

The Management of Acute Appendicitis in the Elderly: An Update: Narrative Review Article

Kumar H.R. (MBBS, MS)^{1*} 

¹Associate Professor of Surgery, Taylor University School of Medicine and Health Science, 47500 Subang Jaya, Malaysia

*Corresponding Author: Dr. Kumar Hari Rajah

Associate Professor of Surgery, Taylor University School of Medicine and Health Science, 47500 Subang Jaya, Malaysia

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Abstract: Acute appendicitis remains one of the most common surgical emergencies worldwide; however, its presentation, diagnosis, and management in elderly patients differ considerably from those in younger populations. Elderly individuals frequently exhibit atypical clinical manifestations, delayed presentation, multiple comorbidities, and reduced physiological reserve, all of which contribute to higher rates of perforation, postoperative complications, prolonged hospitalization, and mortality. Advances in diagnostic imaging, minimally invasive surgery, perioperative care, and risk stratification have significantly improved outcomes in this population. The role of non-operative management with antibiotics remains controversial, particularly given concerns regarding recurrence, missed neoplasms, and delayed definitive treatment. This review examines current evidence regarding the treatment options and outcomes of acute appendicitis in the elderly. Emphasis is placed on the role of non-operative treatment and appendectomy in the management of acute appendicitis in the elderly. We will also look at the role of laparoscopic appendectomy in the management of acute appendicitis in the elderly. Understanding the unique characteristics of appendicitis in elderly patients is essential for improving diagnostic accuracy, reducing complications, and optimizing clinical outcomes.

Keywords: “Acute Appendicitis,” “Elderly,” “Complications,” “Non-Operative Treatment”, “Open Appendectomy”, and “Laparoscopic Appendectomy”.

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INTRODUCTION

Acute appendicitis is considered the most common general surgical condition that presents with symptoms of abdominal pain, but it is seen in less than 15% of patients who are above the age of 50. Acute appendicitis in the elderly is defined as patients who are above the age of 65 years who present with symptoms of acute appendicitis. The clinical presentation of acute appendicitis in the elderly is that of abdominal pain, with symptoms of nausea and vomiting. The clinical signs, like localized guarding and rigidity at the right iliac fossa, are more pronounced. Still, the lack of the ability of elderly patients to perceive pain may lead to delayed presentation of acute appendicitis. Blood investigations, such as an elevated total white cell count or inflammatory markers like C-reactive protein (CRP), are often seen but may indicate complications, like

perforation. Imaging modalities like ultrasound and computerized tomography are often performed to establish the diagnosis (Fransvea *et al.*, 2022; Lapsa *et al.*, 2021). The management of acute appendicitis in the elderly is by performing an appendectomy, which can be performed as an open or laparoscopic method. Non-operative treatment can be performed in selected cases, but is seldom done due to the high risk of complications like perforation, mass formation, and abscess (Garba & Ahmed, 2012).

The Italian Society of Surgical Pathophysiology (SIFIPA), the World Society of Emergency Surgeons (WSES), the Italian Society of Geriatric Surgeons (SICG), and the Italian Society of Emergency Medicine (SIMEU), in their guidelines for the diagnosis and management of acute appendicitis in the elderly of 2019, have recommended non-operative treatment for elderly

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patients with uncomplicated appendicitis which is diagnosed by computerized tomography and who choose to avoid surgery and understand the risk of recurrence. Laparoscopic appendectomy is recommended as the operative method for performing an appendectomy in the elderly, due to reduced morbidity, length of hospital stay, and cost (Fugazzola *et al.*, 2020). The European Association of Emergency Surgeons (EAES), in their rapid guidelines for the management of acute appendicitis in the elderly of 2020 have recommended appendectomy for the management of acute appendicitis in the elderly, which can be performed as an open or laparoscopic method. Non-operative treatment was not recommended for the treatment of acute appendicitis in the elderly (Antoniou *et al.*, 2021).

As there is no current consensus in the management of acute appendicitis in the elderly, we have conducted this review article looking into the management of acute appendicitis in the elderly. We will look at the role of non-operative treatment and appendectomy in the management of acute appendicitis in the elderly. We conducted a literature review using PubMed, the Cochrane Database of Systematic Reviews, Google Scholar, and Semantic Scholar, searching for randomized controlled trials, non-randomized trials, observational and cohort studies, clinical reviews, systematic reviews, and meta-analyses from 1990 to 2026. The following keywords were used: “acute appendicitis”, “Elderly”, “complications”, “Non-operative treatment”, “open appendectomy”, and “laparoscopic appendectomy”. All articles were written in English, and they were assessed through manual cross-referencing of the literature. Commentaries, case reports, and editorials were excluded from this review. Elderly patients above the age of 60 were included in this study.

