



## A PROSPECTIVE COMPARATIVE STUDY BETWEEN EARLY AND INTERVAL APPENDICECTOMY FOR APPENDICULAR MASS

### General Surgery

|                                    |                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dr. Janni Laxman</b>            | Associate Professor, Department of General Surgery, GITAM Institute of Medical Sciences and Research, Visakhapatnam, Andhra Pradesh, India.                      |
| <b>Dr. R S Teja Reddy*</b>         | Assistant Professor, Department of General Surgery, GITAM Institute of Medical Sciences and Research, Visakhapatnam, Andhra Pradesh India. *Corresponding Author |
| <b>Dr. Sivasai Krishnaprasad K</b> | Assistant Professor, Department of General Surgery, GITAM Institute of Medical Sciences and Research, Visakhapatnam, Andhra Pradesh India.                       |

### ABSTRACT

Acute appendicitis remains the most common cause of acute abdomen requiring surgical intervention. Patients presenting late in acute appendicitis are complicated by the development of an inflammatory mass in the right iliac fossa. The treatment of appendicular mass is controversial. However, there are several other management options for appendicular mass.<sup>1</sup> Traditionally, these patients are managed conservatively, followed by interval appendicectomy 4-6 weeks later. Advocates of the initial conservative approach claim a lower rate of complications compared to the early operative approach.<sup>2</sup>

**Objective:** To study the safety and feasibility of emergency appendicectomy for appendicular mass by comparing the complications, morbidity and mortality with conservatively treated patients.

**Materials & Methods:** This is a prospective and comparative study conducted at **Gitam Institute of Medical Sciences and Research, Visakhapatnam**, from January 2018 to December 2019. A total of 60 patients with appendicular mass were divided into two groups of 30 each. Group I included patients who underwent emergency appendicectomy, while Group II consisted of patients who were managed conservatively.

**Results:** In this study, patients' mean age was 27.58 yrs with a male to female ratio of 2.66:1. Intraoperative findings in Group I - 20(70%) cases had simple mass, 8(26.66%) had adhesions and loculated pus in 2(6%). In Group II, 14(53.84%) patients had normal findings, 4(15.38%) cases had simple mass, 6(23%) had adhesions, 1(3.84%) had loculated pus and adhesive intestinal obstruction. Postoperatively, In Group I, 3(10%) patients had wound infection, and 1(3.33%) patient developed fecal fistula, which was managed conservatively. In Group II, 2(6.66%) patients had wound infection, 4(13.33%) had failure of conservative treatment, four had lost follow-up, 3 had respiratory tract infection, and one patient developed intestinal obstruction due to adhesions. Mean length of hospital stay was 5.3 days in Group I and 8.5 days in Group II.

Fewer complications, reduced number of days of parenteral medication, and reduced duration of total hospital stay were noted in Group I compared to Group II, indicating that emergency appendicectomy is a safe and feasible method of managing patients with appendicular mass.

### KEYWORDS

Appendicectomy, Appendicular mass, Emergency Appendicectomy, Ochsner Sherrin Regime

### INTRODUCTION

An appendicular mass is a common surgical clinical entity encountered in 2-6% of patients presenting with acute appendicitis.<sup>3</sup> Appendicular mass is the localization of infection occurring 3 to 5 days after an attack of acute appendicitis. This inflammatory mass is composed of the inflamed appendix, omentum and bowel loops.

The treatment of appendicular mass is controversial; however, there are several management options for appendicular mass.<sup>1</sup> Traditionally, these patients are managed conservatively followed by interval appendicectomy 4-6 weeks later, believing that an early appendicectomy in these cases is hazardous, time-consuming and may lead to life-threatening complications such as fecal fistula. The need for interval appendicectomy has also been questioned.<sup>4</sup> Advocates of the initial conservative approach claim a lower rate of complications than the early operative approach.<sup>2</sup> However, in 10-20% of the cases, it proves unsuccessful, and the patients need emergency operation due to spreading infection, which is comparatively more difficult. Also, the patient may suffer a recurrence of appendicitis after being discharged from the hospital. A large number of patients refuse re-admission for operation once their acute problem is solved, and this seems to be a major disadvantage of the initial conservative approach. Another disadvantage of conservative management is the chance of misdiagnosis, as reported by Garg *P et al*,<sup>5</sup> claiming that conditions like intussusception and carcinoma caecum may be treated conservatively by mistake, adding considerable morbidity. The early operation, on the other hand, has an edge of being curative in the index admission and ensures an early return to work and higher compliance.

