

## SIMPLE LIGATION VERSUS STUMP INVAGINATION DURING APPENDICECTOMY-A PROSPECTIVE TRIAL

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### ABSTRACT

A prospective, randomized trial on 416 consecutive cases of appendicectomies was carried out in which half of the cases had simple ligation of the stump and the rest had invagination of the stump in addition. The two groups were matched for age, sex, state of personal hygiene and nutrition. The incidence of wound infection, and early and late post-operative complications remained comparable between the two groups. However, the mean operating time was significantly less in case of simple ligation. Barium enema in suspected cases of caecal neoplasm in post-operative cases did not reveal any caecal deformity in the group of simple ligation thus avoiding confusion of mistaking deformed caecum due to the invaginated stumps as neoplasm. Simple ligation of the appendiceal stump is therefore advocated during appendicectomy.

*MJIRI, Vol. 4, No. 1, 21-23, 1990*

### INTRODUCTION

Appendicectomy remains the commonest operation performed in general surgical units world wide. In Pakistan, like most other third world countries this procedure occupies well over 50% of all the emergency surgical load. Mostly, appendicectomies are performed by junior and relatively inexperienced colleagues of the surgical team. Therefore, any simplification of the technique, which does not exaggerate the postoperative complications and saves valuable time, is of paramount significance. Invagination of appendiceal stump after ligation of the base has been described as standard procedure in text books of surgery.<sup>1,2</sup> In some centres even double invagination by purse string or Z-stich is customary.<sup>3</sup> Although historically, the practice of simple ligation of the stump only is traceable as far back as a century ago,<sup>4,5</sup> the

majority of the surgeons still remain sceptical towards this technique on the assumption that bare ligation of the stump may lead to an increased rate of postoperative wound infection or other complications like intestinal obstruction due to adhesion formation.<sup>3</sup> However, over the past two decades some of the investigators in the West after conducting retrospective and prospective trials tried to prove this assumption otherwise.<sup>3,6,7</sup> There is no literature on such trials available in the third world. Thus, the present prospective randomized trial was conducted in the surgical B unit of Civil Teaching Hospital, Abbottabad in order to compare early and late complications in general, in addition to wound infection and mean operating time between the two groups.

Table I. Age and sex distribution of 416 patients

Technique	Mean Age(Range)	Females	Males
Simple Ligation	27(15-70)	96	112
Invagination	23(15-60)	102	106

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## Simple Ligation In Appendicectomy

Table II. Wound infection in ligation and invagination groups

Grade of Pathology	Total No of cases	Ligation		Total No of cases		Invagination	
		With Gross Infection				With Infection	
		No	%	No	%	No	%
Catarrhal	61	5	8.2	46	3	6.5	
Phlegmonous	59	4	6.8	77	7	9.1	
Gangrenous	21	8	38.1	32	8	25.0	
Perforated	15	7	46.7	21	10	47.6	
Interval Appendicectomy	20	3	15.0	22	2	9.1	
Normal	32	2	6.25	10	1	10.0	
<b>Total</b>	<b>208</b>	<b>29</b>	<b>13.9</b>	<b>208</b>	<b>31</b>	<b>14.9</b>	

### MATERIAL AND METHODS

Patients on admission were randomly allocated to one of the two groups (i.e. simple ligation and invagination group) after matching their age groups, sex, status of hygiene and nutrition. All patients were given one antibiotic injection (i.e. any of the second generation cephalosporins) one hour prior to surgery. Selection of the operator was according to routine of the unit and availability of the surgeon on duty. Gridiron muscle splitting incision was used as standard procedure. Stump was ligated with chromic catgut in all the cases and cleaning of the stump was carried out with available antiseptic solution.

Invagination was carried out with the help of chromic catgut in the other group either by purse string or Z-stitch technique. Appendices were subjected to histopathological study in addition to gross examination in order to assess the severity of pathology. Operating time was measured from skin incision to the skin stitch and was

operating team to avoid prejudicial hurry by the surgeon in completing the procedure. All wounds were inspected on the 4th postoperative day and again at the time of discharge. Pus discharge from subcutaneous and subfascial planes spontaneously or on deliberate incision was taken as positive wound infection. Unexplained pyrexia over 37.5°C for more than two consecutive days was observed in addition to other early and

Table III. Comparative wound infection in different age groups

Age Groups (Years)	Simple Ligation		Invagination	
	No. of Infected Cases	%	No. of Infected Cases	%
15-34	126	14(11.1)	113	11(9.7)
35-49	62	11(17.7)	69	15(21.7)
50+	20	4(20.0)	26	5(19.2)

Table IV. Comparative wound infection following appendicectomies by surgeons of different experience.

	Simple Ligation			Invagination		
	Cases	Infected		Cases	Infected	
		No	%		No	%
House Surgeons	72	15	20.8	76	14	18.4
Registrars	120	14	11.7	112	14	12.5
Consultants	16	0	0	20	3	15.0

late postoperative complications. Patients were intermittently followed up for up to six months and after that they were told to report only if any untoward complication arose postoperatively. Barium enema was done only in required cases. Z-test was used to determine the significance of the proportions while t-test was applied to determine the difference between the two means. P value less than 0.05 was considered as significant.

### RESULTS AND CONCLUSIONS

All 416 patients completed the trial, 208 in each group. Age and sex distribution is given in Table I. The overall rate of infections were 13.9% in the simple ligation group and 14.9% in the invagination group, the difference between the two groups not being statistically significant. Detailed comparison according to gradation of pathology is given in Table II. The incidence of wound infection was observed to be less in the 15-34 year old group. (Table III). The comparison of the incidence of wound infection among three classes of surgeons according to their experience is presented in Table IV. Significant difference was observed in the

Table V. Comparison of postoperative complications between the groups.

Complications	Simple Ligation		Invagination	
	No	%	No	%
<b>EARLY COMPLICATIONS</b>				
Unexplained Pyrexia (> 37.5°C)	13	54.2	9	39.1
Intra abdominal Abscesses	6	25.0	7	30.4
Paralytic Ileus (Unexplained)	3	12.4	4	17.4
Faecal Fistula	1	4.2	3	13.1
Pylephlebitis	1	4.2		
<b>LATE COMPLICATIONS</b>				
Intestinal Obstruction	6	37.5	5	35.7
Persistent RIF	7	43.7	5	35.7
Induration & Pain				
Incisional Hernia	3	18.4	4	28.6

comparable results between house surgeons and their senior colleagues ( $p < 0.01$ ). Early and late complications occurring within one year of the follow up, was also compared (Table V). The mean operating time for simple ligation and invagination groups was recorded as  $30 \pm 9.78$  and  $36 \pm 12.46$  minutes respectively. The difference is highly significant ( $p < 0.001$ ). Thus to conclude, simple ligation of the appendiceal stump during appendectomy is proved to be a simple technique and less time consuming. However, the incidence of postoperative complications was observed to be the same. Furthermore, it prevents caecal deformation which may lead to occasional confusion with caecal neoplasm on barium study. Simple ligation of the stump is therefore recommended as standard technique during appendectomy.

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#### Editorial Comment:

*This article once again confirms the previously proven fact that burying the appendiceal stump by purse-string suture is unnecessary, even in adverse conditions in which the infection rate in simple appendectomies is as high as 14-15%.*

*We intentionally accepted this article for print to show our colleagues that no matter what the conditions are, you can still manage to perform a decent research work.*

*Mohammadreza Kalantar Motamedi, MD, FACS*