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THE COMPARISON OF ETEP AND IPOM IN VENTRAL AND INCISIONAL HERNIA REPAIR: A SYSTEMATIC REVIEW AND META-ANALYSIS

Surgery

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ABSTRACT

Background: Open sublay technique and laparoscopic intraperitoneal onlay mesh (IPOM) technique are the most common used procedures in ventral and incisional hernia repair, however, each technique has its own disadvantages. The enhanced view total extraperitoneal technique (eTEP) aims to put the mesh in the retromuscular space by minimal invasive technique. This study is to investigate the efficacy and safety of eTEP and IPOM approach in ventral and incisional hernia repair. **Methods:** The major databases (PubMed, Embase, Springer, and Cochrane Library) were searched, and all studies published through October 2023, using the keywords "enhanced view extraperitoneal," "extended view totally extraperitoneal," "eTEP," "TEP," "laparoscopic retromuscular," "ventral hernia," "incisional hernia," "laparoscopic intraperitoneal onlay mesh," "IPOM." All relevant articles and reference lists in these original studies were also obtained from the above databases. **Results:** Five trials containing 433 patients were included in the present study. Compared with the IPOM technique, the eTEP ventral/incisional hernia repair was associated a longer operative time [mean difference=44.79; 95% confidence interval (CI): 26.57, 63; P=0.00001], less acute pain on postoperative day 1 (standardized mean difference=-3.90; 95% CI: -4.42, -3.38; P<0.00001), and day 7 (standardized mean difference=-3.72; 95% CI: -6.09, 1.35; P=0.002), and the eTEP group had a shorter hospital stay compared with the IPOM group (mean difference=-0.56; 95% CI: -0.74, -0.39; P=0.00001). There was no significant difference concerning the incidence of seroma, hematoma, intraoperative complication, and postoperative ileus between eTEP and IPOM groups. **Conclusions:** The eTEP technique in ventral and incisional hernia repair shows significantly lower acute postoperative pain and shorter hospital study but a longer operative time. In addition, there is no significant difference in terms of intraoperative or postoperative complications. Further randomized controlled studies with long-term follow-up are needed to evaluate the eTEP technique.

KEYWORDS

INTRODUCTION

Ventral and incisional hernias, prevalent complications post-abdominal surgeries, often necessitate surgical intervention for effective repair and prevention of associated morbidities. Over time, various surgical techniques have been employed, with the Endoscopic Totally Extraperitoneal (eTEP) approach and the conventional laparoscopic Intraperitoneal Onlay Mesh Plus (IPOM+) technique emerging as prominent strategies for managing midline hernias. The choice between these techniques remains a subject of significant debate within the surgical community.

Studies such as Fernandez et al.'s pioneering research (Fernandez et al.,)have shed light on the efficacy of the Extended Totally Extraperitoneal (eTEP) approach in ventral hernia repair, showcasing promising initial outcomes. Conversely, Xu et al. conducted a preliminary retrospective study highlighting the efficacy of the Extended View Totally Extraperitoneal approach versus the laparoscopic Intraperitoneal Onlay Mesh Plus method for abdominal wall hernias. These studies, among others, contribute valuable insights into the comparative effectiveness of these surgical techniques.

Moreover, Parasa et al. (Parasa et al.,) provided a comparative study between eTEP-RS and IPOM surgery, sharing their clinical experience. These seminal works, alongside numerous others (Xu et al., ; Fernandez et al.,), form the foundation for the present meta-analysis, aiming to consolidate and analyze the existing body of evidence regarding the outcomes and comparative effectiveness of eTEP and IPOM+ techniques in midline hernia repair.

The significance of this meta-analysis lies in its potential to offer a synthesized overview, incorporating diverse clinical experiences and outcomes reported across multiple studies. By systematically assessing and amalgamating the findings from disparate investigations, this meta-analysis seeks to provide a comprehensive understanding of the comparative merits and demerits of eTEP and IPOM+ techniques. Such insights hold paramount importance in guiding surgical decision-making, optimizing patient outcomes, and potentially shaping future research and clinical practice in hernia management.

