## **MINI REVIEW**

# JOURNA S



## Innovations in minimally invasive gynecologic surgery: Benefits and challenges

Erica Fader<sup>1</sup>, Jocelyn Nensi<sup>2</sup> and Gulden Gysler<sup>3</sup>

<sup>1</sup>Department of Gynecology and Obstetrics, St. Michael's Hospital, Canada <sup>2</sup>Department of Gynecology and Reproductive Sciences, Yale University School of Medicine, USA <sup>3</sup>Department of Gynecology, University of Cagliari, Italy

#### ABSTRACT

Minimally invasive gynecologic surgery (MIGS) has revolutionized the operation of colorful gynecological conditions, offering significant advancements over traditional open surgery. crucial inventions similar as laparoscopic, robotic- supported, and single- harborage ways have advanced surgical perfection, reduced recovery times, and minimized complications. Robotic- supported surgery, in particular, has enhanced dexterity and visualization, easing complex procedures with bettered issues. likewise, the integration of 3D imaging and stoked reality offers surgeons more navigation and delicacy. Despite these advancements, challenges remain, including the high cost of technical outfit, limited availability, and the steep literacy wind associated with new technologies. Training and skill development are critical to ensure optimal case issues, yet difference in training vacuity persist. also, the operation of MIGS to more complex or high- threat cases remain a challenge. As the field continues to evolve, ongoing exploration, bettered training programs, and cost-effective results will be essential in expanding the reach and benefits of minimally invasive ways for gynecologic surgery.

## **KEYWORDS**

Laparoscopic surgery; Robotic-assisted surgery; Single-port surgery; 3D imaging; Augmented reality; Surgical precision

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## Introduction

Innovations in minimally invasive gynecologic surgery have significantly transformed the treatment of various conditions, offering patients safer, more efficient options [1]. Techniques like laparoscopy, robotic-assisted surgery, and hysteroscopy allow for complex procedures with smaller incisions, leading to faster recovery, less pain, and minimal scarring. These advances also contribute to shorter hospital stays and quicker returns to daily activities, enhancing overall patient outcomes. However, the adoption of these techniques comes with challenges, including the high cost of advanced technologies, the need for specialized training, and the risk of complications if not performed by experienced surgeons. Furthermore, not all patients are suitable candidates for minimally invasive surgery, requiring careful selection. Despite these hurdles, ongoing advancements in imaging, robotics, and artificial intelligence continue to refine these methods, promising further improvements in gynecologic care and expanding their potential for a broader range of patients [2].

### Advances in Minimally Invasive Gynecologic Surgery

Minimally Invasive Gynecologic Surgery (MIGS) has seen significant technological advancements, transubstantiating the approach to colorful gynecological procedures [3]. The major inventions in this field include laparoscopy, robotic- supported surgery, single- harborage surgery, and advanced imaging technologies, each immolation unique advantages for both surgeons and cases.

## Laparoscopic surgery

Laparoscopy, a fashion involving small lacerations and the use of a camera to guide surgery, has been a foundation of MIGS for decades. Recent advances in laparoscopic instruments, similar as high- description cameras, specialized tools, and enhanced lighting, have made procedures safer and more effective. These inventions allow for better visualization of the pelvic deconstruction, enabling surgeons to perform complex surgeries with lesser perfection and reduced towel trauma. The trend toward further refined and compact instruments has also led to briskly recovery times and lower complication rates [4].

#### Robotic- supported surgery

Robotic- supported surgery, particularly through systems like the da Vinci Surgical System, has revolutionized MIGS. This technology provides surgeons with enhanced perfection, dexterity, and control, as the robotic arms can perform movements beyond the capabilities of the mortal hand. Robotic surgery allows for further complex procedures to be performed with minimum invasiveness, reducing blood loss, shortening sanitarium stays, and perfecting postoperative recovery [5]. Surgeons also profit from the system's 3D highdescription visualization, which provides lesser clarity and a more detailed view of the surgical field. still, despite these advantages, the cost of robotic systems and the need for technical training are challenges for broader perpetration.

#### Single-port and natural perforation surgery

The development of Single- Harborage Laparoscopic Surgery (SPLS) aims to further reduce the invasiveness of gynecologic procedures by using a single gash, generally in the umbilicus, through which all instruments are fitted [6]. This approach results in nearly scarless surgery, bettered ornamental issues,

\*Correspondence: Dr. Erica Fader, Department of Gynecology and Obstetrics, St. Michael's Hospital, Canada, USA, e-mail: fadererica@stmichaelsfoundation.com © 2023 The Author(s). Published by Reseapro Journals. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. and potentially less postoperative pain. Natural perforation transluminal endoscopic surgery (NOTES) takes this conception further by penetrating the abdominal depression via natural body openings, similar as the vagina or mouth [7]. While still in the experimental phase for numerous procedures, NOTES holds the pledge of indeed less invasive options, though challenges related to safety, feasibility, and training remain.

