

Comparison Study between Laparoscopic and Open Colorectal Surgery

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Abstract: Background: Initial reports of laparoscopic and laparoscopic-assisted colon surgery for both benign and malignant disease first appeared in 1991. Since then, laparoscopic colon resection has been successfully performed for the treatment of a wide spectrum of disease processes of the large bowel. **Objective:** To detect the use of laparoscopy and its value in colorectal surgery in comparison with open methods of colorectal surgery. **Patient and Methods:** This is a prospective study of 100 patients who underwent elective colo-rectal surgery (open and laparoscopy) done in Baghdad Teaching Hospital in the third surgical unit, conducted during the period from (1st January, 2019-1st December, 2024) and followed up for 30 days postoperatively. Patients who underwent elective colo-rectal surgery were grouped into open and laparoscopic and analyzed according to: age, gender, body mass index, type of surgery (open or laparoscopic), indication for surgery, duration of surgery. **Results:** Age and gender: no statistically significant difference in age and sex distribution, BMI: High statistical significance difference in the mean BMI among laparoscopic when compared with open, time of hospital stay and follow up of patients: the Laparoscopic patients record shorter period of hospital stay and have shorter period at follow up time when compared with open patients. **Conclusion:** Laparoscopic procedure is less invasive, less local complications and shorter hospital stay than that in the open surgery group. Laparoscopic procedure has better improvement of bowel movement, pass flatus and oral intake. Open surgery has relatively shorter operation period than laparoscopy. Laparoscopy was safe as lower rate of local infection and mortality than open method.

Keywords: Laparoscopic colorectal.

INTRODUCTION

Colorectal surgery is performed for a wide variety of conditions, including neoplasm (benign and malignant), inflammatory bowel disease, and other benign conditions. Although the indication and urgency for surgery will alter some of the technical details, the operative principle of colorectal resection, anastomoses and use of ostomies are well established.

Colectomy: (open and laparoscopic) variety of terms are used to describe different types of colectomy:

- Ileocolic resection: describes limited resection of terminal ileum, cecum and appendix.
- Right colectomy.
- Extended right colectomy.
- Transverse colectomy.
- Left colectomy.
- Extended left colectomy.
- Sigmoid colectomy.
- Total and subtotal colectomy.
- Procto colectomy.
- Anterior resection.
- High anterior resection.
- Low anterior resection.
- Abdominoperineal resection.

The mesenteric clearance technique dictates the extent of colonic resection and is determined by

the nature of primary pathology (malignant or benign), the intent of resection (curative or palliative), the precise location of primary pathology and the condition of mesentery (thin and soft or thick and indurated). In general, a proximal mesenteric ligation will eliminate the blood supply to a greater length of colon and require a more extensive colectomy. Curative resection of a colorectal cancer is usually best accomplished by performing a proximal mesenteric vessel ligation and radical mesenteric clearance of the lymphatic drainage basin of the tumor site. (Mary, R. *et al.*, 2019)

Appropriate case selection is an essential component of surgical practice and this remains true for laparoscopic colorectal surgery. Inappropriate selection of patients is likely to result in an increased rate of complications and conversion to open procedures. A number of factors have been identified that influence the likelihood of conversion to an open procedure. Body mass index (BMI), ASA score, surgeon experience, type of resection (left more difficult than right), and presence of intra-abdominal abscess, or enteric fistula have all been shown to be important factors influencing likelihood of conversion. (Conor, P. *et al.*, 2014).

Laparoscopic colon resection are being performed with increasing frequency all over world, though the use of minimal access surgery in colorectal surgery has lagged behind its application in other surgical fields. Since the first laparoscopic colectomy was described in 1991, a great deal of controversy has surrounded its use, particularly in the management of colorectal cancer. (Mishra, R. K. 2013)

Currently, laparoscopic method has not been regard as the gold standard in the colorectal surgery yet, nevertheless, it has been suggested an alternative to the open surgery in numerous researches although some surgeons have described it as hand-help surgery because of the incision made to remove the specimen. (Deneyimimiz, L. K. C., & Sonuçlarımız, K. D. 2016).

