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Robotic surgery in gynaecology: Outcomes and challenges

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Abstract

Robotic surgery has emerged as a transformative approach in gynaecologic practice, offering minimally invasive solutions for complex procedures such as hysterectomy, myomectomy, endometriosis management, and oncologic surgeries. Evidence suggests that robotic-assisted surgery improves surgical precision, reduces blood loss, shortens hospital stays, and enhances patient satisfaction compared to traditional open surgery. However, challenges remain in terms of cost, training, accessibility, and long-term outcomes. Nursing professionals play a pivotal role in perioperative care, patient education, and postoperative recovery. This review underscores the need for integrating robotic surgery into gynaecology with a balanced focus on patient safety, cost-effectiveness, and workforce training.

Keywords: Robotic surgery, gynaecology, minimally invasive surgery, hysterectomy, nursing implications

1. Introduction

Advancements in minimally invasive surgery have revolutionized gynaecologic care. Traditional open laparotomy has largely been replaced by laparoscopy and, more recently, robotic-assisted surgery. The da Vinci Surgical System, introduced in 2000, has become the most widely adopted robotic platform in gynaecology ^[1]. Robotic surgery is particularly beneficial in complex gynaecological cases requiring precision, such as endometriosis excision, oncological resections, and fertility-preserving surgeries ^[2]. This review explores the clinical outcomes, advantages, limitations, and challenges of robotic surgery in gynaecology, with an emphasis on patient safety and nursing implications.

2. Evolution of Robotic Surgery in Gynaecology

Robotic surgery in gynaecology gained momentum in the early 2000s, initially applied to hysterectomies and myomectomies. Compared to conventional laparoscopy, robotic systems offer three-dimensional visualization, tremor reduction, and wristed instruments that enhance dexterity ^[3]. By 2010, robotic-assisted hysterectomy had become one of the most common gynaecologic procedures in the United States ^[4].

3. Clinical Outcomes of Robotic Gynaecologic Surgery

3.1 Hysterectomy

Studies show robotic hysterectomy leads to lower blood loss, shorter hospital stays, and fewer complications compared to open surgery ^[5]. However, operative times are often longer.

3.2 Myomectomy

Robotic myomectomy provides superior precision in suturing and reduced blood loss, beneficial in women seeking fertility preservation ^[6].

3.3 Endometriosis

For deep infiltrating endometriosis, robotics enhances visualization and dissection of complex pelvic anatomy, improving pain relief and fertility outcomes ^[7].

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3.4 Gynaecologic Oncology

Robotic surgery is widely applied in endometrial and cervical cancer staging. Evidence suggests similar oncological outcomes compared to laparoscopy, with advantages in obese and high-risk patients^[8].

4. Advantages of Robotic Surgery

- Enhanced 3D visualization and precision
- Reduced blood loss and need for transfusion
- Shorter hospital stays and faster recovery
- Lower conversion rates to open surgery
- Better ergonomics for surgeons^[9]

5. Challenges and Limitations

Despite positive outcomes, robotic surgery faces barriers:

- High cost of equipment and maintenance^[4].
- Longer operative times in some cases
- Steep learning curve and need for specialized training^[2].
- Limited availability in low- and middle-income countries
- Ethical concerns regarding cost-effectiveness and equitable access^[10].

Nursing Implications

Nurses play an integral role in robotic gynaecologic surgeries by:

- Preparing patients preoperatively with education and anxiety reduction.
- Ensuring safe patient positioning and prevention of pressure injuries.
- Monitoring intraoperative complications such as CO₂ insufflation effects.
- Providing postoperative care, pain management, and discharge teaching.
- Supporting enhanced recovery protocols for early mobilization and return to daily activities^[11].

6. Future Perspectives

The future of robotic gynaecology may involve artificial intelligence integration, smaller and more cost-effective robotic systems, and telesurgery applications^[12]. Research is needed to assess long-term oncologic outcomes and cost-effectiveness in different populations.

7. Conclusion

Robotic surgery in gynaecology has significantly improved surgical outcomes and patient satisfaction, especially in complex cases. However, challenges regarding cost, accessibility, and training must be addressed. Nursing professionals remain crucial in delivering safe and patient-centred robotic surgical care. A balanced approach that integrates robotic surgery alongside traditional minimally invasive techniques ensures optimal care in gynaecology.

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