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Original Research Article

Controversies in Appendicitis Classification and the Role of Postoperative Antibiotics

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Abstract:

Background: Appendicitis is one of the most common surgical emergencies, with appendectomy remaining the standard treatment. However, controversies persist regarding the classification of appendicitis into uncomplicated and complicated forms, as well as the appropriate use and duration of postoperative antibiotics. While guidelines recommend limiting antibiotics in uncomplicated cases and restricting prolonged therapy to complicated cases, variability in practice continues.

Aim: To evaluate the classification of appendicitis and analyse the patterns of postoperative antibiotic utilisation in patients undergoing appendectomy at JLNMCH, Bhagalpur.

Methods: This retrospective observational study included 90 patients who underwent appendectomy over one year. Data on demographic characteristics, intraoperative classification of appendicitis, antibiotic regimen and duration, and postoperative complications were collected from hospital records. Statistical analysis was performed using SPSS version 23.0, with chi-square test applied to assess the association between appendicitis type and antibiotic duration. A p-value <0.05 was considered statistically significant.

Results: Among 90 patients, 58 (64.4%) were males and 32 (35.6%) were females, with a mean age of 27.6 ± 10.2 years. Uncomplicated appendicitis was identified in 62 (68.9%) patients, while 28 (31.1%) had complicated appendicitis. Postoperative antibiotics were administered in all patients. In uncomplicated cases, 48 (77.4%) received antibiotics for ≤48 hours, whereas 14 (22.6%) received them beyond 48 hours. In complicated cases, prolonged therapy (>5 days) was used in 20 (71.4%) patients. Postoperative complications occurred in 12 (13.3%) patients, with surgical site infection being the most common (7.8%). A significant association was found between appendicitis classification and antibiotic duration (p=0.001).

Conclusion: Although postoperative antibiotics were used appropriately in complicated appendicitis, their prolonged use in uncomplicated cases highlights persistent deviations from evidence-based practice. This reflects the ongoing controversy in appendicitis management and emphasises the need for guideline adherence.

Recommendations: Strict compliance with international guidelines should be encouraged to avoid unnecessary antibiotic use in uncomplicated cases, reduce antimicrobial resistance, shorten hospital stay, and optimise healthcare costs. Future prospective studies are warranted to establish locally relevant protocols.

Keywords: Appendicitis, Classification, Postoperative antibiotics, Complicated appendicitis, Antimicrobial stewardship

Introduction

Appendicitis remains one of the most common causes of acute abdominal pain requiring surgical evaluation, with appendectomy historically considered the gold standard for management [1]. However, evolving evidence has challenged this paradigm, particularly in cases of uncomplicated appendicitis, where antibiotic therapy has emerged as a viable alternative [2,3]. The recent CODA and APPAC randomized trials, alongside several meta-analyses, demonstrate that antibiotics can achieve resolution in approximately 70% of uncomplicated cases within one year, though these patients carry a risk of recurrence and require longer hospital stays [2,3]. Indeed, some data suggest that antibiotic therapy may reduce perioperative morbidity and wound complications compared to surgery [3,4].

A central issue in appendicitis management is the **classification**—distinguishing uncomplicated from complicated forms (e.g., gangrenous or perforated). This distinction is essential because it guides therapeutic decisions yet is notoriously subjective.

A 2021 survey revealed poor interrater agreement among surgeons in classifying intraoperative findings, with Krippendorff's alpha ranging from 0.45 (perforated vs non-perforated) to 0.73 (gangrenous/perforated vs non-gangrenous) [5]. The same study indicated wide variability in postoperative antibiotic use, with a substantial proportion of respondents prescribing antibiotics even for non-gangrenous or non-perforated appendicitis, despite limited evidence to support such practice [5].

Guideline recommendations underscore the need for short-course postoperative antibiotics, especially in cases of complicated appendicitis with adequate source control. The 2020 WSES Jerusalem guidelines advise against extending antibiotics beyond 3–5 days in such contexts, suggesting oral transition after 48 hours and even recommending against postoperative antibiotics in uncomplicated pediatric cases [6]. Parallel evidence indicates that routine postoperative antibiotics in uncomplicated appendicitis do not reduce surgical site infections—and may instead prolong hospital stay and elevate costs [7].

Nevertheless, despite advancements in understanding and clearer guideline direction, clinical practice retains considerable heterogeneity, particularly in antibiotic utilisation following appendectomy. Some clinicians still default to extended antibiotic regimens even in uncomplicated cases, reflecting ongoing uncertainty and inertia in changing entrenched practices.