The treatment of appendicular mass is taking a turn from the traditional approach of initial conservative treatment followed by interval appendicectomy to immediate appendectomy.<sup>5</sup> However, this change is not widely accepted, and a large number of surgeons continue to adopt the same traditional conservative approach.<sup>6</sup> The early surgical intervention is known to be an effective alternative to conservative therapy for a long time as it considerably reduces the total hospital stay and obviates the need for a second admission.<sup>7</sup> Obviously, a true

controversy exists as to the best approach towards this problem and the opinion is divided about the management of appendicular mass.

This study is designed to evaluate the feasibility and safety of immediate appendicectomy in appendicular mass in our hospital by comparing the results of an equal number of patients treated conservatively.

### AIM OF THE STUDY:

1. To study the safety and feasibility of emergency appendicectomy in appendicular mass.
2. To compare the complications, morbidity and mortality between emergency surgery and conservatively treated appendicular mass

### MATERIALS AND METHODS:

The study is done on 60 patients with appendicular mass who were admitted to the General Surgery department at Gitam Institute of Medical Sciences and Research, **Visakhapatnam** from January 2018 to December 2019. Our study is a clinical, prospective and open study conducted during this period.

### INCLUSION CRITERIA:

1. Patients admitted with signs and symptoms of appendicular mass during the study period.
2. Patients diagnosed with appendicular mass during surgery for acute appendicitis.

### EXCLUSION CRITERIA:

1. Pregnant patients.
2. Patients not fit for surgery.
3. Patients with signs of diffuse peritonitis.

A thorough history and clinical examination were made. Complete blood count; urinalysis; urea and electrolytes; plain x-ray abdomen; and ultrasonography of abdomen and other investigations as per need of the patient were done. The patients were randomly divided into two groups, each containing thirty.

In Group I, surgical exploration was done within 24hrs of admission. Pre-operative preparation was done by keeping the patients nil orally, giving adequate parenteral fluids to maintain fluid and electrolyte balance. Intravenous antibiotics and analgesics were used as needed. Drains were kept in a few cases, which were removed after 48hrs and sutures were removed on the 7<sup>th</sup> post-operative day. Most of the operated patients had an uneventful recovery. The post-operative period was monitored; intake output charts and vital charts were maintained.

In Group II, a conservative approach with Ochsner Sherren Regime was adopted, followed by interval appendectomy 6-8 weeks later. Patients in both study groups were discharged as soon as possible, and the duration of stay and duration of antibiotics and analgesics used in the number of days was noted.

The patients were followed up for a variable period. The data was collected, and a comparison of outcome between the two groups was made statistically by applying Fisher's exact test and t-test.

### OBSERVATION AND RESULTS

In this study of 60 cases, the mean age of patients was 27.58 (SD) years, ranging from 13 to 48, and the majority of patients (50%) belonged to the age group of 21-30 years. There was a male preponderance (70%) with male to female ratio of 2.66:1 (Table-1)

Out of the 60 patients, pain abdomen was noted in all patients. Other main presenting symptoms were anorexia in 55 (92%), nausea/vomiting in 48(80%) cases and fever in 60% of patients.(Table-2)

**Table-1: Age and Sex distribution of the study population**

| Age in years | Sex        |              | Total (%) |
|--------------|------------|--------------|-----------|
|              | Male n (%) | Female n (%) |           |
| <20          | 10         | 2            | 12 (20%)  |
| 21-30        | 19         | 11           | 30 (50%)  |
| 31-40        | 11         | 4            | 15 (25%)  |
| Above 40     | 2          | 1            | 3 (5%)    |
| Total        | 42 (70%)   | 18 (30%)     | 60        |

**Table-2: Symptomatology**

| SYMPTOMS             | No. of cases | Percentage |
|----------------------|--------------|------------|
| Pain abdomen         | 60           | 100%       |
| Anorexia             | 55           | 91.66%     |
| Nausea/Vomiting      | 48           | 80%        |
| Fever                | 36           | 60%        |
| Altered bowel habits | 6            | 10%        |
| Abdominal distension | 1            | 1.66%      |

On comparison of Intraoperative findings, In Group I majority (66.66%) of the patients had simple mass, 8 had adhesions, and loculated pus was seen in 2.

