


## Evaluation of new minimally invasive approaches in surgeries

 <https://doi.org/10.56238/sevned2024.005-010>

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### ABSTRACT

Minimally invasive surgery is a technique that aims to reduce pain and recovery time for patients, as well as minimize complications related to the surgical procedure. Since its origin, with laparoscopy, in 1910, minimally invasive techniques have been widely used in different areas of medicine, including cardiac, gynecological, orthopedic surgery, among others.

**Keywords:** Surgical techniques, Minimally invasive approach, Medicine.

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## INTRODUCTION

Minimally invasive surgery is a technique that aims to reduce pain and recovery time for patients, as well as minimize complications related to the surgical procedure. Since its origin, with laparoscopy, in 1910, minimally invasive techniques have been widely used in different areas of medicine, including cardiac, gynecological, orthopedic surgery, among others.

Laparoscopy was the first minimally invasive technique used in surgery, allowing surgical interventions to be performed with the aid of an endoscope. This technique has been shown to be effective in performing abdominal surgeries, such as gallbladder removal, hernias, and appendicitis (SEMM, 1983).

With the advancement of technology and the miniaturization of surgical instruments, other minimally invasive techniques have been developed, such as minimally invasive thoracic surgery, which allows lung and mediastinal surgeries to be performed with less trauma to the patient, and minimally invasive cardiac surgery, which allows cardiac surgeries to be performed with a smaller incision (SWANSON *et al.*, 2012).

In addition, the development of new technologies, such as robotics, has allowed surgeons to perform even more precise and minimally invasive procedures. Robotic surgery is a minimally invasive technique that allows the surgeon to control surgical instruments through a console, offering greater precision and control during the procedure (SILVA *et al.*, 2015).

Despite the benefits of minimally invasive approaches, it is important to note that these techniques require specific skills and training on the part of surgeons, and not all patients are eligible for this type of procedure. The choice of the most appropriate surgical technique should be made on a case-by-case basis, considering the individual characteristics of each patient and the type of procedure to be performed.

Thus, the evaluation of the efficacy and safety of new minimally invasive approaches in surgeries becomes essential for the improvement of clinical practice and the improvement of surgical techniques. Clinical studies and economic evaluations are important to determine the applicability and cost-effectiveness of these techniques, while patient satisfaction must be evaluated to ensure the quality of care provided.

Therefore, this study aimed to evaluate the efficacy and safety of new minimally invasive approaches in surgeries, focusing on their clinical applicability and benefits for patients. The specific objectives are: to identify and analyze the new minimally invasive approaches used in different types of surgeries; analyze clinical outcomes and cost-effectiveness of using minimally invasive approaches; reflect on patient satisfaction with new minimally invasive approaches.

## METHODS

To achieve the objectives of this research, a literature review was conducted in order to identify the new minimally invasive approaches used in different types of surgeries and to evaluate the clinical results of these approaches.

This chapter presents an evaluation of new minimally invasive approaches in surgery through a review study, using the qualitative method. The review was chosen because it is an effective resource for summarizing the empirical or theoretical literature on a given topic, offering an easier understanding of the subject to the reader.

The steps followed in this review were: identification of the problem, search of the databases, evaluation of the data, analysis of the data and presentation of the results (WHITTEMORE & KNALF, 2005). The guiding question adopted for the development of this review was: What is the scientific evidence related to the evaluation of new minimally invasive approaches in surgeries?

For data collection, the following databases/databases were consulted: Latin American and Caribbean Health Sciences Literature (Lilacs), via the Ministry of Health's Virtual Health Library, *Scientific Electronic Library Online* (SciELO), *Medical Literature Analysis and Retrieval System Online* (Medline), *Scopus*, *Cumulative Index to Nursing and Allied Health* (Cinahl) and *Web of Science*. The search was conducted between January and March 2023.

## RESULTS

Studies published in the last 10 years were selected. The inclusion criteria were: studies that evaluated the efficacy and safety of new minimally invasive approaches in surgery. Exclusion criteria included studies that did not present clinical outcomes or that did not address minimally invasive approaches.

The results of this analysis were obtained based on the reading and analysis of the 16 articles selected for discussion. It was possible to observe that minimally invasive surgery is a technique on the rise, being used in several areas of medicine, such as cardiac surgery, gynecology oncology, treatment of periodontal bone defects, treatment of endometrial cancer, among others.

Among the selected studies, a variety of minimally invasive surgical approaches were identified, such as video-assisted thoracoscopy, porto-access surgery, myocardial revascularization, and minimally invasive mitral valve surgery. These techniques offer significant benefits to patients, such as shorter recovery time, less postoperative pain, shorter hospital stay, and a lower incidence of complications.

Some of the selected studies reported the use of innovative technologies, such as augmented reality and gamification, for skills training in minimally invasive surgery. These tools can be useful to improve the efficiency and quality of surgeon training (SILVA *et al.*, 2015).



In addition, the comparison between minimally invasive approaches and conventional surgeries was addressed in some of the selected studies. In general, minimally invasive surgery has been shown to be a viable and safe alternative for patients with different pathologies.

