

Acute Appendicitis in Elderly Population a Study of the Various Risk Factors for Severity of Appendicitis

Article History
Received: 10.05.2022 Revision: 28.05.2022 Accepted: 12.06.2022 Published: 30.06.2022 Plagiarism check - Plagscan DOI: 10.47310/iarjmsr.2022.V03i03.02
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How to Cite the Article:
Samuel Kevin, Rai Rakesh A and Reshmina Chandni Clara Dsouza. Acute Appendicitis in Elderly Population a Study of the Various Risk Factors for Severity of Appendicitis. <i>IAR J. Med & Surg Res.</i> 2022;3(3):3-9.
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Abstract: Appendicitis in the elderly continues to be a challenging surgical problem. Being a potential life endangering pathology. It accounts for 5% of all acute abdominal condition in people aged more than 65 years .Mortality rates being 16 times more when compared to a young adult with appendicitis and complication rates like perforation being as high as to 70% as the disease presents with Vague symptoms and with a more virulent pathologic course that allows rapid progression of the disease which leads to delayed hospitalization, diagnosis, treatment and increased morbidity and mortality. **Material and Methods -** A 5 year retrospective cross sectional Chart review was done to collect information on patient's above 60 years of age who had undergone appendicetomy .Demographic data , clinical presentation ,delay in hospital arrival and co morbid condition ,usg and intra operative findings noted and analysed **Results:-** Out of 111 elderly patients, 71 males and 40 females with a mean age of 69.8 years, 88 had hypertension, 62 with diabetes , 19 ckd . 61 proved to have perforated appendicitis, 37 males and 24 females with significant delay in hospital arrival duration of 2-7 days .Perforation rates were increased in patients with multiple comorbidities (diabetes, hypertension,ckd) and delay in hospital arrival. **Conclusion:** A high index of suspicion is needed in elderly patients with acute abdomen to prevent misdiagnosis. Delay in presentation to the hospital and multiple comorbidities are the main risk factors associated with higher rates of appendicular perforation.

Keywords: Appendicitis, Vague symptoms, hypertension.

INTRODUCTION

Appendicitis in the elderly continues to be a challenging surgical problem. Being a potential life endangering pathology (Condon, R.E., & Acute appendicitis. 1986).

The high risk of morbidity and mortality are high in a elderly person with appendicitis the need to diagnose the condition is an challenge for the surgeons and delay in seeking medical attention is a contributing factor in the increase of complication rates (Hardin, D. 1999).

Inspite of detailed radiological modalities and imediate evaluation of these patients, appendicitis in elderly still has higher complication and mortality rates. For reasons being that diagnosis of acute appendicitis in elderly patients is difficult as there is no single diagnostic test that can

accurately diagnose appendicitis and requires serial abdominal examinations and can be one of the most challenging issues in surgery and the surgeon (Horattas, M.C. *et al.*, 1990).

Inspite of recent advances made in the treatment of Acute Appendicitis and the mortality rate being less than 1% in the general population the morbidity and mortality in elderly remains significant at 28- 60% and 10% respectively (Sheu, B. F. *et al.*, 2007; & Khalili, T. M. *et al.*, 1999).

The purpose of this study is to have a thorough knowledge about the role of comorbidities and delay in hospital presentation as risk factors for perforation appendix in elderly.

METHOD OF COLLECTION OF DATA:

This is a retrospective cross sectional descriptive study over a period of 5 YEARS Retrospectively from AUGUST 2020.

METHODOLOGY:

A 5 year retrospective Chart review will be done from the medical records department of Father Muller Medical College to collect information on patient's above 60 years of age who had undergone appendicetomy after approval of the Institutional Ethics Committee, and confidentiality was maintained.

A sample size of 111 was obtained from retrospective chart review of 5 year duration.

Inclusion criteria was Patient aged more than 60 years with a diagnosis of appendicitis.

Exclusion criteria were previous laparotomy and Perforation due to malignancy.

