



Clinical Observation of Extraction-Site Incisional Hernia after Laparoscopic Colorectal Surgery: A Systematic Review

*Dr. Aws Mohammed Matrood

Higher Diploma in General Surgery, Al-Elwayia Teaching Hospital. Baghdad. Iraq.

DOI: [10.5281/zenodo.13327163](https://doi.org/10.5281/zenodo.13327163)

Submission Date: 10 July 2024 | Published Date: 15 Aug. 2024

*Corresponding author: [Dr. Aws Mohammed Matrood](#)

Higher Diploma in General Surgery, Al-Elwayia Teaching Hospital. Baghdad. Iraq.

Abstract

Extraction-site incisional hernia is a significant complication that can occur after laparoscopic colorectal surgery. This type of hernia occurs at the site where the surgical specimen is removed from the body. Clinical observation of extraction-site incisional hernia involves closely monitoring patients postoperatively for signs and symptoms of hernia formation, such as bulging or pain at the extraction site. Early detection and intervention are crucial in managing this complication effectively. Various factors, including patient characteristics, surgical techniques, and postoperative care, may influence the development of extraction-site incisional hernia. Close clinical observation and proactive management strategies are essential in addressing this postoperative concern.

Keywords: Incisional hernia; Extraction-site; Laparoscopic colorectal surgery.

Introduction

Extraction-site incisional hernia is a notable complication that can occur after laparoscopic colorectal surgery, posing challenges for both patients and healthcare providers [1-2]. Laparoscopic colorectal surgery has become a preferred approach for many patients due to its minimally invasive nature and potential benefits in terms of recovery and postoperative outcomes [3-4]. However, the development of extraction-site incisional hernias post-surgery can significantly impact patient well-being and necessitate further intervention [5]. Understanding the intricacies of extraction-site incisional hernias is crucial for healthcare professionals involved in colorectal surgery, as early detection and appropriate management can lead to improved patient outcomes and reduced complications. By exploring the clinical observations and studies related to this specific type of hernia, we aim to provide insights that can inform clinical practice and enhance patient care.

Throughout this review, we will explore the risk factors that contribute to the development of extraction-site incisional hernias, such as patient-related factors, surgical techniques, and postoperative care practices. Additionally, we will examine the strategies and interventions that can help prevent the occurrence of these hernias and minimize their impact on patients' recovery and quality of life.

By synthesizing the existing literature on extraction-site incisional hernias post laparoscopic colorectal surgery, this review seeks to contribute to the body of knowledge in this field and provide valuable information for healthcare professionals, researchers, and policymakers. Ultimately, our goal is to facilitate a deeper understanding of this complication and pave the way for improved patient care and outcomes in the context of laparoscopic colorectal surgery.

Methodology

To conduct a comprehensive literature review on the clinical observation of extraction-site incisional hernia after laparoscopic colorectal surgery, a systematic approach was followed to ensure the reliability and validity of the findings. The methodology employed in this review aimed to gather relevant information from reputable sources and provide a thorough analysis of the topic.

1. Search Strategy:

A systematic search was conducted in major medical databases, including PubMed, MEDLINE, and Cochrane Library, using specific keywords related to extraction-site incisional hernia, laparoscopic colorectal surgery, and clinical observations. The search was limited to studies published between 2010 and 2024 to focus on recent research and developments in the field.

2. Selection Criteria:

The selection of studies was based on predefined inclusion criteria, including articles that specifically addressed the clinical observation of extraction-site incisional hernia following laparoscopic colorectal surgery. Studies that discussed risk factors, prevention strategies, surgical techniques, and management approaches related to this complication were prioritized for inclusion in the review.

3. Screening and Data Extraction:

Initially, search results were screened based on titles and abstracts to identify relevant studies. Full-text articles of the selected studies were then reviewed to extract key information, such as study objectives, methodologies, findings, and conclusions. Data relevant to clinical observations, case studies, surgical techniques, and management of extraction-site incisional hernia were extracted for further analysis.

