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Original Research Article

"A COMPARATIVE STUDY BETWEEN LAPAROSCOPIC SURGERIES VERSUS OPEN SURGERY IN THE TREATMENT OF SMALL BOWEL OBSTRUCTION"

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ABSTRACT:

Background: Small bowel obstruction (S.B.O) is being one of the common causes of hospital admission worldwide for acute onset of abdominal pain and requiring emergency surgical intervention.Laparoscopy has recently superseded traditional laparotomy as an elective treatment for a variety of diseases because to its reduced risk of morbidity and shorter hospital stay.

AIM: To study the role of laparoscopy in small bowel obstruction and to compare the outcomes of laparoscopic approach and open approach.

Material & Methods: Study Design: A prospective comparative study. **Study area:** The study was done at surgery department, Subbaiah Institute of Medical Sciences, Shimoga. **Study Period:**Apr.2020 – Mar.2021.**Study population:** Patients who were attended and admitted in the dept.of.Surgerywith symptoms of obstruction.**Sample size:** 30 cases were included in our study.**Sampling method:** Simple Random sampling method.**Ethical consideration:** Institutional Ethical committee permission was taken prior to the commencement of the study.**Study tools and Data collection procedure:**All the patients in the study were examined clinically after obtaining a thorough clinical history which included the symptoms, time of onset and the duration of symptoms along with associated co-morbidities.**STATISTICAL ANALYSIS:**The data was entered in Microsoft Excel in tabulated form. Data on continuous scale was represented as MEAN and STANDARD DEVIATION. Categorical data were represented as NUMBERS and PERCENTAGES. Results were represented as Graphs and Tables. P value, degree of freedom was calculated and analysed. Pearson's Chi Square test was applied to show association between factors where $p < 0.05$ was considered statistically significant.

Observations & Results: In the present study, in open surgeries majority belonged to 41-60 years of age group with 80% (12 cases), followed by 13% (2 cases) belonged to 21-40 years of age group, followed by 7% (1 case) belonged to 61-80 years of age group. In laparoscopic

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surgies, majority belonged to 41-60 years of age group with 53% (8 cases), followed by 33% (5 cases) belonged to 21-40 years of age group, followed by 13% (2 cases) belonged to 61-80 years of age group.

CONCLUSION: Laparoscopic surgery is a better treatment modality as found in our study compared to open surgery in terms of duration of surgery, bowel injury, post-operative pain, hospital stay, wound infection, cosmetic benefit etc as seen in our study.

Key words: Small bowel obstruction, Laparoscopic surgery, post-operative pain, hospital stay, wound infection, cosmetic benefit.

INTRODUCTION:

Small bowel obstruction (S.B.O) is being one of the common causes of hospital admission worldwide for acute onset of abdominal pain and requiring emergency surgical intervention.

Post-operative adhesions being the most common etiology of S.B.O and accounts to nearly 65- 80% of S.B.O cases. The traditional choice for S.B.O in whom conservative treatment has failed or in patients who present with symptoms which are suggestive of clinical or physiological emergency such as toxaemia or ischaemia is open laparotomy. Laparotomy does, however, carry a risk of post-operative infections, incisional hernias and may aid to the process of further adhesion formation and the recurrence of S.B.O .

Laparoscopy has recently superseded traditional laparotomy as an elective treatment for a variety of diseases because to its reduced risk of morbidity and shorter hospital stay. And nowadays surgery through laparoscopy is growing as a tool in the armamentarium of the emergency surgery in cases such as acute appendicitis, acute cholecystitis, peptic ulcer perforation and S.B.O could be a candidate for adaption laparoscopic surgery through laparoscopy.

S.B.O was previously considered to be a contraindication to surgery through laparoscopy because of limited working space and fragile gut which can lead to un- noticed injuries to bowel at the time of operation. Since, the first report of successful management of S.B.O by laparoscopic adhesiolysis by Bastug et al in 1991; laparoscopic management of S.B.O is considered safe and feasible and hence the scope of laparoscopic surgery is being extended and thoroughly researched.

Several studies published in the previous two decades have demonstrated that surgery through laparoscopy has advantages over open surgery, including reduced post-operative agony, faster recovery, and lower morbidity, as well as a lower incidence of post-operative adhesions when compared to laparotomy. As a result, laparoscopic surgery is a feasible alternative to open surgery.

In surgical management of S.B.O, the open and laparoscopic approaches have their own benefits and drawbacks. However, there is not much prospective trials comparing the laparoscopic and open management of S.B.O have been published. Hence, the goal of this study is to evaluate the outcomes of laparoscopic surgery for S.B.O .

