

Comparative Analysis of Clinical Patterns, Laboratory and Radiological Parameters, Intraoperative Findings and Postoperative Course in Patients with Perforated Versus Non Perforated Acute Appendicitis.

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ABSTRACT

Background: Appendicitis is one of the most common abdominal emergencies encountered in surgical patients and admissions due to acute appendicitis forms a major portion of hospital admissions in developed as well as developing countries. It is most commonly seen in young adolescent patients but no age is immune to this condition. Males are more commonly affected than females. Acute appendicitis is usually diagnosed clinically in patients presenting with typical history and clinical examination findings. The patients with lesser duration of symptoms usually have non perforated appendix while those having a longer duration of symptoms with signs of peritonitis are more likely to have perforated appendix. Appendectomy is the treatment of choice. This study is conducted to study acute appendicitis with an emphasis on analyzing the difference in perforated and non perforated appendicitis in context with their presentation, intra-operative features, postoperative outcome and treatment options available for these cases. **Aims and Objectives:** (1) To study the clinical pattern of presentation and to analyze the difference in the anatomical, biochemical, microbiological and histological determinants in patients of perforated and non perforated acute appendicitis. (2) To evaluate the intra-operative features and postoperative outcome in patients with acute appendicitis presenting with or without perforation. (3) To evaluate the relative importance of these determinants, effect of preoperative delay, pre-hospital antibiotic therapy with postoperative morbidity of perforated acute appendicitis. **Methods:** This was a clinical prospective study comprising of 150 Patients presenting to a tertiary care centre with intra-operative findings of appendicitis conducted in the department of general surgery, in a postgraduate teaching institute and tertiary medical centre, in Mumbai over a period of 2 years. **Results:** The analysis of age distribution of the studied cases revealed that most of the patients were in their 2nd or 3rd decades of life. Maximum patients belonged to age group of 20-29 years (22.67%) and 30-39 years (18.67%). There was a male preponderance with the M:F ratio being 1: 0.57. Majority of the patients (64%) has symptoms less than that of 5 days duration. In patients presenting with perforated appendix 34/75 (45.33%) had duration of symptoms between 3-5 days and 20/75 (26.67%) had duration of symptoms between 6-7 days. The duration of symptoms less than 2 days was less commonly associated with perforation and was seen in 21.95% patients. Patients having perforated appendix most commonly presented with symptoms of abdominal pain (100%), signs of localised peritonitis (85.33%), fever (49.33%), generalised peritonitis (48%) and vomiting (41.33%). In cases of Non-perforated appendix the patients most commonly presented with abdominal pain (100%), localised peritonitis (68%), fever (53.33%), vomiting (52%) and signs of generalized peritonitis (14.66%). **Conclusion:** Acute appendicitis is a common surgical condition. The spectrum of this disease comprises of acute non perforated appendicitis to perforated appendicitis with peritonitis in neglected cases. Detailed history, careful clinical examination and imaging studies can reliably diagnose this condition. Though the treatment depends upon the type and extent of involvement majority of the cases require appendectomy and intravenous antibiotics. Morbidity, increased duration of hospital stay and complications are more common in perforated appendicitis than non perforated uncomplicated appendicitis having short duration of symptoms.

Keywords: Acute appendicitis, perforated vs non perforated appendicitis, peritonitis, management, outcome.

INTRODUCTION

The vermiform appendix is considered by most to be a vestigial organ; its importance in surgery is only due to its tendency for inflammation resulting in the syndrome called acute appendicitis. Acute appendicitis is the most common cause of an "acute abdomen" in young adults. Appendectomy is the

most frequently performed emergency abdominal operation. Despite extraordinary advances in the modern radiographic imaging & laboratory investigations, the diagnosis of appendicitis remains essentially clinical. Appendicitis is common in childhood and early adult life, rare in infants and uncommon after middle age.^[1] Any form of obstruction to the lumen (fecolith, stricture or

neoplasia) can be cause of appendicitis. In majority of cases this obstruction is due to fecoliths. It is observed that a significant minority of inflamed appendices does not have any luminal obstruction and the pathogenesis of inflammation remains unknown. Perforation of gangrenous appendix carries significant risk of morbidity and mortality.^[2] Overall rate of perforated appendicitis is 25.8% of the total cases. These patients who have perforated appendicitis differ in clinical presentation and laboratory parameters as compared to non perforated cases of acute appendicitis.^[3]

