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RESEARCH ARTICLE

AN OBSERVATIONAL STUDY ON ASSESSMENT OF POSTOPERATIVE COMPLICATIONS AMONG PERFORATION PERITONITIS USING CLAVIEN-DINDO CLASSIFICATION IN TERTIARY CARE CENTER OF CENTRAL INDIA

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Abstract

Introduction : Surgical team always tries to provide consistently low incidence of major complications for patient undergoing any operation. Clavien-Dindo (CD) classification is the simplest way of reporting all complications. The main aim of this study was to test the usefulness of Clavien-Dindo classification in patients undergoing the abdominal surgery. In this study Clavien-Dindo classification has been used for assessment of postsurgical complications after major abdominal surgery.

Material and method: It was an observational study of all perforation peritonitis patients admitted in sri aurobindo medical college and post graduate institute between november 2017 to may 2019 (1 and 1/2 Year) on the basis of Clavien-Dindo classification.

Results : This was an observational prospective study was carried out in Department of General Surgery, Sri Aurobindo Medical College and P.G. Institute, Indore, which includes total 60 patients of perforation peritonitis admitted and treated in the department, During the period of November 2017 to May 2019. In our study Most common symptoms in patients presenting with perforation is Abdominal pain in 60 (100%) patients. 45(75%) patients had constipation & obstipation, 41 (68.33%) patients had vomiting ,33(55%) of patients had fever 17 (28.33%) patients had abdominal distensions the other common symptoms. Out of 60 patients, all 60(100%) patients had abdominal tenderness and guarding, 47 (78.33%) patients had absent bowel sounds, 42(70%) patients had tachycardia, 26 (43.33%) patients had hypotension, 23 (38.33%) patients had tachypnoea and 21 (35%) patients had low urinary output. In 16 (26.6%) patient's comorbid conditions were present. In 10 (16.66%) patients multiple perforations were found out of which only 01 (10%) patient is haemodynamically stable and 09 (90%) patients were unstable. Complication occurred in 09(90%)

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patients and no complication were only in 01 (10%) patients. In this group 04(40%) patients got discharged and 6(60%) patient expired. **P Value was 0.001 which is significant.** In our study most common site of perforation was gastric perforation 30(49.18%) Complication according to clavien -dindo classification 14 out of 60 (23.33%) patients had no complications, 4 (6.66%) had grade I complication, 5 (8.33%) had grade II complications, 12 (20%) had grade III complications, 11 (18.33%) had grade IV complications, and 14 (23.33%) had grade V complication rates.

Conclusion : Perforation peritonitis is a life-threatening condition and requires urgent hospital care, resuscitation and surgery. Early resuscitation and surgery are required to decrease morbidity and mortality. On the basis of risk stratification in Peritonitis patients its management requires lots of expensive modalities, skill, monitoring and treatment to provide better care to the patient. For the classification of complications, a new system is proposed by Clavien–Dindo which is very helpful during perforation surgery.Clavien- Dindo classification helps us to distinguish a normal postoperative course and the severity of complications, which allows us to compare postoperative morbidity and evaluate the outcomes. We also recommend a larger study with a bigger sample size for better analysis of clavien-dindo classification of complications and to confirm the findings of our study.

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Introduction:-

Perforation peritonitis is one of the most common surgical emergencies across the globe. Gastrointestinal perforations have very high morbidity and mortality rates, irrespective of the type of operative procedure performed. The Clavien-Dindo system is nowadays widely used for complications after surgery for grading adverse events (i.e. complications) which occur as a result of surgical procedures and has become the standard classification system for many surgical specialties for open as well as laparoscopic surgeries. Complications are now used as a basis to evaluate the improvement in standard surgical procedures, for selection of management options, and to compare results in individual centers and among centers. [1] When a new surgical procedure is introduced or when several surgical approaches exists for one procedure, there is a need to compare outcomes and complication for each specific approach in a sound and reproducible way. [2-5]Clavien-Dindo (CD) classification is the simplest way of reporting all complications.[5-7]

It allows surgeons to distinguish between a normal postoperative course from any deviation and the severity of the complication and it may be useful for comparing postoperative morbidity in each patients. [6,8-11] A classification is useful only if it is widely accepted and applied throughout different countries and surgical cultures. [12-16] Morbidity was defined as all the non-fatal surgical and/or medical complications occurred during the patient's stay in hospital, in the 30-day period following the operation. [10,11,17,18] The main aim of this study was to test the usefulness of Clavien-Dindo classification in patients undergoing the abdominal surgery. In this study ClavienDindo classification has been used for assessment of postsurgical complications after major abdominal surgery. Emergency surgical patients are an important target group for quality improvement, and negative outcomes should be measured and classified in order to find more specific targets for quality improvement. [19-23] Hence, assessments of complications in emergency abdominal surgeries were also included in the study along with elective abdominal surgeries. Thereby improving management and prevention. The therapy used to correct a specific complication is the basis of this classification in order to rank a complication in an objective and reproducible manner. It consists of 7 grades (I, II, IIIa, IIIb, IVa, IVb and V)

Table 1:- Classification of surgical complications as per the classification proposed by Clavien-Dindo et al.

