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Bowel Anastomotic Leak-Clinicopathological Factors Influencing It.

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ABSTRACT
INTRODUCTION:*Bowel Anastomotic leak is one of the most feared complications of gastrointestinal surgery. It causes considerable morbidity and mortality to the patient,several factors influence bowel anastomotic leak.*
AIMS AND OBJECTIVES :*To determine the pre-operative, intraoperative and post-operative risk factors related to anastomotic leak.*
METHODS: *Prospective study.60 patients undergoing bowel resection and anastomosis in department of general surgery GMCH during the period of 1st march 2021 to 30th June 2022 were taken.*
RESULTS: *Among 60 patients 15 patients had anastomotic leak (25%) and 45 patients discharged without any leak (75%). From the study the factors significantly predicting anastomotic leak are male gender ,S.albumin(mean-2.9)with p-value of 0.01,emergency surgery,intraoperative hypotension,number of unit blood transfused.*
CONCLUSION:*Male gender,Serum albumin pre-operative value of 2.9g/dl or lower,Intraoperative Hypotension and need for blood transfusion are the factors which increase the risk of anastomotic leak.*
KEY WORDS:*anastomotic leak,albumin,male sex,Hypotension,Transfusions.*

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I. INTRODUCTION

Anastomotic leakin bowel surgery is one of the most feared complication. It causes considerable morbidity and mortality to the patient and increase burden to hospital resources. The term anastomosis is derived from the Greek term anastomoein meaning "to furnish with a mouth".

In review of literature there is no universaly accepted defination for Anastomotic leak. 97 studies from 1993 to 1999 demonstrated 56 different definations of anastomotic leakage after gastrointestinal surgery.

A more recent attempt has been made to standardize terminology of anastomotic leak offering the defination: "a communication between the intra- and extra-luminal compartments owing to a defect of the integrity of the intestinal wall at the anastomosis, either between small intestine and large intestine or between two ends of the intestinal wall regardless of the way this anastomosis was achieved."(1)

So many factors influence bowel anastomotic leak .In these some are patient related and some are non-patient related which increases mortality and morbidity of the patients.

II. AIMS AND OBJECTIVES

To determine the pre-operative, intraoperative and post-operative risk factors related to anastomotic leak like Age,Gender, Body mass index ,Serum Albumin, Serum haemoglobin ,Setting of surgery ,Duration of surgery ,Intraoperative hypotension ,Blood transfusion requirement.

III. MATERIALS AND METHODS

Patients undergoing bowel resection -anastomosis under the department of general surgery at Gauhati medical college and hospital Guwahati in the period of 1st march 2021 to 30th June 2022 were taken into the study with exclusion criteria being Pediatric patients,history of previous pelvic radiation ,Previous enteric diversion procedure. Total number of patients for the study is 60.

Data were collected from his/her inpatient file with due consent. The study was conducted taking various variables like Age, Gender,Clinical Examination (Pulse rate ,Blood pressure ,Temperature Urine Output, BMI, Respiratory, Abdomen, Cardiovascular systems,Drain output and content). Pre operative Investigations ,Complete blood profile,Renal function test, S Na+and k+,Liver Function Test,Blood grouping and typing ,Viral Markers,ECG ,Chest Xray PA view, Plain abdominal X ray(erect) ,Ultrasound whole Abdomen.Post operative Blood transfusions(Packed red cells 350ml/unit). Whether leak occurred, on which day

and how it was detected (feculent matter in abdominal drain or from surgical incision site) .All anastomoses were done end-to-end fashion carried out in 2 layers.Data was analysed using univariate analysis. P value of 0.05 or lower was considered significant.