DISCUSSION

Non-Operative Treatment for Acute Appendicitis in the Elderly

Non-operative treatment of acute appendicitis in the elderly has been used selectively for patients who are not fit for surgery, but due to the high recurrence rate and the risk of complications like perforation, abscess formation, its use has been limited (Farah *et al.*, 2024). The selection of elderly patients with acute appendicitis who can undergo non-operative treatment is essential to prevent complications and mortality. Proper pre-operative evaluation is essential, with assessment of blood investigations and imaging modalities like computerized tomography (Kot *et al.*, 2016). A retrospective study was conducted by Aslan *et al.*, which compared the clinical and prognostic effects of surgical intervention and conservative management for acute appendicitis in the elderly. A total of 300 patients were included in this study, with 83 patients undergoing non-operative treatment and 207 patients undergoing appendectomy. The recurrence rate for 1 year for patients who underwent non-operative treatment was 25.3%, and the recurrence rate was at 54.5% for patients who were

aged above 85 years. This study showed that non-operative treatment of acute appendicitis in the elderly should be carefully selected in elderly patients (Aslan *et al.*, 2026).

A retrospective study comparing non-operative and operative treatment of acute appendicitis in older adults in the United States was conducted by Meier *et al.*, A total of 474,875 patients were included in this study, with 61,481 patients who were above the age of 65, with 50,108 patients undergoing appendectomy, and 11,373 underwent non-operative treatment. The patients in the non-operative treatment group were associated with a 3.72% decreased risk of complications (95%CI, 2.99-4.46). There was a 1.82% increase in the mortality rate in the patients who underwent non-operative treatment (95%CI, 1.49-2.15). This study showed that non-operative treatment of acute appendicitis in the elderly was associated with reduced complications but increased mortality (Meier *et al.*, 2023).

Surgical Treatment for Acute Appendicitis in the Elderly

The management and outcomes of acute appendicitis in the elderly were assessed by a retrospective study by Cohen-Arazi *et al.*, A total of 74 patients were included in this study, with 56.8% underwent open appendectomy, while complications were observed in 21.6%, and the length of hospital stay was longer in the elderly group. The pathological assessment of the appendix in the elderly showed a higher rate of severe appendicitis (Cohen-Arazi *et al.*, 2017). A prospective multicenter study on acute appendicitis in the elderly was conducted by Kraemer *et al.*, A total of 102 elderly patients with acute appendicitis were compared with 417 younger patients, and the complication rates (20% vs 8%) and mortality (3% vs 0.2%) were higher in the elderly patients who had undergone appendectomy. The elderly patients were also associated with a higher perforation rate (35% vs 13%) (Kraemer *et al.*, 2000). A retrospective review was conducted by Weinandt *et al.*, on the outcomes of elderly patients with acute appendicitis. A total of 2060 patients were included in this study, with 65 elderly patients undergoing appendectomy and 1995 adult patients undergoing appendectomy. The complication rate was higher in the elderly group (46% vs 8%), the incidence of complicated appendicitis was also higher in the elderly group (63% vs 11.6%), and the mortality rate for appendectomy in the elderly was 6.15% (Weinandt *et al.*, 2020).

A retrospective review of the outcomes of acute appendicitis in the elderly was conducted by Lee *et al.*, A total of 130 patients were included in this study, with a morbidity rate of 28% and a mortality rate of 2.3%. The length of hospital stay was also longer in these patients (Lee *et al.*, 2000). Cimino *et al.*, looked at the practical patterns and outcomes of acute appendicitis in the elderly. This prospective observational study

included 521 elderly patients, and appendectomy in the elderly patients was associated with a longer operative time (70.1 vs 60.3 mins), postoperative complications were also higher in the elderly patients (27.9% vs 12.9%), and the length of hospital stay was also longer in the elderly (7.9 vs 3.6 days)(Cimino *et al.*, 2024). Further studies by Harbrecht *et al.*, and Pokharel *et al.*, also concluded that elderly patients with acute appendicitis are associated with higher complication rates, increased length of hospital stay, and a higher risk of complications like perforation(Harbrecht *et al.*, 2011; Pokharel *et al.*, 2011).