Diagnosis of acute appendicitis was made on the appearance of its wall, surrounding inflammation and edema with or without the presence of intra-abdominal free fluid.

Appendicitis was categorized into perforated or non-perforated based on intra operative findings and radiological investigations ie (free or contained perforation, abscess formation).

Open/ laproscopic appendectomy was done A comparison between them was made in regard to demographic data, clinical presentation, investigations. This time taken from the onset of symptoms to the time to reach the hospital was defined as patient delay, and complications to determine the risk factors for perforation of appendix.

Statistical analysis

The data were captured and stored in a database (Microsoft Excel® 2010). The variables were analyzed through descriptive statistics. Data regarding the study population was calculated and the results were plotted on a graph. The SPSS Statistics Version 20.0 software was employed to perform the statistical analysis.

RESULTS

A total of 111 patients above the age of 60 years with a diagnosis of acute appendicitis and underwent appendicetomy during the period between June 2015 to June 2020 were analyzed retrospectively. There were 71

males and 40 females with a mean age of 69.8 years (range 60-95 years).SD of 7.447

Of 111 patients, there were 88 patients of Hypertension (males-55, females -33), 67 patients of Diabetes mellitus (males -41, females -28), 19 patients of End stage renal disease (males-9, females -10) who had concurrent chronic medical diseases; (graph-1)

Out of 111 patients 61 proved to have perforated appendicitis, 37 males and 24 females. (graph -2) The incidence of perforated appendix was found to be higher in the age group i.e 71-80 yrs – 32 pts , when compared to the other age groups e 60-70 yrs – 24 pts,80-90yrs – 5 patients .(graph -3) The perforated group had a significantly longer Pre-hospital time delay than those in the non-perforated group. The duration of pain and time to present to the hospital was a minimum of 2 days and maximum of 7 days. The overall median duration of pain in the preadmission period was 5 days after the onset of abdominal pain. The study showed there were statistically significant differences between the two groups and also showed that Age and duration of pain is higher in perforated group compared to not perforated group and it is significant which implies that delay in hospital presentation is a risk factor for appendicular perforation (table 1 and 2)

The clinical presentation, the typical migratory pain that starts around the umbilicus and shifts later to the right lower abdomen was described only by 25 patients, patients in the non-perforated and 15 in the perforated group. But diffuse tenderness in the right lower abdomen was present 35 in the non-perforated compared to 40 in the perforated group (graph -4).

Out of the 88 patients with hypertension 57 patients had perforated appendix (males>females) on usg and intra operatively and was statistically significant with a p value of <0.001 (table 3, graph -5).

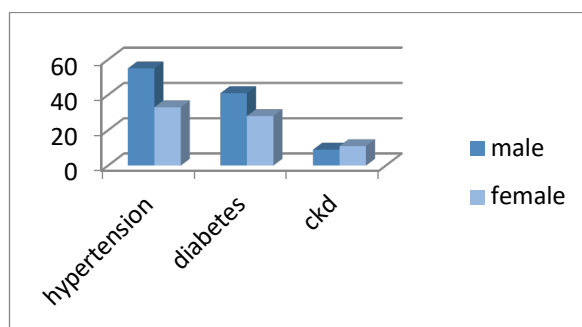
Similarly, out of the 68 patients with diabetes mellitus 52 patient had perforated appendix (males>females) and was statistically significant with p <0.001(table 4, graph -6).

Out of the 19 patients of end stage renal disease (females>males) all of the patients had perforated appendix intraoperatively (table 5, graph -7).