In group II the intraoperative finding in the majority (53.84%) of the patients were normal, 4 had simple mass, 6 had adhesions, one patient had loculated pus, and adhesive intestinal obstruction was seen in 1 patient. (Table-3)

The major intraoperative difficulty encountered in this study population was difficulty in localization of appendix in both groups. Fisher's exact test was applied, and the p-value was found to be >0.05, which is insignificant.

**Table 3: Intra Operative findings**

|                                 | Group I n (%) | Group II n (%) |
|---------------------------------|---------------|----------------|
| Simple mass                     | 20 (66.66%)   | 4 (15.38%)     |
| Adhesions                       | 8 (26.66%)    | 6 (23%)        |
| Loculated pus                   | 2 (6.66%)     | 1 (3.84%)      |
| Adhesive intestinal obstruction | 0             | 1 (3.84%)      |
| Normal                          | 0             | 14 (53.84%)    |
| Total                           | 30            | 26             |

**Table 4: Intra Operative problems**

| Intraoperative problems                | Group I n (%) | Group II n (%) |
|----------------------------------------|---------------|----------------|
| Difficulty in localization of appendix | 4 (13.33%)    | 5 (19.23%)     |
| Difficulty in adhesiolysis             | 3 (10%)       | 4 (15.38%)     |
| Minor trauma to the bowel              | 2 (6.66%)     | 2 (7.69%)      |

|                |           |    |
|----------------|-----------|----|
| Minor bleeding | 1 (3.33%) | 0  |
| Total          | 10        | 11 |

In this study, the major (10%) complication in Group I patients was wound infection, and the overall rate of complication was 13.33%. The major (13.33%) complication in Group II patients was failure of treatment and lost follow up, and the overall rate of complication was 46.66%.

Fecal fistula developed in one patient in Group I, which was managed successfully, conservatively.

**Table 5: Post Operative complications**

| Complications                   | Group I n (%) | Group II n (%) |
|---------------------------------|---------------|----------------|
| Wound infection                 | 3 (10%)       | 2 (6.66%)      |
| Fecal fistula                   | 1 (3.33%)     | 0              |
| Failure of treatment            | 0             | 4 (13.33%)     |
| Lost follow up                  | 0             | 4 (13.33%)     |
| Respiratory tract infection     | 0             | 3 (10%)        |
| Adhesive intestinal obstruction | 0             | 1 (3.33%)      |
| Total                           | 4 (13.33%)    | 14(46.66%)     |

Four patients in Group II had failure of conservative management and had to undergo emergency surgery in a difficult situation. Of the four, one had adhesive intestinal obstruction and had to undergo laparotomy, adhesiolysis and appendectomy with uneventful post-op recovery. Another four patients managed successfully by the Oschner Sherren regime did not return for interval appendectomy, and their fate is unknown.

Fisher's exact test was applied, and the p-value was found to be >0.05 (insignificant) while comparing individual complications, but the p-value was <0.05 (significant) when the overall complication rates between the two groups were compared.

There was no mortality noted in either of the groups.

Histopathology of all the appendix specimens of Group I patients showed features of acute appendicitis, and that of group II patients showed features of chronic appendicitis in all except the four patients who underwent emergency appendectomy due to failure of conservative management, in whom it showed features of acute appendicitis. The fate of the four cases that were managed successfully by conservative management but lost follow up and did not return for interval appendectomy is unknown.