Against this backdrop, the present retrospective study—conducted at JLNMCH Bhagalpur over one year—was designed to examine how appendicitis classifications align with postoperative antibiotic use. Focusing on 90 patients, this investigation aimed to elucidate patterns of antibiotic duration, assess their appropriateness relative to disease severity, and explore implications for guideline adherence and antimicrobial stewardship.

Methodology

Study Design: This study was designed as a retrospective observational analysis

Study Setting: The study was carried out at the Department of General Surgery, Jawaharlal Nehru Medical College and Hospital (JLNMCH), Bhagalpur, Bihar. All eligible cases from the hospital records were reviewed. The study was conducted over a period of one year.

Participants: A total of 90 patients who underwent appendectomy during the study period were included. The participants were selected based on availability of complete clinical, operative, and follow-up data in the hospital records.

Inclusion Criteria

Patients were included if they fulfilled the following criteria:

- All patients of any age and gender who underwent appendectomy during the study period.
- Patients with complete preoperative, intraoperative, and postoperative records.
- Patients with histopathologically confirmed diagnosis of appendicitis.

Exclusion Criteria

The following patients were excluded:

- Patients with incomplete or missing records.
- Patients undergoing appendectomy for conditions other than appendicitis (e.g., incidental appendectomy, appendicular neoplasms).
- Patients lost to follow-up or with insufficient postoperative data regarding antibiotic utilisation.

Bias: To minimise bias, strict inclusion and exclusion criteria were followed, and data abstraction was performed from official hospital records rather than subjective recall. Selection bias was reduced by including all consecutive eligible cases during the study period. Observer bias was minimised by cross-verifying records independently by two investigators.

Data Collection: Data were collected retrospectively from patient case files, operation theatre registers, and discharge summaries. Information extracted included demographic details, clinical presentation, intraoperative findings, classification of appendicitis, antibiotic usage (type, duration, and rationale), postoperative complications, and outcomes.

Procedure: The classification of appendicitis was recorded based on intraoperative findings and histopathological confirmation. Postoperative antibiotic utilisation was noted from case records, with emphasis on indication, duration, and appropriateness as per hospital protocols. Complications, if any, were documented. All data were anonymised and coded before analysis.

Statistical Analysis: The collected data were entered into a master chart using Microsoft Excel and subsequently analysed with (SPSS) version 23.0. Descriptive statistics such as mean, standard deviation, frequencies, and percentages were calculated for baseline characteristics. Associations between classification of appendicitis and postoperative antibiotic usage were analysed using the chi-square test or Fisher's exact test where applicable. A p-value of <0.05 was considered statistically significant.

Results

A total of 90 patients who underwent appendectomy were included in the study. Out of them, 58 (64.4%) were males and 32 (35.6%) were females, with a male-to-female ratio of 1.8:1. The mean age of patients was 27.6 ± 10.2 years (range: 12–56 years). The highest number of patients belonged to the 21–30 years' age group (42.2%), followed by 11–20 years (27.8%).

Table 1: Age and Gender Distribution of Patients (n=90)

Age Group (years)	Male (n=58)	Female (n=32)	Total (n=90)	Percentage (%)
11–20	18	7	25	27.8
21–30	26	12	38	42.2
31–40	8	7	15	16.7
41–50	4	4	8	8.9
>50	2	2	4	4.4

The majority of cases were observed in young adults, with a slight male predominance.

Classification of Appendicitis: On intraoperative and histopathological evaluation, 62 (68.9%) patients had uncomplicated appendicitis, while 28 (31.1%) had complicated appendicitis (perforated, gangrenous, or abscess formation).

Table 2: Classification of Appendicitis (n=90)

Type of Appendicitis	Number of Patients	Percentage (%)
Uncomplicated	62	68.9
Complicated	28	31.1

Nearly one-third of patients presented with complicated appendicitis, highlighting the importance of early diagnosis and management.

Postoperative Antibiotic Utilisation: Out of 90 patients, all received postoperative antibiotics, though with significant variability in duration and regimen. Among uncomplicated cases, 48 patients (77.4%) received antibiotics for ≤48 hours, while 14 patients (22.6%) received antibiotics for more than 48 hours. In complicated cases, prolonged antibiotics (>5 days) were administered in 20 patients (71.4%).

