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ORIGINAL ARTICLE

INCIDENCE, RISK FACTORS AND COMPLICATIONS OF ACUTE PERFORATED AND NON-PERFORATED APPENDICITIS IN A RURAL SETUP OF ANDHRA PRADESH

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ABSTRACT: Appendicitis is one of the most common surgical emergencies. The incidence of appendicitis and chances of complication in the form of perforation are dependent on both the patients and non-patient factors. There are various studies conducted to address this problem, but there are no studies conducted to look in to the incidence of appendicitis in east Godavari district of Andhra Pradesh. Our study was aimed to bridge this gap. **METHODS AND MATERIALS:** this was a retrospective study, patient data from 2009- 2014 was analyzed and the age, distance from hospital, educational and socioeconomic background of the patients was collected. The duration between first appearance of symptoms and hospitalization was recorded. The incidence of post-op complication was also recorded. **RESULTS:** The incidence of perforation was 15% in our study population, most of the patients were from low socioeconomic group and having income less than 5000/month. The middle age group between 30-40 years was commonly affected by the appendicitis. The time laps between appearance of symptoms and hospitalization was found to be a predominant factor in the perforation. Surgical site infection was most common complication in the patients treated. **CONCLUSION:** The incidence of perforation is still high and the time laps between first appearance of symptoms and hospitalization is a major determinant of perforation or complication in the appendicitis.

KEYWORDS: Appendicitis, Perforated, Education, monthly income, complications, Andhra Pradesh.

INTRODUCTION: Acute appendicitis is the most common indication for urgent intra-abdominal surgery.[1] surgeons have maintained that appendicitis progresses in a time-dependent manner as luminal obstruction and visceral distension lead to venous congestion, blood supply compromise, gangrenous changes in the appendiceal wall, and, ultimately, perforation. Observational studies have demonstrated an association between perforation and the overall amount of time elapsed from symptom onset to definitive care.[2,3] This time lapse might be due to various factors such as the age, gender, socioeconomic status, educations background and the distance from the healthcare center.

All the above factors are known to develop the complications of appendicitis individually also.[4,5]

In the present study we tried to evaluate the incidence of the acute perforated and non-perforated Appendicitis in the patients presented at the KIMS Amalapuram. Our hospital is a one of the major tertiary care unit in the Amalapuram mandal of East Godavari District of Andhra Pradesh.

We also tried to study the relation of major parameters which lead to complications related to the Appendicitis.

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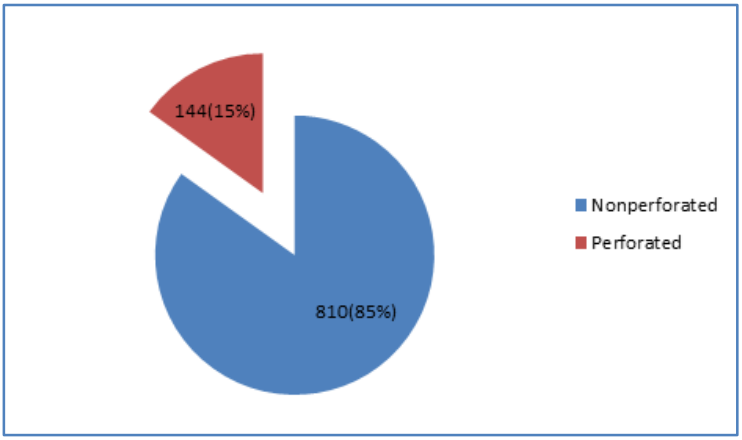
MATERIAL AND METHODS: This study was conducted at KISM Amalapuram, the patients admitted with history of acute abdominal pain and operated with diagnosis of perforated and non-perforated appendicitis between December 2009 to December 2014 were included in the study. Ethical clearance was obtained from the institutional ethical committee.

