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Recent Trends in the Treatment of the Appendicular Mass

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1. Introduction

An appendicular mass is one of the common complications seen in patients presenting a few days late after the onset of acute appendicitis. There is no consensus on the optimum treatment of this potentially dangerous condition. The ideal treatment of acute appendicitis is considered to be appendectomy failing which a number of complications, including an appendicular mass, usually result (Margaret Farquharson and Brendan Moran 2007). This usually follows a late presentation or a failure of diagnosis at presentation. Sadly, when the diagnosis has been missed at first presentation to a physician the history is often found to have been quite unremarkable and the error considered unavoidable. Traditionally acute appendicitis was principally diagnosed on repeated physical examinations after active observation, without much reliance on laboratory investigations. Greater reliance on putatively objective tools for the diagnosis can delay the diagnosis and has changed the outlook for some patients (Muhammad Shoiab et al 2010). Delayed diagnosis changes the uncomplicated simple acute appendicitis into complicated appendicitis (Chan L et al 2011). A reluctance for surgery is common in third world where most of the population live below the poverty line and a single member may generate the income for the whole family. For this reason time off work can be difficult for some. Another important factor is a general fear of surgery amongst much of the population. Additional factors that contribute to the development of an appendicular mass include lack of health facilities in remote under-resourced areas. In some rural areas general practitioners often keep the patient on symptomatic therapy rather than referring to a higher level hospital.

The appendicular mass is reported to be more common among males who are elderly (Okafor et al 2003) and have different pathogenesis, clinical course and outcome (Gurleyik G and Gurleyik E 2003). The mass usually forms in the right iliac fossa after 48-72 hours after the first symptoms of acute appendicitis. The mass develops when appendicitis is caused by obstruction of the lumen and there is an ensuing danger of perforation of the appendix following ischemic necrosis and gangrene of the appendicular wall (Norman S William, Christopher JK Bulstrode and P Ronan O' Connel 2008). As a natural protective mechanism, the omentum and small bowel wrap up the inflamed appendix in an attempt to prevent infection from spreading by isolating the inflamed organ from rest of the abdominal cavity. There may have been an evolutionary advantage that selected this kind of defensive mechanism.

The patient usually presents with a tender mass in the right iliac fossa associated with fever, malaise and anorexia. This walling off mechanism may fail and generalized peritonitis may

ensue. This is more often seen when there is obstruction of the appendicular lumen by a faecolith, an immunocompromized patient, the extremes of age, diabetes Mellitus and when the inflamed appendix is lying freely in the pelvis beyond the ability of the omentum to wrap the inflamed organ (Norman S. Williams et al 2008).

1.1 Pathogenesis of the appendicular mass

The appendicular mass usually develops following an attack of acute appendicitis and ranges from a phlegmon to an abscess formation and is usually palpable as a tender mass in the right iliac fossa (Brown CV et al 2003). As described above it usually develops in patients presenting later in the course of acute appendicitis where there is a natural walling off of the inflamed appendix by omentum and coils of small bowel in the vicinity of appendix. Initially this mass is composed of a confused mixture of inflamed appendix these organs and granulation tissue (Brian W.Ellis and Simon -Paterson-Brown 2000). If the barriers work and the inflamed appendix does not perforate a clinically palpable tender mass develops in the right iliac fossa within 48 hours. If the barriers cannot wall off the inflammation or the appendix perforates an appendicular abscess may develop. Another term for the mass is phlegmon.

The mass poses a dilemma to the surgeon as to the optimum treatment since there are more than one schools of thought and different modes of treatment are suggested.

1.2 Treatment options for the appendicular mass

The treatment of the appendicular mass is controversial and perhaps confusing as there is no consensus about the optimum approach. Currently there are four modes of treatment practiced all over the world with a very clear distinction between two of these schools of thought.

1. The conventional mode of management includes an initial conservative treatment assuming the patient is well and settles, followed by an interval appendectomy after a period of 6-8 weeks.
2. A totally conservative treatment without interval appendectomy. This approach was introduced after the need for an interval appendectomy was questioned in a number of reports.
3. An early and aggressive approach favouring early appendectomy in appendicular mass.
4. Laparoscopic management of the appendicular mass is the most recent advancement in the treatment of appendicular mass.

All four modalities are practiced and since there are advocates and critics of every technique, we need to explore each in detail.

2. Conventional treatment: The Ochsner-Sherren regime

Traditionally it was believed that surgery during the phase of acute appendicitis with a mass was potentially dangerous and could lead to life threatening complications because of oedema and the fragility of important structures like the terminal ileum and caecum. The surgeon may do more harm than good considering the fact that the problem was contained and resolution might follow. The Ochsner-Sherren regime was popularised by Oschner (Oschner AJ 1901) The concept has enjoyed a unique position over many years as the standard treatment for the appendicular mass.

The essential components are now are as follows:

- Nursing the patient in a popped -up position encouraging gravitational flow of any exudates towards the pelvis.

