



## Appendiceal mass: Is interval appendicectomy "something of the past"?

Abdul-Wahed Nasir Meshikhes

Abdul-Wahed Nasir Meshikhes, Department of Surgery, King Fahad Specialist Hospital, Dammam 31444, Eastern Province, Saudi Arabia

Author contributions: Meshikhes AWN solely contributed to this paper.

Correspondence to: Dr. Abdul-Wahed Nasir Meshikhes, FRCS Chairman and Consultant Surgeon, Department of Surgery, King Fahad Specialist Hospital, Dammam 31444, Eastern Province, Saudi Arabia. [meshikhes@doctor.com](mailto:meshikhes@doctor.com)

Telephone: +966-3-843-1111 Fax: +966-3-855-1019

Received: August 20, 2010 Revised: January 29, 2011

Accepted: February 5, 2011

Published online: July 7, 2011

**Key words:** Appendiceal mass; Cost-effectiveness; Interval appendicectomy; Laparoscopic appendicectomy

**Peer reviewer:** Giuseppe Kito Fusai, MS, FRCS, Consultant Surgeon and Clinical Lead Hepato-pancreato-biliary Surgery, Honorary Senior Lecturer University College London Medical School HPB and Liver Transplant Unit, Royal Free Hospital, Pond Street, London NW32QG, United Kingdom

Meshikhes AWN. Appendiceal mass: Is interval appendicectomy "something of the past"? *World J Gastroenterol* 2011; 17(25): 2977-2980 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v17/i25/2977.htm> DOI: <http://dx.doi.org/10.3748/wjg.v17.i25.2977>

### Abstract

The need for interval appendicectomy (I.A) after successful conservative management of appendiceal mass has recently been questioned. Furthermore, emergency appendicectomy for appendiceal mass is increasingly performed with equal success and safety to that performed in non-mass forming acute appendicitis. There is an increasing volume of evidence -although mostly retrospective- that if traditional conservative management is adopted, there is no need for routine I.A except for a small number of patients who continue to develop recurrent symptoms. On the other hand, the routine adoption of emergency laparoscopic appendicectomy (LA) in patients presenting with appendiceal mass obviates the need for a second admission and an operation for I.A with a considerable complication rate. It also abolishes misdiagnoses and deals promptly with any unexpected ileo-cecal pathology. Moreover, it may prove to be more cost-effective than conservative treatment even without I.A due to a much shorter hospital stay and a shorter period of intravenous antibiotic administration. If emergency LA is to become the standard of care for appendiceal mass, I.A will certainly become 'something' of the past.

© 2011 Baishideng. All rights reserved.

### INTRODUCTION

Acute appendicitis is the most common surgical emergency which may be complicated by the development of an appendiceal mass in 2%-10% of cases<sup>[1]</sup>. This mass results from a walled-off appendiceal perforation and represents a wide pathological spectrum ranging from an inflammatory mass that consists of the inflamed appendix, some adjacent viscera and the greater omentum (a phlegmon) to a periappendiceal abscess<sup>[2]</sup>. Ultrasonography has been advocated as the diagnostic modality of choice, revealing the diagnosis in 70% of cases, however, contrast-enhanced computerized tomography (CT) scanning is far superior<sup>[1]</sup>. The standard treatment which was introduced by Ochsner in 1901 advocating a conservative regimen (nil by mouth, intravenous antibiotics, bed rest and watchful observation) has proved popular over the years and has been shown to be safe and effective<sup>[1]</sup>. It allows the acute inflammatory process to subside in more than 80% of cases before interval appendicectomy (I.A) is performed some 8-12 wk later. However, some management issues of appendiceal mass such as the need for I.A after successful conservative treatment, and emergency appendicectomy for a 'hot' appendix

mass have recently surfaced with no general consensus or agreement on the appropriate line of management.

## THE CONTROVERSY OVER INTERVAL APPENDICECTOMY

A recent questionnaire study of 67 surgeons in the Mid Trent region of England showed no agreed consensus on the management of appendiceal mass<sup>[3]</sup>. One of the controversial management issues is the need for I.A after successful conservative treatment. A survey of 663 surgeons in North America revealed that I.A is routinely performed by 86% of the surveyed surgeons<sup>[4]</sup>. The most cited reason is the risk of recurrent appendicitis which is reported to occur in 21%-37% of cases<sup>[4,5]</sup>. Another questionnaire survey of 90 consultant general surgeons in England (response rate: 78%) revealed that 53% of surgeons perform I.A routinely some 6-8 wk after resolution of the mass; mainly because of concerns about symptom recurrence<sup>[6]</sup>. However, the study from Mid Trent region, U.K showed that more than 75% of surveyed surgeons do so<sup>[3]</sup>. Moreover, the specialist registrars are less likely to offer patients routine I.A after successful conservative management than their consultants ( $P < 0.05$ )<sup>[3]</sup> which may reflect a change in the attitude of younger surgeons towards I.A.