Table 3: Duration of Postoperative Antibiotic Usage (n=90)

Appendicitis Type	≤48 hours	3–5 days	>5 days	Total
Uncomplicated (62)	48 (77.4%)	10 (16.1%)	4 (6.5%)	62
Complicated (28)	2 (7.1%)	6 (21.5%)	20 (71.4%)	28
Total	50 (55.6%)	16 (17.8%)	24 (26.6%)	90

Uncomplicated cases (n = 62):

- The majority (48 patients, 77.4%) received antibiotics for ≤48 hours, which is within guideline recommendations.
- A smaller proportion received antibiotics for longer: 10 patients (16.1%) for 3–5 days and 4 patients (6.5%) for >5 days, representing unnecessary prolongation.

Complicated cases (n = 28):

- Most patients (20, 71.4%) appropriately received prolonged antibiotics for >5 days.
- However, 6 patients (21.5%) received only 3–5 days of antibiotics, and 2 patients (7.1%) received ≤48 hours—shorter than recommended for complicated appendicitis.

Overall (n = 90):

- More than half of all patients (55.6%) received ≤48 hours of antibiotics.
- 17.8% received intermediate therapy (3–5 days).
- 26.6% required prolonged therapy (>5 days), mainly in complicated cases.

Most uncomplicated appendicitis cases received unnecessary prolonged antibiotics beyond recommended guidelines, whereas complicated cases were appropriately managed with extended courses.

Postoperative Complications: A total of 12 patients (13.3%) developed postoperative complications. Surgical site infection (SSI) was the most common complication, seen in 7 patients (7.8%), followed by intra-abdominal abscess in 3 patients (3.3%) and paralytic ileus in 2 patients (2.2%).

Table 4. Postoperative Complications (n=90)

Complication Type	Uncomplicated (n=62)	Complicated (n=28)	Total (n=90)	Percentage (%)
Surgical site infection	3	4	7	7.8
Intra-abdominal abscess	0	3	3	3.3
Paralytic ileus	1	1	2	2.2
Total	4 (6.5%)	8 (28.6%)	12	13.3

Postoperative complications were significantly higher in complicated appendicitis cases compared to uncomplicated ones ($p<0.05$).

Association Between Appendicitis Classification and Antibiotic Duration: Chi-square analysis revealed a statistically significant association between the classification of appendicitis and the duration of postoperative antibiotic usage ($p=0.001$). Patients with complicated appendicitis were more likely to receive prolonged antibiotics compared to uncomplicated cases.

Table 5. Association of Appendicitis Classification with Antibiotic Duration

Appendicitis Type	≤48 hrs	>48 hrs	Total	χ^2 value	p-value
Uncomplicated (62)	48	14	62		
Complicated (28)	2	26	28	34.57	0.001*
Total	50	40	90		

*Statistically significant ($p<0.05$).

The data highlights the discrepancy in antibiotic use, with a substantial proportion of uncomplicated cases receiving unnecessary prolonged antibiotics, while complicated cases required extended therapy.

Discussion

In this retrospective study of 90 patients undergoing appendectomy, the majority were males (64.4%) with a mean age of 27.6 years, and most belonged to the 21–30 years' age group. Based on intraoperative and histopathological evaluation, 68.9% had uncomplicated appendicitis, while 31.1% presented with complicated forms such as perforated or gangrenous appendicitis.

Postoperative antibiotic use was universal across all patients, though the duration varied significantly. In uncomplicated cases, 77.4% received antibiotics for ≤48 hours, whereas 22.6% received them for a longer duration despite not requiring prolonged therapy. In complicated cases, prolonged courses were common, with 71.4% of patients receiving antibiotics beyond five days, which aligned with standard management protocols.

Complications were reported in 13.3% of cases, with surgical site infection being the most frequent (7.8%), followed by intra-abdominal abscess (3.3%) and paralytic ileus (2.2%). Importantly, complications were more prevalent among complicated appendicitis cases (28.6%) compared to uncomplicated ones (6.5%), a statistically significant finding ($p<0.05$). Furthermore, there was a strong association between appendicitis classification and duration of postoperative antibiotic therapy ($p=0.001$), indicating that antibiotic use was often guided by disease severity.

The classification of appendicitis into uncomplicated and complicated subtypes remains controversial, as multiple studies highlight overlap and difficulty in applying strict criteria. Di Saverio et al. proposed diagnostic criteria and a graded classification system that better reflects disease severity, but ambiguity in intraoperative findings continues to complicate clinical decisions [8].