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It has been documented that perforated and non perforated appendicitis may have different pathophysiology affecting the subsequent intra-operative and post-operative picture.^[4] The organisms responsible for severe inflammation leading to perforation, the time interval between the onset of symptoms and the diagnosis ,prehospital antibiotic therapy , age of the patient are the determinants that may impact on the occurrence of perforation and its subsequent outcome.^[5] The time interval between first sign and symptom and surgical intervention may also have an impact on the rate of perforations. When the time exceeds 24 h, there is an increased rate of complicated appendicitis and morbidity, including complications that are not directly related to the appendicitis.^[6] There are many factors that are associated with perforation but there is no single factor that independently predicted perforation of appendix.^[7] Considering this background this study is planned to highlight the possible risk factors for perforations of appendix, the changing pattern and the difference in the operative management and outcome of perforated and non perforated appendicitis.

MATERIALS AND METHODS

This was a clinical prospective study comprising of 150 Patients presenting to a tertiary care centre with intra-operative findings of appendicitis conducted in the department of general surgery, in a postgraduate teaching institute and tertiary medical centre, in Mumbai over a period of 2 years. Inclusion criteria: Patients of age more than 12 years presenting to a tertiary care centre with intra-operative findings of appendicitis. Exclusion criteria (1)Patients diagnosed to be suffering from other organ pathology of bowel (2)Patients belonging to age group less than 12 years(3). Patients who have undergone other abdominal surgery affecting the small bowel. All

patients were admitted in the emergency care unit as per hospital protocols. A detailed history was taken with a special emphasis on duration of symptoms. All patients were clinically evaluated in detail and investigated with routine hematological tests, Chest X-Ray, and electrocardiogram (if required), which are necessary for preoperative fitness. All Patients who are suspected to have acute appendicitis are subjected to X-ray chest and abdomen, ultrasonography and CT abdomen in selected case where there was disconnect between the ultrasound and the clinical findings. Intra-operative findings were noted Patients found eligible as per inclusion and exclusion criteria were included in the study. Patient information sheets in three different languages were given to patients and their valid, written consents were taken. Data on patient characteristics was obtained by a proper personal interview and documented. Patients were examined preoperatively. Following clinical, biochemical, microbiological, intraoperative and postoperative observations were made. Preoperative investigational criteria and laboratory parameters were recorded. Intra-operative findings and postoperative course of these patients were studied using a case record proforma.

RESULTS

The analysis of demographic features of the patients revealed that maximum number of patients were young adults and in the 2nd or 3rd decade of life. 34 (22.67%) patients belonged to the age group of 20-29 years and 28 (i.e. 18.67%) belong to the population of 30-39 years.

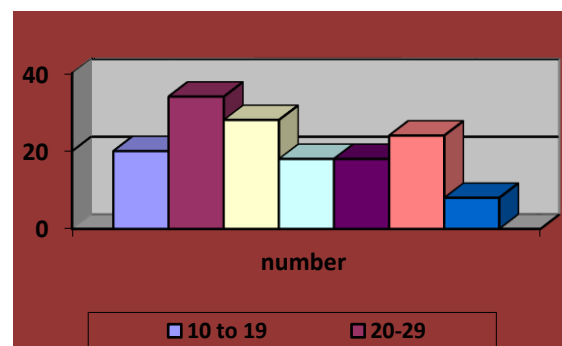


Figure 1: Age distribution of the studied cases.

95 (63.33%) of the patients in the study were males and 55 (36.67 %) of patients were females in the study with a male to female ratio of 1:0.57. The analysis of the duration of symptoms revealed that in patients with symptom duration less than 2 days maximum had acute inflamed but non perforated appendicitis. (78.4% amongst patients with symptom duration up to 2 days) Patients who had perforated appendicitis when analyzed they were found to have symptom duration more frequently

ranging from 3 -5 days (34 out of 75 i.e. 45.33%) and 6-7 days (20 out of 75 i.e. 26.67 %).

