

Outcomes of laparoscopic cholecystectomy in rural hospitals – A systematic review



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ABSTRACT

There are many studies on the laparoscopic cholecystectomy in rural hospitals. It is important to understand whether the advantages of the laparoscopic cholecystectomy are there in the rural hospital set up. The present systematic review of literature aims to find the various outcomes of laparoscopic cholecystectomy in rural hospitals. The study was conducted based on PRISMA guidelines for systematic reviews. The MEDLINE and EMBASE database were used to retrieve the articles. A detailed descriptive analysis was on the various outcomes of open and laparoscopic cholecystectomy. The present systematic review has identified that the laparoscopic cholecystectomy in rural hospitals is most preferred as that of urban setting. It not only provides less hospital stay, but also provides economical option for rural patients. However, there are some limitations in many rural settings like lack of instrumental facility and trained surgeon. The outcomes of the laparoscopic cholecystectomy in some rural hospitals are comparatively same as that of urban settings.

Key words: Systematic review; laparoscopic cholecystectomy; rural hospitals; outcomes

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INTRODUCTION

Gallstones(cholelithiasis) that form in the gall bladder often needs surgery as the treatment.¹Cholecystectomy is one of the common intra-abdominal surgeries performed in hospitals of India.^{2,3} In the era of minimal invasive surgery, laparoscopic surgery has taken over the open surgery in the treatment of cholelithiasis. Now this surgery is considered to be the gold standard in the treatment of cholelithiasis.⁴

The laparoscopic surgery has an advantage of having less postoperative pain and shorter hospital stay.⁵ Further, it has good cosmetic results and faster recovery with minor complications.⁶ As far as surgeon is concerned it has less operating time.⁷ It has been believed to have economic advantage.⁶

Even though the advances in the medical technologies reach the hospitals of urban area, many hospitals of rural areas are deprived of these advancements. It may be attributed to many reasons including lack of instruments and trained specialist surgeons.^{8,9} There are many studies on the laparoscopic cholecystectomy in rural hospitals. It is important to understand whether the advantages of the laparoscopic cholecystectomy are there in the rural hospital set up.

The present systematic review of literature aims to find the various outcomes of laparoscopic cholecystectomy in comparison with open surgery in rural hospitals. The study attempts to determine the advantages and limitations of laparoscopic cholecystectomy in rural hospitals. The results of this review can help to find the lacunae and difficulties of laparoscopic cholecystectomy in rural hospitals.

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MATERIALS AND METHODS

Study design

The present systematic review was done to access the various outcomes of open versus laparoscopic cholecystectomy in rural hospitals. The study was conducted based on PRISMA guidelines for systematic reviews.¹⁰

Inclusion criteria

1. Study conducted to assess various treatment outcomes in open and laparoscopic cholecystectomy in rural.
2. All cross-sectional, clinical trials, case control studies, cohort studies and qualitative studies.
3. Study involving rural hospitals.
4. Full length articles in English.

Exclusion criteria

Those articles not matching the inclusion criteria are excluded from the study. Review articles, case reports and letters to editor were excluded from the study.

Search methods

The MEDLINE and EMBASE database were used to retrieve the articles. For MEDLINE search, the MeSH term used were (((laparoscopic surgery) AND (cholecystectomy)) AND (open surgery)) AND (rural hospital))) The Pubmed

advanced search was used. Boolean operator ‘AND’ was used in between the MeSH terms in the advanced search. For EMBASE search, Emtree thesaurus was used to retrieve the articles.

Selection of articles

The articles were analysed by authors in collaboration and the articles were selected for this study based on the inclusion and exclusion criteria. The articles were also checked for the adequacy of data and those articles which are inadequate in terms of details and data were excluded (Figure 1).

Synthesis of results

A detailed descriptive analysis was on the various outcomes of open and laparoscopic cholecystectomy. All the data were compiled in the form of tables and were explained in descriptive manner. Considering the heterogeneity of data, meta-analysis was not performed with this data.

