essential.

Where robotic surgery may add value

Robotic systems provide magnified three-dimensional vision and flexible instruments that allow more precise movement in narrow spaces. These features can be helpful in complex situations such as severe endometriosis, repeated pelvic surgery, or advanced pelvic organ prolapse, where anatomy is often distorted and conventional laparoscopy may be technically challenging.^{3,7}

Avoiding open surgery is particularly important in Pakistan, where laparotomy is often associated with longer hospital stays and delayed recovery due to higher risk of wound-related complications. When robotic surgery allows complex cases to be managed minimally invasively, it supports better postoperative recovery, reduces surgical stress, promotes early mobilization, and shortens hospital stay.^{8,9}

Where benefits are limited and costs increase

Despite its technical advantages, robotic surgery is associated with significantly higher costs compared with conventional laparoscopy, largely due to capital investment, maintenance contracts, limited instruments' lifespan, and longer operating times during the learning curve.⁵ In high-income settings, these costs may be partially offset by surgical volume and negotiated procurement contracts. In Pakistan, lower case volumes and fragmented purchasing mechanisms amplify per-case expenditure. For routine gynecologic procedures, including uncomplicated benign hysterectomy, multiple studies have demonstrated equivalent outcomes between robotic and laparoscopic approaches, without clear clinical superiority of robotics.^{5,6} The use of robotic platforms may represent inefficient resource utilization and the diverting of funds from higher-impact services such as training, infrastructure, and access to basic minimally invasive care.

Equity and access considerations

Keeping Pakistan's current healthcare system in mind, equity is a central concern when it comes to introducing advanced surgical technologies. Without deliberate planning, robotic gynecologic surgery risks becoming accessible only to patients who can afford out-of-pocket payment, reinforcing a two-tier system of care.

Concentrating robotic services in a limited number of high-volume centers may improve efficiency, reduce per-case costs, and facilitate structured training. Transparent patient counseling is equally important, ensuring that women are offered the surgical approach which may be most appropriate to their clinical condition rather than one driven by technology availability, cultural stigma or perceived prestige.

Training, credentialing, and outcome monitoring

The success of robotic gynecologic surgery programs depend not only on surgeon skill but on the coordinated performance of the entire operating team. Evidence from established

programs emphasize the importance of structured, competency-based training pathways, including simulation, proctored cases, and ongoing performance assessment.¹⁰ Credentialing based on objective metrics rather than seniority alone is essential to maintain safety and quality.\

Systematic outcome monitoring is equally important. Indicators such as operation time, blood loss, complications, length of stay, and cost per case provide objective measures of value and safety. Registry-based data collection has been advocated internationally as a means of guiding responsible expansion and ensuring accountability in robotic surgery programs.¹¹

Policy Implications

The introduction of robotic gynecologic surgery in Pakistan has implications for health policy and resource allocation. In the absence of national guidance, adoption may be driven by market forces rather than clinical need, increasing costs without improving access. Policy frameworks should be made for selective use of robotics for complex cases, concentration of services in high-volume centers, and competency-based credentialing. Transparent costing and routine outcome reporting are essential.

Conclusion

Robotic gynecologic surgery offers potential benefits for selected complex cases in Pakistan, minimally invasive management that would otherwise require laparotomy. However, its value is highly context-dependent and closely linked to appropriate case selection, structured team-based training, and transparent outcome evaluation. Without these safeguards, robotic surgery risks increasing healthcare costs and exacerbating inequities. A cautious, evidence-informed approach is essential to ensure that technological advancement translates into meaningful improvement in women's surgical care.

Disclosure: The author serves as a visiting gynecologist to Pakistan and is regularly invited as a speaker at national and international academic conferences and educational forums in gynecology and minimally invasive surgery. In his routine clinical practice, he has performed over 2,000 minimal invasive robotic and laparoscopic gynecologic surgeries.

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