AIM: To study the role of laparoscopy in small bowel obstruction and to compare the outcomes of laparoscopic approach and open approach.

Material & Methods:

Study Design: A prospective comparative study.

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Study area: The study was done at surgery department, Subbaiah Institute of Medical Sciences, Shimoga.

Study Period: Apr.2020 – Mar.2021.

Study population: Patients who were attended and admitted in the dept.of.surgerywith symptoms of obstruction.

Sample size: 30 cases were included in our study.

Sampling method: Simple Random sampling method.

Inclusion Criteria:

- Patients of both genders
- Patients more than 18 years of age
- Those cases of S.B.O which were diagnosed clinically and by radiologically.
- Those cases of S.B.O which were managed surgically.
- Patients who have given informed consent.

Exclusion criteria:

- Patients below 18years of age
- Patients who have sub-acute bowel obstruction and treated conservatively.
- Patients who have contraindications to laparoscopy.
- Patient not gave consent.

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure:

All the patients in the study were examined clinically after obtaining a thorough clinical history which included the symptoms, time of onset and the duration of symptoms along with associated co-morbidities. The patients underwent routine investigations such as complete haemogram, liver function tests, renal function tests, coagulation profile, blood grouping and typing, viral screening, chest X-ray and ECG. To confirm small bowel obstruction X-ray erect abdomen, ultrasound abdomen was routinely done and in some special cases CECT abdomen was also done if the patient was haemodynamically stable.

Initially, stable patients without peritonitis symptoms and who did not present with obstructed hernia were treated conservatively by nasogastric (Ryle's) tube placement, nil per oral, intravenous fluid replacement, broad spectrum antibiotics and regular hourly abdominal girth measurement.

Failure of the conservative management is considered in patients who did not pass flatus within 48 hours of conservative management or increase of symptoms or appearance of new symptoms suggestive of peritonitis or increase in abdominal girth. These patients were the candidates in whom surgical intervention is indicated.

The patients were subjected randomly using Research Randomizer application to either laparoscopic surgery or open surgery after the examination investigations and pre anaesthetic check-up were done.

STATISTICAL ANALYSIS:

The data was entered in Microsoft Excel in tabulated form. Data on continuous scale was represented as MEAN and STANDARD DEVIATION. Categorical data were represented as

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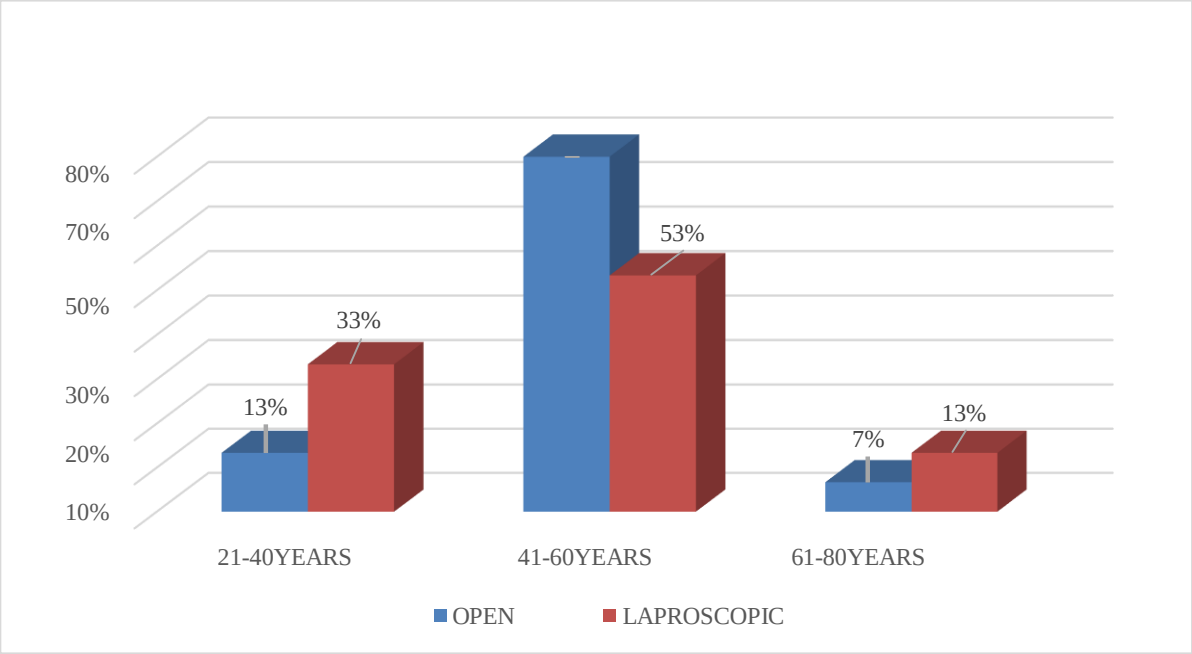
NUMBERS and PERCENTAGES. Results were represented as Graphs and Tables. P value, degree of freedom was calculated and analysed. Pearson's Chi Square test was applied to show association between factors where $p < 0.05$ was considered statistically significant.

