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RESEARCH ARTICLE

Using Veress Needle for Laparoscopy in Females with Prior Cesarean Section: Considerations and Safety Implications

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ABSTRACT

Laparoscopic surgery has brought about a significant transformation in modern surgical practices, offering numerous advantages such as reduced postoperative discomfort and quicker recovery times. However, the initial step of accessing the abdominal cavity presents inherent challenges, especially in patients with previous cesarean sections, whose abdominal anatomy may be altered by adhesions or scar tissue. Among the techniques used to establish pneumoperitoneum, the Veress needle method is commonly employed, yet its safety in females with prior cesarean sections requires careful consideration. This paper provides a thorough examination of safety outcomes, strategies for managing complications, and the long-term implications of Veress needle insertion in females with prior cesarean sections undergoing laparoscopic surgery. It delves into the evolution of laparoscopic surgery, emphasizing the need for a nuanced understanding of the challenges posed by altered abdominal anatomy. Drawing from diverse literature, including peer-reviewed articles and clinical studies, the paper explores the intricacies of preoperative assessment, highlighting the importance of comprehensive patient evaluation to identify potential risk factors and inform surgical planning. Furthermore, it investigates refinements in surgical techniques, examining novel approaches and safety measures proposed to mitigate the risks associated with Veress needle insertion in this specific patient population. From innovative methods for measuring the depth of the anterior abdominal wall to alternative entry sites and techniques, such as the open (Hasson) technique or left upper quadrant (Palmer's point) entry, the paper elucidates the multifaceted strategies employed to enhance safety and efficacy. Additionally, it addresses acute safety concerns and long-term complications, advocating for ongoing monitoring and follow-up care. Identifying research gaps, the paper calls for further investigation to refine safety protocols and improve patient outcomes, ultimately aiming to enhance patient well-being in this specific patient cohort.

Introduction

Laparoscopy, a minimally invasive surgical technique, has revolutionized many aspects of modern surgery due to its numerous benefits such as reduced postoperative pain, shorter hospital stays, and faster recovery times. However, the initial step of gaining access to the abdominal cavity carries inherent risks, particularly concerning injury to organs and blood vessels. Various techniques have been developed to mitigate these risks, with the choice often depending on factors such as patient characteristics, the specific surgical procedure, and the surgeon's experience. One commonly used method for establishing pneumoperitoneum, a necessary step in laparoscopic procedures, is the Veress needle technique. This technique involves the blind insertion of a specialized needle into the abdominal cavity to introduce carbon dioxide gas, creating space between the abdominal organs and the abdominal wall. The Veress needle consists of an outer hollow needle with a sharp tip and an inner spring-loaded blunt needle, serving as a conduit for insufflation gas.[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]

Abdominal surgery poses enduring risks due to the formation of clinically significant adhesions. These adhesions may remain asymptomatic or lead to substantial morbidity and mortality, manifesting as bowel obstruction, infertility, or organ injury during subsequent abdominal surgeries. Notably, adhesion formation is prevalent following cesarean births, with the severity increasing with each subsequent procedure. Studies indicate adhesion prevalence ranging from 12 to 46 percent after the second cesarean and 26 to 75 percent after the third.

However, the incidence of small bowel obstruction remains comparatively low. A population-based cohort study revealed a significantly elevated risk of small bowel obstruction following cesarean births compared to those without, with the risk escalating with each additional cesarean birth. Despite these risks, there is currently insufficient evidence to advocate for the routine use of adhesion barriers or peritoneum closure to mitigate adhesion-related complications following cesarean births.[12,13,14,15,16,17]

Importantly, female patients with a history of cesarean section present unique considerations when utilizing the Veress needle technique for laparoscopy. Prior cesarean sections may lead to alterations in abdominal anatomy, such as adhesions or scar tissue formation, which can impact the safety and efficacy of abdominal entry. Therefore, careful attention must be paid to patient history, surgical planning, and intraoperative technique to minimize the risks associated with laparoscopic procedures in this population. In this context, understanding the considerations and safety implications of using the Veress needle for laparoscopy in females with prior cesarean section is essential for ensuring optimal patient outcomes and minimizing the risk of complications. By carefully assessing patient characteristics, selecting appropriate entry sites, and employing precise surgical techniques, surgeons can navigate the challenges posed by prior cesarean section and safely perform laparoscopic procedures in this patient population.

Aims and objectives

The aims and objectives of this scientific paper are to systematically review existing literature to assess the safety and efficacy of using the Veress needle for laparoscopy in females who have undergone a previous cesarean section. This review will involve evaluating reported complications associated with Veress needle insertion, including bowel injury, vascular injury, and uterine perforation, to quantify their frequency and severity. Additionally, the paper aims to analyze various surgical techniques and approaches used for Veress needle insertion in this population, considering factors such as needle placement and intra-abdominal pressure monitoring. By identifying potential risk factors and providing evidence-based recommendations for the safe use of the Veress needle in females with prior cesarean section, this paper seeks to contribute valuable insights to clinical practice and enhance patient safety during laparoscopic procedures.

Methodology

The methodology employed in this scientific paper involved a comprehensive review of existing literature to investigate the safety and efficacy of utilizing the Veress needle for laparoscopy in females who have undergone a previous cesarean section. A systematic literature search was conducted using electronic databases such as PubMed, Scopus, and Web of Science, employing a combination of relevant keywords including "Veress needle", "laparoscopy", "cesarean section", and "contraindications". The search was limited to peer-reviewed articles published within the past 10-15 years to ensure the inclusion of contemporary evidence. Inclusion criteria encompassed studies that specifically addressed the use of the Veress needle in females with prior cesarean section, while exclusion criteria comprised studies lacking pertinent information or not directly addressing safety considerations. Data extraction encompassed study characteristics, patient demographics, surgical techniques, outcomes, and reported complications. A thorough risk of bias

assessment was conducted for each included study utilizing appropriate tools, considering study design, sample size, and potential sources of bias. Synthesis of results involved summarizing findings from the included studies, identifying common themes, and discussing any discrepancies or limitations in the evidence. Ultimately, conclusions were drawn based on the synthesized evidence, offering insights into the safety profile and potential contraindications of Veress needle insertion in this specific patient population. This methodology ensures a rigorous and systematic approach to addressing the research question, thereby contributing valuable insights to clinical practice and guiding future research endeavors.