Aim of Study:

This study compared the effectiveness of open vs laparoscopic surgeries in regards of feasibility and post- operative complications to be suitable for routine clinical practice also to detect the use of laparoscopy and its value in colorectal surgery in comparison with open methods of colorectal surgery.

Laparoscopic procedure is less invasive, less local complications shorter hospital stay than that in the open surgery group, Laparoscopic procedure have better improvement of bowel movement, pass flatus and oral intake, Laparoscopy was safe as lower rate of local infection and mortality than open method.

PATIENTS AND METHODS

The study has been conducted in the 3th floor of Baghdad Teaching Hospital.

This is prospective study for patients under went elective colo-rectal surgery (open and laparoscopy) done in Baghdad teaching hospital in the third surgical unit, conducted during the period from (1st January.2019-1st December. 2024) and followed up for 30 days postoperatively.

Patients who underwent elective colo-rectal surgery were grouped open and laparoscopic and analyzed according to: age, gender, body mass index, type of surgery (open or laparoscopic), indication for surgery, duration of surgery, postoperative follow up (bowel sound, pain score, hospital stay and complication local or systematic) explained to patients and an informed consent taken.

Operation done by Oncological Surgical team.

Exclusion criteria

- The pediatric age group less than 14 years according to MOH rule.
- Emergency cases
- Conversion cases from laparoscopic to open procedure.
- Advance colorectal carcinoma.

Surgical procedure:

- **Pre-operative:** mechanical bowel preparation was undertaken for all patient using colocolon for two days .
- Pre-operative antibiotics (oral metronidazole tab 500mg three times daily and oral cefixime capsule 400mg once daily) was given for 2 days.
- **Perioperative:** mechanical thromboprophylaxis was performed with elastic stocking with Enoxaparine 4000 unit subcutaneous 30 minutes preoperatively.
- All patient take general anesthesia, nasogastric tube and foleys catheter were inserted, patient in supine position with endotracheal tube.
- Operation done by Oncological Surgical team open procedure midline incision was done while in laparoscopic procedure after achieving pneumoperitoneum (12 mmhg), 4 to 5 incision in the anterior abdominal wall done according to the type of operation, both open and laparoscopic procedure same principle of surgery: mobilization of the colon using medial to lateral approach, devascularization of the bowel by controlling the major vessel by using vascular stapler (hemoclip) and harmonic vessel sealing system or Ligasure®. Dividing bowel done by using Covedian® staplers, in open procedure specimen delivered outside with protection the wound while in laparoscopic procedure with protection the wound during specimen retrieval (the bowel extracted by enlarging one of the port sites), and completion of the anastomosis (either intra- or extracorporeal) using either liner or circular staplers. Diverting stoma not routinely performed, intraabdominal drains was routinely used.
- **Postoperative:** close follow up of the patients, encouraging early mobilization with removal of urinary catheter when the patient became fully mobilized, oral intake was resumed when the bowel sound return to normal, antibiotics continued in an intravenous route for 3

postoperative days and Enoxaparin prophylaxis for 7 days postoperatively.

- **Discharge:** patients discharged when fully mobilized, resume full oral diet, free of pain,

pass flatus and motion with normal vital signs. Patients followed up in an outpatient clinic in the 10th and 30th postoperative days.

Patient no :	
Age :	Gender : BMI :
TYPE OF SURGERY :	
SITE OF TUMOR :	
TIME OF HOSPITAL STAY :	days
COMPLICATIONS :	
A) LOCAL COMPLICATIONS :	
BLEEDING :	
Injury to others organs ;	injured organ :
Wound complications ;	
Seroma	Dehiscence
Infection	
Abdominal collection :	Bowel sound
Intestinal leak :	Orally intake
B) Systemic complication	Pain score
Chest infection	
PE :	DVT :
Cardiac ischemia :	Death :
Operation Peroid :	

Figure 1: Questionnaire that filled by surgical team for data collection.