The argument of recurrent appendicitis has been questioned as it occurs in less than 20% of cases and the risk becomes minimal after the first 2 years of the initial episode<sup>[3,7]</sup>. Hence, more than 80% of patients with appendiceal mass can be spared the morbidity of a surgical intervention that has questionable validity. Moreover, a recent large retrospective population-based cohort study of 1012 patients treated initially with conservative therapy showed that only 39 (5%) patients developed recurrent symptoms after a median follow-up of 4 years with male sex having a slight influence on recurrence<sup>[4]</sup>. Hence, it may be concluded that I.A after initial successful conservative treatment is not justified<sup>[4]</sup>.

## THE ARGUMENTS AGAINST I.A

A prospective non-randomized study of 48 I.A specimens, showed 37 (77%) appendices to have a patent lumen, while only 11 (23%) showed fibrosis and obliteration of appendicular lumen and symptom recurrence approaching 40%<sup>[5]</sup>. This fact has led some authors to advocate routine I.A. However, this means subjecting many patients to unnecessary I.A which necessitates a second admission and is not entirely free of complications; the reported complication rate of I.A is 12%-23%<sup>[1,8,9]</sup>. It seems that the driving force behind I.A after successful conservative treatment is the fear of symptom recurrence. Many other studies, however, have confirmed a low recurrence which is highest during the first 2 years of the initial inflammation<sup>[3,7]</sup>. A recent prospective randomized controlled trial (RCT) showed that patients treated conservatively without I.A had the shortest hospital stay and duration of work-days lost, and only 10% of patients developed recurrent appendicitis during a median

follow-up period of more than 33.5 mo<sup>[10]</sup>. This overwhelming evidence from a well conducted RCT and the fact that the histological examination of 30% of the I.A specimens were found to be normal with no evidence of previous inflammation<sup>[1]</sup> argues strongly against routine I.A after the successful conservative treatment of an appendix mass.

Moreover, 83% of patients presenting with appendix mass did not require any intervention over a mean follow-up of 15.5 mo<sup>[11]</sup>. Therefore, I.A should not be the rule in every patient presenting with appendiceal mass. Karaca *et al*<sup>[12]</sup> demonstrated complete disappearance of the mass on repeat ultrasonography and normal appendix on barium enema in 10 out of 11 children with appendiceal mass who were treated conservatively with triple antibiotics for a week. None of these patients developed recurrent appendicitis during the follow-up period of 1-7 years, confirming that conservative treatment is feasible with no need for I.A<sup>[12]</sup>. However, a week of intravenous triple antibiotics in hospital<sup>[12,13]</sup> and repeated ultrasonography<sup>[12]</sup> is certainly not cost-effective. This cost needs to be compared with the cost of emergency laparoscopic appendicectomy (LA) for appendix mass. In term of costs, routine I.A is indeed not cost-effective as it involves another admission and an operation which is not free of complications; it increases the cost per patient by 38% compared with a more selective approach (follow-up and appendectomy only if recurrence occurs)<sup>[14]</sup>.

Furthermore, only very few (20%) patients benefit from prevention of recurrent symptoms if I.A is performed after 6-12 wk and the complication rates for appendicectomy performed before or after recurrence of symptoms were equal at 10%<sup>[15]</sup>.

## HIDDEN PATHOLOGY

If I.A is not performed after successful conservative treatment, the fear of missing hidden pathologies such as cecal cancer, Crohn's disease and ileo-cecal tuberculosis masquerading as an appendiceal mass becomes an important issue. In a recent retrospective review of 106 patients, 17 (10.3%) patients had their diagnosis changed during follow-up; 5 patients (3%) were found to have colon cancer<sup>[15]</sup>. It is therefore essential to perform some follow up investigations to exclude the presence of such hidden pathologies. It is advocated to perform barium enema or colonoscopy after the acute episode has subsided in patients who have been treated conservatively<sup>[15]</sup>, especially if aged more than 40 years<sup>[7,12]</sup>. However, there is no general consensus as to the right time to perform such an investigation. Timing is important as incompletely resolved appendix mass may mimic cecal carcinoma on barium enema and may give false positive results. A CT scan or CT colonography augmented -when indicated- by colonoscopy is far superior in excluding cecal pathology. It is believed that such investigations can be performed safely 4-6 wk after the acute episode<sup>[16]</sup>.