- Nothing is to be given by mouth for an initial 24-48 hours while the patient is kept on intravenous fluids
- Intravenous antibiotics are administered with regular monitoring of vital signs as well as measurement of the size of the mass.
- If the patient's general condition improves, the size of the mass reduces and the fever and anorexia subside, the patient is usually allowed liquids orally and then diet. If this is tolerated discharge home is considered. After six weeks an interval appendectomy is performed.
- On the other hand, if the condition of the patient deteriorates, the size of the mass increases, pulse rate increases or general peritonitis develops or the patient becomes septic then the conservative management is curtailed and the patient is considered for operation.

Failure of the conservative regime is reported in 2-3% and urgent exploration is considered essential.

2.1 Advocates of the conventional treatment

This is the most commonly practiced treatment for an appendicular mass without abscess formation (Price MR 1996). It is favoured because it can avoid the potential hazards of damage to the caecum and the development of faecal fistula (Nitecki S 1993), (Norman S William). Surgeon preference remains a common reason (Kim JK 2010). The conservative approach is considered to be associated with a substantially low rate of complications (Tingstedt B 2002) and is safe (Kumar S and Jain S 2004). The rate of success is reported to range between 88-95% (Safirullah 2007). Interval appendectomy is considered essential believing that the rate of recurrence of appendicitis and mass formation is high after conservative treatment and resolution of the mass (Friedell ML and Perez-Izquierdo M 2000). Another reason for an interval appendectomy is the conformation of the diagnosis as it is possible to miss other pathology like ileocaecal tuberculosis or malignancy. These conditions mimic acute appendicitis and conservative therapy alone should be considered cautiously (E.S Garba 2008) (Garg P et al 1997).

2.2 Critics of conventional treatment

Critics report poor patient compliance, a requirement for re-admission, and sometimes difficulty in finding the appendix at the interval appendectomy or undue bleeding (Malik et al 2008). It is also reported that about 10% of patients need exploration due to deterioration on a conservative regimen (Olika D 2000). In the Third World patients frequently do not attend for an interval appendectomy if they have been pain free and asymptomatic. The recurrence rate is reported to be as low as 5-20% (Tekin A 2008, Adala SA 1996) and importantly the recurrent disease is milder than the primary acute appendicitis (Dixon MR 2003). The effectiveness of the immediate conservative therapy is a proven and acceptable mode of treating the mass but the need of interval appendectomy is questioned and it may not be cost effective (Hung-Wen Lai 2005).

2.3 Conservative treatment without interval appendectomy

It is argued that interval appendectomy is unnecessary after successful conservative management of an appendicular mass (Anna Kaminski et al 2005). This approach can be applied in selected patients who do not develop recurrent symptoms (Garba ES et al 2008).

Conservative treatment alone will suffice in 80% of patients. The greatest risk of developing recurrent appendicitis after successful conservative management is during the first 6 months (Hoffmann j et al 1984) and there is a minimal chance of developing symptoms after 2 years. Interval appendectomy is considered by some to be a difficult operation and sometimes the fibrotic appendix may not be found on operation (Deakin DE et al 2007). This has led to the concept of a “wait and watch policy” after successful conservative management and has been found to be cost effective (Hung-Wen lai et al 2005). The advocates of this approach may go as far as to propose that recurrent disease is also amenable to conservative treatment and is cost effective (Willemsen PJ et al 2002).

3. Early appendectomy in appendicular mass

Many surgeons will perform an appendectomy if a small mass is felt under a general anaesthetic but a minority will wake the patient and continue with a non-operative approach. It is crucial that the patient understands this option if it is a possibility when they go to theatre. Thus, early appendectomy is widely performed but not when the mass is substantial and felt pre-operatively.

This author argues that during the early phase of the appendicular mass surgery is not as hazardous, as it once was. The key to early surgery is good resuscitation, expert anaesthesia, broad spectrum antibiotics and an experienced surgeon (De U et al 2002). This approach obviates the need of re-admission, cures the problem totally, and there is an opportunity to reach to a conclusive diagnosis at an early stage. A number of studies consider this approach to be safe, economical and time saving, facilitating an early return to work (Sardar Ali et al 2010). The experience of the surgeon plays a vital role.

4. Authors study

We conducted a study of 176 patients with an appendicular mass who were managed in two groups of equal size. In this study the patients chose their own group. One group was operated immediately on admission after relevant investigations and work up while the other group had conservative management and an interval appendectomy after 6-8 weeks. The outcome measures included operative difficulties, total operating time, operative and post-operative complications, total duration in hospital, and the willingness for interval appendectomy.

The patients had a history of pain around the peri umbilical region at the start and then localized to right iliac fossa. Most of them reported to general practitioners who either advised them some symptomatic treatment or appendectomy. Due to various reasons many of them declined operative treatment and returned back with an established appendicular mass in a few days. All relevant investigations were performed and patients were categorised on their own will into two groups. The procedures were explained to both groups of patients explaining benefits and drawbacks of each technique.

4.1 Results

- Most of the patients who were treated successfully on an initial conservative treatment either did not return or were not willing for an operation unless there were recurrent attacks of acute appendicitis.

- We found immediate operation to be relatively easy compared to interval appendectomy. There were more complications in the the interval appendectomy group.