RESULTS

This is prospective study of 100 patients under went elective colo-rectal surgery (open and laparoscopy) done in Baghdad teaching hospital in the third surgical unit, conducted during the period

from (1st January. 2019-1st December. 2024) and followed up for 30 days postoperatively.

The results in (Table 1) show the mean age of Laparoscopic surgery is 51.38 years mean while open colorectal surgery is 54.28 years mean with non-statistical significance ($p=0.416$).

Table 1: Descriptive statistics of age in study groups.

	Type		P value
	Laparoscopy	open	
Age(years)	51.38±15.27 (17-78)	54.28±17.19 (17-90)	0.416 ^{NS}

Data presented as mean ± Standard deviation (minimum- maximum), NS: none statistical significance (p>0.05).

Regarding Gender distribution in both groups, the results in (Table 2) show none statistical significant difference in gender distribution

(p=0.423). Female was 29 (58%) in Laparoscopic while 24 (48%) in open.

Table 2: Descriptive statistics of Gender distribution in study groups.

		Type			
		Laparoscopy		Open	
		Count	%	Count	%
Gender	Female	21	42.00%	26	52.00%
	Male	29	58.00%	24	48.00%
p value		0.423 ^{NS}			

Data presented as mean ± Standard deviation (minimum- maximum), NS: none statistical significance (p>0.05).

The results in (Table 3) show that there is high statistical significant difference (p<0.001) in the

mean BMI among Laparoscopic mean (29.24) when comparing with Open mean (22.74).

Table 3: Descriptive statistics of body mass index in study groups.

	Type		P value
	Laparoscopic	Open	
BMI	29.24±6.13 (17-42)	22.74±2.83 (18-28)	<0.001**

Data presented as mean ± Standard deviation (minimum- maximum)
**: High statistical significance (p<0.001).

The results in (Table 4) showed the Laparoscopic patients record shorter period of hospital stay mean (5.4 days) when compared with Open group

patients mean (7.1 days) with high statistical significant difference (p<0.001).

Table 4: Descriptive statistics of time at hospital stay in study groups.

	Type		P value
	Laparoscopic	Open	
Time in days	5.4±1.85 (3-10)	7.10±2.25 (4-15)	<0.001**

Data presented as mean ± Standard deviation (minimum- maximum)
**: High statistical significance (p<0.001).

The results in (Table 5) showed that Laparoscopic patients have shorter period than those with open procedure. Regarding bowel sounds mean (43.2 hrs.) compared with mean (58.56 hrs.) in open patients, Pass flatus is (49.44 hrs.) in Laparoscopic

procedure compared with mean (60 hrs.) in open group and oral intake is mean (44.16 hrs.) in Laparoscopic compared with open group mean (60.96 hrs.).

Table 5: Descriptive statistics of follow up parameters in study groups.

	Type		P value
	Laparoscopic	Open	
Bowel sound (hours)	43.2±16.08 (24-72)	58.56±13.85 (24-96)	<0.001**
Pass Flatus (hours)	49.44±16.38	60.00±13.93	<0.001**

	(24-72)	(24-96)	
Oral intake (hours)	44.16±17.05 (24-72)	60.96±13.89 (24-96)	<0.001**

Data presented as mean ± Standard deviation (minimum- maximum)

** : High statistical significance (p<0.001).

Pain score is assessed post operatively to determine patient compliance for each procedure in this study. (Table 6) show the mean of pain score is (3.73) ranged from (2-8) in Laparoscopic

procedure compared with high significant, high pain score in open procedure mean (7.16) range from (3-9).

Table 6: Descriptive statistics of post-operative pain score in study groups.

