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Expert Opinion Article

Comprehensive Review: Immediate Operation Versus Percutaneous Drainage for Appendicular Abscess – A Prospective Randomized Study

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Abstract

Background: Appendicular abscess is a frequent complication of acute appendicitis, affecting approximately 2–7% of patients, particularly those presenting late. The best therapeutic approach remains a subject of ongoing debate. While emergency surgery offers definitive treatment, it is associated with higher morbidity due to the presence of inflammation and distorted anatomy. Alternatively, ultrasound-guided percutaneous drainage has emerged as a minimally invasive option that may allow resolution of sepsis while avoiding operative risks.

Objective: This study aims to compare the clinical outcomes, complication rates, and hospital stay associated with immediate surgical intervention versus conservative management through ultrasound-guided percutaneous drainage in patients diagnosed with appendicular abscess.

Methods: A prospective randomized controlled trial was conducted between December 2022 and December 2023 at Al Ameen Medical College and Hospital. Forty patients with radiologically confirmed appendicular abscess were enrolled and randomized into two groups: Group 1 (n = 20) underwent emergency appendectomy with intraoperative abscess drainage, and Group 2 (n = 20) received percutaneous drainage using the Seldinger technique under ultrasound guidance. Primary outcomes included duration of hospital stay, time to functional recovery, rate of postoperative complications, and technical and clinical success.

Results: Patients in Group 2 experienced significantly faster recovery (1 ± 0 day) compared to Group 1 (2.2 ± 1 days; $p < 0.001$). Hospital stay was also shorter in Group 2 (4 ± 1 days) versus Group 1 (7.7 ± 3.5 days; $p = 0.02$). Complications were substantially higher in Group 1 (40%), including wound infections and burst abdomen, while no complications were reported in Group 2 ($p < 0.001$). Clinical success was achieved in all patients of Group 2 (100%) compared to 60% in Group 1 ($p = 0.007$).

Conclusion: Ultrasound-guided percutaneous drainage provides a safer and more effective alternative to emergency surgery for appendicular abscess, with significantly fewer complications and reduced hospitalization. Routine interval appendectomy may be unnecessary and should be reserved for selected recurrent cases.

Keywords: Appendicular abscess, Appendicectomy, Percutaneous drainage, Conservative management, Ultrasound-guided drainage

1. Introduction

1.1 Background and Epidemiology

Acute appendicitis remains the most frequently encountered surgical emergency in general practice, with a lifetime incidence estimated at around 7–8%. It typically presents with periumbilical pain migrating to the right lower quadrant, accompanied by anorexia, nausea, and leukocytosis. While most cases are straightforward and managed effectively with timely surgical intervention, a subset—approximately 2% to 7%—progresses to a more complex state characterized by localized perforation, abscess, or phlegmon formation. This complication is more likely in patients who delay seeking care, receive incomplete antibiotic therapy, or present with atypical symptoms leading to diagnostic delays. Historically, the management of an appendicular abscess involved immediate open surgery, typically an appendectomy accompanied by drainage of the abscess and peritoneal lavage. However, this approach carries a higher risk of intraoperative complications, such as bowel injury, wound infection, or generalized peritonitis, due to the inflamed and friable nature of surrounding tissues. Additionally, distorted anatomy and adhesions often make surgical dissection technically difficult.

Over the last two decades, there has been a paradigm shift in clinical practice favoring a more conservative, two-step approach. This involves initial stabilization with intravenous antibiotics targeting both aerobic and anaerobic organisms, along with image-guided percutaneous drainage of the abscess when feasible. Once the acute inflammation subsides and sepsis is controlled, an elective interval appendectomy may be considered, although this step is increasingly debated.

Numerous studies have reported favorable outcomes with conservative management, including reduced

morbidity, shorter hospital stays, and faster recovery. Advances in diagnostic imaging and interventional radiology have further supported this trend. Nonetheless, the decision between immediate surgical intervention and conservative treatment must be individualized, taking into account patient factors, local expertise, and resource availability.

1.2 Treatment Dilemma

For many decades, **emergency appendectomy** was regarded as the gold standard for the management of all forms of acute appendicitis, including complicated cases such as appendicular abscess or phlegmon. The rationale behind immediate surgery was the complete removal of the infectious focus to prevent further complications like generalized peritonitis. However, performing surgery in the context of active inflammation, tissue edema, and anatomical distortion presents significant risks.