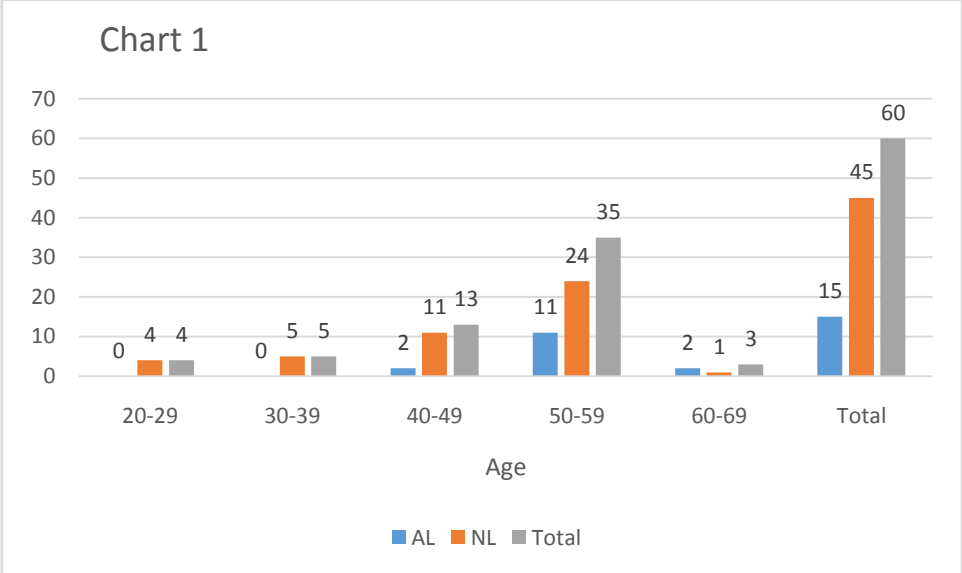
IV. RESULTS AND OBSERVATIONS

Among 60 patients 15 patients had anastomotic leak (25%) and 45 patients discharged without any leak (75%). Here anastomotic leak group of patients were designated as **AL**(anastomotic leak) and patients without any leak as **NL**(no leak).

AGE:

Age	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**Total**
AL	**0**	**0**	**2**	**11**	**2**	**15**
NL	**4**	**5**	**11**	**24**	**1**	**45**
Total	**4**	**5**	**13**	**35**	**3**	**60**

Table 1

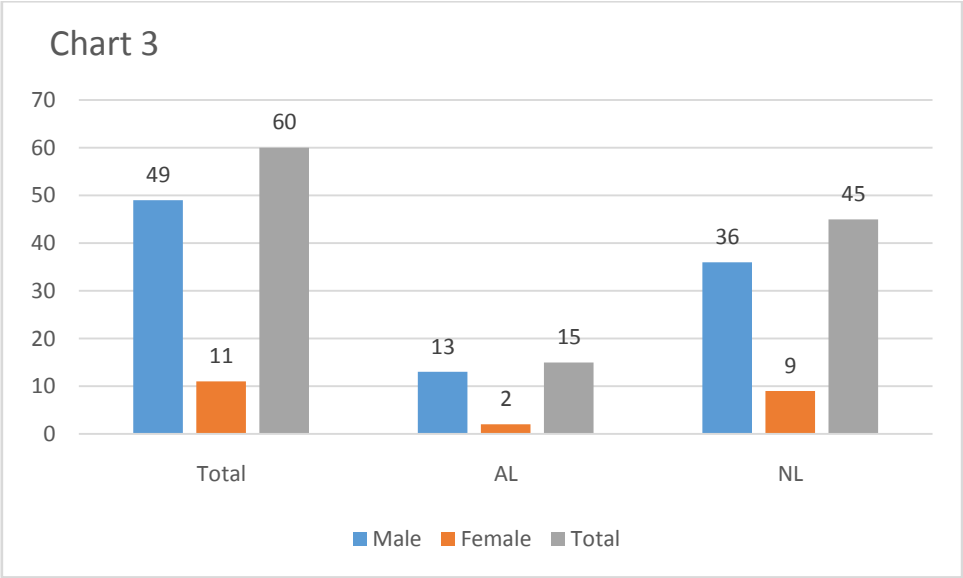


Mean age for AL and NL is 53.6 and 47.5 respectively.

GENDER:

	Total	**AL**	**NL**
Male	49	13	36
Female	11	2	9
Total	60	15	45

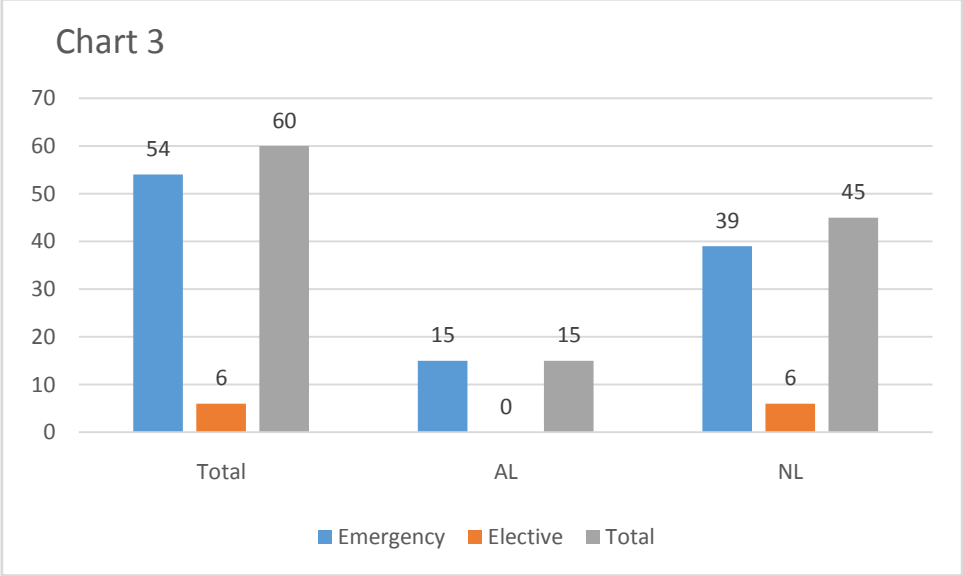
TABLE 2



SETTING OF SURGERY was decided based on clinical condition of the patients and informed consent from the patients/ patients' attenders.

	Total	**AL**	**NL**
Emergency	54	15	39
Elective	6	0	6
Total	60	15	45

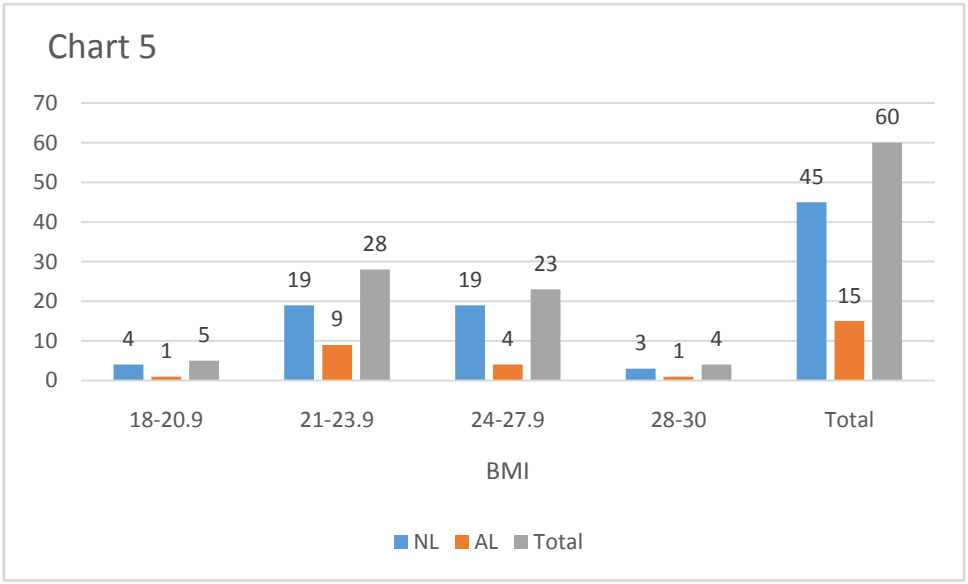
TABLE 3



Body mass index:

BMI	**18-20.9**	**21-23.9**	**24-27.9**	**28-30**	**Total**
NL	**4**	**19**	**19**	**3**	**45**
AL	**1**	**9**	**4**	**1**	**15**
Total	**5**	**28**	**23**	**4**	**60**