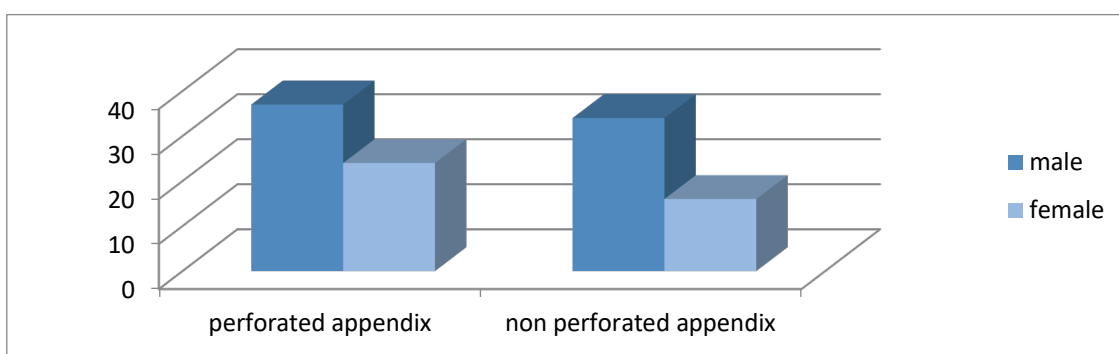
When data like age ,comorbidities , delay in hospital presentation and clinical findings were compared with the appendicular perforation rates it revealed that patients with increasing in age with delayed hospital presentation and with multiple comorbidities had higher rates of perforation of appendix ie out of the 61 patients with perforated appendix 33 patients were in the age group of 70-80 and 30 patients have presented to the

hospital 5-6 days after the onset of pain and more than 60-65 patients had multiple comorbidities at the time of presentation .Thus indicating that htn , dm, end stage

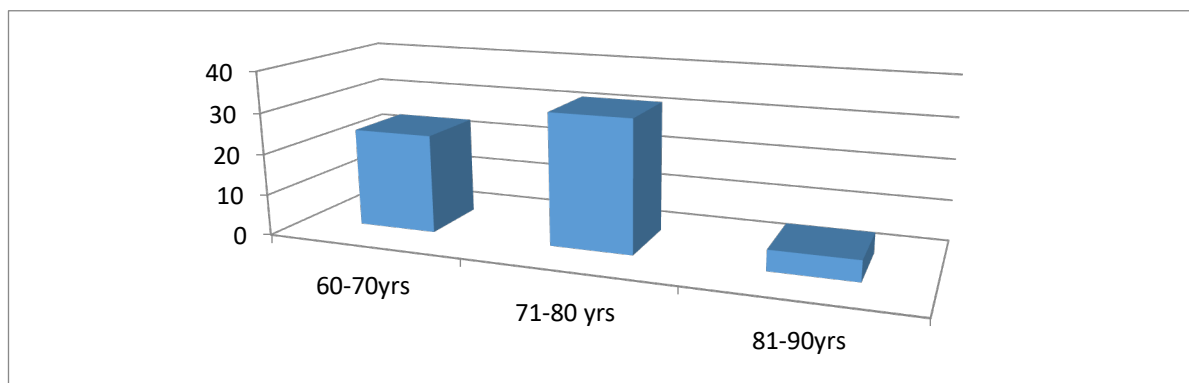
renal disease with increasing age and delay in presentation to the hospital play a vital role as risk factors of appendicular perforation in elderly patient.



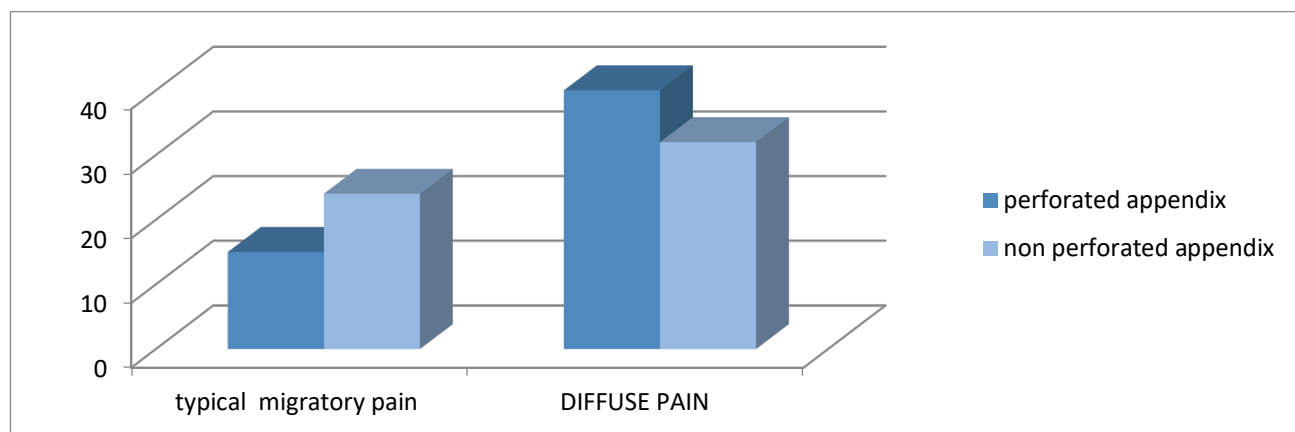
Graph -1 - Distribution of comorbidities in elderly males and females