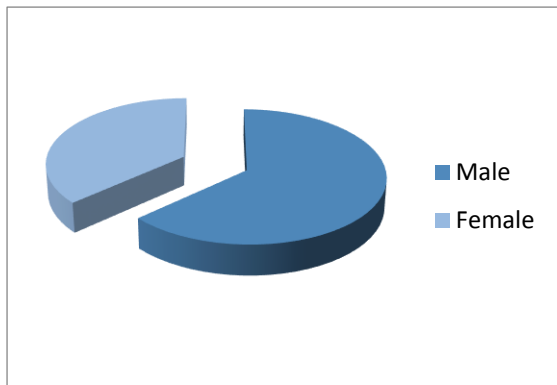


Figure 2: Sex distribution of the studied cases.

Table 1: Duration of symptoms in patients with perforated and non perforated appendicitis.

Symptom Duration	No of patients	Perforated appendicitis (A)	Non perforated Appendicitis (B)
< 48 hrs (upto 2 days)	41 (27.33%)	9 (21.95%)	32 (78.04%)
3-5 days	55 (36.67%)	34 (61.81%)	21(38.18%)
6-7 days	28 (18.67%)	20 (71.42%)	8(28.57%)
More than 7 days	26 (17.33%)	12(46.15%)	14(53.84%)
Total	150	75	75

Fever and vomiting were present in almost equal number of patients in perforated as well as non perforated appendicitis. 115 out of 150 patients in the study presented with signs of localized peritonitis, 64 amongst them had perforated appendicitis (55.65 %). Generalized peritonitis was seen in 47 patients, 36 out of them had perforated appendicitis (76.59 %).

Table 2: Common symptoms in acute appendicitis.

Symptom	No of patients (N)	Perforated appendicitis (A)	Non perforated Appendicitis(B)
Abdominal Pain	150	75	75
Fever	77	37	40
Vomiting	70	31	39
Localised peritonitis	115	64	51
Generalised peritonitis	47	36	11

Out of 19 patients known or detected diabetic in the study 12 had perforated appendicitis. (63.17%), 7 had acute non perforated appendicitis. One patient in the series was known seropositive for HIV, had perforated appendicitis.

Other co-morbidities seen included chronic renal failure, patient on cancer chemotherapy and patient on steroids therapy for systemic illness.

Table 3: Presence of co-morbidities in patients with appendicitis (perforated and non perforated).

Pathology	Total no of pts	Pts with perforated appendicitis	Patients with non perforated appendicitis
Diabetes	19	12	7
HIV	1	1	0
Others	5	2	3

A very small number of patients have alvarado score between 4, 5. (3.33%). 40% of the patients had the score 6 or 7 and 56.66% of patients had the alvarado score as 8 or 9. The difference in the number of subjects having higher alvarado score between patients having perforated and non perforated appendicitis was found to be statistically significant. (p value 0.038).

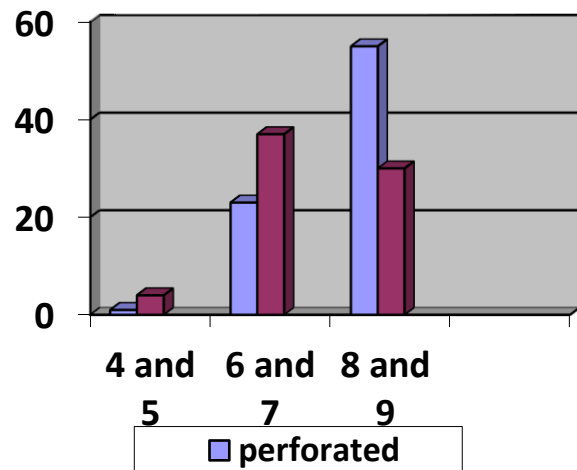


Figure 3: Alvarado score of studied cases.

Ultrasonography was done in all 150 patients with appendicitis enrolled in the study. Probe tenderness was seen in maximum (78 %) of patients with appendicitis Free fluid in periappendiceal area was seen in 67.33 % of patients. Lump formation was observed in 4% of patients.

