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THE SYSTEMATIC REVIEW OF LAPAROSCOPIC SURGERY FOR TRAUMA

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ABSTRACT

Background: *While trauma is the primary cause for mortality during the early half of a person's life, it ranks as the fourth greatest reason fatalities in the general population. When performed by skilled surgeons under hemodynamically stable circumstances, laparoscopy proves as being secure and efficient procedure for managing patients with abdominal trauma.*

Methods: *Under evaluating it against the criteria established by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, the present research demonstrated that it satisfied all of the criteria. As a result, the professionals ensured that the study was as current as feasible. The aforementioned search technique considered papers published during 2013 through 2023. Multiple electronic reference sources, including Pubmed as well as SagePub, were employed to accomplish it. It was decided not to consider evaluation parts, productions those were previously released, as well as projects which had been just partly done.*

Result: *Our search yielded 4570 papers within the PubMed database, but only 616 articles in SagePub. The search outcomes for the last year of 2014 generated an overall of 60 PubMed publications and 46 SagePub publications. At the final phase, our team gathered an entire collection of four publications, three from PubMed and one from SagePub. He selected four studies that satisfied the requirements.*

Conclusion: *In summary, laparoscopic surgery is an acceptable substitute for open surgery; nonetheless, the procedure should only be carried out by skilled surgeons in state-of-the-art medical facilities. More carefully planned RCTs are need to confirm the effectiveness of laparoscopy as the detection and management of abdominal trauma.*

Keyword: *Laparoscopic surgery, Trauma, Review*

INTRODUCTION

One of the most successful intervention techniques, laparoscopy improves the results of major surgeries. Compared to standard laparotomies, the laparoscopic method has demonstrated better diagnostic outcomes in trauma patients during the last ten years. This method also saves a lot of money, shortens hospital stays considerably, and lowers the risk of complications. However, patients with normal hemodynamic parameters are typically the only ones who can benefit from laparoscopies in trauma cases, and those who have head injuries should not undergo them. Laparoscopies can now be utilized to treat different problems such organ lacerations and diaphragmatic injuries thanks to advancements in knowledge and training.[1]

Stone et al. carried out the first laparoscopic procedure into 1942 to identify hemorrhage within an individual who had suffered severe damage. Heselson promoted the use of laparoscopy in 1970 as a means of identifying piercing wounds and injury to internal abdominal organs. Since then, laparoscopic technology and tools have advanced significantly, and results have improved along with them. Since then, laparoscopy has become increasingly common in trauma centers across the globe, gradually displacing the need for exploratory laparotomies.[2]

Some of many biggest contributors of mortality among young individuals globally, regardless of the cause—a blunt or penetrating trauma, an explosion, or an accidental fall. For these individuals, a number of recommendations and management techniques have been made in an effort to give them the best care possible with the least amount of morbidity. The laparoscopy is one constantly improving technique that enables medical professionals to adhere to the standards' demands. The satisfaction of patients with trauma as well as operative situations, such as cholecystectomy, appendectomy, visceral perforation, and hernia repair, have improved with laparoscopic procedures. A laparoscopy's primary objective is to discover or rule out organ and visceral injuries using the least invasive technique while, if at all possible, making a diagnosis. Consequently, laparoscopy may one day be an effective treatment choice to individuals suffering from specific injuries due to trauma as a result of developing skills and better practice.[3]

When identifying diaphragmatic injuries and peritoneal penetration in trauma patients with normal hemodynamic parameters, laparoscopic procedures are a great option. Laparoscopies are connected with fewer problems and are more cost-effective and efficient than standard laparotomies. There are still no precise recommendations, though, to encourage and recommend laparoscopy for trauma patients. Prospective randomised controlled trials are also required to provide more solid support for the laparoscopic approach to trauma patient care.[1]

METHODS

Protocol

The researchers ensured that the paper satisfied the prerequisites by adhering to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. The following ensures that the inquiry's findings are correct.

Criteria for Eligibility

Considering the objective of this literature review, we'll look at published material on laparoscopic trauma evaluation in patients. It is carried out to explain while enhancing the patient's treatment experience. The major goal of this study is to demonstrate the significance of the challenges that have been recognized throughout the study.

In order to participate in the research project, researchers had to meet the following specifications: 1) The article should be composed using English. To be eligible to have the chance of being selected for publication as well as the manuscript must fulfill both of these criteria. 2) Several of the studies analyzed had been released afterwards 2013, but before the time period considered relevant in this systematic review. Editorials, applications with no a DOI, peer-reviewed papers which were previously released, as well as submissions which appear closely comparable to already published articles from journals are all instances of unapproved research.