A systematic review and meta-analysis on the outcomes of appendectomy in the elderly versus the non-elderly patients with acute appendicitis was conducted by Yuan *et al.*, A total of 15 studies, with 12,514 elderly patients with acute appendicitis, were included in this review. The postoperative complications (RR, 2.59, 95%CI, 2.19, 3.06), intra-abdominal abscess rate (RR, 1.84, 95%CI, 1.15, 2.96), and wound infection rates (RR, 3.80, 95%CI, 1.09, 1.99) were higher in the elderly patients. The risk of complicated appendicitis (RR, 2.38, 95%CI, 2.13, 2.66) and mortality (RR, 12.48, 95%CI, 3.65, 42.7) were also higher in elderly patients with acute appendicitis(Yuan *et al.*, 2022). A meta-analysis on laparoscopic versus open appendectomy in older patients with acute appendicitis was conducted by Southgate *et al.*, A total of 6 studies with 15,852 patients were included, with 4398 patients undergoing laparoscopic appendectomy and 11,454 patients undergoing open appendectomy. Laparoscopic appendectomy was associated with reduced postoperative complications (OR-0.61, 95%CI, 0.50-0.73), reduced mortality (OR-0.24, 95%CI, 0.15-0.37), and reduced length of hospital stay (WMD-0.51 days, 95%CI, 0.64-0.37 days). This study showed that laparoscopic appendectomy in the elderly was associated with reduced morbidity and mortality(Southgate *et al.*, 2012). A systematic review and meta-analysis comparing laparoscopic versus open appendectomy for acute appendicitis in the elderly was conducted by Wang *et al.*, A total of 12 studies with 126,237 patients undergoing laparoscopic appendectomy and 213,201 patients undergoing open appendectomy. Post-operative complications (OR0.65, 95%CI, 0.62-0.67), Wound infection rates (OR0.27, 95%CI, 0.19-1.03), and mortality

(OR0.33, 95%CI, 0.28-0.39). The intra-abdominal abscess rate was similar between the groups (OR0.44, 95%CI, 0.19-1.03). The duration of surgery was longer for laparoscopic appendectomy (MD, 7.25, 95%CI, 3.13-11.16), but the length of hospital stay for laparoscopic appendectomy was shorter (MD, 2.72, 95%CI, 3.31-2.13). This review showed that laparoscopic appendectomy was safe and feasible for the management of acute appendicitis in the elderly(Wang *et al.*, 2019).

Laparoscopic appendectomy was performed in elderly patients who had been diagnosed with acute appendicitis by Guller *et al.*, A total of 9476 elderly patients were included in this study, with 1475 patients undergoing laparoscopic appendectomy and 8001 patients undergoing open appendectomy. The complication rates and mortality were lower in the group that underwent laparoscopic appendectomy. The length of hospital stay was also shorter in patients who underwent laparoscopic appendectomy (Guller *et al.*, 2004). A nationwide population study was conducted by Yeh *et al.*, to assess whether laparoscopic appendectomy was favorable in elderly patients with acute appendicitis. A total of 1399 elderly patients underwent laparoscopic appendectomy, and the length of hospital stay was reduced in this group. There were no differences in postoperative complications between the procedures (Yeh *et al.*, 2011).

Masoomi *et al.*, compared laparoscopic with open appendectomy in the management of acute appendicitis in the elderly. A total of 65,464 patients were included in this study, with 20,301 patients undergoing laparoscopic appendectomy and 12,482 patients undergoing open appendectomy. Patients who underwent laparoscopic appendectomy had a lower complication rate (15.82% vs 23.49%), reduced mortality (0.39% vs 1.31%), and reduced length of hospital stay (3.0 vs 4.8 days)(Masoomi *et al.*, 2012). Further retrospective studies that were conducted by Kirshtein *et al.*, and Baek *et al.*, who looked at the value of laparoscopic appendectomy in the elderly. These studies also showed that laparoscopic appendectomy in the elderly was associated with reduced postoperative complications and shorter length of hospital stay(Baek *et al.*, 2011; Kirshtein *et al.*, 2009).

