

Complicated Appendicitis-Shifting towards Early Appendectomy-A Comprehensive Review

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Keywords

Complicated appendicitis, Appendicular mass, interval appendectomy, laparoscopic appendectomy, and early appendectomy

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ABSTRACT

The management of complicated appendicitis has undergone a transformative shift in recent years, moving away from the traditional conservative approach followed by interval appendectomy towards early appendectomy. This review article explores the current landscape of complicated appendicitis management, investigating the roles of conservative treatment, interval appendectomy, and early appendectomy. With no definitive consensus in place, the choice of treatment largely depends on the individual surgeon. The emergence of laparoscopic appendectomy has played a pivotal role in this paradigm shift, further highlighting the need to reevaluate and understand the various management options available. A total of 43 articles, 24 from Asia, 12 from Europe, 5 from the USA and 1 from Africa were retrieved from PubMed, Google scholar and the Cochrane database of clinical reviews. This review synthesizes existing literature, shedding light on the advantages and considerations associated with each approach.

INTRODUCTION

Complicated appendicitis encompasses a spectrum of conditions, including perforated appendix, abscess formation, the presence of appendicolith, and purulent peritonitis. While there is consensus among general surgeons regarding the definition of complicated appendicitis, there remains a significant controversy surrounding its management. This management primarily bifurcates into conservative treatment followed by interval appendectomy or immediate appendectomy. The pivotal role of interval appendectomy post-conservative treatment has recently been questioned, especially considering the low recurrence rates and minimal associated morbidity. Additionally, the emergence of laparoscopic appendectomy has introduced new dimensions to the management of complicated appendicitis, favoring early surgical intervention. In this review article, we conduct a comprehensive analysis of the current landscape of the management of complicated appendicitis, exploring the advantages and disadvantages of conservative treatment, interval appendectomy, and early appendectomy.¹

The role of interval appendectomy after conservative treatment of appendicular mass has been questioned with

it being indicated for patients who present with recurrent attacks of pain. Computed tomography and colonoscopy may be used to investigate older patients who have completed conservative treatment in order not to miss any other pathology.² The management of complicated appendectomy can be divided into three types: a) conservative treatment followed by interval appendectomy after 8 to 12 weeks, b) Conservative treatment without interval appendectomy and c) Immediate appendectomy. Conservative treatment involves the use of intravenous antibiotics and fluids.³

As the management of complicated appendicitis is still controversial, we have conducted this review article to investigate this.

A thorough literature review was carried out using well-established databases such as PubMed, the Cochrane Database of Systematic Reviews, and Google Scholar. The search spanned articles from 1990 to 2023, encompassing original research articles, observational studies, clinical trials, systematic reviews, meta-analyses, and clinical reviews. The chosen keywords for this search included "complicated appendicitis," "appendicular mass,"

"appendicular phlegmon," "appendicular abscess," and "interval appendectomy." Only articles published in the English language were considered, with case reports, case studies, and tutorials being excluded from the analysis. A total of 43 articles were identified, of which 24 were from Asia, 13 from Europe, 5 from the USA and 1 from Africa.

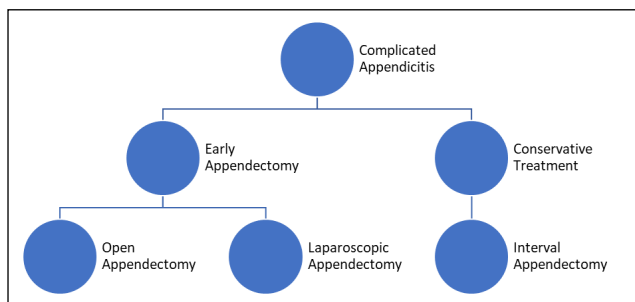


Figure 1. Flowchart on the management of complicated appendicitis

DISCUSSION

Conservative treatment of complicated appendicitis

Conservative treatment of complicated appendicitis, which was initially described by Ochsner and Sheeren, involves strict nil by mouth status, intravenous antibiotics, and analgesics, followed by interval appendectomy within 8 to 12 weeks.⁴ Historically, this approach has been the conventional method for managing appendicular masses. This approach offers the advantage of safety and effectiveness, avoiding damage to adjacent structures. Notably, the need for interval appendectomy arises primarily to prevent recurrence.⁵

Several studies have suggested that conservative treatment is associated with lower complication rates and reduced treatment failure rates compared to immediate surgery. However, the drawback lies in the retrospective nature of most studies, demanding further prospective investigations. Conservative treatment may be a safer option for patients who present late to the hospital due to financial constraints or self-medication with analgesics. Factors influencing the success of conservative treatment include the size of the mass and the duration of symptoms, with larger masses and prolonged symptoms correlating with higher treatment failure rates.⁶⁻⁹

In pediatric patients below 5 years, conservative treatment is particularly effective, as immediate appendectomy

carries a higher risk of blood loss and bowel injury. Pediatric patients with complicated appendicitis and appendicular abscess may also benefit from percutaneous drainage followed by conservative therapy, with associated lower complication rates and faster recovery.¹⁰⁻¹⁴ Common predictors of recurrent appendicitis after conservative management include persistent symptoms and the presence of an appendicolith on ultrasonography.¹⁵

The wound infection rates and recurrence rates were low but as most of the studies were retrospective in nature, further prospective studies may be required to evaluate this.

Table I: Studies that support conservative treatment of complicated appendicitis.