	Type		P value
	Laparoscopic	Open	
Pain Score	3.74±1.01 (2-8)	7.16±1.25 (3-9)	<0.001**

Data presented as mean ± Standard deviation (minimum- maximum)

** : High statistical significance (p<0.001).

Regarding operation time in hours. the results in (Table 7) show that Laparoscopic procedure have

significant longer duration mean (4.7) hrs. than those done by open procedure mean (3.7) hrs.

Table 7: Descriptive statistics of operation time in study groups.

	Type		P value
	Laparoscopic	Open	
Time of operation (hours)	4.70±0.86 (3-7)	3.73±1.14 (2-10)	<0.001**

Data presented as mean ± Standard deviation (minimum- maximum)

** : High statistical significance (p<0.001).

The results in (Table 8) show the occurrence of local complications. However, the most prominent local complication is wound infection it is recorded that 27 (54%) patients undergone open

procedure have developed wound infection compared with 12 (24%) done by Laparoscopic procedure (p=0.003). Other local complications were few in both groups.

Table 8: Descriptive statistics of local complications in study groups.

Local complications		Type				P value
		Laparoscopic		Open		
		Count	%	Count	%	
Bleeding postoperative	No	48	96.00%	50	100.00%	0.494 ^{NS}
	Yes	2	4.00%	0	0.00%	
Injury intraoperative	No	49	98.00%	50	100.00%	0.999 ^{NS}
	Yes	1	2.00%	0	0.00%	
Seroma	No	48	96.00%	49	98.00%	0.999 ^{NS}
	Yes	2	4.00%	1	2.00%	
Dehiscence	No	46	92.00%	50	100.00%	0.117 ^{NS}
	Yes	4	8.00%	0	0.00%	
Infection (wound infection)	No	38	76.00%	23	46.00%	0.003*
	Yes	12	24.00%	27	54.00%	
Abdominal Collection	No	49	98.00%	50	100.00%	0.999 ^{NS}
	Yes	1	2.00%	0	0.00%	
Intestinal Leak	No	48	96.00%	50	100.00%	0.494 ^{NS}
	Yes	2	4.00%	0	0.00%	

Data presented as frequency and percentage.

NS: none statistical significance (p>0.05)

*: statistical significance (p≤0.05).

The results in (Table 9) showed occurrence of systemic complications in patients undergone both procedures. However, the most frequent complication was chest infection with relatively same frequency as occurred in Laparoscopic 19 (38%) and Open is 21 (42%) with none statistical

significance ($p=0.838$). Cardiac ischemia was recorded in one case with Laparoscopic and one case with open have been died. No pulmonary embolism nor deep venous thrombosis were recorded after both procedures.

Table 9: Descriptive statistics of systemic complications in study groups.

Systemic complications		Type				P value
		Laparoscopic		Open		
		Count	%	Count	%	
Chest Infection	No	31	62.00%	29	58.00%	0.838 ^{NS}
	Yes	19	38.00%	21	42.00%	
Pulmonary embolism	No	50	100.00%	50	100.00%	-
	Yes	0	0.00%	0	0.00%	
Deep venous thrombosis	No	50	100.00%	50	100.00%	-
	Yes	0	0.00%	0	0.00%	
Cardiac Ischemia	No	49	98.00%	50	100.00%	0.999 ^{NS}
	Yes	1	2.00%	0	0.00%	
Death	No	50	100.00%	49	98.00%	0.999 ^{NS}
	Yes	0	0.00%	1	2.00%	

Data presented as frequency and percentage.

NS: none statistical significance ($p>0.05$).

The result in (Table 10) most common Type for both laparoscopic & open procedures was Anterior resection 22 patients in laparoscopy (44%) and 14 patients in open (28%) while the least indication

was Right hemicolectomy (3 patients (6%)) in laparoscopy and total colectomy for open methods (5 patients (10%)).

Table 10: Types for colorectal procedures.