Search Strategy

Researchers used "laparoscopic surgery" as well as "trauma" as keywords. The investigation for articles to incorporate in a systematic assessment was conducted out utilizing the PubMed and SagePub databases by entering the phrases: *(("laparoscopes"[MeSH Terms] OR "laparoscopes"[All Fields] OR "laparoscope"[All Fields] OR "laparoscopical"[All Fields] OR "laparoscopically"[All Fields] OR "laparoscopics"[All Fields] OR "laparoscopy"[MeSH Terms] OR "laparoscopy"[All Fields] OR "laparoscopic"[All Fields]) AND ("surgery"[MeSH Subheading] OR "surgery"[All Fields] OR "surgical procedures, operative"[MeSH Terms] OR ("surgical"[All Fields] AND "procedures"[All Fields] AND "operative"[All Fields]) OR "operative surgical procedures"[All Fields] OR "general surgery"[MeSH Terms] OR ("general"[All Fields] AND "surgery"[All Fields]) OR "general surgery"[All Fields] OR "surgery s"[All Fields] OR "surgerys"[All Fields] OR "surgeries"[All Fields]) AND ("laparoscopy"[MeSH Terms] OR "laparoscopy"[All Fields] OR ("laparoscopic"[All Fields] AND "surgery"[All Fields]) OR "laparoscopic surgery"[All Fields]) AND ("injuries"[MeSH Subheading] OR "injuries"[All Fields] OR "trauma"[All Fields] OR "wounds and injuries"[MeSH*

Terms] OR ("wounds"[All Fields] AND "injuries"[All Fields]) OR "wounds and injuries"[All Fields] OR "trauma s"[All Fields] OR "traumas"[All Fields]) AND ("abdomen"[MeSH Terms] OR "abdomen"[All Fields] OR "abdomens"[All Fields] OR "abdominal cavity"[MeSH Terms] OR ("abdominal"[All Fields] AND "cavity"[All Fields]) OR "abdominal cavity"[All Fields])) AND ((ffrft[Filter]) AND (clinicaltrial[Filter]) AND (2014:2023[pdat])) used in searching the literature.

Data retrieval

Following reviewing results of each investigation abstract and title, the authors conducted an investigation to find out the probability they matched the standards for inclusion. Researchers subsequently chose which past articles they wished to include to use to be reference to use in their paper. This result was reached after reviewing a variety of studies that appeared to indicate to the same tendency. The entire contributions are needed provided in English and ought to have never previously been published.