4. Synthesis and Analysis:

The extracted data from the selected studies were synthesized and analyzed to identify common trends, patterns, and gaps in the literature concerning extraction-site incisional hernia after laparoscopic colorectal surgery. The findings from the studies were synthesized to provide a comprehensive overview of the clinical observations and best practices associated with this complication.

5. Quality Assessment:

The quality of the selected studies was assessed to ensure the credibility and robustness of the findings. Studies with clear methodologies, appropriate data analysis, and relevant outcomes were given preference in the review to enhance the reliability of the synthesized information.

6. Citation and Referencing:

Proper citation and referencing were consistently applied throughout the review to acknowledge the original sources and authors of the included studies. This approach aimed to maintain academic integrity and provide readers with access to the primary literature for further exploration and verification.

By adhering to this meticulous methodology, this literature review on extraction-site incisional hernia after laparoscopic colorectal surgery aims to offer valuable insights into the clinical observations and management of this significant surgical complication.

Overview of Extraction-Site Incisional Hernia

Clinical observations indicate that extraction-site incisional hernias can manifest as bulging or protrusion of abdominal contents through the weakened fascia or muscle layers at the extraction site. Patients may present with symptoms such as pain, discomfort, and visible swelling at the hernia site [6-7]. Additionally, complications such as incarceration or strangulation of the herniated contents can occur, necessitating prompt medical intervention [8].

Several risk factors have been associated with the development of extraction-site incisional hernias, including obesity, older age, smoking, poor wound healing, and inadequate closure techniques during surgery [9]. The laparoscopic approach itself, with its reliance on small incisions and trocar placement, may predispose patients to this complication compared to open surgery [10].

Prevention strategies play a crucial role in mitigating the risk of extraction-site incisional hernias [11]. Proper closure techniques, reinforcement of the fascial defect, and adherence to postoperative care guidelines can help reduce the incidence of hernia formation at the extraction site [12]. Surgeons should pay attention to meticulous closure of the fascial defect and consider the use of mesh reinforcement in high-risk patients [13].

In terms of management, early detection and timely intervention are essential in addressing extraction-site incisional hernias. Surgical repair is often required to correct the hernia and prevent further complications. The choice of surgical technique, such as laparoscopic versus open repair, depends on the size and characteristics of the hernia, as well as the patient's overall condition [14].

Overall, a comprehensive understanding of extraction-site incisional hernia is crucial for healthcare professionals involved in colorectal surgery. By recognizing the risk factors, implementing preventive measures, and employing appropriate management strategies, healthcare providers can optimize patient outcomes and minimize the impact of this challenging complication.

Risk Factors and Prevention Strategies

Several risk factors have been identified that contribute to the development of extraction-site incisional hernia following laparoscopic colorectal surgery [15]. Patients with a higher body mass index (BMI) are at increased risk of developing incisional hernias due to the added pressure on the abdominal wall and compromised tissue integrity [16]. Advanced age is associated with decreased tissue elasticity and strength, making older patients more susceptible to hernia formation post-surgery [17]. Tobacco use has been linked to impaired wound healing and increased risk of incisional hernias due to its detrimental effects on tissue perfusion and repair processes [18]. Patients with underlying conditions that affect wound healing, such as diabetes or immunocompromised states, are more prone to developing incisional hernias [19]. Suboptimal closure of the fascial defect during surgery, inadequate suture techniques, or excessive tension on the wound can predispose patients to hernia formation [20]. Improper placement of trocars during laparoscopic surgery can create weak points in the abdominal wall and increase the risk of herniation at the extraction site [21].