Table 4: Ultrasound features of patients presenting with appendicitis

USG findings	No of patients
Probe Tenderness	117 (78%)
Free fluid in abdomen	101 (67.33%)
Lump formation	6 (4%)

Computed tomography was done in 15 patients in whom ultrasound findings were either equivocal or in cases where there was disconnect between the ultrasound and the clinical findings. The most common finding found in CT was free fluid in the periappendicular area followed by wall thickening of the caecum and appendix and multiple mesenteric lymphadenitis [Table 5].

Table 5: Computed tomography features of patients presenting with appendicitis,

CT finding	No of patients
Wall thickening of the caecum and appendix	12
Extra luminal air	5
Multiple mesenteric lymphadenopathy	10
Free fluids in the periappendiceal areas	14
Total no of patients	15

Mc Burney's incision was the most preferred incision used in 110 patients (73.33%) in our study group. In patients with advanced peritonitis due to appendicular perforation midline may be the choice of incision. Some surgeons used Right paramedian incision (Used in 16.66% patients in our study) The Choice of incision depend on the clinical finding and the surgeons preference as well as the clinical profile of the patient.

Table 6: Surgical procedure done in patients with appendicitis.

Incision	Total no of patients	Pts with perforated appendicitis	Patients with non perforated appendicitis
Mc Burney's	110(73.33%)	41(37.27%)	69
Right paramedian	15(10%)	11(73.33%)	4
Complete midline incision for exploratory laparotomy	25(16.66%)	23(75%)	2
Total	150	75	75

Intraoperatively Maximum appendix were retrocaecal (57.33%) Followed by pelvic (25.33%) followed by postileal (6.67%). There is no significant difference as compared with rate of perforation and the position of appendix.

Table 7: position of appendix as found during surgery.

Position of appendix	No of patients	Pts with perforated appendicitis	Patients with non perforated appendicitis
Retrocaecal	86(57.33%)	45(52.32%)	41(47.67%)
Preileal	2(1.33%)	2	0
Paracaecal	6(2.66%)	3	3
Pelvic	38 (25.33%)	20	18
Postileal	10 (6.67%)	5	5
Subcaecal	8 (5.53%)	0	8

Appendectomy was the solution in 89.33% i.e. 134 patients. The occurrence of perforation per se doesn't alters the surgical plan as the perforation occurs at tip or distal to the obstruction caused by faecoliths. The rest 10.66% of patients required other procedures. 11 patients underwent Quartercolectomy with primary anastomosis (14 out of 75 i.e. 14 %), 4 underwent hemicolectomy with anastomosis (5.3%). one patient required bowel exteriorization in the form of ileostomy (1.3%).

The analysis of complication frequency revealed that 45.33 % of patients developed fever amongst the perforated appendicitis whereas 17.33% of patient had fever among the non perforated group.

Wound infection was seen in 18.67 % of patients in perforated group and in 8 % of patients in non perforated group. Post operative abdominal collection / paralytic ileus (13.33%), Burst abdomen (5.33%), fecal fistula (1.33%) were uncommonly complications encountered.

Table 8: Type of surgery done in studied cases.

Name of procedure	Perforated appendicitis	Non perforated appendicitis	Total No of patients
Appendectomy (A)	59	75	134
Local resection and anastomosis (B)	11	0	11
Rt Hemicolectomy Anastomosis (C)	4	0	4
Exteriorisation of the Bowel (D)	1	0	1

Table 9: Complications seen in studied patients.

Complication	Perforated appendicitis	Patients with non perforated appendicitis	Total No of patients
Fever	34(45.33%)	13(17.33%)	47
Wound infection	14(18.67%)	6(8%)	20
Post operative abdominal collection / paralytic ileus	10(13.33%)	0	10
Burst Abdomen	4(5.33%)	4(5.33%)	0
Faecal Fistula	1(1.33%)	0	0

Histopathological examination revealed that 81.33% of the patients had acute inflamed appendicitis, 11.33% patients had suppurative appendicitis. 7.33% had gangrenous appendicitis

Gangrenous and suppurative appendicitis was statistically in higher number of patients in perforated group than in non perforated group. Diagnostic yield of the smear microscopy in identifying the presence of organism.

Is 12.66 % Culture report and implications the pus aspirates from the appendicular stump was cultured in the routine culture media.