The demographic data like age, gender, socioeconomic status and distance from our hospital were recorded from the patient's registration records with the hospital. All the cases were classified according to the clinical diagnosis made, either as having perforated appendicitis or Non-perforated appendicitis.

Diagnosis of the perforated appendices was confirmed on the basis of operative notes and diagnosis of the non-perforated appendices was confirmed on the basis of histopathological report on operated cases. In the case where conservative management was done the clinical diagnosis of the treating surgeon was taken as a basis of inclusion.

Patients in both groups were sub classified depending on their age. The incidence was calculated in percentage.

RESULTS:



Graph 1: Incidence of perforated appendicitis

Non perforated Appendicitis						
Age group	**No.**	**Time between onset of symptoms to arrival in hospital (hours)**				**Average hospital stay**
		<24	24-48	48-72	>72	
<10 years	120(15%)	84(76%)	21(19%)	5(5%)	0	4.3
10-20	166(20%)	111(67%)	51(31%)	4(2%)	0	3.1
20-30	140(17%)	82(56%)	48(34%)	9(6%)	1(1%)	2.9
30-40	200(25%)	148(74%)	50(25%)	2(1%)	0	2.8
40-50	82(10%)	63(71%)	12(15%)	5(6%)	2(2%)	3.2
50-60	65(8%)	40(62%)	15(23%)	6(9%)	4(6%)	3.2
>60	37(5%)	15(32%)	20(43%)	6(13%)	6(13%)	3.8
Total	**810**	**543(67%)**	**217(27%)**	**37(5%)**	**13(2%)**	

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Perforated Appendicitis						
<10 years	26(18%)	1(4%)	1(4%)	8(31%)	16(62%)	8.9
10-20	30(21%)	0	2(7%)	8(27%)	20(67%)	8.4
20-30	21(15%)	0	1(3%)	9(29%)	21(68%)	8.2
30-40	34(24%)	2(6%)	3(9%)	12(35%)	17(50%)	9.7
40-50	12(8%)	0	0	1(8%)	11(92%)	10
50-60	13(9%)	0	0	2(15%)	11(85%)	10.5
>60	08(6%)	0	0	1(10%)	9(90%)	11.1
Total	**144**	**3(2%)**	**7(4%)**	**41(26%)**	**105(67%)**	

Table 1: Profile of patients with non-perforated appendicitis and perforated appendicitis

As shown in Table 1/Figure 1, we found that the incidence of perforated and non-perforated appendicitis was highest in the age group of 30-40 years, 24% and 25% respectively and the incidence was least in the >60 years age group. Furthermore, we found that the time lapse between onset of symptoms and admission to a hospital is a strong determinant in the incidence of perforated appendicitis across all age groups and the incidence of perforation was highest in the patients who arrived at hospital after 72 hours of the symptoms. The third finding of our study highlights that the duration of hospital stay is highest in the cases of perforated appendicitis and in the perforated appendicitis group increasing age is a major determinant for increased stay in the hospital (Table/Figure-1 and 4).

Category of patients	Monthly Income (in Indian rupees)			Educational Background				Distance from Hospital	
	<5000	5000-10000	>10000	Illiterate	Primary	Secondary	Higher	<20 KM	>20 KM
Non perforated Appendicitis	354 (44%)	265 (33%)	191 (24%)	246 (30%)	205 (25%)	305 (28%)	54 (7%)	386 (48%)	424 (52%)
Perforated Appendicitis	96 (67%)	28 (19%)	20 (14%)	24 (17%)	34 (24%)	54 (38%)	32 (22%)	85 (59%)	59 (41%)

Table 2: Socioeconomic status of the patient

The incidence of appendices perforated (67%) and non-perforated (44%) was highest in those who were having income less than 5000 per month (Table/Figure-2). Illiterate population had a high incidence (30%) non perforated appendicitis and those who have completed education up to secondary level have highest incidence (38%) of perforation. Distance from hospital is another major determinant in the cases of perforation as 59% of case were form distance less than 20 Kilometers from the hospital (Table/Figure-2).