In this study, the majority (90%) of Group I patients had parenteral medications for  $\leq 5$  days, and the mean duration of parenteral medication was 3.3 days in this Group. Whereas in group II the majority (70%) of patients had parenteral medications for 6-8 days and the mean duration of parenteral medication was 6.2 days in them. t-test was applied, and the p-value was calculated to be <0.05, which is significant. (Table-6)

In this study, the majority (63.33%) of Group I patients had a total duration of hospital stay for  $\leq 5$  days, and the mean duration of hospital stay was 5.3 days in this Group. Whereas in group II only 6.66% of patients had a total duration of hospital stay for  $\leq 5$  days, and the mean duration of hospital stay was 8.5 days in them. t-test was applied, and the p-value was calculated to be <0.05, which is significant. (Table-7)

**Table 6# - Duration of Medications**

| The total duration of medications | Group I n (%)   | Group II n (%)*   |
|-----------------------------------|-----------------|-------------------|
| $\leq 5$ days                     | 27 (90%)        | 8 (26.66%)        |
| 6-8 days                          | 3 (10%)         | 21 (70%)          |
| >8 days                           | 0               | 1 (3.33%)         |
| Mean                              | 3.3 days        | 6.2 days          |
| SD                                | 1.534657        | 1.284747          |
| SE                                | .2801888        | .2345616          |
| 95% CI                            | 2.72695-3.87305 | 5.786934-6.746399 |

#Includes antibiotics and analgesics. SD- Standard deviation

\*Includes both 1<sup>st</sup> and 2<sup>nd</sup> admission. SE- Standard error CI- Confidence interval

**Table 7: Total Duration of Hospital Stay**

| The total duration of hospital stay | Group 1 n (%) | Group 2 n (%) |
|-------------------------------------|---------------|---------------|
|-------------------------------------|---------------|---------------|

|           |                   |                   |
|-----------|-------------------|-------------------|
| <= 5 days | 19 (63.33%)       | 2 (6.66%)         |
| 6-8 days  | 10 (33.33%)       | 14 (46.66%)       |
| >8 days   | 1 (3.33%)         | 14 (46.66%)       |
| Mean      | 5.3 days          | 8.5 days          |
| SD        | 2.409035          | 1.943158          |
| SE        | .4398276          | .3547704          |
| 95% CI    | 4.400452-6.199548 | 7.774413-9.225587 |

\*Includes both 1<sup>st</sup> and 2<sup>nd</sup> admission SD- Standard deviation SE- Standard error CI- Confidence interval

## DISCUSSION

An appendicular mass is a common surgical clinical entity encountered in 2-6% of patients presenting with acute appendicitis.<sup>3</sup> The treatment of appendicular mass is taking a turn from the traditional approach of initial conservative treatment followed by interval appendectomy to immediate appendectomy.<sup>5</sup> However, this change is not widely accepted, and a large number of surgeons still continue to adopt the same traditional conservative approach.<sup>6</sup> The early surgical intervention is known to be an effective alternative to conservative therapy for a long time as it considerably reduces the total hospital stay and obviates the need for a second admission.<sup>7</sup>

In the present study, sixty cases of appendicular mass were included. The patients were divided randomly into two groups, each containing thirty. In Group I, surgical exploration was done within 24hrs of admission. In Group II, a conservative approach with Ochsner Sherren Regime was adopted, followed by interval appendectomy 6-8 weeks later.

The mean age of patients was 27.5 years ranging from 13 to 48, and the majority of patients (50%) belonged to the age group of 21-30 years.

In this study, there was no significant difference (p-value >0.05) in the operative problems faced during surgery between the two groups, but the complication rate was more in group II (46.66%) compared to Group I (13.33%), where the p-value was <0.05.

The need for parenteral medications in Group I patients was <= 5 days in 90% cases and the mean duration of parenteral medication was 3.3 days. Whereas in group II, the need for parenteral medications in group II patients was 6-8 days in 70% of cases, and the mean duration of parenteral medication was 6.2 days in them. P-value was <0.05, which is significant.

The total duration of hospital stay was <= 5 days in 63.33% of cases, and the mean duration of hospital stay was 5.3 days in Group I patients. Whereas in group II only 6.66% of patients had a total duration of hospital stay for <= 5 days, and the mean duration of hospital stay was 8.5 days in them. P-value was <0.05, which is significant.

The findings in this study were comparable with other similar studies.

