Appendicular Phlegmon: Current Management

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Abstract

The management of appendicular phlegmon has undergone a paradigm shift in its management from conservative treatment towards immediate appendectomy, with the introduction of laparoscopic appendectomy. The need for an interval appendectomy has also been reduced with this change but the role of extended resection is still debated with there being no consensus of whether to perform a right hemicolectomy or ileocecal resection. We have conducted this review article to investigate the management of appendicular phlegmon especially the role of laparoscopic appendectomy and extended resection.

Introduction

An appendicular phlegmon has often being defined as an inflammatory mass that includes the appendix, caecum and adjacent structures like ileum and Omentum. The diagnosis can be made either by clinical examination or by imaging. Imaging may include ultrasound of the abdomen or computerized tomography [1,2].

The management of appendicular phlegmon is usually conservative, with the patient being kept nil by mouth, starting intravenous antibiotics, analgesics and monitoring the patients’ vital signs. Once the patient’s clinical condition has improved, it was followed by an interval appendectomy in eight weeks’ time. There has been a shift in management now towards immediate appendectomy with the introduction of laparoscopic appendectomy and the role of interval appendectomy has now been questioned [3,4,5].

The World Society of Emergency Surgeons has recommended immediate laparoscopic appendectomy for patients who present with an appendicular phlegmon if the expertise is available. Conservative treatment should be offered if laparoscopic surgical services is not available [6].

The European Association of Emergency Surgeons in their consensus recommended that conservative treatment be the initial management option for patients who present with and appendicular phlegmon [7].

The clinical presentation of patients with an appendicular phlegmon is also important with stable patients being treated with conservative treatment and surgery being reserved for patients who become clinically unstable. The indication for interval appendectomy is for patients who present with recurrent symptoms [8].

As there is no current consensus in the management of appendicular phlegmon, we have conducted this review article looking into the role of conservative management, immediate appendectomy, the role of laparoscopic appendectomy and bowel resection. The role of performing a right hemicolecotomy and limited ileocecal resection was also reviewed. We conducted a literature review using PUBMED, the Cochrane database of systemic reviews, Google scholar and semantic scholar looking for randomized control trials, non-randomized trials, observational and cohort studies, clinical reviews, systemic reviews, and meta-analysis from 1990 to 2023. The following keywords were used, “Appendicular phlegmon”, “appendicular mass”, “right colectomy”, “ileocecal resection “and “laparoscopic appendectomy”. All articles were in
English, and all articles were assessed by manual cross referencing of the literature. Commentaries, case reports and editorials were excluded from this review. Adult and pediatric patients were included in this study and pregnant patients with acute appendicitis were excluded.

**Discussion**

**Conservative treatment of Appendicular Phlegmon**

This method of management involves keeping the patient fasted, starting intravenous antibiotics, analgesics and monitoring the patients’ vital signs. This was followed by an interval appendectomy in eight weeks’ time. This regime was popularized by Ochsner and Sherren and it avoided the complication like injury to the caecum, terminal ileum, and small bowel if an appendectomy was performed [9,10].

Conservative management is a good and effective form of management of appendicular phlegmon as it is safe and effective, but it requires that the patient needs to be followed up and an additional admission is required to perform an interval appendectomy [11,12].

Conservative treatment is associated with decreased wound infection rates, reduced intra-abdominal abscess formation and bowel obstruction [13].

This form of management of appendicular phlegmon in children is also associated with good outcomes and recurrence rates, but they are associated with a slightly higher intra-abdominal abscess rate [14].

Conservative treatment is often associated with a higher cost as it requires another admission to the hospital to perform an interval appendectomy and its associated anesthetic and surgical risks [15].

**Interval Appendectomy for Appendicular Phlegmon**

An interval appendectomy was often performed after successful conservative treatment to prevent recurrence and so as not to miss any other pathology. Its role in the management of appendicular phlegmon was assessed in a meta-analysis by Andersson et al who concluded that the recurrence rate after conservative treatment was 7.4% and the presence of other pathologies was 1.9% [16].

A systemic review by Darwazeh et al looked at the indication of interval appendectomy after completion of conservative treatment of appendicular phlegmon and compared it with conservative treatment alone. The results showed that the morbidity rates were similar between the groups and interval appendectomy provides little benefit and it’s associated with increased cost [17].

The diagnosis of appendicular phlegmon can be achieved with computerized tomography and colonoscopy in older patients and hence there is no need to perform an interval appendectomy. Interval appendectomy is also associated with its own surgical morbidity [18,19].

There is no consensus with regards to the indication for performing an interval appendectomy with opinion being divided among junior and senior surgeons. The recurrence rates have been reported between 11-25% [21].

**Immediate Appendectomy for Appendicular Phlegmon**

The introduction of laparoscopic appendectomy has seen a shift away from conservative treatment as due to it better visibility and access to the peritoneal cavity. This allows appendectomy to be performed and it is associated with reduced morbidity and mortality. The length of hospital stay is reduced, analgesic usage is reduced, and patients tend to ambulate faster [22,23].