Observations & Results:

Figure 1: Age distribution in the study population



In the present study, in open surgeries majority belonged to 41-60 years of age group with 80% (12 cases), followed by 13% (2 cases) belonged to 21-40 years of age group, followed by 7% (1 case) belonged to 61-80 years of age group. In laparoscopic surgies, majority belonged to 41-60 years of age group with 53% (8 cases), followed by 33% (5 cases) belonged to 21-40 years of age group, followed by 13% (2 cases) belonged to 61-80 years of age group.

Table 1: Sex distribution in the study population

GENDER	OPEN SURGERY	LAP SURGERY
MALE	40%(6)	40%(6)
FEMALE	60%(9)	60%(9)
TOTAL	100%(15)	100%(15)

In the present study, in open surgeries and laparoscopic surgeries both majority belonged to females with 60% (9 cases) and rest belonged to males with 40% (6 cases).

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Table 2: Distribution of cases according to type of surgery

SURGERY TYPE	NO. OF CASES	PERCENTAGE
Open	15	50%
laparoscopic	15	50%
TOTAL	30	100%

Current study showed that about 50% (15 cases) underwent open surgery and rest 50% (15 cases) underwent laparoscopic surgery. Out of 15 cases of laparoscopic surgeries, 3 were converted into open surgeries.

Table 3: Distribution of cases according to duration of surgery

DURATION OF SURGERY	OPEN SURG	LAP SURG
< 60 mins	0% (0)	27% (4)
61 - 90 mins	67% (10)	60% (9)
91 - 120 mins	33% (5)	13% (2)
TOTAL	100% (15)	100% (15)
MEAN $\pm$ SD	88.6 $\pm$ 13.27	82.07 $\pm$ 16.12
P-value=<0.001, df-1		

Out of the 15 open surgery cases, 67% (10 cases) had duration of surgery between 61-90mins and rest 33% (5 cases) had between 91-120 mins. Whereas out of 15 laparoscopic surgeries, 60% (9 cases) had duration of surgery between 61- 90mins, 27% (4 cases) had it under 60 mins and 13% (2 cases) had between 91-120 mins.

Table 4: Distribution of cases according to bowel injury

BOWEL INJURY	OPEN SURG	LAP SURG
YES	13% (2)	7% (1)

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NO	87% (13)	93% (14)
TOTAL	100% (15)	100% (15)
X^2 =0.34 p-value=0.542, df-1(NS)		

Out of the 15 open surgery cases, 87% (13 cases) did not have bowel injury and rest 13% (2 cases) had bowel injury. Whereas out of 15 laparoscopic surgeries, 93% (14 cases) did not have bowel injury and rest 7% (1 case) had bowel injury.

Table 5: Distribution of cases according to wound infection post-surgery

WOUND INFECTION	OPEN SURG	LAP SURG
YES	47% (7)	13% (2)
NO	53% (8)	87% (13)
TOTAL	100% (15)	100% (15)
p-value=0.01, df-1		

Out of the 15 open surgery cases, 47% (7 cases) had wound infection post surgery and rest 53% (8 cases) did not. Whereas out of 15 laparoscopic surgeries, 13% (2 cases) had wound infection post-surgery and rest 87% (13 cases) did not.

Table 6: Distribution of cases according to cosmetic benefit

COSMETIC BENEFIT	OPEN SURG	LAP SURG
UNSATISFACTORY	87% (13)	13% (2)
EQUIVOCAL	7% (1)	7% (1)
SATISFACTORY	7% (1)	80% (12)

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TOTAL	100% (15)	100% (15)
p-value= 0.33, df- 1		

Out of the 15 open surgery cases, 87% (13 cases) had unsatisfactory response to cosmetic benefit, 7% (1 case) each had equivocal and satisfactory response respectively. Whereas out of 15 laparoscopic surgeries, 80% (12 cases) had satisfactory response, 13% (2 cases) had unsatisfactory response and 7% (1 case) had equivocal response.