## Other studies :

Bahram MA Conducted a prospective, nonrandomized study over 46 consecutive patients (mean age: 24 ± 8.76 years) presenting with an appendicular mass over a 4-year period. They were subjected to immediate appendectomy within 24 h of admission. The appendix was identified and removed in all 46 patients at operation. Peri-appendiceal abscesses were present in 25% (11 of 46). There was difficulty with adhesiolysis and localization of the appendix in 10%(4) of patients. Superficial wound infection had occurred in 8(17%), while deep wound infection had occurred in 9 %(4) patients. The mean hospital stay was 3 ± 0.25 days. No major complications had occurred. The conclusion was made that early surgical intervention in patients with an appendicular mass is feasible, safe and avoids the consequences of the misdiagnosis and mistreatment of other surgical pathologies.<sup>5</sup>

Samuel M, Hosie G, Holmes K. A prospective, nonrandomized study was conducted of 82 consecutive patients (mean age, 6.9 +/- 3.3 years) presenting with an appendicular mass over a 5-year period. They were categorized as group 1, 58.5% (48 of 82) nonsurgically managed and an interval appendectomy performed at a mean period of 8.6 +/- 4.6 weeks and group 2, 41.5% (34 of 82) appendectomy at presentation. Periappendiceal abscesses present at interval appendectomy in group 1 were (38 of 48) 79.2% versus 100% (34 of 34) at appendectomy in group 2. Adhesions at interval appendectomy in group 1 were 81.3%

(39 of 48) versus 100% (34 of 34) at appendectomy in group 2. In-group 1, superficial wound infection was observed in zero versus four wound infections in group 2. Overall morbidity rate between group 1 and group 2 was statistically significant (P <.05). The total mean hospital stay in group 1 was 13.2 +/- 1.5 versus 4.8 +/- 0.4 days in group 2. They concluded that early surgical intervention was beneficial over nonoperative management in this cohort of patients.<sup>9</sup>

Bülent Kaya, Barış SANA, Cengiz ERİŞ, Rıza KUTANİŞ A retrospective study to evaluate the safety and effectiveness of immediate appendectomy in patients presenting with appendicular mass. Forty-seven patients with appendicular mass were operated on within 24 hours after admission. There were 25 males (53.2%) and 22 females (46.8%), with a mean age of 37.23±15.60 (range: 14-75) years. The mean time from the onset of the symptoms to the operation was 4.06±2.50 (range: 1-15) days. A simple appendectomy was performed in 38 (80.9%) patients. Twenty-nine (61.8%) patients were discharged and followed up without any complication after surgery. Wound infection was detected in 13 (27.7%) patients. Immediate appendectomy in appendicular mass is a safe and effective alternative to conservative management.<sup>10</sup>

Malik Arshad et al. One hundred and seventy-six (176) patients with appendicular mass were included in this study. Patients were conveniently divided into two groups, A and B, with equal distribution of cases (88 Patients each), regardless of age and sex. Immediate appendectomy was performed in Group A patients after preliminary investigations, whereas patients in group B were initially treated conservatively followed by interval appendectomy. A total of 114 (64.8%) males and 62 (35.2%) females with a mean age of 25.09 years (Range 8-44 years) were included in the study population. Post-operative wound sepsis occurred in 17 (19.31%) patients in group A. Treatment failure, patient compliance, re-admission and overall expenses are the main limitations in the group B population. Conclusion: Early appendectomy is a safe and superior option in patients with appendicular mass compared to conventional treatment.<sup>11</sup> Ali S, Rafique HM did a comparative study of conservative treatment versus early surgical exploration of appendicular mass. A total of 60 patients, both males and females between 12 to 65 years of age, with symptoms and signs consistent with appendicular mass, were included. They were randomly divided into Group I (Early exploration) and Group II (Conservative treatment), each containing 30 patients. A comparison of outcome between two groups was made statistically by applying student and Chi-square test. There was a peak incidence of acute appendicitis in the second and third decades of life. Male to female ratio was 2:1. More than 90% of patients had a history of shifting of abdominal pain. 100% of the patients had inflamed appendix to variable extent on exploration. The complications in the form of adhesive intestinal obstruction, failure of treatment, lost follow up, misdiagnosis and re-admission were less in Group I. There was a significantly less duration of hospital stay in Group I as compared to Group II. It was concluded that early surgical exploration of appendicular mass is safe and cost effective.<sup>12</sup>