Prevention Strategies:

Preventive measures play a crucial role in reducing the incidence of extraction-site incisional hernia and improving patient outcomes post-surgery [22-23]. Ensuring meticulous closure of the fascial defect using appropriate suture materials and techniques can promote wound healing and reduce the risk of hernia formation. Consideration of mesh reinforcement at the extraction site, especially in high-risk patients, can provide additional support and reduce the likelihood of herniation [16]. Emphasizing the importance of postoperative care, including early ambulation, proper wound care, and adherence to activity restrictions, can aid in the prevention of incisional hernias [1]. Educating patients about the risks of hernia formation, signs of complications, and the importance of follow-up care can empower them to take an active role in their recovery and early detection of hernias [22]. Ensuring that surgeons are experienced in laparoscopic techniques and proficient in closure methods can enhance the quality of surgical outcomes and decrease the risk of hernia formation [8]. By addressing these risk factors and implementing effective prevention strategies, healthcare providers can help reduce the incidence of extraction-site incisional hernia after laparoscopic colorectal surgery and improve patient safety and satisfaction [20]. In the subsequent sections of this literature review, we will further explore these risk factors and prevention strategies in detail, drawing insights from clinical observations and studies in the field.

Clinical Observations and Case Studies:

Clinical observations and case studies provide valuable insights into the presentation, management, and outcomes of extraction-site incisional hernia following laparoscopic colorectal surgery [23]. By examining real-world cases and patient experiences, healthcare providers can gain a deeper understanding of this complication and tailor their approaches to optimize patient care.

1. Presentation:

Clinical observations of extraction-site incisional hernia typically involve the presentation of patients with symptoms such as a visible bulge or protrusion at the site of the extraction incision [24]. Patients may report discomfort, pain, or a dragging sensation in the area of the hernia, especially during physical exertion or straining [24]. In some cases, complications such as bowel obstruction or strangulation may occur, necessitating urgent medical attention [25].

2. Case Studies:

Case studies offer detailed accounts of individual patients who have developed extraction-site incisional hernia after laparoscopic colorectal surgery [26]. These studies provide insights into the patient's medical history, surgical procedure, postoperative course, and management of the hernia. By examining specific cases, healthcare providers can learn from real-world experiences and apply lessons to their clinical practice. For example, a case study may describe a patient who underwent laparoscopic colectomy for colorectal cancer and later developed an extraction-site incisional hernia due to obesity and poor wound healing [1]. The case would detail the patient's symptoms, diagnostic workup, surgical repair of the hernia, and postoperative recovery. Through the analysis of such cases, healthcare providers can identify common patterns, challenges, and best practices in managing this complication.

3. Management:

Clinical observations and case studies also shed light on the management strategies employed to address extraction-site incisional hernia [26]. Surgical repair is often required to correct the hernia and reinforce the weakened abdominal wall. The choice of surgical technique, such as laparoscopic or open repair, depends on the size and characteristics of the hernia, as well as the patient's overall health status [27]. Furthermore, postoperative care and follow-up play a crucial role in ensuring optimal outcomes for patients with extraction-site incisional hernia. Monitoring for complications, promoting wound healing, and addressing any recurrence of hernias are essential aspects of long-term management [28].

By examining clinical observations and case studies, healthcare providers can enhance their knowledge and skills in managing extraction-site incisional hernia and improving patient outcomes. In the subsequent sections of this literature review, we will delve into specific case studies and clinical observations to provide a comprehensive analysis of this challenging surgical complication.

Surgical Techniques and Management

Surgical repair is often necessary to address extraction-site incisional hernia following laparoscopic colorectal surgery [29]. Various techniques and approaches can be employed to correct the hernia, reinforce the abdominal wall, and minimize the risk of recurrence [30]. Laparoscopic repair of extraction-site incisional hernia involves minimally invasive techniques that offer several advantages, including reduced postoperative pain, shorter hospital stay, and faster recovery compared to open repair [31]. In cases where laparoscopic repair is not feasible or appropriate, open repair of extraction-site incisional hernia may be performed [25]. Open repair allows for direct visualization of the hernia defect and surrounding tissues, facilitating precise closure and reinforcement [26]. The use of mesh reinforcement is a common practice in the surgical management of extraction-site incisional hernia [30]. Mesh can provide additional support to the weakened abdominal wall; reduce tension on the repair site, and lower the risk of hernia recurrence [1]. Different types of mesh, such as synthetic or biological, may be used based on the patient's characteristics and surgeon's preference. Postoperative care is crucial for the successful management of extraction-site incisional hernia [31]. Patients should be monitored closely for signs of complications, such as wound infection, seroma formation, or recurrence of the hernia. Follow-up appointments with healthcare providers are essential to assess the progress of healing, address any concerns, and ensure optimal recovery [30]. By employing appropriate surgical techniques, including laparoscopic or open repair, and implementing mesh reinforcement as needed, healthcare providers can effectively manage extraction-site incisional hernia and promote favorable outcomes for patients. In the subsequent sections of this literature review, we will delve further into specific case studies and clinical data to elucidate the efficacy and challenges associated with surgical techniques and management strategies for this complex surgical complication.