Table 7: Distribution of cases according to post-operative pain on day 2

POST OP PAIN (POD-2)	OPEN SURG	LAP SURG
< 5 on VAS	80% (12)	100% (15)
≥ 5 on VAS	20% (3)	0% (0)
TOTAL	100% (15)	100% (15)
p-value- <0.001, df-1		

Out of the 15 open surgery cases, 80% (12 cases) had post-operative pain on day 2 with a score of less than 5 on VAS (Visual analog scale) and rest 20% (3 cases) had a score of more than 5. Whereas out of 15 laparoscopic surgeries all 100% had post-operative pain on day 2 with a score of less than 5 on VAS (Visual analog scale).

DISCUSSION:

S.B.O is a common surgical emergency usually treated via standard laparotomy. But with the advancement of laparoscopic surgical skills, more surgeons are undertaking laparoscopic approach as well to treat uncomplicated SBO. We aimed to compare the outcome of laparoscopic vs. open surgical techniques in General Surgery Department. A total of 30 cases were included in the current study. Out of which 15 cases underwent open surgery and rest 15 cases underwent surgery through laparoscopy for S.B.O. The results of the study are discussed below.

In the current study, majority of the cases i.e. 67% (20 cases) belonged to 41- 60 years of age group, followed by 23% (7 cases) belonging to 21-40 years of age group, followed by 10% (3 cases) belonging to 61-80 years of age. The mean age was 50.1 + 10.93 years.

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In open surgeries majority belonged to 41-60 years of age group with 80% (12 cases), followed by 13% (2 cases) belonged to 21-40 years of age group, followed by 7% (1 case) belonged to 61-80 years of age group. In laparoscopic surgeries, majority belonged to 41-60 years of age group with 53% (8 cases), followed by 33% (5 cases) belonged to 21-40 years of age group, followed by 13% (2 cases) belonged to 61-80 years of age group.

Mean age for open surgeries was 50.56 + 10.14 years and mean age for laparoscopic surgeries was 49.69 + 10.89 .

Sebastian-Valverde et al [(1)] conducted a study retrospectively with the study's goal was to assess the laparoscopic approach's potential benefits in the treatment of ASBO. The mean age for total patients 66.06 + 18.7 years. For laparoscopic approach group the mean age was 59.36 + 18.7 years of age, whereas mean age for open approach group was 68.9 + 18 years.

Otani et al [(2)] conducted a retrospective study with the aim to determine the outcomes of surgery through laparoscopic for S.B.O. The age range in this study was 37-95 years of age. The mean age group in this study was 72 years of age.

Mothe et al [(3)] conducted a study retrospectively of patients with the aim to compare outcomes following laparoscopic vs. open surgical techniques in a district general hospital. Median age for open group was 69 years (26 - 91 years) vs. 71 years (23 - 94 years) for laparoscopic group.

Gomez et al [(4)] conducted a Comparative study of 68 patients where the mean age group range was between 45 to 49 years of age.

Kohga et al [(5)] showed that the mean age of those who underwent laparoscopic surgery was 74.8 + 14.2 years. The mean age for open group was 76.5 + 10.8 years. P value was 0.687 in this study.

Present study showed female predominance with 60% cases out of 30 being female and rest 40% being male. The male female ratio being 3/2. In the present study, in open surgeries and laparoscopic surgeries both majority belonged to females with 60% (9 cases) and rest belonged to males with 40% (6 cases).

Kohga et al [(5)] conducted a study to check the feasibility of laparoscopic surgery for strangulated SBO. Similar to the current study a female predominance was seen with 6/10 in laparoscopic group and 9/19 in open group.

Sebastian-Valverde et al [(1)] study showed female majority with 52.3% being females and rest 47.7%being males. Laparoscopic group consisted of 52.6% females and open group consisted of 52.2% females.

Otani et al [(2)] conducted a study retrospectively with the goal to evaluate the outcomes of laparoscopic surgery for SBO. In contrast to the present study, this study had male

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predominance with 52.1% being males and 47.9% being females.

In the current study, about 50% (15 cases) underwent open approach and rest 50% (15 cases) underwent laparoscopic surgery. Out of 15 cases of laparoscopic surgeries, 3 were converted into open surgeries.

Otani et al [2] conducted a retrospective study with the aim to assess the outcomes of laparoscopic surgery for SBO. In this study about 29.2% patients underwent laparoscopic surgery whereas rest 70.8% underwent open surgery.