RESULTS

The systematic review was conducted to analyse the various outcomes of Laparoscopic cholecystectomy in rural settings. On analysis of post-operative complication and post-operative hospital stay (Table 1), all the studies

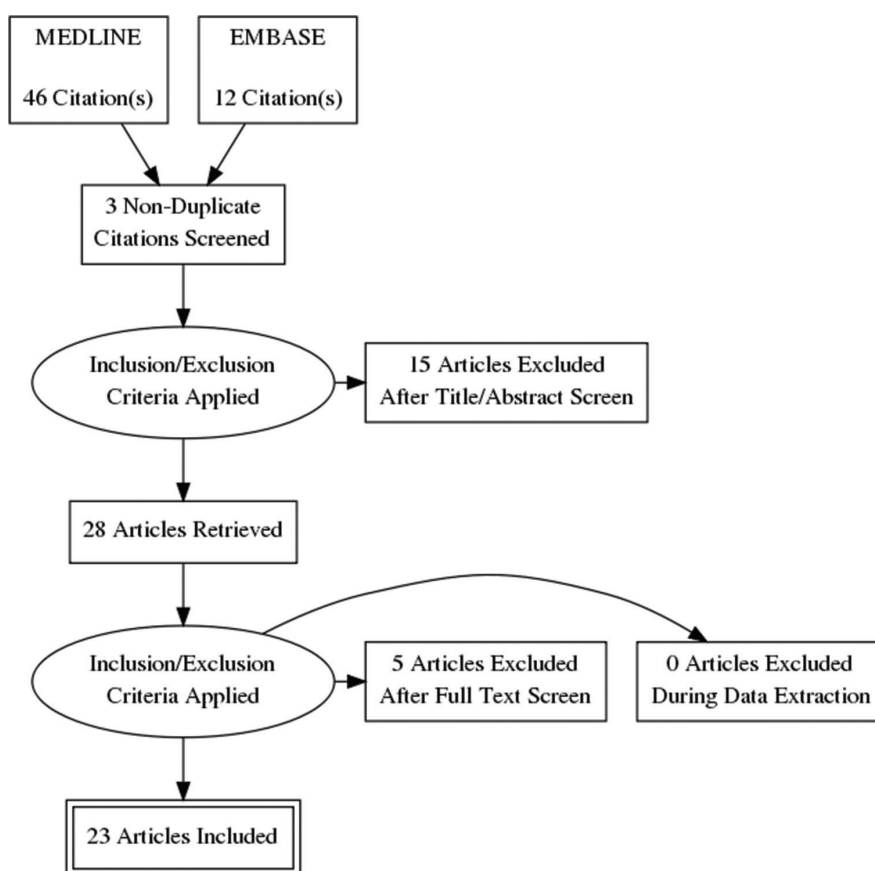


Figure 1: PRISMA chart showing the article selection

have shown that there are not many complications. A study conducted by Ji W *et al.*, the laparoscopic surgery was converted to open surgery to manage the bleeding in some cases.¹³ However, the conversion rate was only 5.3% in that study. Same has been observed in another study conducted in rural settings of Taiwan wherein they have found that there are patients are at greater risk of blood loss.¹⁶ The authors have suggested that the preoperative coagulation profiles should be arranged. Vega EA *et al* have suggested that the overall survival rate is better in laparoscopic surgery than that of open surgery in rural settings.²²

Few studies have been conducted to explore the limitations of resources in rural hospitals with the outcome of laparoscopic surgery (Table 2). The studies have showed that the surgeons could manage to perform laparoscopic surgery without much complications. Basu S *et al.*, have suggested that Mini-laparotomy cholecystectomy may be a good alternative to laparoscopic cholecystectomy in rural settings.²⁴

Further, certain studies based on the lack of training among surgeons on laparoscopic surgery suggested that

Table 1: Laparoscopic cholecystectomy – Post-operative complications and post-operative stay