Table 10: Pus culture and sensitivity in studied cases.

No Of Pus aspirates	Results
28	No growth in culture
44	Organism identified

Diagnostic efficacy to isolate organisms on culture was 38.88 %. The organisms isolated from culture are given in table.

All patients were multiple antibiotics for a period ranging from 3 to 12 days. Patients having mild appendicitis on intraoperative evaluation were given Ciprofloxacin along with metronidazole. Moderate

to severe appendicitis patients were subjected to third generation cephalosporin along with aminoglycoside (garamycin or amikacin) with metronidazole Patients who have complicated appendicitis like perforated ones or in presence of gross intraabdominal sepsis choice of antibiotic was Ceftriaxone / ceftriaxone sulbactam / Piperacillin tazobactam With amikacin with metronidazole. Amongst the perforated group 25.33% of the patients were given piperacillin tazobactam and amikacin with metronidazole 66.67% of the patients were given III generation cephalosporin along with metronidazole and amikacin. Only 8 % could be managed with fluroquinolones and metronidazole On the contrary amongst the non perforated group 33.33% patients were managed by ciprofloxacin and metronidazole 60 % were managed by III generation cephalosporins and only a small number required higher antibiotic like piperacillin tazobactam (6.66%).

Table 11: The organisms isolated from the patients of appendicitis.

Culture pathogen	Perforated appendicitis	Non perforated appendicitis
E.coli	14	3
Pseudomonas	5	0
Klebsiella	6	0
Acinetobactor	10	0
Others	6	0
Total	41	3

Table 12: Antibiotics treatment in cases of appendicitis.

Antibiotic used	Perforated appendicitis Out of 75	Non Perforated appendicitis Out Of 75	Total N= 150
Group A ciprofloxacin + Metro	6 (8%)	25 (33.33%)	26 (17.33%)
Group B Cephalosprin i.e cefotaxim / ceftriaxone + amikacin +metro	50 (66.67%)	45 (60%)	95 (82.60 %)
Group C Piperacillin tazobactam / ceftriaxone with sulbactam + amikacin + metro	19 (25.33%)	5 (6.66%)	29 (19.33%)

Average duration of intravenous antibiotic therapy in Perforated group was 7.5 days and in non perforated group it was 3 days. Change of antibiotics was required in 16 patients (10.66%) out of which 9 belonged to the perforated group 7 belonged to the non perforated group. 27.2% patients (12 out of 44 culture positive patients) were given antibiotics on the basis of culture reports. The average duration of

hospital stay in perforated group was 8.8 days and in non perforated group was 3.1 days.

DISCUSSION

Acute Appendicitis is one of the most common surgical emergencies. Its clinical profile determines the need for emergent operative intervention. The duration of preoperative symptoms and intraoperative findings are direct determinants of patient outcome. Appendicitis is considered as a disease of adolescent age groups. In the present study , Maximum no of patients belonged to 2nd or 3rd decade of life (age group of 20-29 had 22.67% of patients and 30 -39 had 18.67% of patients)13% of patients were from age group of 11-20 & 7 % of the study population belonged to the age group of more than 70 years of age. In comparison with the study done by Hale et al where median age was 23 years the results of our study are comparable. It affects young adult male population more as compared to females. 63.33% of the patients in the study were males. 36.67 % of patients were females in the study .In the study proposed by Hale Et al 64% of the population was males and 36% were females.^[8] Duration of symptoms i.e abdominal pain, vomiting etc can vary from less than 24 hrs to more than 7 days. In patients with symptom duration less than 2 days maximum had acute inflamed but non perforated appendicitis (78.4% amongst patients with symptom duration upto 2 days). Patients with long duration symptoms who remain unattended untreated presents with signs of peritonitis (local or generalized) and sepsis. Patients who had perforated appendicitis when analyzed they were found to have symptom duration more frequently ranging from 3 - 5 days (34 out of 75 i.e 45.33%.) and 6-7 days (20 out of 75 i.e 26.67 %). These Observations are consistent with the study done by Korner et al which concluded that patients with appendicular perforation has higher symptom onset to presentation duration. similarly In a study conducted by David Olick et al Patients with nonperforated appendicitis reported an average of 22 hours of symptoms prior to presentation to the hospital, while patients with perforated appendicitis reported an average of 57 hours.^[9] Results of our study are comparable to both these studies described in literature. Fever and vomiting are present in almost equal number of patients in perforated as well as non perforated appendicitis.^[10] 115 out of 150 patients in the study presented with signs of localized peritonitis, 64 amongst them had perforated appendicitis (55.65 %). Generalized peritonitis was seen in 47 patients , 36 out of them had perforated appendicitis (76.59 %) which suggest a possibility of complicated appendicitis .Out of 19 patients known or detected diabetic in the study 12 had perforated appendicitis.(63.17%), 7 had acute non perforated appendicitis. . Alvarado Scoring system