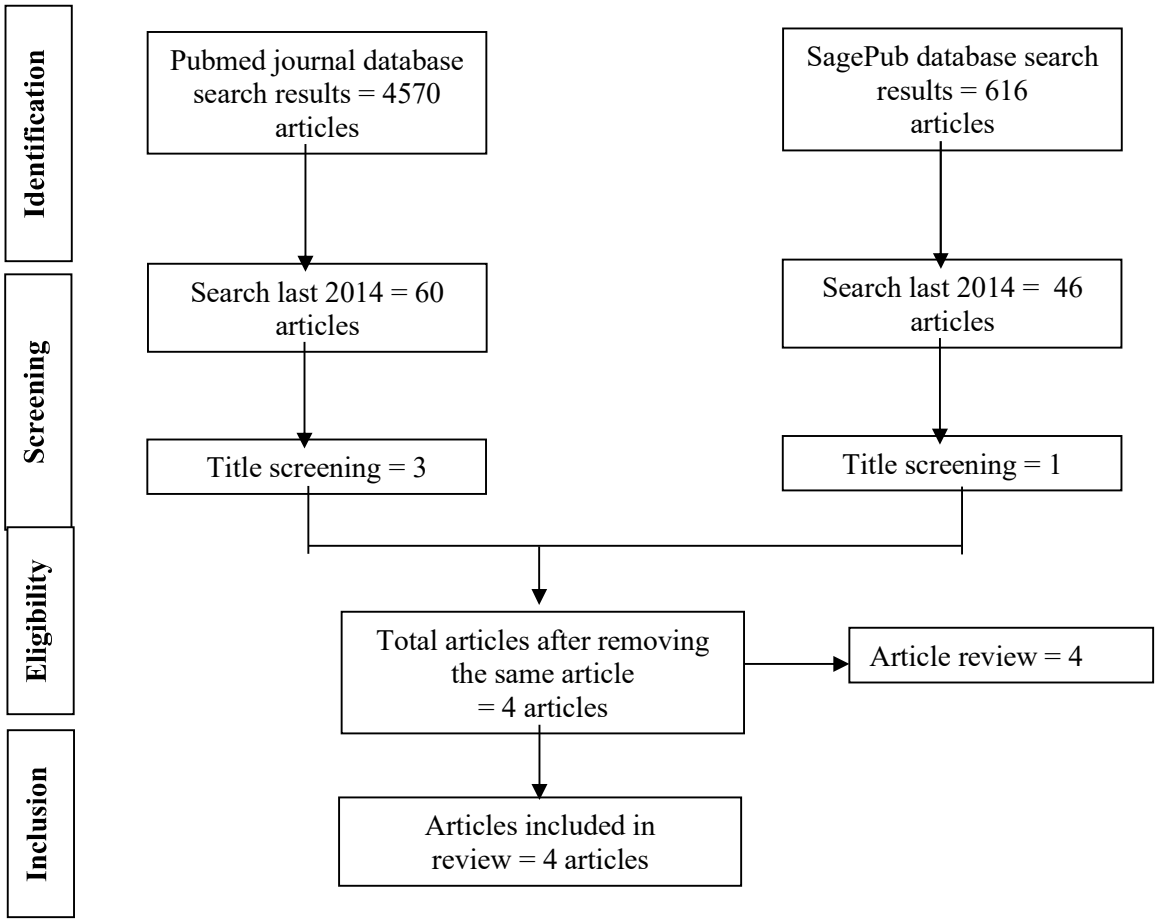

Figure 1. Article search flowchart

The analysis restricted itself to articles which fulfilled every single one of the inclusion criteria. It lowers the amount outcomes by limiting individuals that are suitable for the inquiry. Our team do not examine the findings of any studies that do not meet our conditions. Following this, all study outcomes will be thoroughly analyzed. A variety of details were discovered as a consequence of the investigation conducted for the intention of the current research: names, authors, publication dates, location, study activities, and parameters.

Quality Assessment and Data Synthesis

prior to deciding which papers to investigate further, every single writer conducted their individual investigation into the research referenced in both the abstract and the title of the paper. The subsequent phase is expected to analyze all of the papers that meet the criteria for inclusion in the assessment. Following that, researchers will decide which publications to

include in the review based on what we discover. This criterion is used to select articles for further examination. With the objective to make the approach of choosing papers for evaluation as simple as possible. This section discusses whether previous investigations were conducted and what aspects of those research have rendered them acceptable for inclusion in the review.

RESULT

Our search yielded 4570 papers in the PubMed database, but only 616 papers in SagePub. Findings from searches for the last year of 2014 generated an overall amount of 60 PubMed publications and 46 SagePub publications. In the last stage, our team gathered a total of four publications, three from PubMed and one from SagePub. We selected four studies that satisfied the requirements.

Birindelli, et al[4] (2021) discovered that laparoscopic surgery is related alongside non-inferior morbidity and fatality, as well as considerably enhanced recovery following the procedure. Nevertheless, the theoretical advantages in terms of security of minimally-invasive procedures require being balanced against the institution's degree of knowledge, the accessibility of adequate laparoscopic equipment, plus—most importantly—the presence of a qualified and experienced laparoscopic surgeon. To fully investigate this cutting-edge subject and better understand the immediate as well as long-term advantages of laparoscopic splenectomy for trauma, prospective or randomized controlled studies among individuals with hemodynamically uncompromised as well as "quasi-stable" splenic lesions are necessary.

Lin, et al[5] (2018) showed that Laparoscopy is an efficient as well as secure means of diagnosing and treating hemodynamically stable BAT individuals. Individuals presenting isolated intra-abdominal fluid along with clinical symptoms, potential hollowed viscus injuries, suspected diaphragm injuries, and failed NOM for liver or spleen injuries fall into this category. For these individuals, laparoscopy can be utilized to undertake therapeutic treatments that would otherwise require a non-therapeutic laparotomy.