1. VERESS NEEDLE AND SAFETY OF VERESS NEEDLE INSERTION

The Veress needle, a pivotal instrument in laparoscopic surgery, serves the crucial role of initiating pneumoperitoneum by safely introducing CO2 into the abdominal cavity. Originating in the late 1940s, its adoption marked a significant advancement in surgical technique. Over time, its widespread use has become synonymous with the initial steps of laparoscopic procedures worldwide. However, ensuring its safe and precise insertion remains paramount, particularly in patients with complex medical histories, such as those with prior cesarean sections. Recent literature, including a 2023 study, has delved into innovative approaches to enhance the safety of Veress needle insertion. One notable technique involves pre-insertion measurements of the anterior abdominal wall's depth to ascertain the optimal needle penetration depth. This meticulous approach aims to mitigate the risks of potential complications, including bowel or vascular injuries, and uterine perforations, particularly pertinent in female patients with prior cesarean sections. The establishment of pneumoperitoneum, facilitated by the Veress needle, serves as the cornerstone of laparoscopic surgery, enabling enhanced visualization and access to the abdominal contents while minimizing trauma and recovery time compared to traditional open procedures. Numerous studies have underscored the benefits of laparoscopy, showcasing reduced postoperative complications and shorter hospital stays across various surgical disciplines.

Despite its advantages, laparoscopic entry poses inherent challenges, with access-related injuries comprising a significant proportion of complications. Techniques such as direct trocar insertion and various Veress needle modifications aim to address these challenges, each with its unique merits and considerations based on the surgeon's expertise and patient characteristics. Moreover, advancements in Veress needle technology, such as pressure-sensor-equipped models and optical variants, offer real-time feedback and improved visualization, further enhancing safety and precision during insertion. However, despite these innovations, ensuring proper technique and vigilance in patient selection remain paramount to minimize complications and optimize surgical outcomes.[18,19,20]

Another paper evaluates the safety of laparoscopic entry sites in patients with previous abdominal surgeries, including cesarean sections. And found that adhesions were present in 37.5% of patients with a history of cesarean sections, indicating a potential risk factor for complications during subsequent surgeries. However, the paper reports no complications during Veress needle insertion or laparoscopic procedures in the studied population.[20]

Complications associated with Veress needle insertion include bowel injury, vascular injury, and uterine perforation. The reported incidence rates and outcomes of these complications vary across studies. Bowel injury during Veress needle insertion is a serious complication that can lead to peritonitis and sepsis if not recognized and treated promptly. Studies have reported incidence rates ranging from 0.04% to 0.16%, with higher rates observed in patients with previous abdominal surgeries. Vascular injury is another significant complication associated with Veress needle insertion. Major vascular injuries can lead to life-threatening hemorrhage. The incidence of vascular injuries varies, with rates ranging from 0.1 per 1,000 to 0.3 per 1,000 procedures. Minor vascular injuries, such as injury to the inferior epigastric vessels, have been reported in up to 2.5% of laparoscopic hernia repairs.

Although less common, uterine perforation can occur during Veress needle insertion, especially in patients with a history of cesarean section. The reported incidence of uterine perforation varies depending on the population studied and the technique used for entry. To minimize the risk of complications during Veress needle insertion, various safety tests and techniques have been proposed, including the use of manometer tests, hissing sound tests, aspiration tests, and hanging drop tests. Additionally, alternative entry sites and techniques, such as the open (Hasson) technique, left upper quadrant (Palmer's point) entry, and direct trocar insertion, may be considered in certain patient populations, such as obese patients or those with previous abdominal surgeries.[21]

2. COMPARATIVE ANALYSIS OF ENTRY TECHNIQUES FOR LAPAROSCOPIC SURGERY IN FEMALES WITH PRIOR CESAREAN SECTION

One systematic review with meta-analysis compared the safety outcomes of direct trocar insertion versus Veress needle entry technique in gynecologic laparoscopic surgery, focusing on complication rates and surgical outcomes. The study included seven controlled trials and assessed various outcomes associated with laparoscopic entry. Results indicated that Veress needle entry was associated with a significant increase in several complications compared to direct trocar insertion. These included: extraperitoneal insufflation, omental injury, higher rate of failed entries and increased incidence of trochar site infection. No significant difference was found between the two techniques regarding visceral injury. These findings suggest that while Veress needle entry may lead to a higher incidence of certain complications and more failed entries, there was no significant difference in visceral injury rates between the two techniques. Ultimately concluding that while experienced surgeons may not need to alter their practices based on these findings, the data may be valuable for residency program staff and teaching surgeons when instructing novice gynecologic surgeons.[22]

In the ongoing debate surrounding Veress Needle Insertion versus Direct Trocar Insertion in laparoscopic surgeries, a paper suggests that despite recent scrutiny through a Cochrane review, conclusive evidence favoring one technique over the other remains elusive. However, there are indications that direct trocar entry might hold an advantage over Veress needle entry, particularly in cases of failed entry. This assertion stems from observations that direct trocar insertion could offer a more straightforward alternative when initial attempts at entry prove unsuccessful. Nevertheless, it's crucial to note that the majority of the evidence available is of very low quality, thereby constraining the ability to draw definitive conclusions regarding the superiority of one technique over the other. This highlights the need for further high-quality research to provide clearer guidance for surgeons regarding the optimal approach for laparoscopic entry. Until then, the choice between Veress Needle Insertion and Direct Trocar Insertion should be carefully considered on a case-by-case basis, taking into account factors such as patient anatomy, surgical expertise, and specific clinical circumstances to ensure the safest and most effective entry method is selected.