Author (s)	Year	Country	Study tool	Sample size	Results
Gall CA and Chambers KJ ¹¹	2002	Victoria	Retrospective study	28	Complications were not there in twenty-five of 28 patients who underwent chole-cystectomy by laparoscopic approach.
Haynes JH <i>et al.</i> ¹²	2004	LA	Cohort study	108	Laparoscopic surgery was safe with no deaths, no common bile duct injuries, postoperative complications, or long-term complications
Ji W <i>et al.</i> ¹³	2005	China	Clinical Trial	80	Laparoscopic surgery was successfully performed in 36 cases, and 2 patients were converted to open surgery for difficulty in managing bleeding under laparoscope. The conversion rate was 5.3%.
Carbonell AM <i>et al.</i> ¹⁴	2005	USA	Retrospective study	93,578	73.4% surgeries were performed laparoscopically. Length of hospital stay, charges, morbidity, and mortality were significantly less for laparoscopic cholecystectomy.
Ryan SM <i>et al.</i> ¹⁵	2009	New Zealand	Retrospective study	149	Laparoscopic cholecystectomies were performed safely and showed low complication rates
Su HY and Lee WJ ¹⁶	2009	Taiwan	Prospective study	56	LC is a safe and effective treatment for older patients suffering from cholelithiasis, but these patients are at greater risk of blood loss. Preoperative coagulation profiles should be arranged.
Wichmann MW <i>et al.</i> ¹⁷	2010	Australia and Germany	Comparative study	359	A 4% complication rate was observed in Australia and 3% in Germany.
Teixeira J <i>et al.</i> ¹⁸	2014	Portugal	Critical analysis	520	Mortality rate was laparoscopic cholecystectomy 0.7% vs open cholecystectomy 3.7% (p=0.0369). Postoperative complications: 4.3% vs 5.5% (p=0.6077); Lesion of the main bile duct: 0.9% vs 1.8% (p=0.6091)
Singal R <i>et al.</i> ¹⁹	2015	India		200	In LC patients, there were rise in the levels of serum bilirubin, AST and ALT after 24 hrs of surgery from the preoperative value and then again fall was noted (near to normal value) after 72 hrs of surgery except in that of ALP. ALP levels showed slight fall after 24 hrs of surgery and then slight rise after 72 hrs which was within the normal limit. Whereas in OC patients, there were slight variations in the liver enzymes (which were within the normal range).
Ratti F, <i>et al.</i> ²⁰	2019	Italy	Case-matched analysis using propensity scores	104	Laparoscopic series resulted in a statistically significant lower blood loss (p=0.03), minor intraoperative blood transfusions and postoperative blood transfusions. Other outcomes like shorter length of stay (p=0.04) were also noticed.
Nag HH, <i>et al.</i> ²¹	2020	India	Retrospective study	68	30 patients were in LC and 38 patients were in open surgery. The mean operation time was 286 versus 274 min, mean blood loss was 158 versus 219 ml and mean hospital stay was 6.4 versus 9 days. The complication rate was not statistically significant (P=0.259).
Vega EA, <i>et al.</i> ²²	2020	USA	Observational study	255	Three-year overall survival rates for laparoscopic and open re-resection were 87 and 62 per cent respectively (P=0.502).

many surgeons of rural settings lack proper training in laparoscopic surgery (Table 3). It is also identified that the laparoscopic surgery is difficult to learn by many surgeons in rural settings.^{27, 28}

The present systematic review also done to find the success of laparoscopic surgery in co-morbid cases (Table 4). A study has found that the surgeons prefer open surgeries in case of type 2 diabetes mellites than laparoscopic surgeries.³¹ In a similar study, open surgery was preferred in suspected gall bladder carcinoma.²⁹ In another study, laparoscopic surgery was preferred in place of open surgery in pregnant women.³⁰

DISCUSSION

Providing surgical care in rural settings to patients has significant challenges especially with the surgical technique

like laparoscopy. A rural setting typically has limited number of populations with moderate to low-income group people. Further they have limited technological resources and the practicing surgeon will have limited contacts with other specialists to get expert consultation in case of any post-surgical complications.³²

It is not just the limitations of facilities but also the mindset of a surgeon to practice in rural area poses a great challenge in providing health care facilities in rural settings. However, the present systematic review on various outcomes of the laparoscopic cholecystectomy in rural hospitals had shown that the laparoscopic surgery has been performed successfully in many patients with less complications.