Studies	Efficacy	Study type	N-numbers
Elaasdy et al	88%	Prospective study	169
Olsen et al	85%	Systemic review	3,772
Anderson et al	93%	Meta-analysis	59,488
Gillick et al	84.2%	Retrospective study	427
Fugazolla et al	90%	Meta-analysis	1,288

Interval appendectomy in complicated appendicitis

Traditionally, interval appendectomy has been performed 8 to 12 weeks after conservative treatment to prevent recurrence and confirm the diagnosis. However, the necessity of interval appendectomy has come under scrutiny due to the low recurrence rates and the minimal morbidity associated with the procedure. Practices among surgeons vary concerning interval appendectomy, with specialists showing a lower inclination to recommend it.^{16,17}

The South Coast appendicular mass management survey also confirmed the diverse nature of management of complicated appendicitis and a significant number of surgeons who do not perform interval appendectomy after conservative treatment.¹⁸

Recent studies suggest that routine interval appendectomy may not be required, and patients can be adequately followed up with imaging techniques such as computed tomography and colonoscopy. Interval appendectomy is now offered selectively to patients with recurrent abdominal pain after conservative treatment.¹⁹⁻²³

In the studies examined the pathological examination of the specimen following interval appendectomy was done retrospectively. Study 51% of the specimens showed chronically inflamed appendix, 34.9% showed acute on chronic inflammation, 12.8% acutely inflamed appendix, 16.8% fecolith and 1.3% acute fibromuscular tissue. One study showed the importance of interval appendectomy in children.²⁴ The histopathology of the appendix specimen of patients who underwent interval appendectomy and the results showed that all specimens had various grades of inflammation and there were no neoplasms.²⁵ These studies concluded that interval appendectomy need not be routinely done after completion of conservative treatment. As patients can be followed up with computerized tomography and colonoscopy, Interval appendectomy is only indicated for patients who present with recurrent symptoms.

Table II: Studies that support interval appendectomy in the management of complicated appendicitis.

Studies	year	N-numbers	Study type	Complication rate
Gillick et al	2001	427	Systemic review	2.3%
Gonzales et al	2003	41	Case-control study	N/A
Darwazeh et al	2016	543	Systemic review	10.4%
Weiner et al	1989	104	Retrospective study	5.9%
Fouad et al	2017	149	Observational study	6%

Early appendectomy

Early appendectomy is gaining favor in the management of complicated appendicitis due to its potential in reducing the need for a second admission and total hospital stay. It also minimizes the risk of misdiagnosing other conditions, such as cecal carcinoma. Laparoscopic appendectomy has contributed to this shift by providing better visualization, organ mobilization, and peritoneal lavage.²⁶⁻³⁰

The advantages of early appendectomy include reduced wound infection rates, faster recovery, and shorter hospital stays.³¹⁻³⁴ In children, early appendectomy is associated with better outcomes compared to conservative treatment. Laparoscopic appendectomy in children has shown superiority in terms of reduced wound infection rates and intra-abdominal abscess formation compared to open appendectomy. As we enter the

laparoscopic era, the role of laparoscopic appendectomy in the management of complicated appendicitis is becoming popular due to better access to the abdomen and reduced post operative complications, better analgesia and reduced hospital stay. The mean blood loss was also reduced in patients who undergo laparoscopic appendectomy for complicated appendicitis.³⁵⁻³⁹

The drawback observed in these studies was that they were retrospective in nature and sample size were small.⁴⁰⁻⁴² A systemic review and meta-analysis on the feasibility of laparoscopic appendectomy for complicated appendicitis. In all 16 studies were identified which included 2 randomized control trials and 14 retrospective cohort studies. The results showed that laparoscopic appendectomy was associated with reduced wound infection rate, shorter hospital stay and faster oral intake, but the operative time was longer. This showed that laparoscopic appendectomy was feasible in the management of complicated appendicitis. The limitations of this study were that most of the studies were retrospective in nature.⁴³ These studies showed that laparoscopic appendectomy is associated with fewer complications, decreased wound infection rates, and reduced hospital stay.

Table III: Studies that favor laparoscopic appendectomy in the management of complicated appendicitis.

Studies	Study type	N-numbers	Wound infection rate	Year of study
Ali et al	Randomized control trial	150	8%	2014
Prasad et al	Retrospective study	100	0%	2017
Garg et al	Comparative study	49	8.2%	2008
YM lin et al	Retrospective study	94	1.1%	2009
Gavrillidis et al	Systemic review	810	4.6%	2018

With more training easily available in laparoscopic surgery, more surgeons will be able to perform this procedure. The limitations of the examined studies were that the majority were retrospective studies, and the sample size was small. Further randomized control trials may be needed to evaluate this.

CONCLUSION

This review article underscores the evolving landscape of complicated appendicitis management, with a notable shift towards early appendectomy, particularly

laparoscopic appendectomy. While the World Society of Emergency Surgeons recommends early appendectomy via laparoscopy, it is essential to recognize that in regions lacking laparoscopic services, conservative treatment remains a viable and accepted option.

Interval appendectomy should no longer be a routine practice but instead be reserved for patients with recurrent symptoms. The absence of clear-cut guidelines places the decision-making responsibility on the treating surgeons.

The continued relevance of conservative treatment lies in its feasibility, especially in cases where early appendectomy may require additional surgical training. This consideration is significant since appendectomies are often performed by junior surgeons and surgical registrars, who may face a slightly higher risk of complications.

Proper training is essential for surgeons wishing to adopt early appendectomy for complicated appendicitis. As we navigate further into the laparoscopic era, the role of laparoscopic appendectomy in complicated appendicitis management is expected to increase in numbers, offering patients reduced complications, decreased wound infection rates, and shorter hospital stays. Nonetheless, further randomized controlled trials are warranted to strengthen the evidence supporting these practices.

Overall, the management of complicated appendicitis remains a dynamic field, with multiple viable options depending on individual patient factors, surgeon expertise, and local resources. Further research and collaboration are necessary to refine and individualize treatment strategies.

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