## 3D imaging and stoked reality

Recent advancements in 3D imaging and stoked reality (AR) are enhancing surgical perfection during MIGS. 3D imaging allows surgeons to view the deconstruction in three confines, offering bettered depth perception and better navigation, especially during intricate procedures [8]. stoked reality integrates digital images into the surgeon's field of vision, allowing for the overlay of critical information, similar as excrescence boundaries or anatomical milestones, onto the real- time view of the case's body. These technologies ameliorate delicacy and reduce the threat of surgical crimes, easing better issues in complex gynecological procedures. As these technologies continue to ameliorate and come more extensively accessible, they've the eventuality to revise MIGS indeed further [9].

## Benefits of Minimally Invasive Gynecologic Surgery

Minimally invasive gynecologic surgery (MIGS) offers a wide range of benefits compared to traditional open surgical approaches. These advantages significantly ameliorate patient issues, reduce recovery times, and minimize the threat of complications, making MIGS a largely seductive option for numerous gynecological procedures [10].

One of the primary benefits of MIGS is reduced blood loss. Since minimally invasive ways use lower lacerations and beget lower trauma to girding apkins, cases generally witness less bleeding during surgery. This is particularly important in gynecological surgeries like hysterectomies or myomectomies, where inordinate blood loss is a concern [11].

MIGS also leads to shorter sanitarium stays. Cases witnessing minimally invasive procedures frequently leave the sanitarium within a day or two, as opposed to longer stays needed for open surgeries. The reduced length of hospitalization not only enhances patient comfort but also lowers healthcare costs [12]. numerous cases can return to their diurnal conditioning sooner, reducing the fiscal and particular impact of dragged recovery ages.

A major benefit of MIGS is briskly recovery and hastily return to normal conditioning. lower lacerations affect in lower towel trauma, reducing postoperative pain and allowing cases to renew their usual routines much sooner than with traditional surgery. numerous women are suitable to return to work or take care of their family liabilities in a matter of weeks, rather of the months needed for recovery from open surgery [13] also, MIGS carries a lower threat of complications similar as infections, adhesions, and hernias. The small lacerations minimize the chance of crack infection and the development of internal scar towel, which can beget long- term complications like gravidity or habitual pain [14]. With minimally invasive surgery, the threat of injury to conterminous organs similar as the bladder or bowel is also reduced, thanks to enhanced visualization and perfection, especially when robotic- supported technologies are used [15].

## **Challenges and Limitations**

While Minimally Invasive Gynecologic Surgery (MIGS) offers significant advantages, several challenges and limitations still live. Training and skill development are major walls, as MIGS requires technical knowledge and moxie [16]. Surgeons must suffer expansive training to master advanced ways similar as laparoscopy, robotic- supported surgery, and single- harborage procedures. The steep literacy wind associated with these technologies can lead to a prolonged period of lower optimal performance for new interpreters.

Cost and availability also remain significant challenges. The high cost of robotic surgical systems, advanced imaging outfit, and specialized tools can be prohibitive for numerous healthcare installations, particularly in low- resource settings. These costs can limit access to MIGS for a broader population, particularly in developing regions or lower hospitals.

Another limitation is the operation to complex cases. While MIGS is suitable for numerous routine gynecological procedures, its use in largely complex or high- threat cases similar as those involving expansive pelvic adhesions or large excrescences — can be more delicate or indeed contraindicated [17]. In these situations, traditional open surgery may still be necessary for optimal issues.

## Conclusions

Minimally Invasive Gynecologic Surgery (MIGS) has revolutionized the field of gynecology, offering multitudinous benefits similar as reduced blood loss, briskly recovery, shorter sanitarium stays, smaller complications, and bettered ornamental issues. These advancements have enhanced the overall case experience and significantly bettered surgical perfection. still, challenges similar as the steep literacy wind, high costs of advanced technology, limited connection for complex cases, and the need for technical training still pose walls to wide relinquishment. As technology continues to evolve and pierce to coffers improves, MIGS has the eventuality to further transfigure gynecological care, making it an indeed more feasible option for a broader range of cases. Continued exploration, invention, and education will be pivotal to prostrating these challenges and maximizing the benefits of minimally invasive ways in gynecologic surgery.

## **Disclosure statement**

No potential conflict of interest was reported by the authors.

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