Future Directions and Recommendations:

As we continue to advance our understanding and management of extraction-site incisional hernia following laparoscopic colorectal surgery, several future directions and recommendations can guide research, clinical practice, and healthcare policy to improve patient outcomes and reduce the incidence of this complication. In this section, we will highlight key areas for future exploration and offer recommendations for healthcare providers and policymakers. Future research should focus on refining risk stratification models to identify high-risk patients who may benefit from targeted preventive measures. Incorporating novel biomarkers, imaging techniques, and predictive algorithms into preoperative assessments can help healthcare providers tailor interventions to mitigate the risk of extraction-site incisional hernia. Further refinement of minimally invasive surgical techniques for the repair of extraction-site incisional hernia is warranted. Advances in laparoscopic and robotic-assisted approaches, as well as the development of innovative closure and reinforcement materials, can enhance surgical outcomes, reduce complications, and optimize patient recovery. The adoption of personalized medicine principles in the management of extraction-site incisional hernia can lead to more individualized and effective treatment strategies. Tailoring surgical approaches, mesh selection, and postoperative care based on the patient's unique characteristics, comorbidities, and risk profile can optimize outcomes and reduce healthcare costs. Longitudinal studies with extended follow-up periods are needed to assess the long-term outcomes and recurrence rates of extraction-site incisional hernia. Understanding the durability of surgical repairs, risk factors for recurrence, and patient-reported outcomes over time can inform postoperative care guidelines and improve patient satisfaction. Empowering patients through education, shared decision-making, and engagement in their care can enhance treatment adherence, early detection of complications, and overall satisfaction with the healthcare experience. Providing clear and comprehensive information about the risks of extraction-site incisional hernia, preventive measures, and postoperative expectations is essential for promoting patient well-being. Healthcare policymakers and quality improvement initiatives should prioritize the prevention and management of extraction-site incisional hernia as a key patient safety and quality care measure. Implementing standardized protocols, tracking outcomes, and fostering multidisciplinary collaboration can drive continuous improvement in surgical practices and healthcare delivery.

By embracing these future directions and recommendations, healthcare providers, researchers, and policymakers can work together to advance the field of extraction-site incisional hernia management, enhance patient care, and ultimately improve surgical outcomes for individuals undergoing laparoscopic colorectal surgery. Collaboration, innovation, and a patient-centered approach will be instrumental in shaping the future landscape of hernia prevention and treatment.

Conclusion

In conclusion, the management of extraction-site incisional hernia following laparoscopic colorectal surgery requires a comprehensive understanding of the presentation, surgical techniques, and long-term outcomes associated with this challenging complication. Clinical observations and case studies provide valuable insights into the nuances of hernia

repair, patient care, and risk mitigation strategies. Through the examination of real-world cases and patient experiences, healthcare providers can enhance their knowledge and skills in managing extraction-site incisional hernia, leading to improved outcomes and patient satisfaction. Surgical techniques, such as laparoscopic repair, open repair, and mesh reinforcement, play a crucial role in correcting hernias, reinforcing the abdominal wall, and reducing the risk of recurrence.