Table 1. The litelature include in this study

Author	Origin	Method	Sample	Result
Birindelli et al, 2021[4]	Italy	Retrospective observational study	16 patients	81% of the laparoscopic procedures had been effectively performed. Laparoscopy was linked to a greater frequency of concurrent procedures involving surgery (p 0.016), extended operational periods, and a much quicker restoration to bowel function and oral nutrition with no reoperations. There were no noticeable variations in mortality, morbidity, duration of stay, or permanent sequelae, albeit surgical site infection was decreased in the laparoscopic group (0 vs 21%).The detached splenic damage sub-analysis comprised 25 splenectomies, 76% (19) open and 24% (6) laparoscopic, with the laparoscopic group showing a decrease in post-operative morbidity (40 vs 57%), blood transfusion (0 vs 48%), ICU hospitalization (20 vs 57%), and total LOS (7 vs 9 days).
Lin et al, 2018[5]	Taiwan	Retrospective observational study	126 patients	The scientific results for the two categories have been contrasted. There was a total of 139 individuals in Group A along with 126 in Group B. Group A individuals sustained even more serious traumas

				(mean injury severity score of 23.3 vs. 18.9, P <.001) along with exhibited a higher frequency of traumatic brain injuries (25.2% vs. 14.3%, P =.039). For individuals in group B, laparoscopy for diagnostic purposes had a sensitivity of 99.1% and a specificity of 100.0%. There were no non-therapeutic laparotomies done in the second group, and therapeutic laparoscopy proved successful for 92.0% (103/112) of patients with substantial intra-abdominal injuries. Individuals in both groups showed comparable perioperative along with postoperative results when considering of operation duration, blood loss, blood transfusion needs, mortality, and complications (all, P >.05).
Huang et al, 2017[6]	USA	Retrospective observational study	11 patients	Both sets of participants had excellent matching in terms of age, abdominal injury ratings, as well as arrival vital signs. The open category had considerably less sense of awareness as well as greater acidity versus the laparoscopic group. The majority of laparoscopic splenectomies were done when nonoperative treatment or just embolization failed. The grounds for open splenectomy were a favorable focused assessment with sonography for trauma and computed tomography findings. Laparoscopic participants experienced considerably longer periods among admission thus surgery, as well as lengthier surgeries, although they lost much less blood and required fewer transfusions than the open group. There were no changes in mortality, duration of stay, complications, or discharge status.
Lim et al, 2015[7]	South Korea	Retrospective observational study	41 patients	The transformation percentage reached 18 percent. There were no major side effects, nor was there any postoperative fatalities. When in contrast to open laparotomy, laparoscopic surgery has fewer wound infections, allows for earlier

				gas flow, as well as has a shorter hospital stay. Otherwise, the operating timeframes were comparable, and neither method was exacerbated by a missing injury or a postoperative intraabdominal abscess.

Huang, et al[6] (2017) showed that even in cases when the patient has a high injury grade, laparoscopic splenectomy seems to be more advantageous than open splenectomy for blunt trauma. When early nonoperative therapy or embolization fails in hemodynamically stable individuals, it seems safe and successful. Further research is necessary since the decision to proceed laparoscopically may be influenced by other considerations.

Lim, et al[7] (2015) showed that Laparoscopy is progressively becoming established as an evaluation as well as therapy technique for penetrating abdominal injuries in hemodynamically stable individuals. In compared to an open procedure, the incidence of morbidity/mortality, missed injury, and postoperative problems remain low. Laparoscopic surgery, with the proper technique and hemodynamic stability, may effectively treat both blunt and penetrating injuries. Thus, laparoscopy may help patients by shortening hospitalizations, improving postoperative comfort (reduced pain), speeding up recovery times, and lowering morbidity and death rates.

DISCUSSION

The current systematic review included a total of 194 data of patients who had done the research on laparoscopic surgery in trauma abdominal patients in 4 observational studies.

While trauma is the main cause of mortality in the early fifty percent of the lifespan of an individual, it is the fourth most prevalent source for mortality throughout the general population. Furthermore, the abdomen is implicated in 9-14.9 percent of all trauma cases. Laparotomy has long been considered the standard of treatment for patients with abdominal trauma, which constitutes one of the numerous preventable contributing factors to mortality in multiple traumatic events individuals. However, considering that laparotomies can cause morbidity of 20-40%, it may be advisable to avoid unnecessary laparotomies. When done by trained surgeons under hemodynamically stable conditions, laparoscopy is secure and efficient procedure for managing individuals with abdominal injuries.[8]

In the past, laparotomy was required for penetrating abdominal traumatic injuries in order to reduce the possibility of missing injuries or delays in diagnosis. Nonetheless, over 25% of patients who underwent conventional exploratory celiotomy underwent "negative laparotomies," putting them at risk for a number of possible consequences following the procedure, such as ileus, wound infection, bowel obstruction, cardiovascular morbidity, and even death. In the 1980s, laparoscopic surgery gained popularity and was finally used for "trauma laparoscopy" (TL), a diagnostic and therapeutic procedure. With the advent of TL, there was hope that the morbidity linked to negative laparotomies would decrease and that patients who were hemodynamically stable might have less intrusive choices for managing certain injuries. Although TL is a minimally invasive procedure, there are certain risks involved, as well as related problems.[9]