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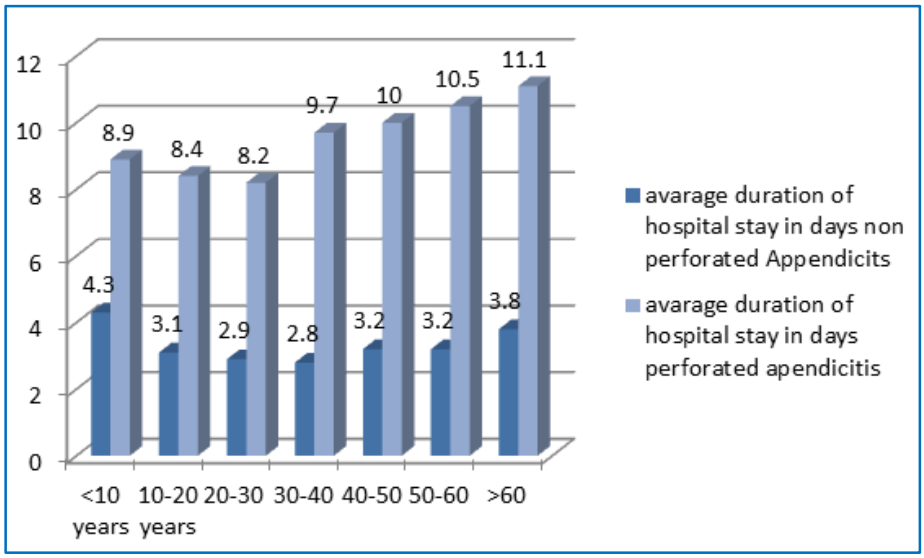
Category of patient	Wound infection	Respiratory complication	Sepsis requiring intensive care	Urinary complication	Residual abscess	Death
Non perforated appendicitis	20(2%)	0	8(1%)	1	0	0
perforated appendicitis	56(31%)	9(6%)	12(8%)	4(3%)	7(5%)	5(3%)

Table 3: Incidence of complications

The complication rate was highest in the patients of perforated appendicitis, and mortality was also high in perforated appendicitis cases.



Graph 2: Showing average stay in the hospital for cases of Non-perforated and perforated appendicitis

DISCUSSION: In our study patients admitted and treated for suspected acute appendicitis in our department during a 4-year period (Dec. 2009 to Dec. 2014) were enrolled. This study was conducted in the east Godavari district of Andhra Pradesh, this area have a socio Economical diversity of population. The incidence of acute appendicitis in our study was similar to that reported by others.[1,4]

The disease was rare in small children (Less than 10 years of age), with the highest incidence found in young adults.[5] Perforated appendicitis and non-perforated appendicitis occurred with an almost similar frequency in small children and the elderly, whereas non-perforated appendicitis was most common in the other three age groups (Fig. 1). Explanations for these two incidence patterns are unknown.[6,7] Our patients with perforated appendicitis had a significantly longer pre-hospitalization duration of symptoms and compared to patients with non-perforated appendicitis.[5,6]

As reported by others we found that patients with perforated appendicitis had a longer pre-hospitalization duration of symptoms, which may indicate that most perforations occurred before admittance to hospital.[3,5,6,7] A significantly longer pre-hospitalization duration of symptoms among

patients with perforation supports the theory that patient-related factors might in part be responsible for delayed diagnosis of the disease. It may also indicate that age related clinical responses to abdominal complaints by small children and the elderly, compared to older children and adults, caused contact with the health care system to be delayed, allowing the inflammatory process to continue.[8,9]

The longer time spent before admission to hospital among patients with perforation is consistent with less obvious symptoms in small children and elderly and may also partly explain the longer in-hospital observation time required by the surgeon for those age groups.[8,9] Majority of our patients of perforated and non-perforated appendicitis were from the lower income group and were having income less than 5000 rupees/ month. This might be due to our hospital is an affordable hospital and the fees charged are considerably less than others; top of it lot any government health schemes are also available.