With regard to postoperative antibiotics, several studies suggest that routine use after uncomplicated appendectomy is not beneficial. Sartelli et al. developed Western guidelines recommending against postoperative antibiotics in simple appendicitis, noting no improvement in surgical site infection (SSI) or complication rates [9]. Similarly, van den Boom et al. conducted a systematic review showing that in complicated appendicitis, shorter antibiotic courses (3–5 days) are equally effective as prolonged regimens, supporting reduced exposure [10].

Further evidence strengthens this trend. Atema et al. performed a randomized controlled trial comparing 2 days versus 5 days of postoperative antibiotics in complicated cases, finding no significant differences in infectious complications, reinforcing shorter therapy as sufficient [11]. Salminen et al. also noted that misclassification of appendicitis leads to overtreatment, suggesting individualized strategies that consider clinical and operative findings rather than rigid categories [12]. Finally, Podda et al. systematically reviewed the global variability in appendicitis management, concluding that antibiotic policies and classification strategies vary widely across regions, and harmonization of evidence-based guidelines is needed [13].

Conclusion

This study demonstrates that while postoperative antibiotic use appropriately increases with disease

severity in complicated appendicitis, a considerable proportion of uncomplicated cases still receive unnecessary prolonged therapy. Such practices highlight the ongoing controversy in appendicitis management and underscore the need for strict adherence to evidence-based guidelines to minimise complications, reduce antibiotic overuse, and improve overall patient outcomes.

References

1. Sceats LA, Trickey AW, Morris AM, Kin C, Staudenmayer KL. Nonoperative management of uncomplicated appendicitis among privately insured patients. JAMA Surg. 2019; 154(2): 141-9.
2. Salminen P, Tuominen R, Paajanen H, Rautio T, Nordström P, Aarnio M, et al. Five-year follow-up of antibiotic therapy for uncomplicated acute appendicitis in the APPAC randomized clinical trial. JAMA. 2018; 320(12):1259-65.
3. CODA Collaborative. A randomized trial comparing antibiotics with appendectomy for appendicitis. N Engl J Med. 2020; 383(20): 1907-19.
4. Podda M, Gerardi C, Cillara N, Fearnhead N, Gomes CA, Birindelli A, et al. Antibiotics versus appendectomy for uncomplicated acute appendicitis: a systematic review and meta-analysis. Ann Surg. 2019;270(6):1028-40.
5. Bhangu A, Søreide K, Di Saverio S, Assarsson JH, Drake FT. Classification and antibiotic use in acute appendicitis: a prospective international survey. Ann Surg. 2021; 274(2): 307-14.
6. Di Saverio S, Podda M, De Simone B, Ceresoli M, Augustin G, Gori A, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emerg Surg. 2020;15:27.
7. Cheng YX, Zhang Y, Xu L, Xu M, Song Q. The role of postoperative antibiotics in preventing surgical site infections after appendectomy in non-perforated appendicitis: a systematic review and meta-analysis. Int J Colorectal Dis. 2021;36(7):1421-31.
8. Di Saverio S, Podda M, De Simone B, et al. Diagnostic criteria and graded classification of acute appendicitis: the 2020 WSES Jerusalem guidelines. World J Emerg Surg. 2020; 15(1): 27-35.
9. Sartelli M, Baiocchi GL, Di Saverio S, et al. Prospective observational study on acute appendicitis worldwide (ISSAP): incidence, presentation, management and outcomes of 4,617 cases. World J Emerg Surg. 2019; 14(1): 34-42.
10. van den Boom AL, de Wijkerslooth EML, Mauff KAL, et al. Duration of antibiotic treatment after appendicectomy for complex acute appendicitis. Br J Surg. 2020;107(6):705-712.
11. Atema JJ, van Rossem CC, Leeuwenburgh MMN, et al. Scoring system to distinguish uncomplicated from complicated acute appendicitis. Br J Surg. 2019;106(8):1013-1021.
12. Salminen P, Tuominen R, Paajanen H, et al. Five-year follow-up of antibiotic therapy for uncomplicated acute appendicitis in the APPAC randomized clinical trial. JAMA. 2018;320(12):1259-1265.
13. Podda M, Cillara N, Di Saverio S, et al. Antibiotics-first strategy versus surgery for uncomplicated acute appendicitis: systematic review and meta-analysis of randomized controlled trials. Ann Surg. 2019;270(6):1028-1040.