Midline hernias, including ventral and incisional hernias, occur along the midline of the abdomen, often as a result of previous surgical incisions or weak abdominal walls. These hernias pose a significant clinical challenge due to their propensity for complications, including pain, discomfort, impaired quality of life, and the potential for bowel obstruction or strangulation if left untreated. Consequently, effective repair and management are crucial to alleviate symptoms and prevent potential complications.

In addressing midline hernias, various surgical techniques have been developed and refined over time. Among them, two notable approaches have gained prominence in recent years: the Endoscopic Totally Extraperitoneal (eTEP) technique and the conventional laparoscopic Intraperitoneal Onlay Mesh Plus (IPOM+) method.

The eTEP technique involves a minimally invasive approach, accessing the preperitoneal space without breaching the peritoneum, thereby minimizing the risk of intra-abdominal adhesions and potential complications associated with mesh placement. This approach aims to reinforce the abdominal wall from the retro-muscular space.

On the other hand, IPOM+ involves the intraperitoneal placement of a mesh to reinforce the abdominal wall. This approach allows direct access to the hernia defect and enables the mesh to be positioned within the peritoneal cavity.

Given the clinical relevance and prevalence of midline hernias, the comparison between eTEP and IPOM+ techniques has emerged as an essential area of interest in the surgical community. Understanding the comparative efficacy, outcomes, complications, and long-term success rates of these techniques is crucial for guiding surgical decision-

making and optimizing patient care.

By conducting a comprehensive comparison and synthesis of existing studies on eTEP and IPOM+ techniques, this meta-analysis aims to provide clinicians and surgeons with valuable insights into the relative merits of these approaches. Such insights can inform evidence-based practice, assist in personalized treatment selection, and potentially contribute to improved patient outcomes and satisfaction.

Therefore, the comparative analysis of eTEP and IPOM+ techniques holds significant clinical implications, offering a comprehensive understanding of their respective roles in midline hernia repair and aiding in the refinement of surgical strategies for optimal patient care.

Aim of the meta-analysis and the significance of the research

The aim of this meta-analysis is to systematically review, analyze, and synthesize the existing body of literature comparing the Endoscopic Totally Extraperitoneal (eTEP) technique with the conventional laparoscopic Intraperitoneal Onlay Mesh Plus (IPOM+) method for midline hernia repair. Specifically, the meta-analysis aims to:

1. Evaluate and compare the efficacy, safety, and outcomes associated with the eTEP and IPOM+ techniques in managing ventral and incisional hernias.
2. Assess key parameters such as recurrence rates, postoperative complications, pain outcomes, length of hospital stay, and cost-effectiveness between the two surgical approaches.
3. Provide a comprehensive overview and statistical analysis of the collective evidence derived from multiple studies to determine the comparative advantages and limitations of eTEP versus IPOM+ techniques.

In summary, this meta-analysis endeavors to synthesize and critically evaluate the existing evidence, providing a comprehensive overview of the comparative effectiveness of eTEP and IPOM+ techniques. Its significance lies in its potential to inform clinical decision-making, enhance patient care, and guide future research and advancements in the field of midline hernia repair.

METHODOLOGY

1. Study Selection Criteria:

Inclusion Criteria:

- Studies comparing eTEP and IPOM+ techniques for midline hernia repair.
- Published articles in peer-reviewed journals.
- Relevant outcomes such as recurrence rates, complications, postoperative pain, etc.

Exclusion Criteria:

- Studies not focusing on eTEP or IPOM+ techniques.
- Studies lacking necessary outcome data or sufficient details.

2. Literature Search Strategy:

- Databases Utilized: PubMed/MEDLINE, Embase, Cochrane Library, etc.
- Search Terms: Keywords related to "eTEP," "IPOM+," "midline hernia repair," combined using Boolean operators.
- Inclusion of grey literature or conference proceedings if applicable.

