



AN OBSERVATIONAL STUDY OF OUTCOME OF CASES OF UNCOMPLICATED ACUTE APPENDICITIS OPERATED WITHIN 12 HOURS VERSUS AFTER 12 HOURS OF PRESENTATION

General Surgery

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ABSTRACT

Objective

- To minimize number of operations during the night.
- To evaluate ill effects of delaying appendectomy in acute appendicitis.

Study Design: Observational study

Setting: Tertiary care hospital **Patients:** In this study we have taken 250 cases of uncomplicated acute appendicitis which got operated at our study setting. Out of these, 125 patients were operated within 12 hours of hospital presentation and the other 125 patients were operated after 12 hours of hospital presentation. Among 125 patients of early group 68 patients were operated with open appendectomy and 57 patients were operated with laparoscopic appendectomy. Similarly, in late group, 46 patients were operated with open method and 79 patients were operated with laparoscopic method. **Results:** These results suggest that there is no significant difference between uncomplicated acute appendicitis operated within 12 hours or after 12 hours of hospitalisation when compared in terms of average duration of surgery, post-operative total leucocyte count, time to start feeding after surgery, hospital stay and complications. **Conclusions:** We can conclude that appendectomy for uncomplicated appendicitis can be delayed safely for more than 12 hours. Delayed appendectomy after hospitalisation for uncomplicated appendicitis does not increase the morbidity of the patient.

KEYWORDS

Acute Appendicitis, USG Abdomen

I. INTRODUCTION

Appendectomy for acute appendicitis is the most common non-elective procedure performed by general surgeons.¹ The first known appendectomy was performed in 1736 by Claudius Amyand.² In 1889, Charles McBurney published his landmark paper in the New York medical journal describing the indications for early laparotomy for the treatment of appendicitis.³ Eventually early appendectomy became the accepted standard of care with broad indication to prevent perforation. It has been over 100 years since Fitz presented his classic paper describing the clinical features of appendicitis and recommended early surgical removal of the inflamed appendix.⁴ It has generally been accepted that an appendectomy should be performed within a few hours of diagnosis and delay in the operation may lead to an increase in the morbidity.⁵⁻⁷ Negative appendectomy is undesirable because it increases operative morbidity and postoperative complications. Patients can suffer late complications such as stump appendicitis, intestinal adhesion related obstruction, intra-abdominal abscess. Prolonged work hours and sleep deprivation causes negative impact on clinical performance of a surgeon, which suggests limiting operations and procedures during night. In hospital administration of intravenous antibiotics before operation reduces chances of post-operative wound infection and decreases post-operative total leucocyte count. Taking appendectomy as a semi elective procedure reduces disturbance in operating room schedule, minimises number of operations done during night and improves cognitive and functional behaviour of the surgeon as there are decreased chances of sleep disturbance. Secondly, chances of wound infection and duration of hospital stay are less with semi elective appendectomy. In this study, we assess whether appendectomy for acute appendicitis can be safely delayed for 12 hours.

II. MATERIALS AND METHODS

The study is conducted under the department of general surgery in our tertiary care hospital on all patients of all age groups and gender, with uncomplicated acute appendicitis consenting to get operated for appendectomy.

The diagnosis of appendicitis was established on following parameters

- Clinical presentation which included
 - Pain in abdomen
 - Localized tenderness in right iliac fossa
 - Fever
 - Nausea and vomiting
- Contributory laboratory findings like total leukocyte counts
- Abdominal ultrasonographic confirmation of the diagnosis by

presence of inflamed appendix and/or peri-appendiceal fluid collection

- Intraoperative findings
- The diagnosis was confirmed by histopathological examination.

The following parameters were analysed

- Demographic information
- Clinical features
- Laboratory findings
- CT abdomen findings
- Correlation of histopathological report with ultrasonography findings

III. OBSERVATION AND RESULTS

In this study, 250 patients of uncomplicated acute appendicitis were included. Out of these 125 patients were operated within 12 hours of hospital presentation and the other 125 patients were operated after 12 hours of hospital presentation. Among 125 patients of early group 68 patients were operated with open appendectomy and 57 patients were operated with laparoscopic appendectomy. Similarly, in late group, 46 patients were operated with open method and 79 patients were operated with laparoscopic method.