Table 1

Study	Study Type	Main Findings Favoring Laparoscopic Appendectomy	Findings Regarding Open Appendectomy	Conclusion
Southgate <i>et al.</i> , 2012	Meta-analysis of 6 studies; 15,852 elderly patients (>60 years) undergoing appendectomy.	Lower postoperative mortality (OR 0.24), lower overall morbidity (OR 0.61), and shorter hospital stay (-0.51 days).	No significant advantage over Laparoscopic Appendectomy in operative time, wound infection, or intra-abdominal collection.	Laparoscopic Appendectomy is associated with significantly lower mortality and morbidity and should be considered the

Study	Study Type	Main Findings Favoring Laparoscopic Appendectomy	Findings Regarding Open Appendectomy	Conclusion
				preferred approach in elderly patients.
Wang <i>et al.</i> , 2019	Systematic review and meta-analysis of 12 studies; 339,438 elderly patients.	Lower mortality (OR 0.33), fewer postoperative complications (OR 0.65), markedly reduced wound infection (OR 0.27), and shorter hospital stay (−2.72 days).	Comparable intra-abdominal abscess rates; shorter operative time than Laparoscopic Appendectomy.	Laparoscopic Appendectomy is safe, feasible, and associated with better postoperative outcomes than Open Appendectomy in elderly patients.
Yuan <i>et al.</i> , 2022	Systematic review/meta-analysis assessing appendectomy outcomes in elderly versus non-elderly patients.	Elderly patients undergoing appendectomy benefit from minimally invasive approaches, although conversion from Laparoscopic Appendectomy to Open Appendectomy was more common in elderly patients (RR 3.02).	Elderly patients had higher risks of postoperative complications, wound infection, abscess formation, readmission, and mortality overall.	Highlights the increased perioperative risk in the elderly; careful patient selection and preference for minimally invasive surgery when feasible may improve outcomes.
Cimino <i>et al.</i> , 2024	Prospective multicenter cohort (ESTES SnapAppy); 521 elderly patients (≥65 years) who underwent laparoscopic appendectomy.	Demonstrated feasibility of Laparoscopic Appendectomy in elderly patients. Despite older age and greater disease severity, laparoscopic management remained the predominant approach.	Open Appendectomy was not directly compared. Elderly patients showed higher rates of complicated appendicitis, postoperative complications (27.9%), and longer hospital stay than younger adults.	Elderly patients have worse outcomes largely due to delayed presentation and disease severity; age-adapted diagnostic and treatment pathways are required.

Table comparing laparoscopic versus open appendectomy in the elderly with acute appendicitis.

Risk Factors for Complicated Appendicitis

The risk factors for complicated appendicitis, like perforation and mass formation, include the late onset of presentation, the presence of a temperature above 38 degrees, and the leukocyte shift to the left of more than 76%. These are the more common factors, and the risk of perforation is around 50% to 70% of the elderly population. Other factors include the male sex and the presence of symptoms like anorexia. Inadequate or improper examination of the abdomen is another factor that increases the risk of perforation, and the presence of obesity, preoperative hemoglobin, and creatinine levels are also factors. The presence of hypertension and heart failure is also an additional factor for the risk of perforation. (Emektar *et al.*, 2022; Gal *et al.*, 2024; Poillucci *et al.*, 2021; Sheu *et al.*, 2007; Sirikurnpiboon & Amornpornchareon, 2015)

Other factors that can affect the risk of perforation and subsequently complicated appendicitis is the prolonged patient interval, where there is a lag from the admission of the patient and subsequent diagnosis of acute appendicitis. As these patients will often undergo imaging in the form of computerized tomography, this

may then lead to a delay in performing an appendectomy in these patients. (Omari *et al.*, 2014; Segev *et al.*, 2015).

CONCLUSION

Acute appendicitis in the elderly represents a distinct clinical entity characterized by atypical presentation, delayed diagnosis, higher perforation rates, increased morbidity, and greater mortality compared with younger patients. Accurate and timely diagnosis requires a high index of suspicion and liberal use of Computerized Tomography imaging. Laparoscopic appendectomy remains the preferred treatment for most elderly patients and is associated with favorable outcomes when performed promptly. Non-operative management may be considered in carefully selected individuals but requires caution because of higher recurrence rates and the increased prevalence of underlying malignancy. As the global population ages, the development of geriatric-focused diagnostic and therapeutic strategies will become increasingly important for improving outcomes in elderly patients with acute appendicitis.

Conflict of Interest: There is no conflict of interest.

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