was used in the study population.^[11] A very small number of patients have Alvarado score between 4,5 (3.33%) This indicates possibility of appendicitis (10) 40% of the patients have the score 6 or 7 . This represents high likelihood for appendicitis. 56.66% of patients had the Alvarado score as 8 or 9 . A high Alvarado Score amongst the study group indicates complicated, perforated appendicitis. Ultrasound findings of the patient are important clinical aid to confirm the diagnosis of acute appendicitis.^[12] Majority of the patients has probe tenderness on ultrasound evaluation this is sensitive but not specific of appendicitis [Figure 4].

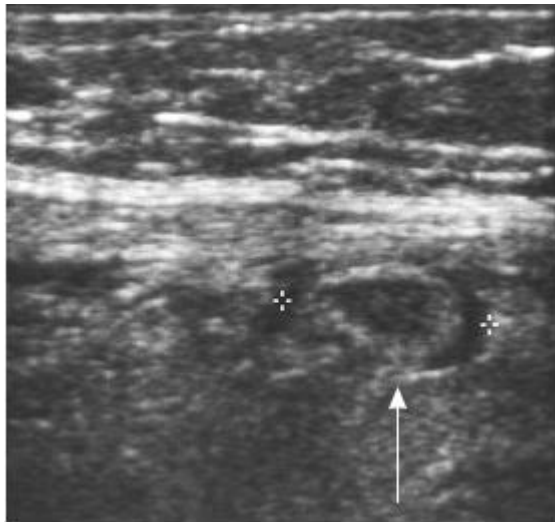


Figure 4: Grayscale ultrasound showing a peristaltic non-compressible appendix with omental edema suggestive of acute appendicitis.

It can be present in all clinical stages of appendicitis but may be absent in advanced stages with gross contamination. 78 % of the study patients had probe tenderness on ultrasound examination where as 67.33 % of patients had free fluid in the abdomen. Free fluid in the abdomen may be due to reactive inflammatory process or it may be secondary to accumulation of pus discharge and can rarely be due to faecal matter spillage . 4% of our patient had lump formation on ultrasound examination they were explored in view of clinical judgment. There is no statistical co relation between the ultra sound finding to differentiate patients with perforated and non perforated appendicitis. A clinical correlation is mandatory and increases the value if coupled with ultrasound examination . 15 out of 150 (10 %) of the patients were subjected to Computed abdominal tomography .wall thickening of caecum and appendix was seen in 12 patients (80 % of those who were subjected to CT Abdomen) . 5 Patients had evidence of extraluminal air. (33.33%) Multiple mesenteric lymphadenopathy was seen in 10 patients (66.67%) Free fluid in the peri-appendiceal areas was seen in 14 patients. The facts that extraluminal air and moderate or severe peri-appendiceal

