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Chapter 8

The Management of Acute Appendicitis in The Elderly: A Review

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Abstract

Acute appendicitis continues to be a prevalent surgical emergency globally; however, its presentation, diagnosis, and management in elderly patients differ significantly from those in younger cohorts. Elderly patients often display atypical clinical symptoms, delayed presentation, multiple comorbidities, and diminished physiological reserve, factors that contribute to increased rates of perforation, postoperative complications, extended hospitalization, and mortality. Advances in diagnostic imaging, minimally invasive surgery, perioperative care, and risk stratification have markedly enhanced outcomes in this demographic. The role of non-operative management with antibiotics remains contentious, particularly due to concerns about recurrence, undetected neoplasms, and delayed definitive treatment. This review evaluates current evidence concerning treatment options and outcomes for acute appendicitis in the elderly, with a focus on the roles of non-operative treatment and appendectomy. Additionally, the role of laparoscopic appendectomy in managing acute appendicitis in the elderly is examined. Understanding the distinct characteristics of appendicitis in elderly patients is crucial for enhancing diagnostic accuracy, minimizing complications, and optimizing clinical outcomes.

Keywords: Acute Appendicitis, Elderly, Complications, Non-operative treatment, Open appendectomy, and Laparoscopic appendectomy.

Introduction

Acute appendicitis is recognized as the most prevalent general surgical condition associated with abdominal pain symptoms, yet it occurs in less than 15% of patients over the age of 50. In the elderly, acute appendicitis is defined as occurring in individuals over 65 years who exhibit symptoms of the condition. The clinical presentation in this demographic typically includes abdominal pain, accompanied by nausea and vomiting. Clinical signs such as localized guarding and rigidity in the right iliac fossa are more pronounced; however, the diminished pain perception in elderly patients may result in delayed presentation. Blood tests often reveal elevated total white cell counts or inflammatory markers like C-reactive protein (CRP), which may suggest complications such as perforation. Diagnostic imaging, including ultrasound and computerized tomography, is frequently employed to confirm the diagnosis (Fransvea et al., 2022; Lapsa et al., 2021). Management typically involves an appendectomy, which can be conducted via open or laparoscopic methods. Although non-operative treatment is an option in selected cases, it is rarely pursued due to the elevated risk of complications such as 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) issued guidelines in 2019 concerning the diagnosis and management of acute appendicitis in elderly patients. These guidelines advocate for non-operative treatment in cases of uncomplicated appendicitis, as confirmed by computerized tomography, for patients who opt to avoid surgery and are aware of the potential for recurrence. For surgical intervention, laparoscopic appendectomy is recommended due to its association with reduced morbidity, shorter hospital stays, and lower costs (Fugazzola et al., 2020). Conversely, the European Association of Emergency Surgeons (EAES) released rapid guidelines in 2020, recommending appendectomy for managing acute appendicitis in the elderly, which may be conducted via open or laparoscopic methods. They did not endorse non-operative treatment for this condition in elderly patients (Antoniou et al., 2021).

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Given the absence of a consensus on the management of acute appendicitis in elderly patients, this review article examines the approaches to managing this condition in this demographic. The focus is on evaluating the roles of non-operative treatment and appendectomy. A comprehensive literature review was conducted using PubMed, the Cochrane Database of Systematic Reviews, Google Scholar, and Semantic Scholar. The search included randomized controlled trials, non-randomized trials, observational and cohort studies, clinical reviews, systematic reviews, and meta-analyses published between 1990 and 2026. The keywords employed were "acute appendicitis," "elderly," "complications," "non-operative treatment," "open appendectomy," and "laparoscopic appendectomy." Only articles written in English were considered, and manual cross-referencing of the literature was performed. Commentaries, case reports, and editorials were excluded from this review. The study included elderly patients aged 60 and above.

Discussion

Non-operative treatment for acute appendicitis in the elderly

Non-operative management of acute appendicitis in elderly patients has been selectively employed for those deemed unfit for surgical intervention. However, its application is constrained by the high recurrence rate and the potential for complications such as perforation and abscess formation (Farah et al., 2024). The careful selection of elderly patients suitable for non-operative treatment is crucial to mitigate complications and mortality. Comprehensive pre-operative evaluation, including blood tests and imaging techniques such as computed tomography, is imperative (Kot et al., 2016). Aslan et al. conducted a retrospective study comparing the clinical and prognostic outcomes of surgical intervention versus conservative management in elderly patients with acute appendicitis. The study encompassed 300 patients, with 83 receiving non-operative treatment and 207 undergoing appendectomies. The one-year recurrence rate for those receiving non-operative treatment was 25.%, increasing to 54.5% among patients over 85 years of age. The findings indicate that non-operative treatment for acute appendicitis in the elderly should be judiciously considered (Aslan et al., 2026).