Graph -2 – appendicular perforation rates sex wise



Graph -3- Appendicular perforation rate age group wise



Graph -4- Clinical feature (pain) in both perforated and non perforated group

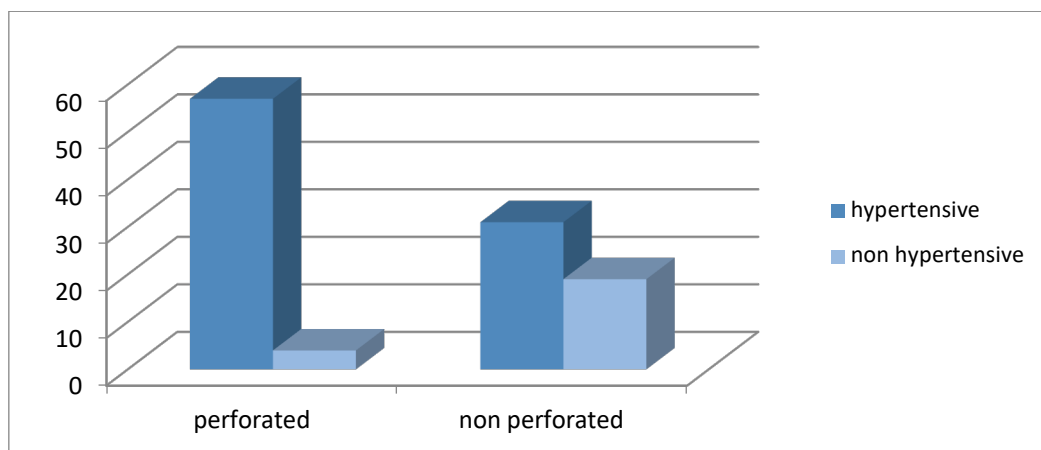
Table 1 appendix perforated		N	Mean	Std. Deviation	Std. Error Mean
Age	Yes	61	73.39	6.795	.870
	No	50	63.82	4.069	.575
Duration of pain	Yes	61	4.98	1.147	.147
	No	50	4.16	.889	.126

Table 2		t-test for Equality of Means			
		t	P	Mean Difference	95% Confidence Interval of the Difference
					Lower Upper
Age		9.177	.001	9.573	7.504 11.643
Duration of pain		4.155	.001	.824	.431 1.217

Age and duration of pain is higher in perforated group compared to not perforated group and it is significant