inflammatory stranding are statistically significant independent predictors for appendiceal perforation are evident and corresponding to our study.^[13] It is also important to note that CT findings changes CT frequently changes management if the clinical diagnosis is indeterminate. In patients with uncomplicated appendicitis Mcburney's incision is the adequate approach for mobilisation of appendix, visualization of the base of the appendix.^[14] In complicated cases other approaches including a midline incision may be needed. In the present study 73% of patients were explored by a McBurney's Incision and 41 had perforated appendicitis. Right Para median incision was utilised in 10% of patients 16% of the patients were subjected to exploratory laparotomy by a midline incision out of which 75% of the patients had perforated appendicitis. The difference in patients explored by midline incision between perforated as well as non perforated group was found to be statistically significant (p value 0.0021). 77 (51.33%) patients had intrabdominal contamination. It was grade in three grades. Maximum patients in such patients had perforated appendicitis (56 out of 77 i.e 72.72 %) .The difference in perforated and non perforated groups in such patients was found to be statistically significant , (p value 0.03) . In perforated group 26 had mild contamination (46.42%), 22 had moderate (39.28%) contamination, 8 had severe contamination (14.28%) (25) Intraoperatively Maximum Number of appendix were retrocaecal (57.33%) Followed by pelvic (25.33%) followed by postileal (6.67%). There is no significant difference as compared with rate of perforation and the position of appendix. Appendectomy was the solution in 89.33% i.e 134 patients. The occurrence of perforation per se does not alter the surgical plan as the perforation occur at tip or distal to the obstruction caused by faecoliths. 11 patients underwent local resection of the adjacent bowel with primary anastomosis (14 out of 75 i.e 14 %), 4 underwent Right hemicolectomy with anastomosis (5.3%) . One patient required bowel exteriorisation in the form of a ileostomy. (1.3%). The rate of bowel resection required in patients with perforated appendicitis in our study is higher as compared with the study done by Perovic Z et al in 2000.^[15] 45.33 % of patients developed fever amongst the perforated appendicitis whereas 17.33% of patient had fever among the non perforated group. Wound infection was seen in 18.67 % of patients in perforated group And in 8 % of patients in non perforated group Post operative abdominal collection / paralytic ileus (13.33%) , Burst Abdomen(5.33%) , Faecal fistula (1.33%) . The difference in the complication frequency in perforated versus non perforated group was statistically significant. In the study done by Perovic Z this frequency is up to 15%, slightly less than our study.^[15] The average duration of hospital stay in perforated group was 8.8 days And in non perforated group was 3.1days. The pus

culture could isolate organisms in 38.88% of cases. The organisms isolated include Escherichia Coli (41.46%), pseudomonas (12.19%), klebsiella (14.63%), Acinetobacter (24.39%), others (14.63%). In the available literature In the study done by Perovic Z. Positive cultures were obtained from peritoneal swabs in (57%), of which all had pure growth of aerobes (Escherichia coli and Pseudomonas aeruginosa, mixed or pure). Histopathological examination done in these patients revealed that 81.33% of the patients had acute inflamed appendicitis 11.33% patients had suppurative appendicitis 7.33% had gangrenous appendicitis. Gangrenous and suppurative appendicitis was statistically in higher number of patients in perforated group than in non perforated group. Patients who have mild appendicitis on intraoperative evaluation were given Ciprofloxacin along with metronidazole. Moderate to severe appendicitis patients were subjected to III generation cephalosporin along with aminoglycoside (garamycin or amikacin) with metronidazole Patients who have complicated appendicitis like perforated ones or in presence of gross intraabdominal sepsis choice of antibiotic Cefrixone / ceftriaxone sulbactam / Piperacillin tazobactam With amikacin with metronidazole . A study done by Nadler Et al suggested a single drug higher antibiotic therapy for complicated appendicitis , but such a step lead to increased wound infection in our set of patients.^[16] The duration of antibiotic should be 3-5 days in non perforated group where as it is 7 -9 days in perforated group.

CONCLUSION

- Our study concluded that perforated appendicitis can be distinguished from non perforated appendicitis based on factors at the time of admission. Patients who presented with pain of two or more days' duration have a much higher incidence of perforation compared to the overall appendicitis Population.
- Age group commonly affected was between 21-30 years with a male predominance.
- Co-morbidities like diabetes mellitus increase the possibility of occurrence of perforation and subsequent complications.
- Alvarado score was found to be best preoperative determinant of appendicitis and can predict the likelihood of perforation in select cases .
- Ultrasound coupled with accurate clinical examination increases diagnostic accuracy of appendicitis, its complications and perforated nature. Computed tomography frequently changes management if the clinical diagnosis is indeterminate and is also important to determine the extent and nature of disease in perforated appendicitis.