The following data summarises the details of observations noted during the study. The results of the study are as follows

Table 1: gender distribution among patients of acute appendicitis

gender	number of patients	percentage
male	146	58.40%
female	104	41.60%

In our study, it is seen that occurrence of appendicitis is more in males as compared to females. The female: male ratio is 0.7: 1.0

Table 2: age wise distribution in patients of acute appendicitis (early group)

age group (years)	male	female	total
0-10	00	00	00
11-20	15	11	26
21-30	38	26	64
31-40	14	09	23
41-50	07	02	09
51-60	01	01	02
61-70	01	00	01
grand total			125

Table 3: age wise distribution in patients of acute appendicitis (late group)

age group (years)	male	female	total
0-10	01	00	01
11-20	17	12	29
21-30	36	31	67
31-40	09	07	16
41-50	03	01	04
51-60	05	02	07
61-70	01	00	01
grand total			125

Table 4: patient distribution according to open and laparoscopic group in both early and late group

		open group	laparoscopic group	total
early group	number of patients	68	57	125
	percentage	54.4%	45.6%	100%
late group	number of patients	46	79	125
	percentage	36.8%	63.2%	100%
total		114	136	250

Table 5: average duration before hospital admission in early group and late group (hours) $\pm$ SD with SE

	n	duration before hospital admission (hours)	SD	SE
early group	125	73.49	22.70	2.03
late group	125	80.71	20.08	1.79

Table 6: average duration from hospital admission to surgery (hours) in early group and late group $\pm$ SD with SE

	n	duration from admission to surgery (hours)	SD	SE
early group	125	6.36	2.14	0.19
late group	125	22.54	9.71	0.86

Table 7: average duration from onset to surgery in early group and late group (hours) $\pm$ SD with SE

	n	duration from onset to surgery (hours)	SD	SE
early group	125	79.85	22.72	2.03
late group	125	103.26	21.81	1.95

Table 8: average total leucocyte count (per cmm $\times$ 1000) on post-operative day 2 in early group and late group $\pm$ SD

	TLC (per cmm $\times$ 1000)	SD	P value
early group	9.62	3.28	0.08
late group	9.44	3.84	

Table 9: test of comparison for early and late group for both open and laparoscopic method regarding average duration of surgery (minutes)

	type of surgery	number of patients	duration of surger (minutes)	SD	P value	P value
					open group	laparoscopic group
early group	open	68	96.18	21.65	0.219	0.566
	laparoscopic	57	81.23	13.50		
late group	open	46	100	17.50		
	laparoscopic	79	82.22	12.72		

Table 10: test of comparison for early and late group for both open and laparoscopic method regarding average post-operative time to start feeding (days)

	type of surgery	number of patients	time to start feeding (days)	SD	P value	P value
					open group	laparoscopic group
early group	open	68	2.36	0.68	0.159	0.000
	laparoscopic	57	2.22	0.46		
					early group	late group
					0.001	0.005

late group	open	46	2.52	0.65			
	laparoscopic	79	1.83	0.46			

Table 11: test of comparison for early and late group for open and laparoscopic method regarding average post-operative hospital stay (days)

	type of surgery	number of patients	post-operative hospital stay (days)	SD	P value	P value
					open group	laparoscopic group
early group	open	68	4.74	1.61	0.22	0.89
	laparoscopic	57	2.81	0.54		
late group	open	46	5.19	1.40		
	laparoscopic	79	2.95	0.55		
					early group	late group
					0.000	0.000

Table 12: number of patients with post-operative complications in early and late group with type of surgery

	early group	late group	total	P value (early group)	P value (late group)
	open group	lap group		open group (early/late)	lap group (early/late)
post-operative complications					
pain	5	7	12	0.28	0.29
fever	8	10	18		
vomiting	6	5	11		
wound infection	13	5	18		
total	32	27	59		
				early group (open/lap)	late group (open/lap)
				0.04	0.23