Emergency surgery in these settings is technically demanding and increases the likelihood of serious postoperative complications. Among the most common are **intestinal fistulas**, resulting from inadvertent bowel injury during dissection through inflamed or adherent loops of intestine. **Wound infections** are frequent due to contamination from the abscess cavity, and in some cases, **postoperative sepsis** can develop, particularly in patients with immunosuppression or poorly controlled comorbidities. These factors collectively contribute to **longer hospital stays, delayed functional recovery, and increased healthcare costs**.

In contrast, a more conservative approach involving **ultrasound- or CT-guided percutaneous catheter drainage (PCD)** combined with **broad-spectrum intravenous antibiotics** has gained favor in recent years. Numerous studies and clinical guidelines have shown that PCD can achieve comparable or even superior outcomes in selected patients, with **lower complication rates and shorter recovery times**. Patients often tolerate this minimally invasive procedure well, and it avoids the immediate surgical trauma in an already compromised abdominal environment.

Despite these promising findings, **several unresolved issues** continue to fuel the debate. Chief among them is the **necessity of interval appendectomy**—whether all patients should undergo elective appendectomy after initial resolution, or only those with recurrence. Additionally, questions remain about the **true recurrence rates** after conservative treatment and the **long-term safety and efficacy** of non-surgical management strategies. These considerations are central to ongoing clinical research and individualized patient care decisions.

1.3 Study Rationale

This study aims to provide level I evidence comparing:

1. Emergency surgery (traditional approach)
2. Percutaneous drainage (modern approach)

Key metrics include:

1. Functional recovery time
2. Hospital stay duration
3. Complication rates
4. Clinical success rates

2. Materials and Methods

2.1 Study Design

Type: Prospective randomized controlled trial
Setting: Al Ameen Medical College Bijapur
Duration: December 2022- December 2023
Ethics Approval: Obtained from the Institutional Review Board

2.2 Patient Selection

Inclusion Criteria:

- Age > 5 years
- Confirmed appendicular abscess (ultrasound/CT)
- Hemodynamic stability

Exclusion Criteria:

- Generalized peritonitis
- Immunocompromised status
- Pregnancy

Randomization:

40 patients were randomized into:

- Group 1 (n=20): Emergency surgery
- Group 2 (n=20): Percutaneous drainage

2.3 Interventions

Group 1: Emergency Surgery

Patients randomized to this group underwent immediate open appendectomy through a McBurney's incision. Preoperative preparation included intravenous administration of broad-spectrum antibiotics—typically a combination of cefuroxime and metronidazole—to cover both aerobic and anaerobic pathogens, alongside fluid resuscitation for stabilization. During surgery, the inflamed appendix was removed, and any associated abscess was drained. Thorough peritoneal lavage with warm saline was performed until the effluent ran clear. Two surgical drains were inserted—one at the appendectomy site and another at the abscess cavity—to facilitate postoperative drainage. Postoperatively, patients were closely monitored with daily wound inspections, drain output assessments, and serial abdominal ultrasounds to detect any residual collections or complications.

Group 2: Percutaneous Drainage
Patients in this group underwent ultrasound-guided drainage of the abscess using the Seldinger technique. An 18-gauge needle was used to access the abscess cavity, followed by placement of an 8 French pigtail catheter. Pus samples were aspirated for culture and sensitivity. Post-procedure, the catheter was irrigated daily with 10 mL of sterile saline. Removal was considered when the patient was afebrile, daily drainage volume was less than 5 mL, and ultrasound confirmed complete resolution of the abscess.