In recent years, there has been a notable emphasis on standardizing practices to prevent entry-related laparoscopic injuries, as evidenced by the publication of guidelines by the Royal College of Obstetricians and Gynaecologists of the UK. These guidelines underscore the importance of adopting uniform protocols to enhance safety during laparoscopic procedures. A significant advancement in this realm was introduced in a 2016 paper, which introduced the Jain point—a novel laparoscopic entry site specifically tailored for cases suspected of adhesions due to previous surgeries. This innovative technique aimed to address the challenges posed by traditional methods such as Veress Needle Insertion and Direct Trocar Insertion in patients with suspected adhesions. The study sought to evaluate the efficacy and safety of the Jain point technique compared to conventional methods in this particular patient population. Remarkably, the Jain point technique demonstrated no significant entry-related, intra-operative, or postoperative complications, suggesting its potential as a promising alternative for laparoscopic entry in challenging cases. By minimizing complications associated with traditional methods, the Jain point approach offers comparable safety and efficacy without increasing the risk of adverse events. However, further research is warranted to validate its long-term effectiveness across diverse patient demographics and surgical contexts, ensuring its widespread applicability and reliability in clinical practice. These advancements collectively represent significant strides in improving the safety and efficacy of laparoscopic surgeries, underscoring the importance of innovation and evidence-based practices in enhancing patient outcomes and reducing surgical complications.[23,24,25]

Several studies have delved into alternative techniques for cannula insertion in laparoscopic surgeries, aiming to improve safety and efficacy, particularly in cases with suspected adhesions or prior abdominal surgeries. Among these investigations, one study thoroughly evaluated the safety and efficacy of primary left upper quadrant cannula insertion, presenting it as a viable alternative to the traditional primary umbilical cannula insertion method, notably reporting no intraoperative complications. Moreover, Palmer's point has emerged as a promising alternative site for Veress needle insertion and primary cannula placement, particularly beneficial in cases with dense intestinal and extensive omental adhesions, potentially lowering the risk of injury during surgery. Additionally, another study examined the safety of a primary laparoscopic approach via the ninth-intercostal micro-laparoscopic approach, particularly advantageous for patients with a history of laparotomy. This approach was found to be safe for laparoscopic surgery and may

effectively mitigate the risk of bowel injury, especially in patients with previous laparotomy. Together, these research findings underscore a burgeoning recognition of alternative cannula insertion techniques in laparoscopic procedures, aiming to minimize complications and bolster patient safety, particularly in challenging surgical scenarios characterized by adhesions or prior abdominal surgeries. Such advancements hold promise for improving surgical outcomes and enhancing patient care in the field of laparoscopic surgery.[26,27,28]

3. IMPACT OF SCAR TISSUE AND ADHESIONS ON VERESS NEEDLE INSERTION AND LAPAROSCOPIC SURGERY

The complexities of adhesions in gynecological surgeries have been extensively studied, particularly regarding the methods of adhesiolysis and their impact on patient outcomes. Comparative studies have investigated the efficacy of hysteroscopic adhesiolysis versus separation by scissors, highlighting the advantages and limitations of each approach. While scissors separation avoids the electrothermal effect and minimizes damage to surrounding endometrial tissue, it may be challenging for certain types of adhesions, particularly those involving muscular peripheral adhesions, due to difficulties in operation and hemostasis. In contrast, hysteroscopic adhesiolysis is considered essential for treating moderate to severe intrauterine adhesions, particularly for muscular peripheral adhesions, offering simplicity and effectiveness in scar tissue removal. However, the timing of adhesiolysis also plays a crucial role in patient outcomes, with operations during the luteal phase offering protective effects on the endometrium and potentially higher pregnancy rates. Hormone therapy further aids in endometrial repair, with estrogen promoting thickening and proliferation of endometrial tissues. Surgical timing also affects adhesion recurrence rates, with operations performed during the luteal phase showing reduced recurrence compared to the follicular phase. Overall, the findings emphasize the importance of surgical timing and technique selection in optimizing patient outcomes and reducing complications associated with intrauterine adhesions.

Scar tissue and adhesions from a previous cesarean section can make it challenging to safely insert the Veress needle for creating pneumoperitoneum, which is necessary for laparoscopic procedures. The presence of dense adhesions may alter the normal anatomy and increase the risk of inadvertently puncturing adjacent structures, such as bowel loops or blood vessels, during Veress needle insertion. Scar tissue and adhesions from previous abdominal surgeries pose a substantial risk of inadvertent enterotomy during laparoscopic procedures. Dissecting through dense adhesions to access the abdominal cavity may inadvertently result in bowel injury. The incidence of inadvertent enterotomy is particularly concerning in laparoscopy, with delayed detection contributing to significant morbidity and mortality. Surgeons should be aware of these potential complications and take appropriate precautions to mitigate risks, including thorough preoperative evaluation and patient counseling.[29,30]

The influence of scar tissue and adhesions resulting from previous cesarean sections is a pivotal consideration for surgeons undertaking laparoscopic procedures. These adhesions and scar tissue alterations can significantly impact the normal anatomical landscape, presenting challenges in safely accessing the peritoneal cavity, particularly during Veress needle insertion. Scar tissue and adhesions may distort the anatomy, making accurate Veress needle placement difficult and potentially leading to complications such as vascular or visceral injuries. Furthermore, in the context of laparoscopic surgery, the presence of scar tissue and adhesions can exacerbate the complexity of the dissection process. Adhesions may interlink organs or obscure the surgical field, impeding the surgeon's ability to identify and manipulate structures safely. Such complications can prolong operating times and heighten the risk of inadvertent injuries to adjacent organs, underscoring the critical nature of assessing and navigating scar tissue and adhesions effectively in laparoscopic procedures.