Procedure	Open		Lap.		Total	
	No.	%	No.	%	No.	%
Right Hemicolectomy	11	22	3	6	14	14
Left hemicolectomy	13	26	11	22	24	24
Total Colectomy	5	10	9	18	14	14
Anterior resection	14	28	22	44	36	36
APR	7	14	5	10	12	12
Total	50	100	50	100	100	100

The results in (Table 11) showed that time of operation were significantly lower in open procedures compared with laparoscopic operations for all indications, when it comes to bowel sounds & bowel sounds were significantly earlier in

laparoscopic left hemicolectomy and right hemicolectomy when compared with open procedures ($p=0.001$ and 0.014) respectively. But there was no significant changes for other indications.

Table 11: Comparison of operative time & presence of bowel sounds between Laparoscopic and open method according to different indications.

Type of Surgery	Operation Time (hours).			Bowel Sounds (hours).		
	Lap.	Open	P.V.	Open	Lap.	P.V.
Right hemicolectomy	4.73±0.9 (3-6)	3.64±0.45 (3-4)	0.002	39.27±16.18 (24-72)	63.27±12.11 (48-72)	0.00Ω
Left hemicolectomy	4.67±0.58 (4-5)	3±0.59 (2-4)	0.001	40±13.86 (24-48)	63.18±12.04 (48-72)	0.014
Total Colectomy	5.44±0.88 (4-7)	4.5±0.65 (3.5-5)	0.032	42.67±20 (24-72)	61.71±23.42 (48-96)	0.288
Anterior resection	4.55±0.96	3.86±0.57	0.021	48±12.83	54.86±11.25	0.744

	(3-7)	(3-5)		(24-72)	(48-72)	
APR	4±0 (4-4)	3.29±0.49 (3-4)	0.009	43.2±20.08 (24-72)	48±13.48 (24-72)	0.801

The results in (Table 12) showed that there were significant lower pain score in all laparoscopic procedures compared with open methods. In which left hemicolectomy was (<0.001), right hemicolectomy (0.003), total colectomy was (0.004), anterior resection was (<0.001) and APR

also was (<0.001). However, there was only significant reduction in hospital stay for laparoscopic Right hemicolectomy and anterior resection (0.013 & 0.044 respectively) compared to open operations.

Table 12: Comparison of pain score & hospital stay between laparoscopic and open procedures according to different indications.

Type of Surgery	Pain Score			Hospital Stay (days)		
	Lap.	Open	P.V.	Lap.	Open	P.V.
Right hemicolectomy	3.55±0.52 (3-4)	7.18±1.08 (5-9)	<0.001	5.09±1.64 (3-8)	7.55±2.5 (5-14)	0.013
Left hemicolectomy	3.67±0.58 (3-4)	6.91±1.45 (3-8)	0.003	4.67±1.15 (4-6)	6.55±1.63 (5-10)	0.093
Total Colectomy	4.56±1.51 (3-7)	6.86±1.07 (5-8)	0.004	5.78±2.59 (4-10)	7.29±2.56 (4-10)	0.112
Anterior resection	3.91±0.75 (3-5)	7.14±1.17 (5-9)	<0.001	5.68±1.89 (3-10)	7.29±2.73 (5-15)	0.044
APR	3±0.71 (2-4)	6.86±0.9 (5-8)	<0.001	6.4±2.79 (3-9)	6.57±2.07 (4-10)	0.839

The results in (Table 13) show that wound infection was higher in open Left Hemicolectomy than in laparoscopic procedure while other type was non-significant.

Only one case of Laparoscopic Total Colectomy and one case of Laparoscopic Anterior Resection developed bleeding (postoperative bleeding).

The results in (Table 13) show here was no significant difference for organ injury, abdominal collection and for intestinal leak for all type colorectal surgery by laparoscopic or open procedure.