Laparoscopic appendectomy is also associated with better outcome when compared to open appendectomy in the management of appendicular phlegmon. It has a clear benefit with regards to morbidity and mortality when compared to open appendectomy [24,25].

The incidence of intra-abdominal abscess formation was high when compared with open appendectomy but with time and training the rate of intra-abdominal abscesses is now comparable to open appendectomy. The rate of superficial surgical site infection rate is lower than open appendectomy [26-29].

A meta-analysis by Athanasiou et al compared laparoscopic appendectomy versus open appendectomy for appendicular phlegmon and laparoscopic appendectomy was associated with reduced morbidity, stay in hospital and faster recovery but the intra-abdominal abscess rate was comparable with open appendectomy [30].

The use of irrigation of the peritoneal cavity during laparoscopic appendectomy for appendicular phlegmon is not encouraged as it increases the operative time and the risk of intra-abdominal abscess formation [31].

**Extensive resection for appendicular phlegmon**

In certain situations, extensive resection may be required for patients with appendicular phlegmon as appendectomy could not be performed due to extensive inflammation. Risk factors for extensive resection include a late presentation, elevated leukocyte, and C-reactive protein [32,33].

Extensive resection for appendicular phlegmon is often seen in twenty five percent of the surgical management of appendicular phlegmon especially when they are encountered intraoperatively [34].

The most common operation that is performed is a right hemicolectomy as this procedure removes the inflammatory and accounts for any other pathology like malignancy from the resected specimen. This procedure is associated with a prolonged stay in the hospital, and it involves an ileocolic anastomosis which comes with its own set of complications like
anastomotic breakdown and an intestinal fistula. This can further lead to the need of performing a stoma and the added risk of wound dehiscence [35,36]. Factors that can influence the risk of anastomotic breakdown include older patients, patients with multiple comorbidities, immunocompromised and hemodynamically unstable patients. Right hemicolectomy with ileocolic anastomosis was feasible in most patients [37].

The choice of whether to perform an emergency right hemicolectomy is often made by the operating surgeon especially if the appendicular phlegmon is encountered intra-operatively. Another problem that can be encountered is that these patients have not undergone any form of mechanical bowel preparation and that can lead to an increased risk of wound infection rate [38,39].

A limited ileocecal resection is another operation that can be performed for an appendicular phlegmon. It is defined as a resection of the cecum and terminal ileum without mesenteric lymph node clearance. This procedure can be performed via the Lanz incision and does not require a midline laparotomy incision. The ileocecal resection is associated with reduced post operative morbidity, mortality and anastomotic breakdown when compared with right hemicolectomy [40,41,42].

Turgut et al conducted a retrospective study comparing ileocecal resection and right hemicolectomy in the surgical management of appendicular phlegmon and he concluded that ileocecal resection was safe and associated with reduced complication like postoperative ileus, wound infection rates and anastomotic breakdown [43].

<p>| Table 1: Comparison of the mortality and wound infections rates of right hemicolectomy and ileocecal resection |
|--------------------------------------------------------|-------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Study type</th>
<th>Right hemicolectomy-mortality (%)</th>
<th>Right hemicolectomy-Wound infection rate (%)</th>
<th>Ileocecal resection-mortality rate (%)</th>
<th>Ileocecal resection-wound infection rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tung et al (1999)</td>
<td>52</td>
<td>Retrospective study</td>
<td>6.3%</td>
<td>3.1%</td>
<td>4.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Turgut et al (2023)</td>
<td>55</td>
<td>Retrospective study</td>
<td>0%</td>
<td>22%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Note: N=numbers

Conclusions
The management of appendicular phlegmon has seen a shift in management towards immediate appendectomy since the introduction of laparoscopic appendectomy but performing an appendectomy in a patient with an appendicular mass requires training and expertise. In healthcare centers where laparoscopic services are not available these patients can still be managed with conservative treatment. One of the problems of patients who have successfully completed conservative treatment is that they do not attend follow up and are not keen to undergo an interval appendectomy as it will incur additional cost. Interval appendectomy need not be performed as the recurrence rate is low in these patients and they can be followed up with computerized tomography and colonoscopy. One problem is the intraoperative presentation of an appendicular phlegmon where an appendectomy cannot be performed and extended resections need to be performed. The choice of performing a right hemicolectomy or ileocecal resection will rest on the operating surgeon, as assessment of the appendicular phlegmon is important in deciding what surgery to perform. Resection will also help in determining the histopathological diagnosis of appendicular phlegmon.

As appendectomies are usually done by surgical registrars and junior surgeons, the management of appendicular phlegmon should include input from the senior members in the surgical team and its management should be decided in the beginning to reduce complications for the patient. It is also better to perform appendectomies for appendicular phlegmon during office hours as if any complication that are encountered can be reviewed and managed by the respective surgical consultant.

Conflict of Interest
None.

References


Perez KS, Allen SR. Complicated appendicitis and considerations for interval appendectomy. JAAPA. 2018;31(9):35-41. doi:10.1097/01.JAA.0000544304.30954.40