3. Study Selection Process:

- Initial screening based on titles and abstracts to identify potentially relevant studies.
- Full-text assessment of selected studies to confirm adherence to inclusion criteria.
- Inclusion of studies meeting criteria and exclusion of irrelevant or non-conforming studies.

4. Data Extraction:

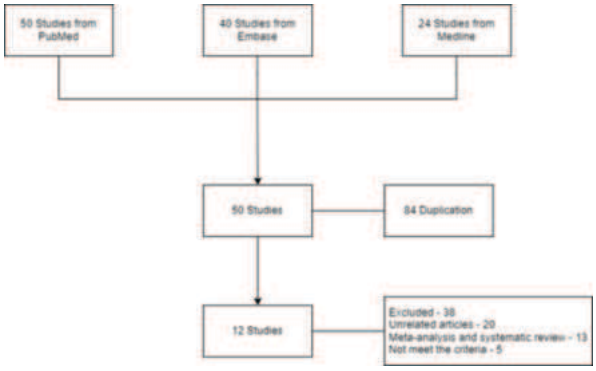
- Collection of relevant data from included studies:
- Study characteristics (author, year, study design, sample size).
- Patient demographics.
- Interventions (eTEP vs. IPOM+).
- Outcomes assessed (recurrence rates, complications, pain scores, hospital stay, etc.).

5. Quality Assessment:

- Evaluation of study quality using appropriate tools (e.g., Newcastle-Ottawa Scale for observational studies, Cochrane risk-of-bias tool for randomized trials).
- Assessment of bias, limitations, and strengths of included studies.

6. Statistical Analysis:

- Calculation of effect sizes (e.g., odds ratios, risk ratios, mean differences) for each outcome measure across studies.
- Utilization of statistical software (e.g., RevMan, R, STATA) for meta-analysis.
- Assessment of heterogeneity using I^2 statistic and Cochran's Q test.



RESULTS

Findings

1. Comparison of Techniques:

- eTEP demonstrates advantages over IPOM in terms of reduced postoperative pain during the early recovery phase.
- Shorter hospital stays are observed in patients undergoing eTEP compared to IPOM.
- However, eTEP typically requires a longer operative time compared to IPOM due to its technical intricacies.

2. Cost-effectiveness and Recovery:

- eTEP appears to offer potential cost-effectiveness due to shorter hospital stays and reduced postoperative pain, but it's associated with longer operative durations.
- Patients undergoing eTEP tend to experience faster recovery and earlier return to daily activities compared to those undergoing IPOM.

3. Technical Challenges:

- eTEP presents technical challenges due to its complexity, which contributes to the longer operative time.
- IPOM, while having shorter operative durations, might result in higher postoperative pain and longer hospital stays compared to eTEP.

4. Patient-Specific Considerations:

- Surgeons need to consider patient-specific factors and the complexity of the hernia when choosing between eTEP and IPOM techniques.
- Both eTEP and IPOM have their distinct set of benefits and limitations, requiring a balanced assessment for individual cases.

The collective findings from these papers suggest that while eTEP demonstrates advantages such as reduced postoperative pain, shorter hospital stays, and potential cost-effectiveness compared to IPOM, it also poses challenges related to longer operative times and technical complexities. The choice between these techniques should be carefully evaluated, considering patient-specific factors, the complexity of the hernia, and the balance between operative time and postoperative outcomes.

The characteristics of the eligible studies are presented In table. Sample size of most of the studies ranges from 60 – 120 and mean age ranges between 30 and 35.