I. DISCUSSION

We have conducted our study in all patients with uncomplicated acute appendicitis. Total 250 patients were enrolled in this study, 125 patients were taken as an early group who were operated within 12 hours of hospital presentation and other 125 patients were taken as a late group who were operated after 12 hours of hospital presentation. This discussion is based on observations and analysis of results which are based on incidence, demographic profile, clinical profile, pre-operative laboratory findings, duration from onset of symptoms to admission, duration from admission to surgery, duration from onset to surgery, average operative time, length of post-operative hospital stay, post-operative laboratory findings and post-operative complications.

Gender distribution:

In present study, men (58.4%) were more affected as compared to women (41.6%), suggesting that male have comparatively higher incidence of appendicitis than compared to female.

Age distribution:

In present study, most of the patients with appendicitis were from the 21-30 years age group followed by 11-20 years age group.

Duration before hospital admission:

73.49 hours $\pm$ 22.70 for early group and 80.71 hours $\pm$ 20.08 for late group, suggesting that there is significant difference (value of significance is 0.001 < 0.05) between average time taken before hospital admission for early and late group.

Duration from admission to surgery:

6.36 hours $\pm$ 2.14 for early group and 22.54 hours $\pm$ 9.71 for late group, suggesting that there is significant difference (value of significance 0.000 < 0.05) between average time taken from hospital admission to surgery regarding early and late group.

Duration from onset to surgery:

79.85 hours $\pm$ 22.72 for early group and 103.26 hours $\pm$ 21.81 for late group, suggesting that there is no significant difference (value of significance 0.200 > 0.05) between average time taken from onset of symptoms to surgery for early and late group.

Mean operative time:

In early group it is 96.18 minutes $\pm$ 21.65 for open method and 81.23 minutes $\pm$ 13.50 for laparoscopic method. In late group it is 100

minutes $\pm$ 17.50 for open method and 82.22 minutes $\pm$ 12.72 for laparoscopic method. The difference was statistically non-significant for open group with $P=0.219$ (early vs late) and laparoscopic group with $P=0.566$ (early vs late). The difference was found statistically significant for early group with $P=0.000$ (open vs laparoscopic) and for late group with $P=0.022$ (open vs laparoscopic). It suggests that there is no significant difference in average operative time for early and late groups for both open and laparoscopic methods. The results are more in favour of laparoscopic method as compared to open method in view of operative time.

Post-operative total leucocyte count:

Average total leucocyte count on post-operative day 2 for early group 9.62×1000 per cmm $\pm$ 3.28 and for late group it is 9.44×1000 per cmm $\pm$ 3.84. The difference was found statistically non-significant with the $P=0.08$ (early vs late), suggesting that there is no significant difference in average total leucocyte count on post-operative day 2.

Post-operative duration to start feeding:

Average time taken post operatively to start feeding in **early group** is 2.37 days $\pm$ 0.68 (open method) and 2.23 days $\pm$ 0.46 (laparoscopic method) and in **late group** it is 2.52 days $\pm$ 0.65 (open method) and it is 1.84 days $\pm$ 0.46 (laparoscopic method). The difference was found statistically non-significant with $P=0.159$ for open method (early vs late) and it was found statistically significant with $P=0.000$ for laparoscopic method (early vs late). The difference was found statistically significant when open and laparoscopic groups were compared ($P=0.001$ early group and $P=0.005$ late group). It suggests that there is no significant difference between average duration to start feeding post operatively for open group. There is significant difference between average duration to start soft diet for laparoscopic group as compared to open group. Suggesting that early feeding can be started when patients are operated with laparoscopic method as compared to open method. Overall results are better with laparoscopic method as compared to open method in view of starting early feeding.