Meier et al. conducted a retrospective study in the United States to compare non-operative and operative treatments for acute appendicitis in older adults. The study included a total of 474,875 patients, of whom 61,481 were over the age of 65. Among these, 50,108 patients underwent appendectomy, while 11,373 received non-operative treatment. The non-operative treatment group exhibited a 3.72% reduction in the risk of complications (95% CI, 2.99-4.46). However, there was a 1.82% increase in mortality rate among patients who received non-operative treatment (95% CI, 1.49-2.15). The findings indicate that while non-operative treatment of acute appendicitis in the elderly is associated with fewer complications, it also correlates with higher mortality (Meier et al., 2023).

Surgical Treatment for acute appendicitis in the elderly

The management and outcomes of acute appendicitis in elderly patients were evaluated in a retrospective study conducted by Cohen-Arazi et al. This study included 74 patients, of whom 56.8% underwent open appendectomy. Complications were observed in 21.6% of cases, and the length of hospital stay was notably longer for the elderly cohort. Pathological assessment revealed a higher incidence of severe appendicitis in this group (Cohen-Arazi et al., 2017). Kraemer et al. conducted a prospective multicenter study on acute appendicitis in the elderly, comparing 102 elderly patients with 417 younger patients. The study found that complication rates (20% vs. 8%) and mortality (3% vs. 0.2%) were significantly higher among elderly patients who underwent appendectomy. Additionally, the elderly group exhibited a higher perforation rate (35% vs. 13%) (Kraemer et al., 2000). Weinandt et al. performed a retrospective review of outcomes in elderly patients with acute appendicitis, including 2060 patients in total. Among them, 65 elderly patients and 1995 adult patients underwent appendectomy. The complication rate was higher in the elderly group (46% vs. 8%), as was the incidence of complicated appendicitis (63% vs. 11.6%). The mortality rate for appendectomy in the elderly was 6.15% (Weinandt et al., 2020).

Lee et al. conducted a retrospective review examining the outcomes of acute appendicitis in elderly patients. The study encompassed 130 patients, revealing a morbidity rate of 28% and a mortality rate of 2.3%. Additionally, these patients experienced extended hospital stays (Lee et al., 2000). In a separate investigation, Cimino et al. explored the practical patterns and outcomes of acute appendicitis in the elderly through a prospective observational study involving 521 elderly patients. The findings indicated that appendectomy in this demographic was associated with a longer operative time (70.1 vs. 60.3 minutes) and a higher incidence of postoperative complications (27.9% vs. 12.9%). Furthermore, the length of hospital stay was notably longer for elderly patients (7.9 vs. 3.6 days) (Cimino et al., 2024). Subsequent studies by Harbrecht et al. and Pokharel et al. corroborated these findings, concluding that elderly patients with acute appendicitis face higher complication rates, prolonged hospital stays, and an increased risk of complications such as perforation (Harbrecht et al., 2011; Pokharel et al., 2011).

Yuan et al. conducted a systematic review and meta-analysis to compare the outcomes of appendectomy in elderly versus non-elderly patients with acute appendicitis. This review included 15 studies encompassing 12,514 elderly patients with acute appendicitis. The findings indicated that postoperative complications (RR 2.59, 95% CI 2.19–3.06), intra-abdominal abscess rates (RR 1.84, 95% CI 1.15–2.96), and wound infection rates (RR 3.80, 95% CI 1.09–1.99) were significantly higher in elderly patients. Additionally, 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 elevated in this demographic (Yuan et al., 2022). Southgate et al. conducted a meta-analysis comparing laparoscopic versus open appendectomy in older patients with acute appendicitis. This analysis included six studies with a total of 15,852 patients, of whom 4,398 underwent laparoscopic appendectomy and 11,454 underwent open appendectomy. The results demonstrated that laparoscopic appendectomy was associated with reduced postoperative complications (OR 0.61, 95% CI 0.50–0.73), decreased mortality (OR 0.24, 95% CI 0.15–0.37), and a shorter length of hospital stay (WMD -0.51 days, 95% CI -0.64 to -0.37 days). The study concluded that laparoscopic appendectomy in the elderly is linked to reduced morbidity and mortality (Southgate et al., 2012). Wang et al. conducted a systematic review and meta-analysis comparing laparoscopic versus open appendectomy for acute appendicitis in the elderly. This review included 12 studies with 126,237 patients undergoing laparoscopic appendectomy and 213,201 patients undergoing open appendectomy. The findings revealed that postoperative complications (OR 0.65, 95% CI 0.62–0.67), wound infection rates (OR 0.27, 95% CI 0.19–1.03), and mortality (OR 0.33, 95% CI 0.28–0.39) were lower in the laparoscopic group. The intra-abdominal abscess rate was comparable between the groups (OR 0.44, 95% CI 0.19–1.03). Although the duration of surgery was longer for laparoscopic appendectomy (MD 7.25, 95% CI 3.13–11.16), the length of hospital stay was shorter (MD -2.72, 95% CI -3.31 to

-2.13). This review demonstrated that laparoscopic appendectomy is a safe and feasible option for managing acute appendicitis in the elderly (Wang et al., 2019).