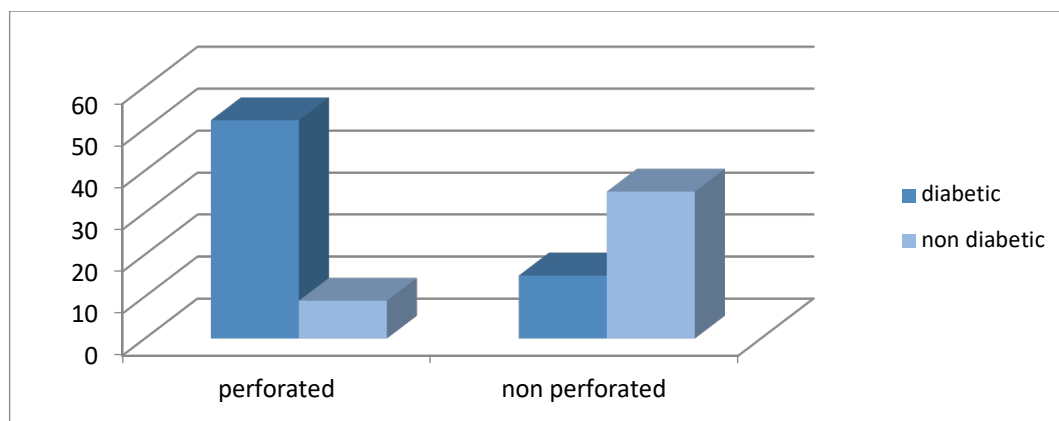
Table 3 appendix perforated * htn			htn		Total
			no	yes	
appendix perforated	Yes	Count	4	57	61
		% within appendix perforated	6.6%	93.4%	100.0%
	No	Count	19	31	50
		% within appendix perforated	38.0%	62.0%	100.0%
Total		Count	23	88	111
		% within appendix perforated	20.7%	79.3%	100.0%

Chi-Square= 16.537 P=0.001 There is association between appendix perforation and htn



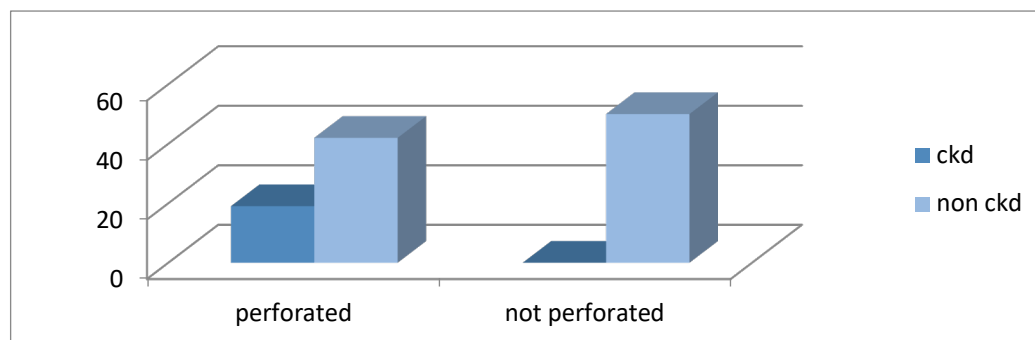
Graph -5 – appendicular perforation and hypertension

Appendix perforated * dm			Dm		Total
			No	yes	
appendix perforated	Yes	Count	9	52	61
		% within appendix perforated	14.8%	85.2%	100.0%
	No	Count	35	15	50
		% within appendix perforated	70.0%	30.0%	100.0%
Total		Count	44	67	111
		% within appendix perforated	39.6%	60.4%	100.0%
Chi-Square Tests		Value	P		
Pearson Chi-Square		35.051	.001		



Graph -6 –appendicular perforation and diabetes

TABLE 5 appendix perforated * ckd			Ckd		Total
			no	yes	
appendix perforated	Count		42	19	61
	% within appendix perforated		68.9%	31.1%	100.0%
	Count		50	0	50
	% within appendix perforated		100.0%	0.0%	100.0%
Total	Count		92	19	111
	% within appendix perforated		82.9%	17.1%	100.0%
Chi-Square Tests			Value	P	
Pearson Chi-Square			18.790	.001	



Graph 7- appendicular perforation rates and ckd

DISCUSSION

Acute appendicitis continues to be the commonest cause of surgical abdominal emergency. It was often considered to be the disease of the young but recent increase in life expectancy, the incidence of acute appendicitis has also increased in the elderly and is between 5-10%.