The incidence of non-perforated appendicitis was almost same across all educational background of the patients and least in those who have completed the higher education. The incidence of perforation was highest in those how have completed the secondary education.

When distance of residence of the patient from hospital was considered the patients living in less than 20 KM radius were more affected than those residing beyond 20 KM radius. This finding was exactly opposite what we hypothesized in the beginning of this study.[1,3,7]

Wound infection rate in our study was higher in the patients with perforated appendicitis this is parallel to the other studies.[9.10] Furthermore the overall rate of complication like sepsis leading to ICU care, urinary and respiratory complications and mortality due to complication was higher in the perforated appendicitis cases.[11,12]

CONCLUSION: Incidence of perforated and non-perforated appendicitis in our hospital was 15% and 85% respectively. Incidence of Non-perforated appendices was common in the age group between 30 -40 years. In about 67% of cases the time between the beginning of symptoms and hospitalization was less than 24 hours and duration of hospital stay was approximately 2-3 days.

Approximately 24% of cases of perforation were in the age group of 30-40 years. In most of the cases the duration between onset of symptoms and hospitalization was more than 48 hours.

The incidence of both perforated and non-perforated appendicitis was more in the educated patients mainly in those how have completed secondary education. The rate of complication was maximum in the cases of perforated appendicitis.

LIMITATION: This study was conducted in the single center, majority of our patents were from low socioeconomic status. Multi1centre study might bridge the demographic and socio-economical gap in this study.

BIBLIOGRAPHY:

1. Korner H, Sondenaa K, Soreide JA, et al. Incidence of acute non-perforated and perforated appendicitis: age-specific and sex-specific analysis. World J Surg. 1997; 21 (3): 313–317.
2. Temple CL, Huchcroft SA, Temple WJ. The natural history of appendicitis in adults: a prospective study. Ann Surg. 1995; 221 (3): 278–281.
3. Cappendijk VC, Hazebroek FW. The impact of diagnostic delay on the course of acute appendicitis. Arch Dis Child. 2000 (1): 64–66.

DOI: 10.14260/jemds/2015/975

4. Sicard N, Tousignant P, Pineault R, Dube S. Non-patient factors related to rates of ruptured appendicitis. Br J Surg. 2007; 94 (2): 214–221.
5. Scher KS, Coil JA Jr. Appendicitis: factors that influence the frequency of perforation. South Med J. 1980; 73 (12): 1561–1563.
6. Kearney D, Cahill RA, O'Brien E, Kirwan WO, Redmond HP. Influence of delays on perforation risk in adults with acute appendicitis. Dis Colon Rectum. 2008; 51 (12): 1823–1827.
7. Anderson, R., Hugander, A., Thulin, A., Nystro¨m, P.O., Olaison, G.: Indications for operation in suspected appendicitis and incidence of perforation. BMJ 1994; 308: 107-12.
8. Velanovich, V., Satava, R.: Balancing the normal appendectomy rate with the perforated appendicitis rate: implications for quality assurance. Am. Surg. 1992; 58: 264-8.
9. Anderson, R., Hugander, A., Thulin, A.: Diagnostic accuracy and perforation rate in appendicitis: association with age and sex of the patient and with appendicectomy rate. Eur. J. Surg. 1992; 158: 37-42.
10. Luckmann, R.: Incidence and case fatality rates for acute appendicitis in California; a population-based study of the effects of age. Am. J. Epidemiol. 1989; 129: 905-9.
11. Siegel, B., Hyman, E., Lahat, E., Oland, Y.: Acute appendicitis in early childhood. Helv. Paediatr. Acta 1982. 37: 215-21.
12. Papandria D, Goldstein SD, Rhee D, et al. Risk of perforation increases with delay in recognition and surgery for acute appendicitis. J Surg Res. 2013; 184 (2): 723–729.

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