TABLE 5

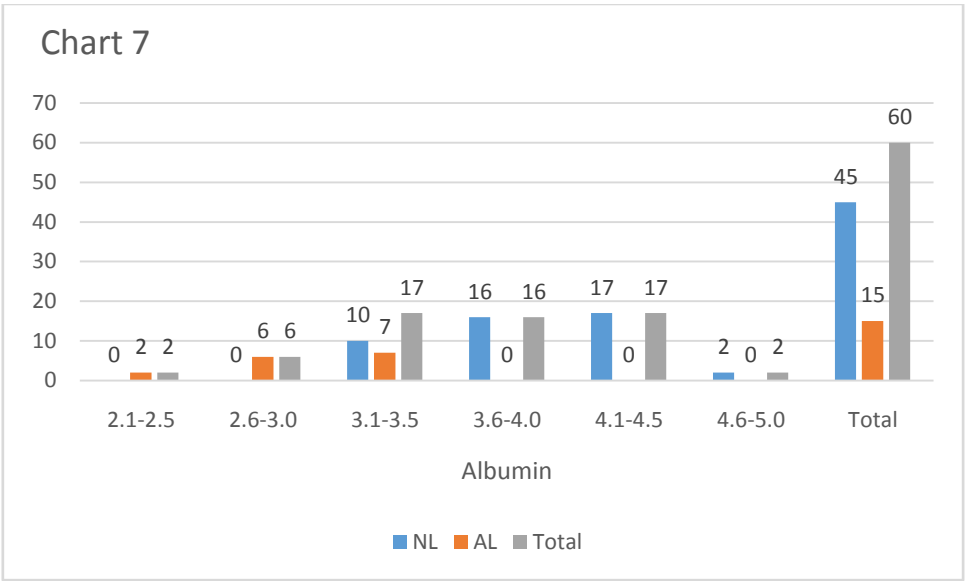


Mean BMI of AL and NL are 23.75 and 23.72 respectively.

ALBUMIN:

Albumin	2.1-2.5	2.6-3.0	3.1-3.5	3.6-4.0	4.1-4.5	4.6-5.0	Total
NL	0	0	10	16	17	2	45
AL	2	6	7	0	0	0	15
Total	2	6	17	16	17	2	60

TABLE 7

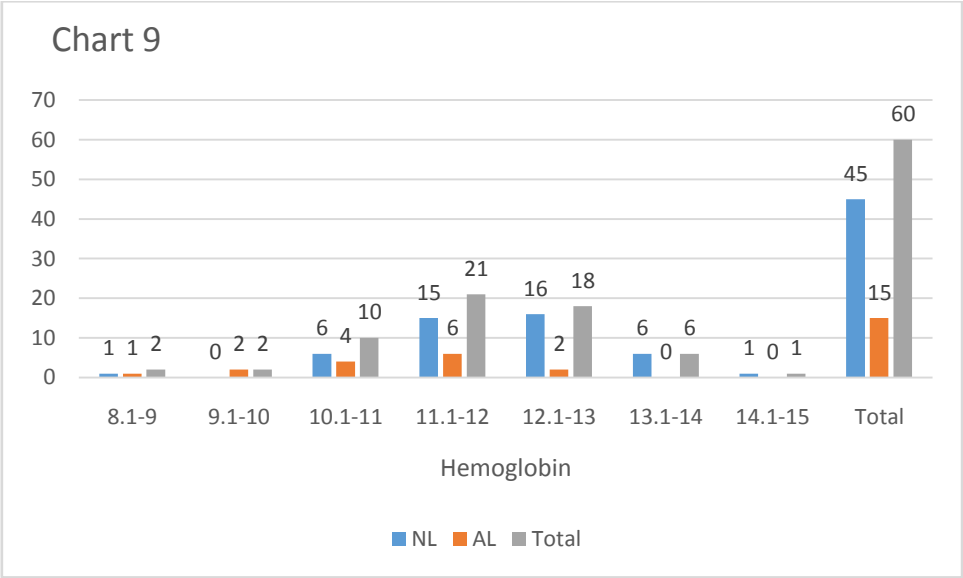


Mean S.Albumin of AL and NL is 2.97 and 3.87 respectively.

HEMOGLOBIN:

	8.1-9	9.1-10	10.1-11	11.1-12	12.1-13	13.1-14	14.1-15	Total
NL	1	0	6	15	16	6	1	45
AL	1	2	4	6	2	0	0	15
Total	2	2	10	21	18	6	1	60