The severity and location of adhesions emerge as crucial determinants that influence the likelihood of complications during laparoscopic surgery. Adhesions situated in specific areas, such as around the bowel or pelvic organs, pose a heightened risk of injury during dissection due to their proximity to vital structures. Additionally, dense and immobile adhesions present greater challenges in safe dissection compared to filmy adhesions, intensifying the intricacies of surgical procedures. Importantly, the repercussions of adhesions extend beyond the immediate perioperative period, as patients may encounter late adhesive complications such as bowel obstruction, female infertility, or chronic pain years or even decades after the initial surgery. These delayed complications can profoundly affect patients' quality of life and may necessitate further surgical interventions, emphasizing the imperative for surgeons to meticulously navigate and manage scar tissue and adhesions to mitigate both immediate and long-term risks associated with laparoscopic procedures.[31,32,33]

4. TECHNIQUES TO ENHANCE SAFETY IN VERESS NEEDLE INSERTION FOR LAPAROSCOPIC SURGERY FOLLOWING CESAREAN SECTION

Mitigating the risks associated with adhesions during laparoscopic surgery demands a multifaceted approach. It begins with a meticulous evaluation of patients' surgical histories, assessing the likelihood of encountering significant adhesions, which can significantly alter the intra-abdominal landscape. Advanced diagnostic tools such as preoperative imaging or diagnostic laparoscopy provide invaluable insights into the extent, location, and nature of adhesions, enabling surgeons to craft a tailored surgical strategy with precision and foresight. Incorporating these modalities into preoperative planning allows surgeons to proactively identify adhesions and strategize their approach, minimizing risks and optimizing outcomes. Intraoperatively, techniques such as gentle tissue handling, meticulous hemostasis, and the use of adhesion barriers or anti-adhesive agents help reduce new adhesion formation and mitigate intraoperative complications. Advanced surgical tools and techniques, such as ultrasonic dissectors, aid in precise tissue dissection, minimizing trauma and adhesion formation. Patient education plays a pivotal role, empowering patients to actively participate in their care and adhere to postoperative instructions aimed at minimizing adhesion formation. By adopting a comprehensive strategy that addresses preoperative evaluation, intraoperative techniques, and patient education, surgeons can effectively mitigate risks associated with adhesions, enhancing patient safety and optimizing surgical outcomes in laparoscopic procedures.[34,35,36,37,38]

Once in the operating room, surgeons must exercise a heightened level of caution and finesse when navigating tissues in patients with known or suspected adhesions. Adhesions can obscure anatomical landmarks and increase the complexity of dissection, necessitating a deliberate and meticulous approach to tissue manipulation. By prioritizing careful tissue handling and employing advanced surgical techniques, such as gentle tissue separation and blunt dissection, surgeons can mitigate the risk of inadvertent injuries and complications, ensuring a safer and more successful surgical outcome. Furthermore, patient education plays a pivotal role in risk mitigation, as informed patients are better equipped to actively participate in their healthcare decisions. Surgeons should engage in transparent and comprehensive discussions with patients about the potential risks associated with adhesions, emphasizing the importance of informed consent and shared decision-making. By fostering open communication and empowering patients to make informed choices, surgeons can not only enhance patient satisfaction but also mitigate the likelihood of litigation related to consent issues surrounding late adhesive complications. In summary, by adopting a comprehensive and proactive approach that integrates advanced diagnostics, meticulous surgical technique, and patient education, surgeons can effectively mitigate the risks associated with adhesions during laparoscopic surgery, ultimately improving patient safety and outcomes.[34,39,40,41,42]

The heightened risk of major vascular complications associated with closed umbilical access in comparison to open techniques underscores the imperative for surgeons to explore alternative sites for abdominal insufflation using the Veress technique, especially when the umbilicus is considered unsuitable. This risk is primarily attributed to the intimate proximity between the umbilical stalk and the aorta, which typically measures less than 4 cm and can be as little as 2 cm, particularly in individuals with a slender physique. Consequently, some surgeons advocate for a nuanced approach that considers various factors, including patient anatomy and surgical history, to minimize the risk of vascular injury during laparoscopic procedures. When contemplating the midline as an alternative site for insufflation, surgeons must ensure the application of upward retraction to provide resistance and mitigate downward needle pressure, thus reducing the likelihood of inadvertent vascular injury. Moreover, the repertoire of alternative sites proposed for establishing pneumoperitoneum encompasses various anatomical landmarks, including points along the midline, the medial costal margin, the ninth left intercostal space, Palmer's point (positioned 3 cm below the left costal margin along the lateral border of the rectus muscle), and the lateral border of the rectus muscle at the level of the iliac crest. By diversifying the options for abdominal insufflation and adopting meticulous surgical techniques, surgeons can effectively mitigate the risks associated with vascular injury during laparoscopic procedures, thereby ensuring safer and more effective outcomes for patients while upholding the principles of patient safety and surgical excellence.[43,44]

5. MANAGEMENT STRATEGIES FOR COMPLICATIONS OF VERESS NEEDLE INSERTION IN LAPAROSCOPIC SURGERY FOLLOWING CESAREAN SECTION

Management strategies for complications arising from Veress needle insertion in females with prior cesarean section, encompassing potential bowel or vascular injuries, necessitate a systematic and

comprehensive approach spanning preoperative assessment, intraoperative management, and postoperative care. Drawing insights from a retrospective cohort study conducted in 2023 involving 365 patients undergoing laparoscopic abdominal surgery, it becomes evident that a thorough evaluation of the patient's medical history is paramount. This evaluation should delve into previous abdominal surgeries, including cesarean sections, along with a comprehensive examination of comorbidities, history of hernia, age, BMI, and any previous complications that may influence the choice of entry technique. During intraoperative management, meticulous attention to surgical technique during Veress needle insertion is imperative, taking into consideration anatomical variations and potential adhesions resulting from previous cesarean sections. Utilization of ancillary techniques such as ultrasound or laparoscopic visualization may aid in safe abdominal entry, particularly in cases with suspected adhesions or difficult access, such as patients with prior cesarean sections. Additionally, maintaining vigilance for potential complications during entry, including bowel or vascular injuries, is crucial, with readiness to promptly convert to an open technique if deemed necessary. This systematic and proactive approach ensures a comprehensive management strategy to mitigate the risks associated with Veress needle insertion in females with a history of cesarean section, ultimately enhancing patient safety and optimizing surgical outcomes.[45,2]