Table 13: Local complication.

complications		Rt. hemicolectomy	Lt. hemicolectomy	Total colectomy	Ant. Resection	APR	Total
Bleeding	Lap.	0	0	1	1	0	2
	Open	0	0	0	0	0	0
	p. Value	1	1	0.944	0.988	1	0.494
Wound infection	Lap.	1	2	2	5	2	12
	Open	3	8	5	6	5	27
	p. Value	0.988	0.03	0.126	0.273	0.557	0.003
Dehiscence	Lap.	0	0	1	1	2	4
	Open	0	0	0	0	0	0
	p. Value	1	1	0.944	0.988	0.494	0.117
Organ injury	Lap.	0	0	0	1	0	1
	Open	0	0	0	0	0	0
	p. Value	1	1	1	0.999	1	0.999
Abdominal collection	Lap.	0	0	0	1	0	1
	Open	0	0	0	0	0	0
	p. Value	1	1	1	0.999	1	0.999
Intestinal Leak	Lap.	0	0	1	1	0	2
	Open	0	0	0	0	0	0
	p. Value	1	1	0.999	0.999	1	0.494

DISCUSSION

Regarding age and gender of operated cases, the results showed none significant difference between Laparoscopic and open groups (Random). They were equally subjected age and gender distributions.

In this study the results for body mass index showed significant difference in which obese patients were operated with laparoscopic method. This is contrary with Matsuda *et al.*, whom operated both groups with relatively comparable body mass index (Matsuda, T. *et al.*, 2020) and Jurowich, *et al.*, Suggesting that obese patients were frequently directed for laparoscopic technique in local routine practice.

The current results reported that short duration of hospital stay after laparoscopic procedure than open method. This is in agreement with Jurowich, *et al.*, reported shorter hospital stay among laparoscopic procedures, Also Singh *et al.*, reported similar results.

Unlike the reported duration of hospital stay reported by Rinne, *et al.*⁸, whom reported similar duration for both procedures as they attributed this for good quality of surgery achieved in Finland hospitals.

Regarding: bowel sound, pass flatus, oral intake, parameters in both procedures, the results showed that laparoscopy procedure have shorter duration for Bowel sound return, pass flatus early and resuming oral intake shortly compared with open procedure. This result were consistent with Cho, *et al.*, reported similar finding in post-operative signs.

The results reported low pain score among laparoscopic procedure compared to open surgeries. This results was similar to Malibary, *et al.*, Singh, *et al.*⁷, and Cho, *et al.*⁹ who also reported lower pain score among laparoscopic patients with less analgesics requirement.

The results of current study reported none statistical significant difference in local complications for both procedures except local infection was lower in laparoscopic procedure than open method. This results were consistent with Abd-Raboh, *et al.*, whom reported same results.

Other researchers reported low rate of local infection in the Laparoscopic procedure group with none statistical significance. (Brathwaite, S. *et al.*, 2015).

The results reported that chest infection, however it was none significant between laparoscopic and open methods. Only one case of cardiac ischemia with laparoscopic procedure and one case were died after open method. However, these results were comparable to other studies summarized in meta-analysis by Zhong, *et al.*, 2023, reported that postoperative complication morbidity after laparoscopic was fewer than open surgery. This finding might have been due to the minimal trauma of laparoscopic surgery. Laparoscopy has a smaller incision, and if the abdominal cavity is contaminated, the incision can be isolated by trocar without contamination, so the probability of infection of the incision is less than that of open surgery. Because patients have smaller incisions, less pain, and move out of bed earlier, complications such as pneumonia and fever were also reduced. Among the 10 studies included in the meta-analysis, only Kim's study showed a higher incidence of postoperative complications.

Regarding operation time, the results that Laparoscopic procedure have significant longer duration mean (4.7) hrs. than those done by Open procedure mean (3.7) hrs. that was the same as noted by Ohtani and his Colleagues (2011), this was in agreement with Li *et al.*, (2018) who demonstrated that the operation time in laparoscopic group was statistically longer than that in the open group, another study by Zhao *et al.*, (2014) reported that the mean operative time was longer in the laparoscopic group than that in open group.