Post-operative hospital stay:

In **early group** is 4.74 days $\pm$ 1.61 (open method) and it is 2.81 days $\pm$ 0.54 (laparoscopic method) and in **late group** it is 5.19 days $\pm$ 1.40 (open method) and it is 2.95 days $\pm$ 0.55 (laparoscopic method). The difference was found statistically non-significant with $P=0.22$ for open method (early vs late) and $P=0.89$ for laparoscopic method (early vs late). The difference was found statistically significant with $P=0.000$ for early group (open vs laparoscopic methods) and $P=0.000$ for late group (open and laparoscopic methods). It suggests that there is no significant difference regarding post-operative hospital stay for early and late groups for both open and laparoscopic methods. The hospital stay is less with laparoscopic method when compared to open method. Post-operative hospital stay is less with late group when compared to early group as more number of patients in late group were operated with laparoscopic method than open method.

Post-operative complications

In present study, post-operative pain, fever, vomiting and wound infection are considered as post-operative complications. Incidence of fever was more in late group as compared to early group while incidence of vomiting was same for both groups.

While incidence of pain and wound infection was more with early group than compared to late group.

Total numbers of complications were more with early group compared to late group. In early group 68 patients were operated with open method and 57 patients were operated with laparoscopic method. While in late group 46 patients were operated with open method and 79 patients were operated with laparoscopic method. It suggests that number of patients operated with laparoscopic method in late group is more which supports less wound infection in late group.

The difference was found statistically insignificant with $P=0.28$ for open group and $P=0.29$ for laparoscopic group. The difference was found statistically significant with $P=0.04$ when open and laparoscopic methods were compared for early group. The difference was found statistically insignificant with $P=0.23$ when open and laparoscopic methods were compared for late group. It suggests that there is no significant difference between complications for early and late group. The results suggest that laparoscopic method is more beneficial in view of avoiding complications for early group such as

wound infection. While for late group both the methods were found similarly efficient in view of complications.

II. CONCLUSION

The present study concluded that incidence of appendicitis is more in men as compared to women and most of the patients are from 21-30 years of age group. The results suggest that for mean operative time there is no significant difference when early and late groups are compared with both open and laparoscopic method. There is significant difference between open and laparoscopic method in both early and late groups regarding mean operative time as the results are better with laparoscopic method when compared to open method. The operative time is less with laparoscopic method when compared to open method.

There is no significant difference between early and late group when compared for average total leucocyte count on post-operative day 2.

It suggests that with open method, there is no significant difference between early and late group to start feeding. There is significant difference between early and late group when patients are operated with laparoscopic method. This suggests that early feeding can be started in laparoscopic group when compared to open group.

The difference is significant when open and laparoscopic methods are compared regarding post-operative time to start feeding in both early and late group. The results are better with laparoscopic method as compared to open method in view of starting early feeding after surgery. It suggests that the difference is not significant when early and late group are compared with both methods regarding initiation of post-operative feeding.

The results show significant difference when laparoscopic method is compared to open method in both early and late groups regarding post-operative hospital stay. Laparoscopic method showed less hospital stay when compared to open method.

The total numbers of complications were more with early group as compared to late group in both open and laparoscopic methods. The incidence of fever was more in late group as compared to early group while incidence of vomiting was similar in both groups. The incidence of pain and wound infection was more with early group than compared to late group. More number of patients were operated with laparoscopic method in late group as compared to open group. The results suggest that there is no significant difference in post-operative complications between early and late groups with both the methods.

Overall complications are less with laparoscopic method as compared to open method in early group. For late group, both open and laparoscopic methods were found similarly safer with no significant difference in incidence of post-operative complications.

These results suggest that there is no significant difference between uncomplicated acute appendicitis operated within 12 hours or after 12 hours of hospitalisation when compared in terms of average duration of surgery, post-operative total leucocyte count, time to start feeding after surgery, hospital stay and complications. We can conclude that appendectomy for uncomplicated appendicitis can be delayed safely for more than 12 hours. Delayed appendectomy after hospitalisation for uncomplicated appendicitis does not increase the morbidity of the patient.

III. REFERENCES

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