Diagnosis of acute appendicitis in elderly still remains a challenge due to specific physiological alterations, co morbidities and socio-behavioral factors. These factors affect the disease and the response to intervention. Due to the modification of neural mechanisms and diminished immune function and reduced T-cell function, autoantibodies levels are raised, bone marrow potency is reduced and the inflammatory response is dampened and leading to bacteremia (Khalili, T. M. *et al.*, 1999; & Cooper, G.S. *et al.*, 199; & Sheu, B. F. *et al.*, 2007).

Studies show that the vermiform appendix in elderly patient undergoes vascular sclerosis, narrowing of the lumen by fibrosis, the muscular layer is infiltrated with fat and there is a structural weakness with tendency towards early perforation and concurrent medication may further complicate this issue

The morbidity rate associated with acute abdominal pain increases with age, ie more than 60% over the age of 70- 80 years. This present study showed that rates of perforation were higher in males which was similar to a study done by Siripong Sirikurnpiboon and Suparat Amornpornchareon in 2015 in relation to risk factors, that male sex was significantly related to higher rates perforation (Storm-Dickerson, T. L., & Horattas, M. C. 2003; & Freund, H. R., & Rubinstein, E. 1984). A possible explanation for this is elderly males' culture of

reluctance to go to hospital, as found in a report by Sheu *et al.*, (2003).

The classical signs and symptoms which include nausea vomiting, migrating pain and localized tenderness is seen in less than half of the elderly patients (Condon, R.E., & Acute appendicitis. 1986; & Hardin, D. 1999). Elderly patients have a higher threshold to pain than young individuals as reported by Sherman and Robillard in 1960 that pain sensitivity decreased with age and the clinical scenario of Right lower quadrant pain is absent in 20-50% of these cases (Freund, H. R., & Rubinstein, E. 1984; & Eldar, S. *et al.*, 1997) and with age, the abdominal musculature decreases, and peritoneal irritation is less likely to manifest itself as guarding or rebound. It has been shown that approximately one-fifth of elderly patients do not even exhibit right lower quadrant pain (Augustin, T. *et al.*, 2011). The present study also had similar findings ie out of 110 patients only 40 presented as right lower quadrant pain. It is also explained by the fact that perforated appendix show poor localization of pain, more generalized lower abdominal tenderness and guarding.

The present study showed that the risk of perforation of appendix in the elderly population increased significantly when there was a delay to present to the hospital. Out of the 110 patients 60 patients had perforated appendix who presented to the hospital with an average of 4 days from the onset of pain. The incidence of appendiceal perforation is estimated to be in the range 32-72% in patients above 60 years of age (Augustin, T. *et al.*, 2011; & Singh, M. *et al.*, 2014). Perforation rates are high due to the delayed and atypical presentation, presence of comorbid diseases and to the age-specific physiological changes which were one of the main reason for the higher incidence rate of perforation of appendix seen in the elderly population. Augustin *et al.*, (1995) in their study reported that the risk of perforation increased 36 hours after onset of pain. A study by Singh *et al.*, (2000) also highlighted a significant association between perforated appendicitis and a duration of pain to admission of longer than 72 hours. Busch *et al.*, (2004) documented that a delay of more than 12 hours in presentation to the hospital was associated with a significant increase in the rates of perforation. study by C L Temple *et al* (1995) over a period of 6 month with 95 patients presenting with appendicitis concluded that patients with perforated appendix waited 2.5 times longer before reporting to the hospital (Körner, H. *et al.*, 1997).

CONCLUSION

A high index of suspicion is necessary especially in elderly age groups in cases of acute abdomen to prevent any misdiagnosis Acute appendicitis should be considered in the differential diagnosis. Elderly patients come with atypical and delay in presentation and later associated with higher rates of Morbidity and mortality rates especially in elderly with

multiple comorbidities like, diabetics, hypertensive, and end stage renal diseases.

Delay in presentation to the hospital and multiple comorbidities are the main risk factors associated with higher rates of appendicular perforation and post-operative complications. Therefore the treating physician should be aggressive in the diagnosis and treatment of acute appendicitis in elderly associated with high risk factors Emergency surgery and appropriate use of perioperative antibiotics can help in reducing the morbidity and mortality.

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