Kohga et al [5] conducted a study to check the feasibility of laparoscopic surgery for strangulated SBO. In this study about 51.1% patients underwent laparoscopic surgery whereas rest 48.9% underwent open surgery.

Sebastian-Valverde et al [1] conducted a study retrospectively in which about 29.8% patients underwent laparoscopic surgery whereas rest 70.2% underwent open surgery.

In the current study, out of the 15 open surgery cases, 67% (10 cases) had duration of surgery between 61-90mins and rest 33% (5 cases) had between 91-120 mins. Whereas out of 15 laparoscopic surgeries, 60% (9 cases) had duration of surgery between 61-90mins, 27% (4 cases) had it under 60 mins and 13% (2 cases) had between 91-120 mins. Mean duration of surgery was found to be 83.33 + 17.29 minutes. P value of < 0.001 was seen showing very high statistical significance.

Kohga et al [5] conducted a study to check the feasibility of laparoscopic surgery for strangulated S.B.O. In this study in laparoscopic surgery the mean duration was 72.6 + 38.4 minutes. Whereas in surgery through open approach the mean duration was 80.4 + 40.0 minutes.

Hackenberg et al [6] conducted a study in which laparoscopic approach had a mean operative time of 112 minutes and open surgery had a mean operative time of 137 minutes.

Gomez et al [4] conducted a Comparative study of 68 patients where the mean duration of surgery was found to be 129 minutes.

Sebastian-Valverde et al [1] conducted a study in which the surgery through laparoscopic had the mean duration of 103.11 + 48.2 minutes. Whereas in open surgery the mean duration was 128.41 + 63.8 minutes. Overall the meanduration of surgery was 120.75 + 60.5 minutes.

In the current study, out of the 15 open surgery cases, 87% (13 cases) did not have bowel injury and rest 13% (2 cases) had bowel injury. Whereas out of 15 laparoscopic surgeries, 93% (14 cases) did not have bowel injury and rest 7% (1 case) had bowel injury. P value > 0.05 was seen showing that there was no statistical significance seen.

Hackenberg et al [6] conducted a study in which laparoscopic approach, 4 cases had bowel

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injury out of 25 cases whereas in open approach 4 cases had bowel injury out of 66 cases.

In the current study, out of the 15 open surgery cases, 47% (7 cases) had wound infection post-surgery and rest 53% (8 cases) did not. Whereas out of 15 laparoscopic surgeries, 13% (2 cases) had wound infection post-surgery and rest 87% (13 cases) did not. P value of <0.05 was seen showing the results were statistically significant. The higher chance of wound infection in case of open surgery may be due to the long midline incisions which indirectly increases the chance of infection as compared to small incisions in case of laparoscopic surgery.

Gomez et al [(4)] conducted a Comparative study of 68 patients where the 2 cases surgical site infection accounting to 2.9 % cases.

In the current study, on day 1 post surgery out of the 15 open surgery cases, all 100% had post-operative pain on day 1 with a score of more than 5 on VAS (Visual analog scale). Whereas out of 15 laparoscopic surgeries 80% (12 cases) had post-operative pain on day 1 with a score of more than 5 on VAS (Visual analog scale) and rest 20% (3 cases) had a score of less than 5. P value of >0.05 was seen showing that the results were statistically insignificant.

In the present day, on day 2 post surgery Out of the 15 open surgery cases, 80% (12 cases) had post-operative pain on day 2 with a score of less than 5 on VAS (Visual analog scale) and rest 20% (3 cases) had a score of more than 5. Whereas out of 15 laparoscopic surgeries all 100% had post-operative pain on day 2 with a score of less than 5 on VAS (Visual analog scale). P value of < 0.001 was seen showing that the results were statistically very highly significant on 2nd post-operative day.

In the current study, out of the 15 open surgery cases, 80% (12 cases) had post-operative fever and rest 20% (3 cases) did not. Whereas out of 15 laparoscopic surgeries, 27% (4 cases) had post-operative fever and rest 73% (11 cases) had within 12 hours. P value < 0.05 was seen showing that the results were statistically significant.

CONCLUSION:

Small bowel Obstruction is a common surgical problem that accounts for a large percentage of surgical admission for acute abdomen. Adhesions still remain as one of the commonest cause for Small bowel obstruction. Open surgery and Laparoscopic surgery are the treatment modalities when conservative management fails. Laparoscopic surgery is a better treatment modality as found in our study compared to open surgery in terms of duration of surgery, bowel injury, post-operative pain, hospital stay, wound infection, cosmetic benefit etc as seen in our study.

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