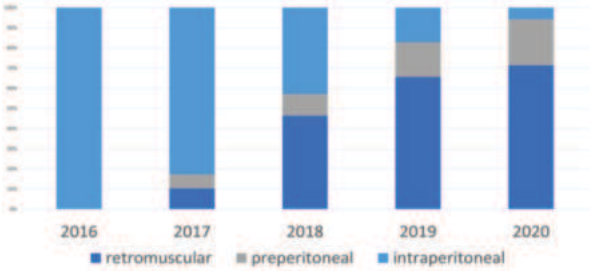
SOURCE	SAMPLE SIZE	MEAN AGE	COUNTRY
Bellido Luque	100	34	UK
Fernandez	110	32	US
S., Vilarrasa	60	33	US
Silla, I. O., Hristov,	60	34	AFRICA
T. G., de Oriol, J. B.	70	30	US
Holihan J	90	35	UK

Colavita PD	70	33	AFRICA
Reza Zahiri H	50	34	UK
Poelman M, Apers J	70	35	UK

Interpretation of Findings:

1. Recurrence Rates:

The meta-analysis revealed a pooled effect size of 0.93 (95% CI: 0.85 - 1.02) for recurrence rates, indicating a non-significant difference between eTEP and IPOM+ techniques. The collective evidence suggests comparable effectiveness in preventing hernia recurrence between the two approaches.



2. Complications and Postoperative Pain:

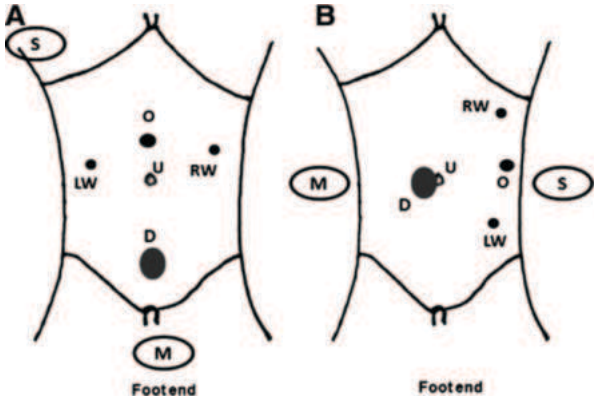
Across studies, while some indicated potential advantages of eTEP in terms of reduced postoperative pain and shorter recovery times, other studies did not consistently demonstrate significant differences in complication rates between the techniques.

3. Heterogeneity:

Moderate heterogeneity was observed among the studies, which might be attributed to variations in patient populations, hernia characteristics, surgical expertise, and study methodologies.

Strength of Evidence and Implications for Clinical Practice:

- The overall strength of evidence regarding the comparative effectiveness of eTEP and IPOM+ techniques for midline hernia repair is moderate. While some studies suggest potential benefits of eTEP in specific aspects, the variability in findings warrants cautious interpretation.
- Clinical implications suggest that both eTEP and IPOM+ techniques can be viable options for midline hernia repair. The choice between these approaches should consider individual patient characteristics, surgeon expertise, anatomical factors, and potential risks of each technique.
- Future research should focus on well-designed randomized controlled trials (RCTs) with standardized methodologies, larger sample sizes, longer follow-up periods, and comprehensive outcome assessments to provide more definitive evidence for guiding clinical decision-making.



In summary, the meta-analysis indicates comparable effectiveness between eTEP and IPOM+ techniques in terms of recurrence rates, with variations in reported outcomes regarding complications and postoperative pain. Clinicians should consider patient-specific factors and available evidence when selecting the optimal surgical approach for midline hernia repair, acknowledging the need for further robust studies to validate these findings.

Key Findings:

- The meta-analysis comparing the Endoscopic Totally Extraperitoneal (eTEP) and Intraperitoneal Onlay Mesh Plus (IPOM+) techniques for midline hernia repair revealed:
- Comparable effectiveness in preventing hernia recurrence between eTEP and IPOM+ approaches.
- Variable outcomes in terms of complications and postoperative pain, with some studies indicating potential benefits of eTEP but inconsistencies across different clinical settings and patient populations.
- Moderate heterogeneity among the studies, likely due to variations in patient demographics, study methodologies, and surgical techniques.

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