- Mc Burney's incision was the preferred one in maximum no of cases of appendicitis, even in perforated cases with minimal contamination. Midline approach should be considered in severe complicated appendicitis with perforation with moderate to severe contamination. Fast and adequate surgical interventions followed by adequate antibiotic therapy successfully resolve the cases of perforated appendicitis.
- Perforation of appendix is associated with mild contamination in most of the cases but can be severe in gross peritonitis with perforation .The position of appendix does not seem to have any relation with the rate of perforated appendicitis. Appendectomy is the procedure of choice even in perforated appendicitis If Base is healthy. Patient with associated caecal involvement and gross contamination require local resection, hemicolectomy or exteriorisation.
- Hospital stay and complications like wound infection, Burst abdomen, Post operative collection/ileus are more with perforated group than non perforated.

REFERENCES

1. Kim SY, Lee KH, Kim K, Kim TY, Lee HS, Hwang SS, Song KJ, Kang HS, Kim YH, Rhee JE. Acute appendicitis in young adults: low- versus standard-radiation-dose contrast-enhanced abdominal CT for diagnosis. Radiology. 2011 Aug;260(2):437-45.
2. Cueto García J, Ribé Bello J, Giordiana LA, Cervantes Llaça C. [Morbidity and mortality of appendicitis]. Rev Gastroenterol Mex. 1977 Sep-Dec;42(3):126-38.
3. Körner H, Söndena K, Söreide JA, Andersen E, Nysted A, Lende TH, Kjelleveid KH. Incidence of acute nonperforated and perforated appendicitis: age-specific and sex-specific analysis. World J Surg. 1997 Mar-Apr;21(3):313
4. Livingston EH, Woodward WA, Sarosi GA, Haley RW. Disconnect between incidence of nonperforated and perforated appendicitis: implications for pathophysiology and management. Ann Surg. 2007 Jun;245(6):886
5. Fitzmaurice GJ, McWilliams B, Hurreiz H, Epanomeritakis E. Antibiotics versus appendectomy in the management of acute appendicitis: a review of the current evidence. Canadian Journal of Surgery. 2011;54(5):307-314.
6. Cueto García J, Ribé Bello J, Giordiana LA, Cervantes Llaça C. Morbidity and mortality of appendicitis. Rev Gastroenterol Mex. 1977 Sep-Dec;42(3):126-38.
7. Arnbjörnsson E. Some factors affecting perforation in acute appendicitis. Ann Chir Gynaecol. 1983;72(2):50-2. PubMed PMID: 6870159.
8. Hale DA, Molloy M, Pearl RH, Schutt DC, Jaques DP. Appendectomy: a contemporary appraisal. Ann Surg. 1997 Mar;225(3):252-61.
9. David Oliak., Dan Yamini, ., Vikram M. Udani, Roger J. Lewis, M.D., Hernan Vargas, M.D., Tracey Arnell, M.D., Michael J. Stamos, M.D. et al Can Perforated Appendicitis Be Diagnosed Preoperatively Based on Admission Factors? GASTRO SURG 2000;4:470-474.)
10. Hung MH, Lin LH, Chen DF. Clinical manifestations in children with ruptured appendicitis. Pediatr Emerg Care. 2012 May;28(5):433-5.
11. Adedeji OA. Alvarado score and acute appendicitis. Journal of the Royal Society of Medicine. 1992;85(8):508-509.

12. Mostbeck G, Adam EJ, Nielsen MB, et al. How to diagnose acute appendicitis: ultrasound first. *Insights into Imaging*. 2016;7(2):255-263.
13. Sharma M, Agrawal A. Pictorial essay: CT scan of appendicitis and its mimics causing right lower quadrant pain. *The Indian Journal of Radiology & Imaging*. 2008;18(1):80-89.
14. Switzer NJ, Gill RS, Karmali S. The Evolution of the Appendectomy: From Open to Laparoscopic to Single Incision. *Scientifica*. 2012;2012:895469.
15. Perović Z. [Drainage of the abdominal cavity and complications in perforating appendicitis in children]. *Med Pregl*. 2000 Mar-Apr;53(3-4):193-6
16. Nadler EP, Reblock KK, Ford HR, Gaines BA. Monotherapy versus multi-drug therapy for the treatment of perforated

appendicitis in children. *Surg Infect(Larchmt)*. 2003 Winter;4(4):327-33.

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