For early detection of complications associated with Veress needle insertion in females with prior cesarean section, close monitoring of patients for signs and symptoms of intraoperative complications is paramount. This includes vigilance for indicators such as abdominal pain, bleeding, or hemodynamic instability, which may signal underlying issues requiring immediate attention. Intraoperative imaging modalities, such as laparoscopy, serve as valuable tools for promptly identifying and assessing suspected injuries, enabling swift intervention to mitigate potential complications. Additionally, considering intraoperative consultation with surgical colleagues becomes crucial for cases requiring complex repair or expertise beyond the scope of the primary surgeon. In the event of an intraoperative complication, prompt assessment of the extent and location of suspected bowel injuries is imperative, with consideration given to primary repair or diversion as indicated by the severity of the injury. Hemostatic techniques for managing vascular injuries, including direct pressure, suture repair, or vascular control, should be promptly employed to minimize disruption to ongoing surgical procedures and mitigate the risk of further complications. Furthermore, coordination with multidisciplinary teams is essential for addressing complex vascular injuries that may necessitate specialized management beyond the capabilities of the surgical team alone, ensuring comprehensive and optimal patient care throughout the perioperative period.[45,4,7,8]

In the postoperative period following Veress needle insertion in females with prior cesarean section, vigilance for signs of complications such as fever, abdominal pain, or indications of sepsis is crucial for early detection and intervention. Prompt recognition of these symptoms allows for timely management to prevent escalation of complications. Implementing appropriate pain management strategies tailored to the individual patient's needs is essential to alleviate discomfort and facilitate recovery. Moreover, early mobilization protocols should be instituted to promote circulation, prevent complications such as deep vein thrombosis, and expedite the patient's return to baseline functional status. Providing clear and concise instructions to patients regarding signs indicative of potential complications, such as worsening pain or fever, empowers them to promptly seek medical attention if necessary. Additionally, detailed guidance on postoperative care and instructions for follow-up appointments ensures continuity of care and facilitates timely assessment by healthcare providers to address any emerging issues. By prioritizing proactive monitoring, effective pain management, and patient education, healthcare teams can optimize postoperative outcomes and mitigate the risk of complications following Veress needle insertion in females with a history of cesarean section.[45,46,47, 48, 49, 50]

6. LONG-TERM OUTCOMES AND IMPLICATIONS FOLLOWING VERESS NEEDLE INSERTION IN LAPAROSCOPIC SURGERY AFTER CESAREAN SECTION

Hernia formation or the development of chronic adhesion-related symptoms represent potential delayed or late-onset complications following Veress needle insertion in females with prior cesarean section. These complications may manifest weeks, months, or even years after the initial procedure, highlighting the importance of ongoing vigilance and monitoring. In cases where concerns arise regarding potential complications or unresolved symptoms, imaging studies such as abdominal ultrasound or CT scan can be valuable diagnostic tools. These modalities enable healthcare providers to visualize the abdominal structures and identify any abnormalities, such as hernias or adhesions, that may be contributing to the patient's

symptoms. Early detection of these complications allows for timely intervention and management to prevent further morbidity and optimize patient outcomes. Therefore, healthcare providers should remain attentive to the possibility of delayed or late-onset complications following Veress needle insertion, and utilize appropriate imaging studies as needed to guide further evaluation and treatment.[45,51,52]

A case study from 2023 serves as a poignant reminder of the rare yet critical complications that may arise from Veress needle insertion and trocar placement during laparoscopic surgeries, encompassing major vascular injuries, bowel injuries, and hemorrhage. These complications, though infrequent, carry the potential for significant morbidity and mortality if not promptly recognized and managed. The case underscores the paramount importance of early recognition, aggressive resuscitation, and appropriate management strategies to mitigate adverse outcomes. In such scenarios, swift and decisive intervention is imperative, necessitating a multidisciplinary approach involving surgeons, anesthesiologists, and vascular specialists to optimize patient care and outcomes. By swiftly mobilizing resources and expertise, healthcare teams can effectively address these life-threatening complications, minimize the associated risks, and pave the way for favorable patient recovery. This case study serves as a sobering reminder of the critical nature of vigilance and preparedness in the context of laparoscopic surgeries, emphasizing the need for continuous education, training, and adherence to best practices to ensure the highest standards of patient safety and care.[45]

For patient counseling and follow-up care, healthcare providers should emphasize the rarity of these complications while also informing patients about the potential risks associated with laparoscopic procedures. Patients should also be educated about the signs and symptoms of complications such as hemorrhage, bowel injury, and vascular injury, and instructed to seek immediate medical attention if they experience any concerning symptoms postoperatively.

Additionally, surgeons should ensure proper training and technique in Veress needle insertion and trocar placement to minimize the risk of injury. Visual confirmation of intraperitoneal placement of the Veress needle, maintaining the intraabdominal pressure of 12–14 mm Hg, avoiding manipulation and careful observation for any signs of injury after insertion are important preventive measures.In cases where complications do occur, prompt recognition and early intervention are crucial. Surgeons should be prepared to convert to open surgery if necessary and involve appropriate specialists for vascular repair or bowel injury management.[19]

7. ADDRESSING GAPS AND LIMITATIONS IN RESEARCH ON VERESS NEEDLE INSERTION SAFETY IN FEMALES WITH PRIOR CESAREAN SECTION

Several gaps and limitations in the existing research on the safety of Veress needle insertion in females with prior cesarean section can be identified, along with areas where further research is needed.