Guller et al. conducted a study involving 9,476 elderly patients diagnosed with acute appendicitis, comparing outcomes between those who underwent laparoscopic appendectomy (1,475 patients) and those who underwent open appendectomy (8,001 patients). The results demonstrated that the laparoscopic appendectomy group experienced lower complication rates and mortality, as well as a reduced length of hospital stay (Guller et al., 2004). Similarly, Yeh et al. conducted a nationwide population study to assess the efficacy of laparoscopic appendectomy in elderly patients with acute appendicitis. In this study, 1,399 elderly patients underwent laparoscopic appendectomies, resulting in a shorter hospital stay. However, no significant differences in postoperative complications were observed between the two surgical approaches (Yeh et al., 2011).

Masoomi et al. conducted a comparative analysis of laparoscopic versus open appendectomy for managing acute appendicitis in elderly patients. The study encompassed 65,464 patients, with 20,301 undergoing laparoscopic appendectomy and 12,482 undergoing open appendectomy. The findings indicated that patients who underwent laparoscopic appendectomy experienced a lower complication rate (15.82% compared to 23.49%), decreased mortality (0.39% compared to 1.31%), and a shorter hospital stay (3.0 days compared to 4.8 days) (Masoomi et al., 2012). Additional retrospective studies by Kirshtein et al. and Baek et al. also evaluated the efficacy of laparoscopic appendectomy in the elderly, corroborating that it is associated with reduced postoperative complications and a shorter duration of hospitalization (Baek et al., 2011; Kirshtein et al., 2009).

Table 1: Clinical comparison of laparoscopic and open appendectomy for the management of acute appendicitis in elderly patients

Study	**Study Type**	**Main Findings Favoring Laparoscopic Appendectomy**	**Findings Regarding Open Appendectomy**	**Conclusion**
Southgate et al., 2012	Meta-analysis of 6 studies; 15,852 elderly patients ($>$60 years) undergoing appendectomy.	Lower postoperative mortality (OR 0.24), lower overall morbidity (OR 0.61), and shorter hospital stay (-0.51 days).	No significant advantage over Laparoscopic Appendectomy in operative time, infection, or intra-wound abdominal collection.	Laparoscopic Appendectomy is associated with significantly lower mortality and morbidity and should be considered the preferred approach in elderly patients.
Wang et al., 2019	Systematic review and meta-analysis of 12 studies; 339,438 elderly patients.	Lower mortality (OR 0.33), fewer postoperative complications (OR 0.65), markedly reduced wound infection (OR 0.27), and shorter hospital stay (-2.72 days).	Comparable intra-abdominal abscess rates; shorter operative time than Laparoscopic Appendectomy.	Laparoscopic Appendectomy is safe, feasible, and associated with better postoperative outcomes than Open Appendectomy in elderly patients.
Yuan et al., 2022	Systematic review /meta-analysis assessing appendectomy outcomes in elderly versus non-elderly patients.	Elderly patients undergoing appendectomy benefit from minimally invasive approaches, although conversion from Laparoscopic Appendectomy to Open Appendectomy was more common in elderly patients (RR 3.02).	Elderly patients had higher risks of postoperative complications, wound infection, abscess formation, readmission, and mortality overall.	Highlights the increased perioperative risk in the elderly; careful patient selection and preference for minimally invasive surgery when feasible may improve outcomes.
Cimino et al., 2024	Prospective multicenter cohort (ESTES SnapAppy); 521 elderly patients ($\geq$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

The Risk factors for complicated appendicitis in the elderly

The risk factors associated with complicated appendicitis, such as perforation and mass formation, include delayed presentation, a body temperature exceeding 38 degrees Celsius, and a leukocyte shift to the left greater than 76%. These factors are prevalent, with the risk of perforation ranging from 50% to 70% in the elderly population. Additional factors include male sex and symptoms such as anorexia. Furthermore, inadequate or improper abdominal examination increases the risk of perforation. Obesity, preoperative hemoglobin, and creatinine levels also contribute to this risk. Moreover, the presence of hypertension and heart failure further elevates the risk of perforation (Emektar et al., 2022; Gal et al., 2024; Poillucci et al., 2021; Sheu et al., 2007; Sirikurnpiboon & Amornpornchareon, 2015). Additional factors influencing the risk of perforation and subsequent complicated appendicitis include an extended patient interval, characterized by a delay between patient admission and the diagnosis of acute appendicitis. Patients frequently undergo imaging, such as computerized tomography, which may contribute to a postponement in performing an appendectomy (Omari et al., 2014; Segev et al., 2015).

Conclusion

Acute appendicitis in elderly patients constitutes a unique clinical condition, marked by atypical symptoms, delayed diagnosis, elevated perforation rates, increased morbidity, and higher mortality compared to younger individuals. Achieving an accurate and timely diagnosis necessitates a high degree of clinical suspicion and frequent utilization of Computerized Tomography imaging. Laparoscopic appendectomy is the preferred treatment for most elderly patients, yielding favorable outcomes when executed promptly. Non-operative management may be considered for carefully selected patients; however, it requires caution due to higher recurrence rates and the increased prevalence of underlying malignancies. As the global population continues to age, the development of geriatric-specific diagnostic and therapeutic strategies will become increasingly crucial for enhancing outcomes in elderly patients with acute appendicitis.

Declaration

Conflict of interest: There is no conflict of interest

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