Senapathi PS, Bhattacharya D, Ammori BJ. During a 1-year period, 62 patients underwent LA for suspected appendicitis (n = 50), generalized peritonitis (n = 2), and an appendicular mass (n = 10). Another patient who presented with an appendicular mass was found at laparoscopy to have an idea-ileal intussusception. All appendectomies were attempted and completed laparoscopically. Post-operative complications occurred in two patients; there were no deaths. None of the patients treated for appendicular mass-developed complications. There was no difference between the patients who underwent LA during the index admission for an appendicular mass and those who had surgery for non-mass-forming appendices with regard to the operative time (median [interquartile range]: 45 [36-60] vs. 40 [25-50] min, p = 0.085) and post-operative hospital stay (median [interquartile range]: 2 [1-2] vs. [1-2] days, p = 0.1). Early LA during the index admission of patients with an appendicular mass is feasible and safe, obviates the need for second hospital admission, and avoids misdiagnoses.<sup>1</sup>

## CONCLUSION

- Appendicular mass is common in males.
- The mean age of presentation of appendicular mass is 27.58 yrs. Ranging from 13 to 48 years.
- Ultrasound is the investigation of choice in pts. With appendicular mass.

- There is no significant difference in the operative problems faced between the two lines of management studied here.
- There was a significant difference in the complications between the two groups, with more complications occurring in the Group of patients treated by Ochsner Sherren regimen followed by interval appendicectomy, and hence these patients had more morbidity.
- The duration of parenteral medications was more in Group II than in Group I and was statistically significant.
- The total duration of hospital stay was more in group II patients than in Group I hence increasing the economic burden on the patient.
- Early appendicectomy obviates the need for a second admission and provides curative treatment during the index admission whereby minimizing total expenses.
- Early appendicectomy may also avoid the consequences of the misdiagnosis and mistreatment of other surgical pathologies.
- Early appendicectomy in appendicular mass is safe owing to the improvements in surgical skills and better post-operative care.
- Low morbidity, reduced hospital stay, low cost and patient compliance favor operative management of appendicular mass by experienced surgeons, thus obviating the old practice of conservative treatment followed by interval appendicectomy.

#### REFERENCES :

1. Senapathi PSP, Bhattacharya D, Amori BJ. Early laparoscopic appendectomy for appendicular mass. *Surg Endosc.* 2002;16(12):1783–5.
2. Tingstedt B, Bexé-Lindskog E, Ekelund M, Andersson R. Management of appendiceal masses. *Eur J Surg* 2002;168(11):579–82.
3. Jordan JS, Kovalcik PJ, Schwab CW: Appendicitis with a palpable mass. *Ann Surg*; 1981;193:227-9
4. Ein SH, Shandling B. Is interval appendectomy necessary after rupture of an appendiceal mass? *J Paediatr Surg.* 1996;31:849–50.
5. Garg P, Dass BK, Bansal AR, Chitkara N. Comparative evaluation of conservative management versus early surgical intervention in appendicular mass—a clinical study. *Indian Med Assoc.* 1997;95(6):179–80.
6. Erdogan D, Karaman I, Narci A, Karaman A, Cavuşoğlu YH, Aslan MK, et al. Comparison of two methods for the management of appendicular mass in children. *Pediatr Surg Int.* 2005;21(2):81–3.
7. De U, Ghosh S. Acute appendicectomy for appendicular mass: a study of 87 patients. *Ceylon Med J.* 2002;47(4):117–8.
8. Bahram MA. Evaluation of early surgical management of complicated appendicitis by appendicular mass. *Int J Surg.* 2011;9(1):101-3. Epub 2010 Oct 19.
9. Samuel M, Hosie G, Holmes K. Prospective evaluation of nonsurgical versus surgical management of appendiceal mass. *J Pediatr Surg.* 2002 Jun;37(6):882-6.
10. Bülent KAYA,1 Barış SANA,2 Cengiz ERİŞ,3 Rıza KUTANİŞ2 Immediate appendectomy for appendiceal mass. *Ulus Travma Acil Cerrahi Derg* 2012; 18 (1):71-74.
11. Malik Arshad, Laghari A. Aziz, Mallah Qasim, K. Altaf Hussain Talpur Early appendicectomy in appendicular mass—a Liaquat university hospital experience *J Ayub Med Coll Abbottabad* 2008;20(1).
12. Ali S, Rafique HM. Appendicular mass; Early exploration vs conservative management. *Professional Med J Jun* 2010;17(2):180-184.