Future directions and recommendations, including enhanced risk stratification, personalized medicine approaches, and long-term follow-up studies, offer a roadmap for advancing the field of hernia management and optimizing patient care. By embracing innovation, collaboration, and patient-centered care principles, healthcare providers, researchers, and policymakers can work together to shape the future landscape of hernia prevention and treatment.

In closing, the journey towards improving outcomes for patients with extraction-site incisional hernia is an ongoing process that requires dedication, continuous learning, and a commitment to excellence in surgical practice. By staying informed, implementing best practices, and prioritizing patient safety and well-being, we can make significant strides in the field of hernia management and ensure better outcomes for all individuals undergoing laparoscopic colorectal surgery.

Conflict of interest: -None

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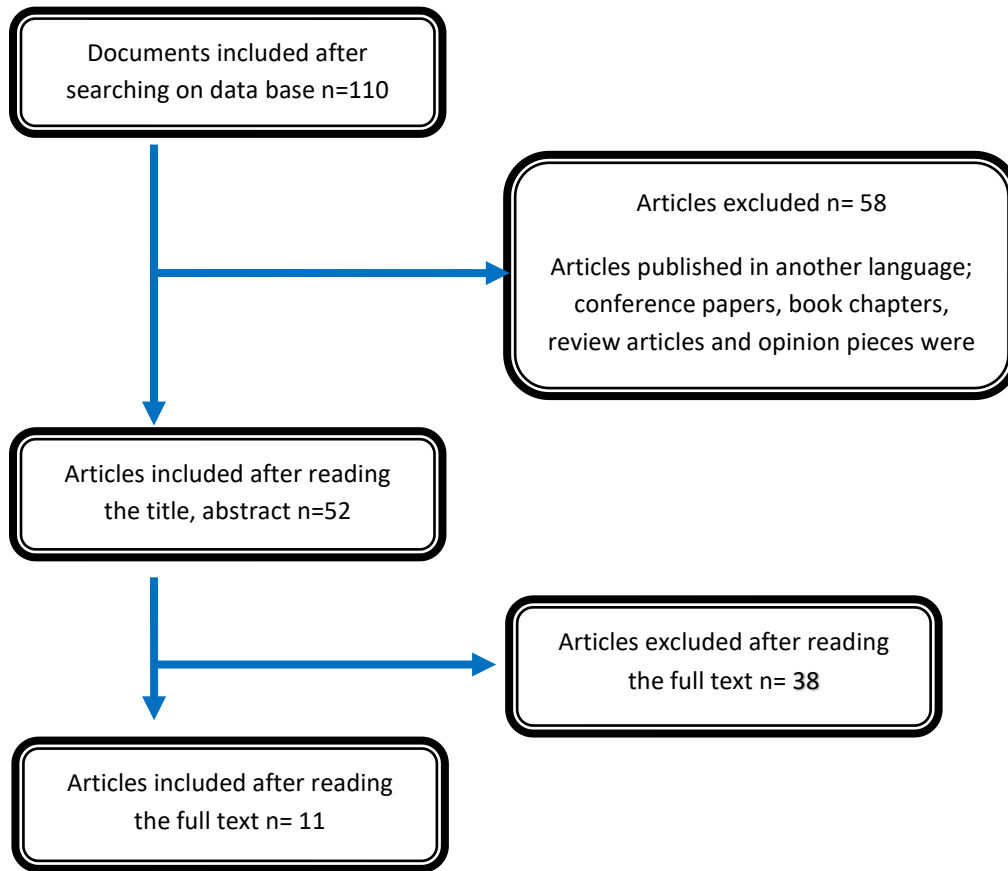


Figure 1. Flowchart of the study selection process.