As will be discussed in the next section, the analysis of the selected articles indicates that minimally invasive surgery is a promising technique, with great potential to improve the quality of life of patients undergoing surgical procedures in several areas of medicine. Innovative technologies can be used to improve the training of surgeons and improve surgical techniques.

## DISCUSSION

Minimally invasive surgery (IMC) has gained more and more space in surgical practice, providing benefits to patients, such as less pain, hospitalization time, and faster recovery. Among the various specialties, IMT has been used in cardiac, oncological and orthopedic surgeries.

Mohr *et al.* (1998) present the technique of minimally invasive surgery for mitral valve repair. The minimally invasive approach was performed through small incisions in the skin, allowing direct access to the mitral valve without the need for sternotomy. The results presented were positive, with shorter hospital stay, less bleeding and faster recovery compared to conventional surgery.

In a similar vein, Amorim *et al.* (2015) presented a study on the use of IMC in gynecology oncology, highlighting that this approach is safe and effective in selected cases, providing shorter hospital stay, less postoperative pain, and better aesthetic results.

To assess the importance of the technique, Rodrigues and Barreto (2014) conducted a systematic review on the use of biomaterials in minimally invasive surgical approaches for the treatment of periodontal bone defects. The authors highlight the importance of biomaterials in tissue repair, and the use of these materials can facilitate minimally invasive surgery, reducing the need for more invasive and aggressive techniques.

In addition to the practical studies, the analysis also deals with the minimally invasive approach in surgeries as a teaching methodology. Paiz (2014), for example, presented a critical analysis of the development of an e-book to teach minimally invasive surgery in abdominal wall hernias. The author pointed out that the use of educational technologies can improve teaching and learning in minimally invasive surgery, enabling a more complete and up-to-date training of surgeons.

Ferreira *et al.* (2020) presented a study on coronary artery bypass grafting. The researchers discuss the minimally invasive approach as a safe and effective option for certain cases, with shorter hospital stay and less surgical trauma. In the same area of expertise, Zica *et al.* (2020) conducted a comparative analysis between conventional and minimally invasive cardiac surgery in tertiary



hospitals in the Federal District. The authors highlighted that minimally invasive surgery may be a safe and effective option in certain cases, with shorter hospital stay and less bleeding.

Another study that shows the effectiveness of the method is by Miranda (2019). The researcher presented a new approach to transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache, highlighting the use of minimally invasive techniques for the treatment of certain pathologies.

To strengthen the use of this approach, Silva *et al.* (2015) propose the association of the technique with other technological resources. In their study, the authors looked at the use of augmented reality and gamification for laparoscopic skills training, underscoring how the use of these technologies can improve the efficiency and quality of surgeon training.

In the field of minimally invasive cardiac surgery, research addresses the minimally invasive approach to cardiac procedures, including mitral valve surgery and coronary artery bypass grafting. These studies indicate that the minimally invasive approach can offer results comparable to standard sternotomy techniques, with shorter recovery time, shorter hospital stay, and lower postoperative morbidity (JATENE *et al.*, 1997; CHITWOOD *et al.*, 1997; CASTRO NETO *et al.*, 2012; GAMMIE *et al.*, 2010).

However, the study by Grossi *et al.* (2001) reveal that the long-term outcomes of minimally invasive mitral valve surgery are still uncertain and that additional studies are needed to determine whether there are significant differences in long-term survival and clinical outcomes compared with the standard sternotomy approach.

In the field of minimally invasive general surgery, authors Monteiro (2015) and Anjos (2017) address the minimally invasive approach to the treatment of gastrointestinal stromal tumor and endometrial cancer, respectively. Both studies highlight the benefits of minimally invasive surgery, including shorter hospital stays, lower postoperative pain, and faster recovery. However, the study by Rocco *et al.* (2008) shows in his research that there is still significant variability in the practice of minimally invasive thoracic surgery, which can affect the results and efficacy of treatment.

Overall, studies indicate that the minimally invasive approach may offer many benefits for patients, including faster recovery, lower morbidity, and reduced length of stay. However, more research is still needed to assess the long-term outcomes of minimally invasive surgery compared to standard techniques and to identify best practices for minimally invasive surgery in different surgical specialties.

## CONCLUSION

Based on the articles analyzed, it can be concluded that the minimally invasive approach in cardiac and thoracic surgeries presents promising results and is a safe alternative for patients.



Minimally invasive coronary artery bypass grafting, for example, has shown good results with the use of video-assisted thoracoscopy and suture stabilizer. In addition, the minimally invasive approach in the treatment of endometrial cancer and gastric GIST has been shown to be efficient and with a shorter recovery time.

Regarding valve surgeries, studies have shown that the minimally invasive approach is feasible and safe, with shorter hospital stays and faster recovery. Based on these results, it can be stated that the minimally invasive approach has been shown to be an advantageous option in relation to median sternotomy in several surgeries, providing better results and greater comfort for patients.



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