Some of the results appear below. Our results favour early appendectomy in line with the findings of others (Asal Y Izzidien Al-Samarrai 1995) (Friedell ML 2000) (Sardar Ali And Rafique Hm).

To date the authors have extended the previous study to a total of 1356 patients divided into two groups as in the earlier study. The results are similar.

We now conclude that the best way of managing the appendicular mass is immediate operation as it saves time, ensures total recovery during the initial admission and excludes other pathology. There is a great satisfaction to the patient that the actual problem is completely cured while if appendectomy is delayed for 6-8 weeks, the patients compliance is poor and there can be mild pain for which patients usually do not seek medical advice.

In Third World countries like Pakistan and India, where the majority of the population are living below the poverty line early intervention is a better option as it proves to be cost effective.

Variable	Type of Treatment (n = 130)		P value
	Immediate appendectomy n (88)	Interval appendectomy n (42)	
Operative findings:			
Simple mass	64(72.7%)	3(7.14%)	< 0.001*
Perforated appendix	8(9.1%)	0	
Loculated collection of pus	7(8.0%)	0	
Appendicular abscess	4(4.5%)	0	
Firm Adhesions	5(5.7%)	33(78.57%)	

N= Numer of patients

Table 1. Operative findings

Variable	Type of Treatment (n = 130)		P value
	Immediate appendectomy n (88)	Interval appendectomy n (42)	
Difficulty in localization of appendix	12(13.63%)	28(66.66)	0.001*
Difficulty in adhesiolysis	23(26.1%)	32(76.19%)	
Minor trauma to bowel	13(14.8%)	2(2.3%)	
Bleeding	11(12.5%)	9(21.42%)	

N= Number of patients

Table 2. Operative problems.

Variable	Type of Treatment (n = 130)		P value
	Immediate appemdectomy n (88)	Interval appendectomy n (42)	
Post-operative complications:			
Wound sepsis	14(15.9%)	6(6.8%)	0.12
Partial wound dehiscence	4(4.5%)	2(2.3%)	
Residual abscess	1(1.1%)	0	

Table 3. Post-operative complications.

Variable	Type of Treatment (n = 130)		P value
	Immediate appendectomy n (88)	Interval appendectomy n (42)	
Total operative time:			
30-60 Minutes	69(78.40%)	8(19.04%)	< 0.001*
60-90 Minutes	13(14.77%)	31(73.80%)	
90-120 Minutes	6(6.81%)	2(76.19%)	
>120 Minutes	Nil	1(2.38%)	

Table 4. Total operative time.

Outcome of total patients managed conservatively followed by interval appendectomy			
Outcome		No: of Patients	Percentage (%)
1.	Sucessfull mass resolution	75	85.22
2.	Converted to appendectomy	13	14.77
3.	Refused interval appendectomy	21	23.86
4.	Lost to follow up	11	12.5
5.	Underwent interval appendectomy	42	47.72

Table 5. Break up of patients in Conservative group.

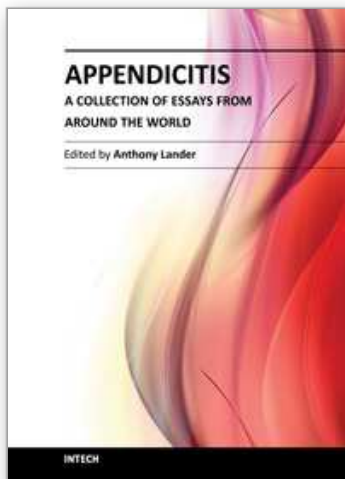
Laparoscopic appendectomy has recently gained popularity as an alternative to open appendectomy but is still in the evolving stage. A number of studies have proposed this to be a safe and cost effective method of treating acute appendicitis. Despite rising popularity of this

method in acute appendicitis, its role is not really established so far in appendicular mass and a consensus is yet to be developed. However, a number of reports are published claiming its role in the treatment of appendicular mass (Vishwanath V et al 2011). It is also considered to be safe and the patient is cured at the first admission obviating the need for re-admission (sanapathi S et al 2002). Although technically demanding, it is yet considered a safe option of management in children presenting with appendicular mass (Goh BK et al 2005). As claimed by Garg Cp et al 2009, the technique of laparoscopic surgery in appendicular mass can be as safe as open techniques but it has an additional advantage of being cost effective and is cosmetically more acceptable to patients specially the females. Despite all the reports favouring laparoscopic approach to appendicular mass, the role of this technique is yet to be established as there are no randomized control studies substantiating adequately to this recent advancement in the management of appendicular mass.

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This book is a collection of essays and papers from around the world, written by surgeons who look after patients of all ages with abdominal pain, many of whom have appendicitis. All general surgeons maintain a fascination with this important condition because it is so common and yet so easy to miss. All surgeons have a view on the literature and any gathering of surgeons embraces a spectrum of opinion on management options. Many aspects of the disease and its presentation and management remain controversial. This book does not answer those controversies, but should prove food for thought. The reflections of these surgeons are presented in many cases with novel data. The chapters encourage us to consider new epidemiological views and explore clinical scoring systems and the literature on imaging. Appendicitis is discussed in patients of all ages and in all manner of presentations.

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