TABLE 9

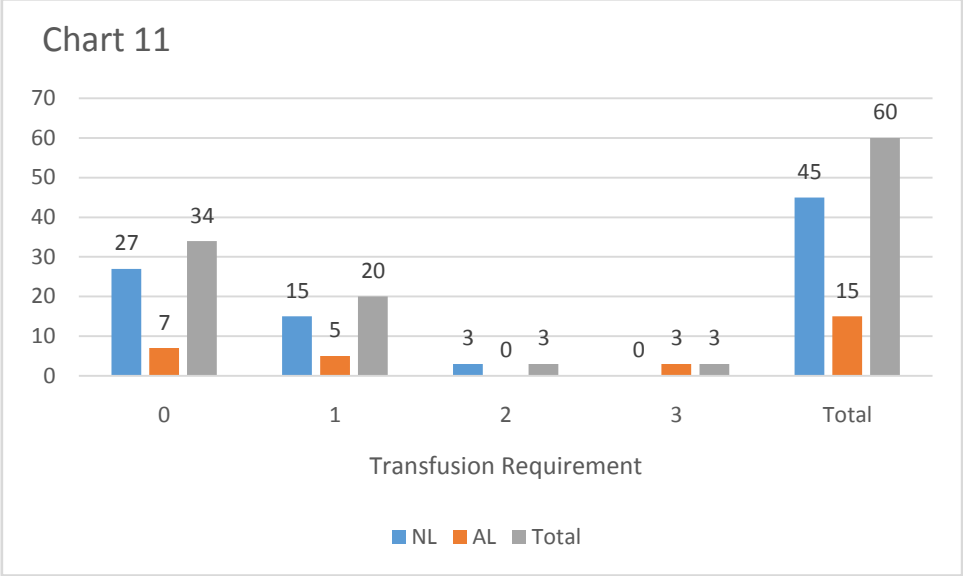


Mean Hemoglobin of AL and NL is 11.97 and 11.06 respectively.

Number of blood transfused:

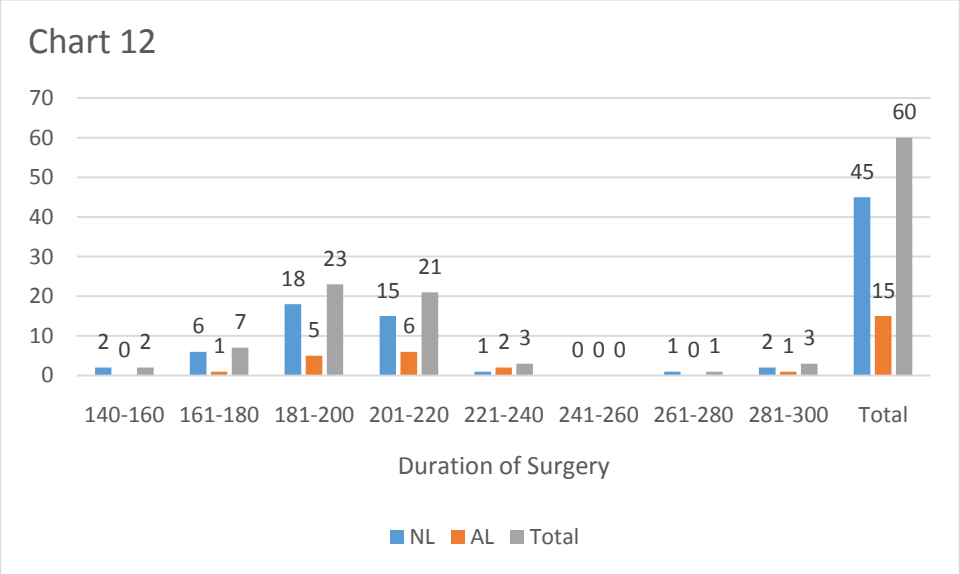
	0	1	2	3	Total
NL	**27**	**15**	**3**	**0**	**45**
AL	**7**	**5**	**0**	**3**	**15**
Total	**34**	**20**	**3**	**3**	**60**

TABLE 11



DURATION OF SURGERY: Number of minutes from beginning of surgery to end as per operative records in case sheet.

	NL	AL	Total
140-160	**2**	**0**	**2**
161-180	**6**	**1**	**7**
181-200	**18**	**5**	**23**
201-220	**15**	**6**	**21**
221-240	**1**	**2**	**3**
241-260	**0**	**0**	**0**
261-280	**1**	**0**	**1**
281-300	**2**	**1**	**3**
Total	**45**	**15**	**60**