Table 1: Included Study Characteristics

	Author/year	Insight	Methods used	Main results
1	Fan, 2024[1]	The study observed a 3.2% incidence of incisional hernia post laparoscopic colorectal surgery, with off-midline incisions having an 8.8% rate. Infraumbilical midline incisions showed lower hernia rates.	Retrospective analysis of 1614 laparoscopic colorectal cancer surgeries. Investigated differences in incision sites and risk factors for hernia	Incidence of postoperative IH varies by extraction site. Infraumbilical midline incision has lower hernia rate.
2	Meyer et al,2020[2]	The paper's title matches your query, but it doesn't address your specific question.	Systematic review Network meta-analysis	-
2	Kim et al ,2022[26]	The paper's title matches your query, but it doesn't address your specific question.	Abdominal closure with PDS (Ethicon) or Vicryl (Ethicon) Diagnosis of incisional hernia on computed tomography at 6 and 12 months	Incidence of incisional hernia higher in females, BMI >25, liver disease. No significant difference in hernia rates between closure materials used.

3	Cano-Valderrama et al , 2020[7]	The paper's title matches your query, but it doesn't address your specific question.	Retrospective analytic cohort study Clinical examination or imaging for diagnosis of incisional hernia	17.3% of patients developed extraction-site incisional hernia after surgery. Midline incisions had higher hernia risk compared to other types.
4	Yamamoto et al, 2018[14]	The paper's title matches your query, but it doesn't address your specific question.	Image analysis system for fat area calculation Postoperative CT for incisional hernia diagnosis	8.5% incidence of incisional hernia after laparoscopic colorectal surgery Visceral fat area and female sex are risk factors
5	Benlice et al, 2016[10]	The paper's title matches your query, but it doesn't address your specific question.	Relationship between extraction-site location and incisional hernia rates assessed. Impact of specific incision for specimen extraction studied.	Extraction-site location impacts incisional hernia rates. Relationship between extraction-site location and incisional hernia assessed.
6	Naguib et al , 2015[22]	-	CT scan as gold standard for detection Cohort study comparing laparoscopic and open surgery	-
7	Samia et al , 2013[6]	The paper's title matches your query, but it doesn't address your specific question.	Retrospective data collection from laparoscopic colorectal resections Statistical analysis with t tests, Fisher's exact tests, chi-square tests	Midline extraction sites have higher incisional hernia rates. Overall incisional hernia rate was 7% after laparoscopic colorectal surgery.
8	Burgard et al 2024[23]	The paper's title matches your query, but it doesn't address your specific question.	Retrospective observational cohort study Uni-and multivariate logistic regression analysis	Midline extraction site: 29.8% incisional hernia, 6.7% required repair. Off-midline extraction site: 1.9% incisional hernia, 0% required repair.
9	Fukuoka et al , 2021[25]	Preoperative umbilical hernia and visceral fat area ≥ 100 cm ² are significant risk factors for incisional hernia after laparoscopic colorectal surgery, suggesting alternative incision sites in such cases.	Retrospective multi-institution study Analyzed patient-, tumor-, and surgery-related variables	IH risk factors after LCRS: preop umbilical hernia, VFA ≥ 100 cm ² Alternate incision site recommended for high-risk patients.
10	Khor et al, 2022[9]	The incidence of incisional hernia after major colorectal cancer surgery in the Asian population is analyzed, with laparoscopy showing potential benefits in reducing associated risk factors.	Retrospective analysis of prospectively collected data Multivariate analysis to identify risk factors for incisional hernia	Laparoscopy did not reduce incisional hernia risk after colorectal surgery. Risk factors for incisional hernia were identified in Asian population.
11	Lee et al,	Transverse incisions show	Single-center, parallel-arm,	No significant difference

	2018[11]	lower incisional hernia rates compared to midline incisions in laparoscopic colectomy patients, with improved quality of life and similar pain scores.	nonblinded, superiority randomized trial Conducted in accordance with ethical standards of Declaration Helsinki	in incisional hernia incidence at 1 year. Transverse incision had lower IH rate with longer follow-up.
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CITATION

Aws M.M. (2024). Clinical Observation of Extraction-Site Incisional Hernia after Laparoscopic Colorectal Surgery: A Systematic Review. In Global Journal of Research in Medical Sciences (Vol. 4, Number 4, pp. 39–47). <https://doi.org/10.5281/zenodo.13327163>