The studies had shown that there is shortage of surgeons in rural areas because of various difficulties faced by the

Table 2: Laparoscopic surgery in resource limited settings of rural area hospital

Author (s)	Year	Country	Study tool	Sample size	Results
Basu S, et al. ²³	2006	India	Prospective study	32	Mini-laparotomy cholecystectomy may be a good alternative to laparoscopic cholecystectomy in rural settings of developing countries, where resources are limited and waiting lists are long.
Straub CM, et al. ²⁴	2011	Mongolia	Observational Study	410	There was no significant difference in intraoperative or postoperative complications between hospitals.
Ekwunife CN and Nwobe O ²⁵	2014	Nigeria	Retrospective study	100	The study suggested that basic laparoscopic procedures could be offered safely to resource-poor rural population.
Shrestha AL, et al. ²⁶	2015	Nepal	Retrospective study	348	The rate of conversion to open cholecystectomy was 6.9%. Post-operative complications were less. There was no mortality in the study. Hence laparoscopic cholecystectomy is a safe, reliable and a promising option even in the rural peripheral set up.

Table 3: Laparoscopic surgery-need for training in rural settings

Author (s)	Year	Country	Study tool	Sample size	Results
Subramonian et al. ²⁷	2004	UK	Observational Study	13	The study group perceived that laparoscopy was more difficult to learn than open surgery even after the training.
Imran JB, et al. ²⁸	2019	Guatemala	Retrospective study	9402	Lack of formal training in laparoscopy was identified in 57% of surgeons. Lack of government funds to implement a laparoscopic program was noted by 71% of surgeons. Lack of sufficient laparoscopic equipment was identified by 71% of surgeons. The majority of surgeons preferred to perform LC if these problems could be addressed.

Table 4: Laparoscopic surgery in co-morbid cases in rural settings

Author (s)	Year	Country	Study tool	Sample size	Results
Lundberg O and Kristofferson A ²⁹	2001	Sweden	Comparative study	270	Open surgery was recommended in cases of known or suspected gallbladder carcinoma since laparoscopic cholecystectomy has an increased risk of disseminating tumor cells.
Buser KB ³⁰	2002	Nebraska	Retrospective study	11	Urgent laparoscopic operations can be carried out successfully in pregnant patients throughout their pregnancy however the surgeon must be skilled in surgical obstetrics and in advanced laparoscopic techniques.
de Miguel-Yanes JM, et al. ³¹	2016	Spain	Observational Study	611533	The rates of open cholecystectomies were 3-fold higher in patients with T2DM than in those without T2DM, while the laparoscopic cholecystectomies rate was almost 2-fold higher.

surgeon in rural settings.³³ The major issues faced by the rural surgeon are diverse case mix, professional isolation, frequent call coverage and life style concerns.³⁴ There are situations wherein the anesthetist may not be available for surgery and in emergency situations surgeons himself has to perform anesthesia for the patients.³⁵ In this scenario, the surgeons prefer the laparoscopic surgery than the open surgery taking into consideration of the less post-operative complication and hospital stay. Thus, in rural settings, the laparoscopic surgeries are preferred by many surgeons. Udwardia³⁶ has advocated that the developing world should adhere to the concept of the 5 A's viz., availability, affordability, accessibility, acceptability along with the selection of appropriate surgery for the progress of advancements in rural surgery. Further, it has been ascertained that the rural surgeon with skill of laparoscopic surgery form a vital back-up for other clinicians in specialties like critical care and emergency services and thus provide great financial value to the rural community.³⁷

CONCLUSION

The present systematic review has identified that the laparoscopic cholecystectomy in rural hospitals is most preferred as that of urban setting. It not only provides less hospital stay, but also provides economical option for rural patients. However, there are some limitations in many rural settings like lack of instrumental facility and trained surgeon. The outcomes of the laparoscopic cholecystectomy in some rural hospitals are comparatively same as that of urban settings.

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