## IS I.A "SOMETHING" OF THE PAST?

Is I.A 'something' of the past? The short answer is no, as

delayed appendectomy is needed for patients with recurrent symptoms and those with a patent or chronically inflamed appendix<sup>[17]</sup>. The problem of how to determine the patency of the appendix and chronicity of the inflammation still remains in patients presenting with appendiceal mass who have settled on conservative treatment<sup>[16]</sup>. This may be done by performing barium enema on all patients treated conservatively and only those with patent appendices may be offered LA. However, this may prove impractical, costly and may increase the workload of any radiology department. Contrast-enhanced CT scanning is another modality that may help in this regard as it may strongly suggest the presence of underlying neoplasm in the majority of patients with secondary appendicitis<sup>[18]</sup>.

## EMERGENCY SURGERY FOR APPENDIX MASS IN THE LAPAROSCOPIC ERA

Fear of the increased risk of intraabdominal abscesses<sup>[19]</sup> after performing LA in complicated appendicitis has recently been dismissed<sup>[20]</sup>. The successful adoption of laparoscopic I.A after successful conservative treatment is reported without perioperative morbidity<sup>[21,22]</sup> and the percentage of I.As which are performed laparoscopically has increased in recent years from 30% to 85%<sup>[22]</sup>. The operating time and complication rates did not differ from those of open I.A, but the hospital stay was much shorter in favor of the interval laparoscopic method<sup>[20,22-25]</sup>.

Is there a role for LA in the emergency intervention for appendiceal mass? The answer is yes. Senapati *et al*<sup>[21]</sup> reported experience with emergency LA in patients with appendiceal mass in comparison with LA for non-mass-forming appendicitis. It was found that early emergency LA for appendiceal mass is feasible and safe; moreover, its operative time and hospital stay are comparable to those of LA performed for non-mass forming appendicitis<sup>1</sup>. However, the proper timing for emergency surgery needs further substantiation.

Another major advantage of emergency surgery is that it obviates the need for a second hospital admission, avoids misdiagnoses and promptly deals with any unexpected ileocecal pathology that masquerades as an appendiceal mass. Furthermore, LA can be offered safely and successfully in the interval setting after successful conservative treatment for those with recurrent symptoms<sup>[20,22-25]</sup>.

## THE NEED FOR RCTS

The majority of -if not all- studies on I.A after conservative treatment of appendiceal mass are retrospective. The need for prospective randomized controlled multi-institutional trials is essential to scientifically compare emergency surgery for appendiceal mass with conservative management without I.A<sup>[26]</sup>. Such trials are needed to establish the safety of emergency open *vs* laparoscopic appendectomy for appendix mass and to establish the safety of omitting I.A in those treated conservatively with successful outcomes. Such studies should look into various cost issues and the possible differences -if any- in the management

of appendiceal masses in various age groups (pediatric *vs* adults) and different sexes (males *vs* females)<sup>[26]</sup>. The question of "golden hours" for emergency LA for 'hot' appendix masses -similar to that identified for emergency laparoscopic cholecystectomy for acute cholecystitis- needs to be answered. The possibility of increased infertility in females with appendiceal masses treated conservatively should also be studied to determine if emergency surgery is more beneficial in affected females in order to make a stronger argument for emergency management, at least, in females.

## CONCLUSION

Based on the above, it seems that I.A can be safely omitted after exclusion of other ileocecal pathologies. This avoids a second hospital admission and a surgical procedure which is associated with a 10%-20% complication rate. I.A will still be reserved for patients with recurrent symptoms and can be performed safely by laparoscopic means. Emergency laparoscopic appendectomy is emerging as a new safe treatment modality for the appendiceal mass, and may prove to be more cost-effective than conservative treatment even without I.A as it is associated with a much shorter hospital stay and obviates the need for long intravenous antibiotic therapy. It further obviates the need for I.A; the centre of controversy. If emergency LA becomes the standard of care, I.A will certainly become 'something' of the past.