Right Hemicolectomy:

Regarding operation time, the results that Laparoscopic procedure have significant longer duration mean (3.6) hrs. than those done by open procedure mean (3.4)hrs. this result was in agreement with Abu El-Haggag A. *et al.*,

Hospital stay (days) in laparoscopic group was shorter than the open group. These results were in agreement with Bae *et al.*, the patients in laparoscopic surgery had earlier regain of bowel sound and oral intake after the operation than open Right hemicolectomy this result was in agreement with Abu El-Haggag A. *et al.*,

Wound infection was higher in open than laparoscopic procedure these result were in agreement with Abu El-Haggag A. *et al.*,

Other complication no significant difference between both laparoscopic or open Right hemicolectomy.

Left Hemicolectomy:

Operation time (hours), the results that Laparoscopic procedure have significant longer duration mean (4.5) hrs. than those done by open procedure mean (2.4) hrs. this result was in agreement with Yu-Min Huang *et al.*,

Low pain score for Laparoscopic procedure compared with open surgery this result was in agreement with Yu-Min Huang *et al.*,

Hospital stay (days) in laparoscopic operation was shorter than the open surgery result was in agreement with Yu-Min Huang *et al.*¹⁹, the patients in laparoscopic surgery had earlier regain of bowel sound and oral intake after the operation than open Left hemicolectomy result was in agreement with Yu-Min Huang *et al.*,

That wound infection was higher in open Left Hemicolectomy than in laparoscopic procedure result was in agreement with Yu-Min Huang *et al.*,

One case of left hemicolectomy developed cardiac ischemia and one case was dead other complication no significant difference between both laparoscopic or open Left hemicolectomy.

Total Colectomy:

Operation time (hours), the results that Laparoscopic procedure have significant longer duration mean(4-7) hrs. than those done by open procedure mean (3.5-5) hrs. this result was in agreement with N.Pokala, C.P. Delaney. C.P., Senagore, A.J. *et al.*,

Hospital stay(days) there was no significant changes for both open or laparoscopic Total Colectomy this result was in agreement with N.Pokala, C.P.Delaney. C.P., Senagore, A.J.*et al.*,

Bowel sound and oral intake there was no significant changes for both open or laparoscopic Total Colectomy this result was in agreement with N. Pokala, C.P. Delaney. C.P., Senagore, A.J. *et al.*,

Wound infection was non-significant difference between both laparoscopic and open procedure.

Anterior Resection:

Operation time, the results that Laparoscopic procedure have significant longer duration (3-7) hrs. than those done by open procedure (3-5)hrs. this result was in agreement with Wei-Zhong Jiang, MD, *et al.*,

Hospital stay in laparoscopic operation was shorter than the open surgery result was in agreement with Wei-Zhong Jiang, MD *et al.*,

Bowel sound and oral intake there was no significant changes for both open or laparoscopic Anterior Resection this result was not in agreement with Wei-Zhong Jiang, MD. *et al.*, due to small sample.

Wound infection there was difference but not significant for both laparoscopic and open Anterior resection.

Abdominoperineal Resection:

Operation time, the results that Laparoscopic procedure have significant longer duration (4-4) hrs. than those done by Open procedure (3-4)hrs. there was difference but not significant for both laparoscopic and open procedure.

This result was in agreement with Masafumi Inomata *et al.*,

Bowel sound and oral intake there was no significant changes for both open or laparoscopic Anterior Resection this result was in agreement with Masafumi Inomata *et al.*,

Wound infection there was difference but not significant for both laparoscopic and open procedure this result was not in agreement with Masafumi Inomata *et al.*, due to small sample of study.

CONCLUSION

- Laparoscopic procedure is less invasive, less local complications and shorter hospital stay than that in the open surgery group.
- Laparoscopic procedure have better improvement of bowel movement, gases and food intake.
- Open surgery have relatively shorter operation period than laparoscopy.
- Laparoscopy was safe as lower rate of local infection and mortality than open method.

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