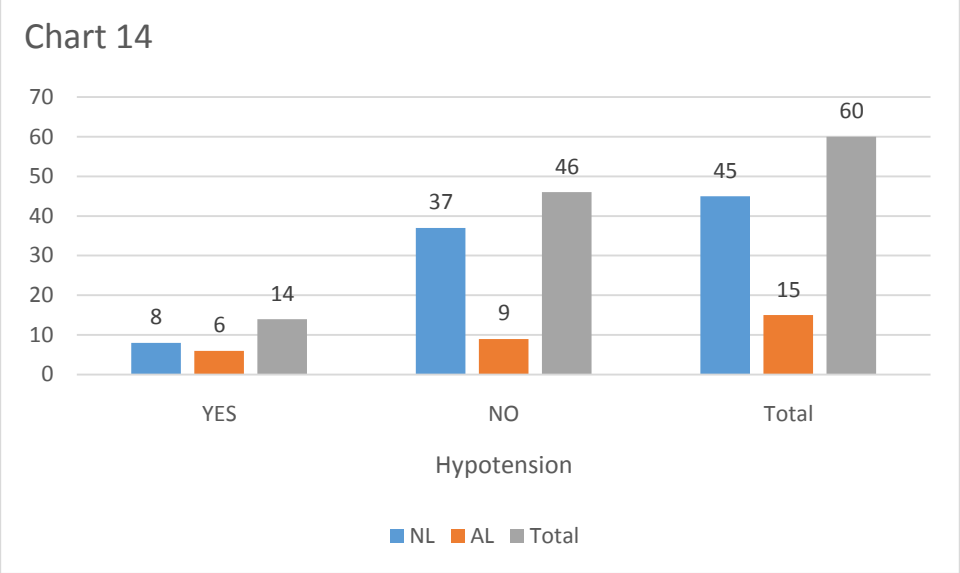


Mean duration of AL and NL is 204.8 and 213.06 mins respectively.

HYPOTENSION:measured as systolic blood pressure less than 90mm of Hg and diastolic blood pressure less than 60mm of Hg.

Hypotension	YES	NO	Total
NL	8	37	45
AL	6	9	15
Total	14	46	60

TABLE 14



V. DISCUSSION

Several factors causes Anastomotic leak after bowel anastomosis and causes significant morbidity and mortality as evident from various literature. It is important to know the factors influencing anstomotic leak for its prevention.

In our study among 60 patients 15 patients had anastomotic leak(25%).

Age is significant factor for anastomotic leak and in our study AL occurred mostly in those patients who were in 6^{th} decade of life(p-value 0.2) which is not statistically significant as around 35(50%) are from 6^{th} decade of life. In some like parthasarathy M et al(2) showed increased risk of anastomotic leak in younger group.But only 8% are from younger age group in our study.

Gender is significant factor for AL . In our study anastomotic leak occurred more in male gender (26%) in contrast to female gender (18%) .Zheng F Ba et al(3) showed reduction in perfusion pressure in male explains the increase in AL in male gender.
Obesity is significant factor causing anastomotic leak . In various studies like Binod S et al(4) showed obesity as factor for AL . As non of our patients are obese with mean BMI 23 in our study,it is not significant factor in our study.
Albumin is important factor for healing of bowel anastomosis. In our study S albumin < 2.9 is significantly associated with anastomotic leak (p-value 0.01), as shown in various literature like Golub R et al(5) and Jina et al,(6) low S albumin pre operatively is significantly associated with AL.
Anemia is associated with anastomotic leak and Hemoglobin is important factor for healing as shown by various study (choudhury et al)(7) but in our study it is not significant factor probably due to small sample size.
AL is more common after emergency operation compared to elective setting as shown in various study like Ibrahim aldoghan et al(8). In our study AL is more common after emergency operations(27%) as there will be proper pre operative preparation before elective setting compare to emergency.
Duration of surgery varies due to operating surgeon and environment.Increased duration of surgery significantly causes AL as shown by various study like paul suding et al(9) . In our study average operating time is 206 min and very few has long operating time(p value 0.3) which is not significant.
Intraoperative hypotension is significantly associated with AL as shown in various studies like (Awatef E farghaly et al)(10) .In our study 42% patients who developed intraoperative hypotension has anastomotic leak which is significantly associated with AL.
Number of blood transfusions given post operatively significantly associated with AL. In our study 45% patients received blood transfusion among them 32% had anastomotic leak and increase in the number of units transfused also increased the risk of AL.
Tadros TA ,Wolbes TH et al(11) showed that Blood transfusions are reported to impair cell mediated immune response , because both T lymphocyte and macrophage function are important for wound repair affecting healing of bowel anastomosis.

VI. CONCLUSION

Male sex, Serum albumin pre-operative value of 2.9g/dl or lower, Intraoperative Hypotension and Need for post-operative blood transfusion are important factors influencing bowel anastomotic leak. Hence these clinicopathological factors are given due consideration, while planning for resection and anastomosis, with a goal to prevent morbidity and mortality of the patients.

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Conflict of interest: None declared

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