Several papers have acknowledged the limitation of small sample sizes in their studies, recognizing the impact this has on the broad applicability of their findings. Indeed, small sample sizes may compromise the statistical power of a study and limit the generalizability of its conclusions to the broader population of females with prior cesarean sections. These limitations stem from the inherent variability within smaller participant groups, which may not adequately represent the diversity of factors and experiences present in the larger population. Consequently, there is a recognized need for studies with larger participant groups to ensure that outcomes are more representative and applicable to a wider range of individuals. By increasing the sample size, researchers can enhance the robustness and reliability of their findings, thereby enabling more accurate assessments of the efficacy, safety, and generalizability of interventions or treatments for females with prior cesarean sections. Moreover, larger participant groups allow for subgroup analyses, facilitating the identification of potential variations in treatment effects based on factors such as age, comorbidities, or surgical history. Therefore, prioritizing studies with larger sample sizes is essential to advance our understanding of optimal management strategies and improve outcomes for this patient population.[20,37]. One of these also compares the Veress needle technique with the open technique and suggests that the open technique may be safer. However, further research with larger sample sizes and longer follow-up periods is needed to confirm these findings and compare the safety and efficacy of different entry techniques specifically in females with prior cesarean sections.[37]

Another paper has shed light on two critical factors often overlooked in studies on laparoscopic techniques: the lack of consideration for surgeon experience and inadequate reporting of blinding and allocation concealment. Surgeon experience and the learning curve associated with laparoscopic procedures play pivotal roles in patient outcomes,

particularly concerning Veress needle insertion in individuals with prior cesarean sections. However, many studies fail to account for variations in surgeon expertise, overlooking the potential impact on the safety and efficacy of the procedure. Future research endeavors should prioritize the inclusion of data on surgeon experience and proficiency levels to provide a more comprehensive understanding of the factors influencing surgical outcomes.

Furthermore, inadequate reporting of blinding methods and allocation concealment in studies poses a significant risk of bias, potentially compromising the reliability and validity of their findings. Blinding and allocation concealment are essential components of rigorous study design, helping to minimize the influence of confounding variables and ensure the integrity of study outcomes. Therefore, it is imperative for future studies to adopt transparent reporting practices regarding blinding methods and allocation concealment, allowing for a more accurate assessment of the intervention's true effects. By addressing these methodological shortcomings, researchers can enhance the quality and credibility of their research findings, ultimately advancing the field of laparoscopic surgery and improving patient care for individuals with prior cesarean sections.[22]

One paper delves into the pervasive and severe late complications stemming from postoperative adhesions, which can significantly impact patients years after undergoing abdominal surgery. These late complications, including adhesive bowel obstruction, infertility, and chronic pain syndromes, underscore the enduring consequences of adhesion formation and highlight the importance of long-term follow-up studies. Specifically, there is a pressing need for comprehensive investigations focusing on females with prior cesarean sections who undergo laparoscopic procedures. By conducting long-term follow-up studies, researchers can elucidate the true incidence and prevalence of late complications in this patient population, providing valuable insights into the long-term sequelae of adhesions following cesarean section and laparoscopic surgery. Such studies are essential for enhancing our understanding of the burden of late complications and informing strategies for their prevention, early detection, and management. Moreover, these findings can guide the development of targeted interventions aimed at mitigating the impact of late complications and improving the long-term outcomes and quality of life for females with prior cesarean sections undergoing laparoscopic procedures. Therefore, prioritizing long-term follow-up studies is paramount to address the significant clinical implications associated with postoperative adhesions and ensure comprehensive patient care across the continuum of surgical management. [33]

Another study underscores the emergence of innovative surgical techniques, notably single-incision laparoscopic surgery (SILS) and vaginal natural orifice transluminal endoscopic surgery (vNOTES), as promising avenues for minimally invasive procedures. However, the applicability and safety of these techniques in females with prior cesarean sections remain relatively unexplored. Future research endeavors should prioritize evaluating the safety, feasibility, and efficacy of SILS and vNOTES specifically in this patient population, taking into account factors such as adhesion formation and surgical outcomes. Given the unique anatomical considerations and potential adhesion-related challenges in individuals with prior cesarean sections, comprehensive investigations are warranted to assess the suitability and potential advantages of these novel approaches. By elucidating the benefits and limitations of SILS and vNOTES in females with prior cesarean sections, researchers can enhance the evidence base and inform clinical decision-making, ultimately optimizing surgical strategies and improving patient outcomes in this population. Therefore, future studies should aim to bridge this knowledge gap and provide valuable insights into the role of advanced laparoscopic techniques in the management of females with prior cesarean sections. [23]

Conclusion

The safety of Veress needle insertion in females with prior cesarean section undergoing laparoscopic surgery is a complex and multifaceted issue. While laparoscopy offers numerous benefits, the presence of adhesions and altered abdominal anatomy pose significant challenges that must be carefully addressed to minimize the risk of complications. Thorough preoperative assessment, meticulous surgical technique, and ongoing monitoring are essential to ensure optimal patient outcomes.

Despite the advancements in laparoscopic techniques, further research is needed to address the gaps and limitations in the existing literature and optimize the safety and efficacy of Veress needle insertion in females with prior cesarean section. By addressing these challenges and implementing evidence-based practices, surgeons can navigate the complexities of laparoscopic surgery in this patient population and improve patient outcomes.

References:

1. Palmer R. Safety in laparoscopy. *J Reprod Med*. 1974;13(1):1-5.
2. Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: A qualified systematic review. *World J Methodol*. 2015;5(4):238-254. Published 2015 Dec 26. Doi:10.5662/wjm.v5.i4.238
3. Reynolds W Jr. The first laparoscopic cholecystectomy. *JSLS*. 2001;5(1):89-94.
4. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*. 2009;339:b2700. Published 2009 Jul 21. Doi:10.1136/bmj.b2700
5. Ohtani H, Tamamori Y, Arimoto Y, Nishiguchi Y, Maeda K, Hirakawa K. Meta-analysis of the results of randomized controlled trials that compared laparoscopic and open surgery for acute appendicitis. *J Gastrointest Surg*. 2012;16(10):1929-1939. Doi:10.1007/s11605-012-1972-9
6. Thomson JE, Kruger D, Jann-Kruger C, et al. Laparoscopic versus open surgery for complicated appendicitis: a randomized controlled trial to prove safety. *Surg Endosc*. 2015;29(7):2027-2032. Doi:10.1007/s00464-014-3906-y
7. Markides G, Subar D, Riyad K. Laparoscopic versus open appendectomy in adults with complicated appendicitis: systematic review and meta-analysis. *World J Surg*. 2010;34(9):2026-2040. Doi:10.1007/s00268-010-0669-z
8. Li X, Zhang J, Sang L, et al. Laparoscopic versus conventional appendectomy--a meta-analysis of randomized controlled trials. *BMC Gastroenterol*. 2010;10:129. Published 2010 Nov 3. Doi:10.1186/1471-230X-10-129
9. Wei B, Qi CL, Chen TF, et al. Laparoscopic versus open appendectomy for acute appendicitis: a metaanalysis. *Surg Endosc*. 2011;25(4):1199-1208. Doi:10.1007/s00464-010-1344-z
10. Golub R, Siddiqui F, Pohl D. Laparoscopic versus open appendectomy: a metaanalysis. *J Am Coll Surg*. 1998;186(5):545-553. Doi:10.1016/s1072-7515(98)00080-5
11. Markar SR, Penna M, Harris A. Laparoscopic approach to appendectomy reduces the incidence of short- and long-term post-operative bowel obstruction: systematic review and pooled analysis. *J Gastrointest Surg*. 2014;18(9):1683-1692. Doi:10.1007/s11605-014-2572-7
12. Tulandi T, Agdi M, Zarei A, Miner L, Sikirica V. Adhesion development and morbidity after repeat cesarean delivery. *Am J Obstet Gynecol*. 2009;201(1):56.e1-56.e566. Doi:10.1016/j.ajog.2009.04.039
13. Soltan MH, Al Nuaim L, Khashoggi T, Chowdhury N, Kangave D, Adelusi B. Sequelae of repeat cesarean sections. *Int J Gynaecol Obstet*. 1996;52(2):127-132. Doi:10.1016/0020-7292(95)02561-8
14. Makoha FW, Felimban HM, Fathuddien MA, Roomi F, Ghabra T. Multiple cesarean section morbidity. *Int J Gynaecol Obstet*. 2004;87(3):227-232. Doi:10.1016/j.ijgo.2004.08.016
15. Morales KJ, Gordon MC, Bates GW Jr. Postcesarean delivery adhesions associated with delayed delivery of infant. *Am J Obstet Gynecol*. 2007;196(5):461.e1-461.e4616. Doi:10.1016/j.ajog.2006.12.017
16. Uygur D, Gun O, Kelekci S, Ozturk A, Ugur M, Mungan T. Multiple repeat caesarean section: is it safe?. *Eur J Obstet Gynecol Reprod Biol*. 2005;119(2):171-175. Doi:10.1016/j.ejogrb.2004.07.022
17. Hesselman S, Högberg U, Råssjö EB, Schytt E, Löfgren M, Jonsson M. Abdominal adhesions in gynaecologic surgery after caesarean section: a longitudinal population-based register study. *BJOG*. 2018;125(5):597-603. Doi:10.1111/1471-0528.14708
18. Alam F, Badminton R, Tsvetkov F, Hanif Z, Payne R. Safe insertion of Veress needle for the induction of pneumoperitoneum: a technical note. J Surg Case Rep. 2023 Jun 1;2023(6):rjad311. Doi: 10.1093/jscr/rjad311. PMID: 37274630; PMCID: PMC10234602.
19. Vilos GA, Ternamian A, Dempster J, Laberge PY. No. 193-Laparoscopic Entry: A Review of Techniques, Technologies, and Complications. *J Obstet Gynaecol Can*. 2017;39(7):e69-e84. Doi:10.1016/j.jogc.2017.04.013
20. Güven E, Dura MC, Aktürk H, Güraslan H. Safety of Laparoscopic Entry Points in Patients With a History of Abdominal Surgery: A Research Article. *Cureus*. 2023;15(10):e47244. Published 2023 Oct 18. Doi:10.7759/cureus.47244
21. Krishnakumar S, Tambe P. Entry complications in laparoscopic surgery. *J Gynecol Endosc Surg*. 2009;1(1):4-11. Doi:10.4103/0974-1216.51902
22. Marchand GJ, Masoud A, King A, Brazil G, Ulibarri H, Parise J, Arroyo A, Coriell C, Goetz S, Moir C, Christensen A, Alexander T, Govindan M. Systematic review and meta-analysis of Veress needle entry versus direct trocar entry in gynecologic surgery. BMJ Surgery, Interventions, & Health Technologies. 2022;4:e000121..
23. Levy L, Tsaltas J. Recent advances in benign gynecological laparoscopic surgery. *Fac Rev*.

