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EDITORIAL

Interval routine appendectomy following conservative treatment of acute appendicitis: Is it really needed?

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Abstract

Conservative management of acute appendicitis (AA) is gradually being adopted as a valuable therapeutic choice in the treatment of selected patients with AA. This approach is based on the results of many recent studies indicating that it is a valuable and effective alternative to routine emergency appendectomy. Existing data do not support routine interval appendectomy following successful conservative management of AA; indeed, the risk of recurrence is low. Moreover, recurrences usually exhibit a milder clinical course compared to the first episode of AA. The role of routine interval appendectomy is also questioned recently, even in patients with AA complicated by plastron or localized abscess formation. Surgical judgment is required to avoid misdiagnosis when selecting a conservative approach in patients with a presumed "appendiceal" mass.

Key words: Appendicitis; Surgery; Antibiotics; Interval appendicectomy; Plastron; Abscess

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INTRODUCTION

Since the first publication on acute appendicitis (AA) by Fitz *et al*[1] in 1886, surgical management of AA has been considered as a classical dogma for over one century. Emergency appendectomy has the advantage of immediate resolution of a surgical problem, which is dealt with by a single admission, at a time when the benefit is most apparent to the patient and his/her family; this approach eliminates the problem of possible recurrences of AA and the initial uncertainty about the effectiveness and the outcome of conservative treatment. Despite the fact that appendectomy still remains the "gold standard" in the management of AA, during the last two decades there has been an increasing body of evidence suggesting that conservative management is a valuable alternative to surgery in selected patients with suspected AA, which can be used as the first line therapy for AA. This approach has

been shown to be effective in many recent publications (including clinical trials and meta-analyses). The main advantage of the conservative approach is the elimination of the early and late morbidity (and mortality, albeit low) of an abdominal operation and general anesthesia. The effectiveness of this approach has been increased by the availability of new efficient antibiotics[2].

In evaluating the role of conservative management of AA, it is important to consider the need for interval appendectomy. Obviously, if routine interval appendectomy is required, then conservative management of AA would seem unattractive as a therapeutic option for most cases since its main advantage (e.g., avoidance of surgery) is eliminated. On the other hand, if interval appendectomy is not routinely needed, then conservative management of AA would be the treatment of choice in a large percentage of patients with suspected AA. The aim of this review is to critically summarize currently available data regarding the role of interval appendectomy in the management of patients with AA who were conservatively treated.

CONSERVATIVE MANAGEMENT OF AA: HOW EFFECTIVE IS IT?

Success and recurrence rates are the two main end points when evaluating the effectiveness and long-term results of conservative management of AA. Many recent studies have shown that conservative treatment is effective in a high percentage of patients with AA. Success rates range in the literature between 68% and 95%[2-8]. Recurrences following conservative management may be observed in about 5%-14% of patients[9-13]. Recently, Kaminski *et al*[14] reported a 5% recurrence rate with a median follow-up of 4 years in 864 patients treated with antibiotics alone. Interestingly, recurrent episodes exhibited a milder clinical course than the first episode[14]. Dixon *et al*[15] reported a similar low incidence of recurrent appendicitis and found that subsequent attacks were less frequent and less severe. As expected, the identification of factors associated with a high risk of recurrence of AA would be of great interest for the clinician since, when present, the effectiveness of conservative management of AA is diminished. These risk factors should be taken into consideration when selecting patients for conservative or surgical management and include retained fecal stones, increased (> 4 mg/dL) CRP levels, elevated percent bands, partial small bowel obstruction on admission, *etc*.[7,16-22]. In the presence of these "risk factors", emergency appendectomy should be strongly considered.

INTERVAL APPENDECTOMY FOLLOWING SUCCESSFUL CONSERVATIVE MANAGEMENT OF UNCOMPLICATED AA: IS IT NECESSARY?

Although there are some groups suggesting routine interval appendectomy for all patients who have had nonsurgical treatment of an episode of AA, in clinical practice most surgeons question its routine use. The basic question which should be answered is the following: is the risk of surgery and general anesthesia justified by the risk of recurrent AA? The clinician should keep in his/her mind that appendectomy is associated with a small, albeit significant, morbidity and even mortality, despite being considered a "routine" surgical procedure. Indeed, following emergency appendectomy, mortality ranges from 0.07% to 0.7% in patients without and 0.5% to 2.4% in patients with perforation[23-25]. Operative mortality increases in the presence of co-morbidity (e.g., heart and lung diseases, morbid obesity, *etc*.) and in aged patients (< 0.1% in patients younger than 40 years, 2.6% in septuagenarians, 6.8% in octogenarians and 16.4% in nonagenarians)[24]. Morbidity rates range between 10% and 20% for AA without perforation and reach up to 30% for perforated appendicitis[2,9,26]. Common complications after appendectomy include wound and (more rarely) intraabdominal septic complications, adhesive small bowel obstruction (a long term complication requiring surgery in about 1.5% of patients by 30 years)[4,27]. Even the less invasive laparoscopic appendectomy is also associated with its one morbidity and even mortality rates.

Interval appendectomy could, however, be justified if the risk of recurrence was too high. However, the risk of recurrence is low (see above) but increases in the presence of the "risk factors" mentioned above. Moreover, recurrences are usually characterized by a milder clinical course than the primary attack[15]. Therefore routine interval appendicectomy is probably not warranted following successful management of uncomplicated AA, given the low risk of recurrent appendicitis and the potential early and late complications of an elective operation[8,28-30].