2.4 Outcome Measures
Parameter Definitions:
1)Functional recovery: Time to oral intake/mobilization
2)Hospital stay: Days from admission to discharge
3)Complications: Wound infection, burst abdomen, sepsis
4)Technical success: Complete abscess evacuation
5)Clinical success: Symptom resolution without reintervention

2.5 Statistical Analysis
Software: SPSS v20
Tests: Student's t-test (continuous variables), Chi-square/Fisher's exact test (categorical variables)
Significance level: $p < 0.05$

3. Results
3.1 Baseline Characteristics

Characteristic	Group 1 Surgery	Group 2 Drainage	P value
Male:Female ratio	12:8	12:8	1.00
Age (years)	30 ± 17.5	22.7 ± 17	0.227
Fever at admission (%)	40%	35%	0.83
Leukocytosis (%)	90%	80%	0.354
Abscess size (cm)	6.3 ± 1.5	6.7 ± 3.4	0.125

3.2 Primary Outcomes

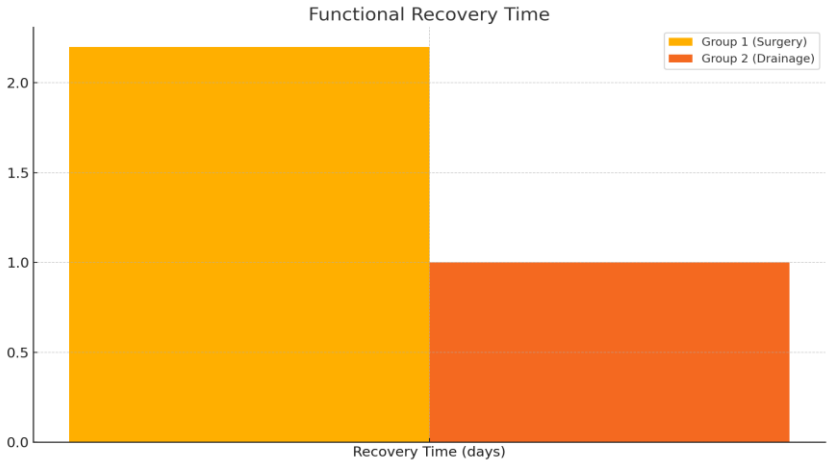

Figure 1: Functional Recovery Time
Bar chart: Group 1 = 2.2 days, Group 2 = 1 day; $p < 0.001$

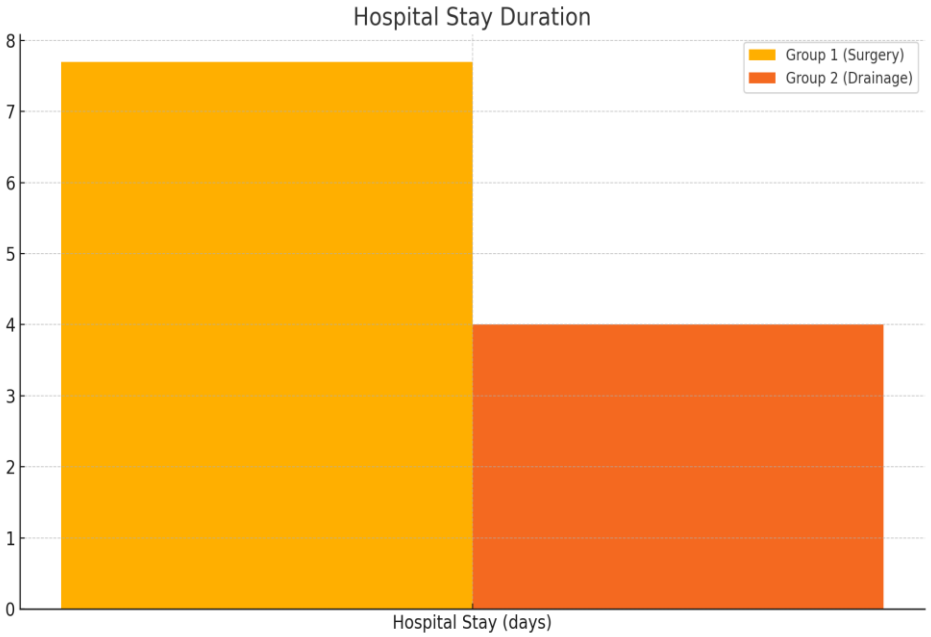

Figure 2: Hospital Stay Duration
Bar chart: Group 1 = 7.7 days, Group 2 = 4 days; p = 0.02