The number of non-therapeutic laparotomies performed on patients who are hemodynamically stable has decreased as a result of advancements in imaging technology and targeted nonoperative care. Research has also indicated that the rate of non-therapeutic laparotomies has declined since the invention of the laparoscopic procedure. Furthermore, compared to laparotomy, laparoscopy is a less painful, shorter hospital stay, and quicker recovery process used for diagnostic or therapeutic purposesDespite past data demonstrating the feasibility and benefits of diagnostic along with interventional laparoscopy among a subgroup of hemodynamically stable trauma patients, a broad understanding has yet to be achieved.

Over the last few decades, much study has been conducted regarding the function of laparoscopy in screening, diagnosis, and treatment. Multiple investigations have shown that people with equivocal abdominal/pelvic computed tomography (CT) or ultrasonography (US) findings can safely receive laparoscopies. The European Association of Endoscopic Surgeons has released evidence-based recommendations for performing laparoscopies in patients with traumatic or piercing abdominal injuries. In a research investigation of 819 patients with minor intestine lesions, Sitnikov et al. reported that video-assisted laparoscopies were associated with 11.8% postoperative complications and 2.3% fatality rates. This less invasive method might perhaps minimize non-therapeutic laparotomies.[1]

A number of systematic reviews summarizing the benefits of laparoscopy for penetrating or blunt abdominal wounds were published shortly after the treatment was first introduced. A number of articles discussing a variety of potential applications for laparoscopy in abdominal trauma were subsequently published.

The findings of this study show that patients with abdominal injuries undergoing laparoscopy or laparotomy do not significantly differ in terms of the incidence of missing damage or mortality. In terms of postoperative complications, Participants in the laparoscopy category are more unlikely to develop wound infection and pneumonia, but they are just as likely to require another exploration or suffer intra-abdominal abscesses, thromboembolism, as long as ileus as patients in the laparotomy category. Furthermore, hospitalizations as well as operation lengths were reduced among individuals who underwent laparoscopy category.[10]

Approximately 25% of individuals who were initially indicated for a laparoscopy ultimately required a laparotomy; the percentage of conversion varied among the included studies. This is most likely due to the fact that hospital resources and the surgeon's surgical proficiency are prerequisites for performing a laparoscopy (20). Another aspect that could affect the outcome is the diverse practices that different hospitals employ. For example, some hospitals advocate routine open surgery, while others perform laparoscopy on similar patients. Furthermore, we observed that compared to ten years ago, conversion rates are significantly lower, possibly as a result of advancements in laparoscopic instrument technology and a build-up of procedural experience.[11,12]

By considerably lowering post-operative problems as well as hospitalization, enhancing quality of life, and hastening the patient's return to normal activities, laparoscopy helps patients. In this review, the majority of common consequence was wound infection, which was far less common than laparotomy, having a total frequency of 2.53% in the laparoscopy group. This is in line with recent research that found a decrease in wound infections after laparoscopic surgeries including cholecystectomy and appendectomy.[13]

This might be because the minimally invasive procedure puts the patient under less stress during surgery and causes less tissue damage. This technique has been related to reduced surgical stress, a smaller incision, quicker mobility, less postoperative pain, a less significant proinflammatory response than open surgery, and greater preservation of systemic immune function, to name a few benefits. Due to the discrepancies between primary and sensitivity analysis, individuals who have had a laparoscopy should be careful about the lower risk of pneumonia.[13]

Because the random-effects model offered a more conservative and trustworthy estimate of pooled RD, it was more appropriate in light of the high variability between the studies. In light of the negative findings from the pooled analysis of high-caliber research, We concluded that the epidemiology of ileus does not change considerably between the two surgical methods. Finally, we found that laparoscopy is linked towards an approximately 4-day reduction in hospital stay duration, which is equivalent to the 5-day value reported in the previous systematic investigation. The stability of the results across all sensitivity analyses led us to believe that the results were trustworthy, despite the significant level of heterogeneity across the included studies for which we were unable to determine the cause.[14]

CONCLUSION

In summary, laparoscopic surgery is an acceptable substitute for open surgery; nonetheless, the procedure should only be carried out by skilled surgeons in state-of-the-art medical facilities. More carefully planned RCTs are need to confirm the effectiveness of laparoscopy in the diagnosis and treatment of abdominal trauma, though.

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