## REFERENCES

- 1 Willemsen PJ, Hoorntje LE, Eddes EH, Ploeg RJ. The need for interval appendectomy after resolution of an appendiceal mass questioned. *Dig Surg* 2002; **19**: 216-220; discussion 221
- 2 Nitecki S, Assalia A, Schein M. Contemporary management of the appendiceal mass. *Br J Surg* 1993; **80**: 18-20
- 3 Ahmed I, Deakin D, Parsons SL. Appendix mass: do we know how to treat it? *Ann R Coll Surg Engl* 2005; **87**: 191-195
- 4 Chen C, Botelho C, Cooper A, Hibberd P, Parsons SK. Current practice patterns in the treatment of perforated appendicitis in children. *J Am Coll Surg* 2003; **196**: 212-221
- 5 Samuel M, Hosie G, Holmes K. Prospective evaluation of nonsurgical versus surgical management of appendiceal mass. *J Pediatr Surg* 2002; **37**: 882-886
- 6 Corfield L. Interval appendectomy after appendiceal mass or abscess in adults: what is "best practice"? *Surg Today* 2007; **37**: 1-4
- 7 Hoffmann J, Lindhard A, Jensen HE. Appendix mass: conservative management without interval appendectomy. *Am Surg* 1984; **148**: 379-382
- 8 Friedell ML, Perez-Izquierdo M. Is there a role for interval appendectomy in the management of acute appendicitis? *Am Surg* 2000; **66**: 1158-1162
- 9 Gillick J, Velayudham M, Puri P. Conservative management of appendix mass in children. *Br J Surg* 2001; **88**: 1539-1542
- 10 Kumar S, Jain S. Treatment of appendiceal mass: prospective, randomized clinical trial. *Indian J Gastroenterol* 2004; **23**: 165-167
- 11 Adalla SA. Appendiceal mass: interval appendectomy should not be the rule. *Br J Clin Pract* 1996; **50**: 168-169
- 12 Karaca I, Altintoprak Z, Karkiner A, Temir G, Mir E. The management of appendiceal mass in children: is interval appendectomy necessary? *Surg Today* 2001; **31**: 675-677
- 13 Ein SH, Shandling B. Is interval appendectomy necessary after rupture of an appendiceal mass? *J Pediatr Surg* 1996; **31**:

Meshikhes AWN. Is there a need for interval appendicectomy after resolution of appendiceal mass?

849-850

- 14 **Lai HW**, Loong CC, Wu CW, Lui WY. Watchful waiting versus interval appendectomy for patients who recovered from acute appendicitis with tumor formation: a cost-effectiveness analysis. *J Chin Med Assoc* 2005; **68**: 431-434
- 15 **Lai HW**, Loong CC, Chiu JH, Chau GY, Wu CW, Lui WY. Interval appendectomy after conservative treatment of an appendiceal mass. *World J Surg* 2006; **30**: 352-357
- 16 **Kaminski A**, Liu IL, Applebaum H, Lee SL, Haigh PI. Routine interval appendectomy is not justified after initial nonoperative treatment of acute appendicitis. *Arch Surg* 2005; **140**: 897-901
- 17 **Gahukamble DB**, Gahukamble LD. Surgical and pathological basis for interval appendicectomy after resolution of appendicular mass in children. *J Pediatr Surg* 2000; **35**: 424-427
- 18 **Pickhardt PJ**, Levy AD, Rohrmann CA Jr, Kende AI. Primary neoplasms of the appendix manifesting as acute appendicitis: CT findings with pathologic comparison. *Radiology* 2002; **224**: 775-781
- 19 **Horwitz JR**, Custer MD, May BH, Mehall JR, Lally KP. Should laparoscopic appendectomy be avoided for complicated appendicitis in children? *J Pediatr Surg* 1997; **32**: 1601-1603
- 20 **Lintula H**, Kokki H, Vanamo K, Antila P, Eskelinen M. Laparoscopy in children with complicated appendicitis. *J Pediatr Surg* 2002; **37**: 1317-1320
- 21 **Senapathi PS**, Bhattacharya D, Ammori BJ. Early laparoscopic appendectomy for appendicular mass. *Surg Endosc* 2002; **16**: 1783-1785
- 22 **Vargas HI**, Averbuck A, Stamos MJ. Appendiceal mass: conservative therapy followed by interval laparoscopic appendectomy. *Am Surg* 1994; **60**: 753-758
- 23 **Nguyen DB**, Silen W, Hodin RA. Interval appendectomy in the laparoscopic era. *J Gastrointest Surg* 1999; **3**: 189-193
- 24 **Gibeily GJ**, Ross MN, Manning DB, Wherry DC, Kao TC. Late-presenting appendicitis: a laparoscopic approach to a complicated problem. *Surg Endosc* 2003; **17**: 725-729
- 25 **Owen A**, Moore O, Marven S, Roberts J. Interval laparoscopic appendectomy in children. *J Laparoendosc Adv Surg Tech A* 2006; **16**: 308-311
- 26 **Meshikhes AW**. Management of appendiceal mass: controversial issues revisited. *J Gastrointest Surg* 2008; **12**: 767-775

S- Editor Sun H L- Editor Webster JR E- Editor Ma WH