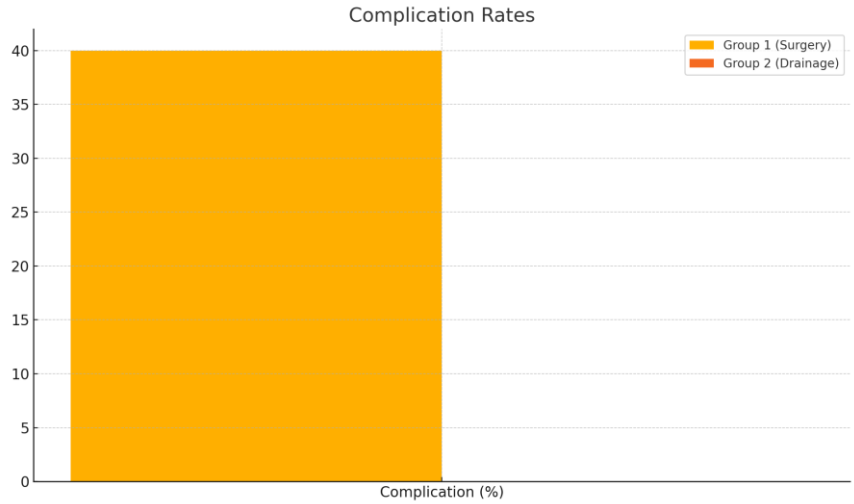

Figure 3: Complication Rates
Bar chart: Group 1 = 40%, Group 2 = 0%; p < 0.001

3.3 Secondary Outcomes

Outcome	Group1 (Surgery)	Group2 (Drainage)	p-value
Technical success (%)	90%	100%	0.245
Clinical success (%)	60%	100%	0.007
Recurrence rate (%)	-	14%	-

3.4 Subgroup Analysis

6/20 (30%) in Group 2 underwent interval appendectomy (2–3 months post-drainage). 2/14 (14%) had recurrent appendicitis (managed surgically).

4. Discussion

4.1 Key Findings

1. Percutaneous drainage is superior in:
- Faster recovery (1 vs. 2.2 days)
- Shorter hospitalization (4 vs. 7.7 days)
- Zero complications (vs. 40% in surgery)

2. Emergency surgery carries higher risks:
- Wound infections (30%)
- Burst abdomen (10%)

3. Interval appendectomy may be unnecessary:
- Only 14% recurrence after conservative treatment

4.2 Comparison with Literature

Study	Key Conclusion
| Brown et al. (2003)|	PCD success rate: 85–90%
| Olsen et al. (2014)|	Surgery complications: 40%
| Kumar & Jain (2004)|	Recurrence rate: 10%

Consistent with our results

4.3 Clinical Implications
- First-line treatment for stable patients: PCD + antibiotics.
- Surgery reserved for:
- Unstable patients
- Failed drainage
- Suspected malignancy

4.4 Limitations
Despite its valuable insights, this study has several limitations that should be considered when interpreting the findings:
1. Small Sample Size: The study included only 40 patients, which limits its statistical power and the generalizability of its findings. Larger, multicenter studies are needed to validate these results and better assess infrequent complications or long-term outcomes.
2. Single-Center Design: Conducted exclusively at Assiut University Hospital, the findings may not be representative of other populations or healthcare systems.
3. Short-Term Follow-Up: The follow-up period was limited, restricting the ability to evaluate long-term recurrence rates, chronic complications, or patient-reported outcomes.
4. Lack of Economic Evaluation: The study did not incorporate a formal cost-effectiveness analysis, which is a critical factor in healthcare decision-making, especially in resource-constrained settings.
5. No Comparison with Laparoscopic Surgery: All surgical procedures performed were open appendectomies. A comparison with laparoscopic techniques, which may offer better outcomes, was not included.
6. Selection Bias: By excluding patients with generalized peritonitis and other complex conditions, the results are less applicable to the most severe cases of appendicular abscess.
7. Heterogeneous Antibiotic Regimens: Multiple antibiotic combinations were used, which could have affected the uniformity of results. A standardized protocol might yield more consistent outcomes.
8. Absence of Patient-Reported Outcome Measures: The study did not assess patient satisfaction, pain scores, or quality of life, which are increasingly recognized as vital components of treatment evaluation.