INTERVAL APPENDECTOMY FOLLOWING SUCCESSFUL CONSERVATIVE MANAGEMENT OF COMPLICATED AA: IS IT ROUTINELY NECESSARY?

Occasionally, a patient's defense mechanisms may restrict and enclose the inflammation, resulting in the formation of an inflammatory mass (phlegmon or plastron) of a contained (circumscribed) abscess. Typically, these inflammatory changes are observed some days (usually more than 4 d) after the onset of symptoms and more commonly in children (especially < 5 years)[2,10].

Patients with plastron formation

Emergency surgery in these cases is not warranted; indeed, under these circumstances surgery may be technically demanding because of the distorted anatomy and the difficulties of closing the appendiceal stump because of the inflamed tissues. The risk of injury of adjacent organs (i.e., intestinal loops) is increased due to the presence of inflammatory changes and adhesions[13,30]. Moreover, the overstimulation of an already primed inflammatory sys-

tem, with extensive stimulation of the cytokine cascade, may further complicate the postoperative course[11,31]. As a result, immediate surgery in these patients is associated with over a 3-fold increase in morbidity compared with conservative management[2]. Occasionally, the exploration ends with an ileocecal resection or a right-sided hemicolectomy (in about 3% of patients) due to technical problems or a suspicion of malignancy because of the distorted inflamed tissues[2,32]. For these reasons, in patients with AA complicated by inflammatory mass (plastron) formation, the classical and recommended initial treatment is conservative with antibiotics[33]. Interval appendectomy is traditionally performed about 6 wk after the episode of AA to prevent recurrences and remove the offending organ to permanently resolve infection[33,34]. During this time of about 6-8 wk, the local inflammatory changes usually have subsided, the edematous and inflamed bowel has recovered and the patient is appropriately prepared[32-35]. However, the need for interval appendectomy after a successful nonsurgical treatment has recently been questioned as the risk of recurrence is relatively small[12,35-37]. This issue remains highly debated, with others proposing either delayed (i.e., appendectomy during the same admission, mainly to diminish sick leave) or routine interval appendectomy[38-40].

Patients with localized abscess formation

Non-operative management has been proposed for the management of patients with localized abscess formation due to perforated appendicitis[11]. Antibiotic therapy is successful in about 93% of these patients; in about 20% of them, image-guided percutaneous drainage of the abscess will eventually be required[2]. Interestingly, Nadler *et al*[7] suggested that patients with a phlegmon on imaging tests as opposed to an abscess are more likely to respond to conservative treatment and that the presence of a phlegmon reflected improved host defenses. These authors also suggested that the need for abscess drainage increases the failure rate, perhaps because of inadequate source control[7]. To date, the role of interval appendectomy in these patients has not been adequately evaluated.

POTENTIAL PROBLEMS, CONCERNS AND DISADVANTAGES OF OMITTING INTERVAL APPENDECTOMY

Some authors have stated that in patients with AA treated conservatively without interval appendectomy, there is a risk (about 2%) of missing pathological findings, such as Crohn's disease or neoplasms (most commonly, appendiceal carcinoids)[2,41]. Immediate surgery with a right sided hemicolectomy, if needed, to avoid this problem, proposed by some authors as the definitive treatment in patients with complicated AA, is too aggressive an approach[42-44] and has not been adopted by most surgeons. Nowadays, the availability and wide use of modern diagnostic tools (including computed tomography and interval colonoscopy) in selected patients have diminished the risk of misdiagnosis. Most colon cancer cases occur in patients over the age of 40 years. Therefore, patients older than 40 years should be followed-up with colonoscopy or computed tomography to exclude malignancy, especially when initial symptoms were atypical or in the presence of other suspicious findings (for example, anemia).

The risk of recurrence of appendicitis is a concern in patients with AA treated conservatively and without interval appendectomy. These patients should be counseled about the possibility of a recurrence of appendicitis and encouraged to seek medical attention early should symptoms recur. Most surgeons would advocate appendectomy (emergency or interval) in patients with multiple (> 2) recurrences. Personal preferences of the patient should also be taken into consideration in the process of management decision-making.

In conclusion, interval appendectomy is not routinely required in patients treated conservatively for AA. The risk of recurrence is low; moreover, potential recurrences usually have a mild clinical course. Interval (or emergency) operation should be considered in selected patients (for example, in the presence of "risk factors" indicating a high probability of recurrence, such as the presence of a retained fecalith) or following multiple (> 2 or 3) episodes of AA. Patients with AA complicated by plastron or localized abscess formation should be treated conservatively initially; image-guided percutaneous drainage may be required to achieve drainage in patients with localized abscess. Despite that interval appendectomy is still performed by the majority of surgeons around the world, there is evidence that, even in these cases, interval appendectomy could be avoided. Currently, the lack of a sufficient body of evidence precludes firm recommendations. Surgical judgment is required to avoid misdiagnosis if such a conservative approach is adopted; further diagnostic evaluation may be required in selected patients (for example in patients > 40 years with anemia and a presumed "appendiceal" mass) to exclude malignancy. Personal preferences and specific conditions (for example, people living in remote or isolated areas without easy access to health facilities) should also be taken into consideration when deciding about the optimal management of each patient with AA (complicated or not).

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