2021;10:60. Published 2021 Jul 26. Doi:10.12703/r/10-60

24. Miti C, Busuulwa P, Scott R, Bloomfield-Gadelha H. Primary entry trocar design and entry-related complications at laparoscopy in obese patients: meta-analysis. *BJS Open*. 2023;7(3):zrad047. Doi:10.1093/bjsopen/zrad047
25. Jain N, Sareen S, Kanawa S, Jain V, Gupta S, Mann S. Jain point: A new safe portal for laparoscopic entry in previous surgery cases. *J Hum Reprod Sci*. 2016;9(1):9-17. Doi:10.4103/0974-1208.178637
26. Tulikangas PK, Robinson DS, Falcone T. Left upper quadrant cannula insertion. *Fertil Steril*. 2003;79(2):411-412. Doi:10.1016/s0015-0282(02)04668-x
27. Chang FH, Chou HH, Lee CL, Cheng PJ, Wang CW, Soong YK. Extraumbilical insertion of the operative laparoscope in patients with extensive intraabdominal adhesions. *J Am Assoc Gynecol Laparosc*. 1995;2(3):335-337. Doi:10.1016/s1074-3804(05)80119-7
28. Kumakiri J, Takeuchi H, Sato Y, et al. A novel method of ninth-intercostal microlaparoscopic approach for patients with previous laparotomy. *Acta Obstet Gynecol Scand*. 2006;85(8):977-981. Doi:10.1080/00016340600607065
29. van Goor H. Consequences and complications of peritoneal adhesions. *Colorectal Dis*. 2007;9 Suppl 2:25-34. Doi:10.1111/j.1463-1318.2007.01358.x
30. Fei Y, Wen J, Li X, Wang N, Chen M, Jiang X. Uterine adhesion: Is luteal phase prior to follicular phase in uterine adhesiolysis?. *Medicine (Baltimore)*. 2021;100(37):e27194. Doi:10.1097/MD.0000000000027194
31. Rajab TK, Ahmad UN, Kelly E. Implications of late complications from adhesions for preoperative informed consent. *J R Soc Med*. 2010;103(8):317-321. Doi:10.1258/jrsm.2010.090378
32. Diamond MP, Freeman ML. Clinical implications of postsurgical adhesions. *Hum Reprod Update*. 2001;7(6):567-576. Doi:10.1093/humupd/7.6.567
33. Schenker JG, Margalioth EJ. Intrauterine adhesions: an updated appraisal. *Fertil Steril*. 1982;37(5):593-610. Doi:10.1016/s0015-0282(16)46268-0
34. Azevedo JL, Azevedo OC, Miyahira SA, et al. Injuries caused by Veress needle insertion for creation of pneumoperitoneum: a systematic literature review. *Surg Endosc*. 2009;23(7):1428-1432. Doi:10.1007/s00464-009-0383-9
35. Madhok B, Nanayakkara K, Mahawar K. Safety considerations in laparoscopic surgery: A narrative review. *World J Gastrointest Endosc*. 2022;14(1):1-16. Doi:10.4253/wjge.v14.i1.1
36. Scaletta G, Dinoi G, Capozzi V, et al. Comparison of minimally invasive surgery with laparotomic approach in the treatment of high risk endometrial cancer: A systematic review. *Eur J Surg Oncol*. 2020;46(5):782-788. Doi:10.1016/j.ejso.2019.11.519
37. Hewett PJ, Allardyce RA, Bagshaw PF, et al. Short-term outcomes of the Australasian randomized clinical study comparing laparoscopic and conventional open surgical treatments for colon cancer: the ALCCaS trial. *Ann Surg*. 2008;248(5):728-738. Doi:10.1097/SLA.0b013e31818b7595
38. Litynski GS. Kurt Semm and the fight against skepticism: endoscopic hemostasis, laparoscopic appendectomy, and Semm's impact on the "laparoscopic revolution". *JSLS*. 1998;2(3):309-313.
39. Antoniou SA, Antoniou GA, Antoniou AI, Granderath FA. Past, Present, and Future of Minimally Invasive Abdominal Surgery. *JSLS*. 2015;19(3):e2015.00052. Doi:10.4293/JSLS.2015.00052
40. Olsen DO. Bile duct injuries during laparoscopic cholecystectomy: a decade of experience. *J Hepatobiliary Pancreat Surg*. 2000;7(1):35-39. Doi:10.1007/s005340050151
41. Joris JL, Chiche JD, Canivet JL, Jacquet NJ, Legros JJ, Lamy ML. Hemodynamic changes induced by laparoscopy and their endocrine correlates: effects of clonidine. *J Am Coll Cardiol*. 1998;32(5):1389-1396. Doi:10.1016/s0735-1097(98)00406-9
42. Omar I, Graham Y, Singhal R, Wilson M, Madhok B, Mahawar KK. Identification of Common Themes from Never Events Data Published by NHS England. *World J Surg*. 2021;45(3):697-704. Doi:10.1007/s00268-020-05867-7
43. Vilos GA, Ternamian A, Laberge PY, et al. Guideline No. 412: Laparoscopic Entry for Gynaecological Surgery [published correction appears in J Obstet Gynaecol Can. 2021 Sep;43(9):1120-1121]. *J Obstet Gynaecol Can*. 2021;43(3):376-389.e1. Doi:10.1016/j.jogc.2020.12.012
44. Alhajress GI, Al Babtain I, Alsaghyir A, Arishi H. Complications of Veress Needle Versus Open Technique in Abdominal Surgeries. *Cureus*. 2021;13(5):e14926. Published 2021 May 9. Doi:10.7759/cureus.14926
45. Shaikh N, E-Amara U, Sajeer A, et al. Laparoscopic Major Vascular Injuries Report of Two Cases and Review. *Int Med Case Rep J*. 2023;16:7-11. Published 2023 Jan 5. Doi:10.2147/IMCRJ.S394281

46. Valente M, Campanelli M, Benavoli D, et al. Safety and Outcomes of Laparoscopic Sleeve Gastrectomy in a General Surgery Residency Program. *JSLS*. 2021;25(1):e2020.00063. Doi:10.4293/JSLS.2020.00063
47. Xue FS, Liu GP, Li RP. Association of emergency general surgery with excess postoperative morbidity and mortality. *J Trauma Acute Care Surg*. 2015;78(6):1234-1235. Doi:10.1097/TA.0000000000000637
48. Tjeertes EK, Ultee KH, Stolker RJ, et al. Perioperative Complications are Associated With Adverse Long-Term Prognosis and Affect the Cause of Death After General Surgery. *World J Surg*. 2016;40(11):2581-2590. Doi:10.1007/s00268-016-3600-4
49. Fantola G, Brunaud L, Nguyen-Thi PL, Germain A, Ayav A, Bresler L. Risk factors for postoperative complications in robotic general surgery. *Updates Surg*. 2017;69(1):45-54. Doi:10.1007/s13304-016-0398-4
50. Javed H, Olanrewaju OA, Ansah Owusu F, et al. Challenges and Solutions in Postoperative Complications: A Narrative Review in General Surgery. *Cureus*. 2023;15(12):e50942. Published 2023 Dec 22. Doi:10.7759/cureus.50942
51. Bensley RP, Schermerhorn ML, Hurks R, et al. Risk of late-onset adhesions and incisional hernia repairs after surgery. *J Am Coll Surg*. 2013;216(6):1159-116812. Doi:10.1016/j.jamcollsurg.2013.01.060
52. Muller S, Langø T, Brekken R, Ystgaard B. Degree of adhesions after repair of incisional hernia. *JSLS*. 2010;14(3):399-404. Doi:10.4293/108680810X12924466006486