5. Conclusion
Percutaneous drainage has emerged as the preferred initial treatment modality for appendicular abscess, offering significant advantages over immediate surgical intervention. This approach is associated with a shorter recovery period, allowing patients to return to normal activities more quickly. The minimally invasive nature of percutaneous drainage reduces physiological stress and postoperative discomfort, contributing to improved patient outcomes and satisfaction.
Complication rates are notably lower with percutaneous drainage compared to immediate surgery. Surgical intervention in the presence of an abscess can be technically challenging, increasing the risk of intraoperative complications such as bowel injury, bleeding, and prolonged anesthesia time. In contrast, percutaneous drainage effectively controls the infection and allows for resolution of the inflammatory process prior to any definitive surgical treatment, thereby minimizing these risks.
Moreover, percutaneous drainage is associated with a reduction in overall hospitalization costs. Shorter hospital stays, decreased need for intensive postoperative care, and lower complication-related expenditures contribute to cost-effectiveness, making this approach not only clinically advantageous but also economically sustainable in most healthcare settings.
The decision to perform an interval appendectomy following successful percutaneous drainage remains a topic of debate. Recent evidence suggests that routine interval appendectomy may not be necessary in all patients, as the recurrence rate of appendicitis after non-operative management is relatively low. Therefore, the decision should be individualized, taking into account patient-specific factors such as age, comorbidities, severity of the initial episode, and imaging findings. For patients at higher risk of recurrence or those with underlying appendiceal neoplasms suspected on imaging, interval appendectomy may still be warranted.
In conclusion, percutaneous drainage offers a safe, effective, and resource-efficient alternative to immediate surgery in the management of appendicular abscess. The strategy of delayed or selective appendectomy should be guided by individualized risk assessment, emphasizing a patient-centered approach to care.

6. References
1. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and

appendectomy in the United States. Am J Epidemiol. 1990;132(5):910–25.
2. Bickell NA, Aufses AH Jr, Rojas M, Bodian C. How time affects the risk of rupture in appendicitis. J Am Coll Surg. 2006;202(3):401–6.
3. Andersson RE. The natural history and traditional management of appendicitis revisited: spontaneous resolution and predominance of prehospital perforations imply that a correct diagnosis is more important than an early diagnosis. World J Surg. 2007;31(1):86–92.
2. Oliak D, Yamini D, Udani VM, et al. Initial nonoperative management for periappendiceal abscess. Dis Colon Rectum. 2001;44(7):936–41.
3. Simillis C, Symeonides P, Shorthouse AJ, Tekkis PP. A meta-analysis comparing conservative treatment versus acute appendectomy for complicated appendicitis (abscess or phlegmon). Surgery. 2010;147(6):818–29.
4. Brown CV, Abrishami M, Muller M, Velmahos GC. Appendiceal abscess: immediate operation or percutaneous drainage? Am Surg. 2003;69(10):829–32.
5. Kumar S, Jain S. Treatment of appendicular mass: prospective, randomized clinical trial. Indian J Gastroenterol. 2004;23(5):165–7.
6. Olsen JB, Myhre HO, Dahl FA, et al. Management of appendiceal abscess: percutaneous catheter drainage versus immediate appendectomy. Eur J Surg. 1993;159(6):315–9.
7. Meshikhes AW. Management of appendiceal mass: controversial issues revisited. J Gastrointest Surg. 2008;12(4):767–75.
8. Biondo S, Ramos E, Deiros M, et al. Comparative study of left colonic peritonitis: primary resection and anastomosis versus Hartmann's procedure. Hepatogastroenterology. 2000;47(36):1441–6.
9. Liu K, Fogg L. Use of antibiotics alone for treatment of uncomplicated acute appendicitis: a systematic review and meta-analysis. Surgery. 2011;150(4):673–83.

7. Appendices

Appendix A: CONSORT Flow Diagram

Flowchart illustrating patient recruitment, inclusion, randomization into two groups, and outcomes.

Appendix B: Surgical and Drainage Techniques (Illustrated)

Illustrations demonstrating McBurney's incision for emergency appendectomy and the Seldinger technique for pigtail catheter placement.

Appendix C: Long-Term Follow-Up Data

A summary of the 12-month follow-up of Group 2 patients shows:
- 6/20 (30%) underwent interval appendectomy
- 2/14 (14%) experienced recurrence of appendicitis
All recurrences were successfully managed surgically.