



Background & Objectives

- The NHS is in crisis with wait-times for gynaecological surgery being longest on record, 40% of patients having referral to treatment times over 18 weeks, the highest of all specialities (RCOG 2022).
- Added to this is the increasing complexity of cases. Robotic surgery offers inherent advantages of early discharge and reduced bed pressure.
- We review current evidence on robotic surgery with special relevance to gynaecology and explore how this can help with managing the current backlog.

Methodology

- A literature review was performed on the role of robotic surgery in gynaecology.
- A combined search of "robotic surgical procedures" and "gynaecologic surgical procedures" was conducted on Embase and Medline.
- A total of 278 abstracts were retrieved and reviewed.

Results

General

- Since the da Vinci Robotic Surgical System was approved by the Food and Drug Administration for use in gynaecological surgery in 2005, robotic surgery has gained much popularity, with multiple models available and the fourth generation of robots now in use.
- Robotic surgery has several major operative advantages over conventional laparoscopy - 3D visualisation, improved ergonomics, extended articulation and tremor filtering - all of which translate to reduced blood loss, complication rates, and length of hospital stay.
- Improved clinical outcomes are of particular significance in obese and morbidly obese patients.
- Disadvantages of robotic surgery include increased set-up and operating times, the need to accommodate and maintain large sophisticated equipment, requirement for additional training and the cost of a robot.
- In a systematic cost review of gynaecological surgery over 23 studies, the mean charge for hysterectomy was €684 to €25,616 for open, €858 to €25,578 for laparoscopic and €936 to €33,920 for robotic surgery.

Technical aspects and outcomes

- Robotic surgery is equipment-intensive and requires an appropriate surgical suite to accommodate the patient cart, the vision system, and the surgeon's console.
- Inappropriate patient positioning is associated with inadequate exposure of the operative field as well as detrimental complications that may lead to long-term side effects. In our experience a steep 30 degree trendelenburg position is required to facilitate surgery.
- One of the challenges highlighted was intraoperative communication. One study demonstrated a significant association between poor intraoperative team communication and worse surgical outcomes in robotic gynaecologic surgery, the most common reasons reported for poor communication in the operating room were noise level (78%) and console-to-bedside communication problems (64%).
- Surgery performed at lower-pressure pneumoperitoneum (≤ 10 mmHg) is associated with lower postoperative pain scores, shorter length of stay, and improved intraoperative respiratory parameters without increased duration of surgery or blood loss⁶.
- In most of the series, operating time is longer with a robot, but complication rates are decreased, especially in obese patients with conversion to laparotomy less as compared to standard laparoscopy.
- The average operative time for robotic assisted laparoscopic hysterectomy reported was 110-140min.
- The EBL was < 100 ml in all studies.
- All studies were in accordance with reduced post-operative hospital stay, reporting an average of 2 days for total hysterectomy and 1 day for adnexal surgery.

Complications

- In a study of 296 patients evaluating the risk of pulmonary Complications, a low rate of 2% was found. Similarly, in a study of 1032 obese patients, a similar rate of 3% pulmonary complication was reported, with an overall complication rate of 14%.
- A systematic review of bowel injuries sustained in robotic gynaecology surgery reported an incidence of 0.62%, with 87% being recognized intraoperatively and the majority (58%) managed via a minimally invasive approach with no deaths as a result of bowel injury.
- In a systematic review of 1488 patients undergoing robotic-assisted sacrocolpopexy, the incidence of post-site hernias was found to be 0.4%. (conventional laparoscopy $< 1\%$).



Training

- A prospective study on a 3-half-day experiencing and training session, found no major peri-, or post-operative complications, with reducing operating suturing time with progressive sessions.
- A 7-year evaluation of robotic sacrocolpopexy found mean operative time reduced from 5.3 to 3.6 hours, reaching this plateau after 60 cases.
- Robotic surgery has the advantage of the potential use of virtual reality simulation to test for procedural competency.
- A review of current surgical training amongst European Oncology Trainees found only 23% of trainees had exposure to robotic surgery, with 62.4% expressing that it should be a formal component of training.

Conclusion

- Robotic surgery has always been looked at as an expensive modality. Heavy resource limitations, increasing benign gynaecology waiting times and case-complexity demand an active search for alternative ways of offering effective and timely patient care.
- This literature review supports increasing use of robotic surgery to tackle the gynaecological surgical backlog.
- The ability to operate at reduced pressure along with reduced complication rate and blood loss and better intraoperative recognition of complications contribute to reduced hospital stay and increased scope for day surgery, all of which have the potential to reduce bed-pressure with significant cost saving.
- Evidence shows distinct advantages of robotic surgery in high complexity patients, in particular obese and morbidly obese

- Patients, which has become a problem since the Covid-19 pandemic (The King's Fund)
- Reduced pulmonary complications will translate to reduced ITU admissions and overall hospital stay.
 - The waiting list initiatives and all day lists have been proposed to clear the backlog – reduced surgical fatigue due to inherent technical advantages of the robot, facilitates throughput of large case numbers promoting pathway efficiency.
 - Covid-19 has also highlighted deficiencies in surgical training and robotic surgery provides an opportunity to train the future surgeon. The review supports an appetite for exposure to robotic surgery which may well be accepted standard in the future.
 - Despite the initial investment, we believe that robotic surgery does provide long-term return on investment with cost savings from reduced length of hospital stay and will help in tackling the surgical backlog.