Grade	
1	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions. Acceptable therapeutic regimens are: drugs as antiemetics, antipyretics, analgetics, diuretics and electrolytes and physiotherapy. This grade also includes wound infections opened at the bedside.
2	Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions, antibiotics and total parenteral nutrition are also included.
3	Requiring surgical, endoscopic or radiological intervention
3a	Intervention under regional/local anesthesia
3b	Intervention under general anesthesia
4	Life-threatening complication requiring intensive care/intensive care unit management
4a	Single organ dysfunction
4b	Multi-organ dysfunction
5	Patient demise

The Clavien-Dindo system allows us to

1) Evaluate the quality of procedures and outcomes from a particular procedure
2) Compare different approaches or procedures as well as helps in comparison between surgeons, and health institutions
3) Analyze and records learning curves of surgical techniques.
4) Use it as the basis of improve quality of care and procedures
5) To standardize and measure surgical errors.
6) To accurately explain and compare different procedures to their patients in terms of risks and complications

Material and Method:-

It was an observational study of all perforation peritonitis patients admitted in SRI AUROBINDO MEDICAL COLLEGE AND POST GRADUATE INSTITUTE between NOVEMBER 2017 to MAY 2019(1 and 1/2 Year) on the basis of Clavien-Dindo classification.

Inclusion criteria:

Patients who are willing for study.All the patients both male and female in the age group more than 10 years with peritonitis caused by perforation of the gastrointestinal tracts were included in this study.

Exclusion criteria:

Patients who are not willing for study. All the patients of primary peritonitis, corrosive, postoperative peritonitis caused by anastomosis leakage. All the patients of primary peritonitis, corrosive, postoperative peritonitis caused by anastomosis leakage. Children below than 10 years. were excluded from the study.

Data Collection and Methods:-

Selection of cases:

An informed written conset was taken from all the patients / relatives in groups after the approval of institutional ethic committee.

Sample:

We expected 60 or more patients of perforation peritonitis undergoinglaparotomy in this study period of one and half year. We have reached this figure after scrutinizing the past records, which suggest that every month five to six patients are operated in our Institute. It is an observational study.Data collection from patients by their clinical history, examination, with appropriate investigations. The cases were evaluated by history, clinical features and special tests if any required.

Method of data collection:

From cases attending our institute in which diagnosis of peritonitis is established by operative findings or surgical interventions during management. Therefore, nonrandomized sampling technique was used.Pre designed semi structure questions were used.

Observation:-

Table 2:- Age, Comorbid Condition and Outcome.

Age (N) %	Sex		Total		Comorbid Condition		Outcome			
	Male	Female								
	N=41	N=19	No. N=60	Percentage	Present	Absent	Discharge	Expired	Chi Square Value	P Value
<20 Years	02 66.6 %	01 33.3%	03	5%		03 (100%)	03 (100%)	00	6.30	0.043
20-39 Years	19 55.8 %	15 44.11 %	34	56%	05 (14.70%)	29 (85.29%)	25 (73.52%)	09 (26.47%)	24.8	<0.00 1
40-59 Years	13 86.6 %	02 13.33 %	15	25%	08 (53.33%)	07 (46.66%)	10 (66.66%)	05 (33.33%)	3.94	0.139
60 or More Years	07 87.5 %	01 12.5%	08	13.33%	02 (25%)	06 (75%)	08 (100%)	00	12.5	0.002

The above table shows the distribution of patients according to age and gender. the age group 20 or less had least number of patients 3(5%) out of which 2 were male and 01 was female. No patients had comorbidity 3(100%) and all the 3 (100%patients were discharged,the age group 20-39 years was the largest group comprising of 34 patients out of which 19 were male and 15 were female ,comorbid conditions were present in 05(14.70%) and absent in 29 people (85.29%). 25(73.52) patients were discharged in this group and 9(26.47%) patients expired, Second largest age group was 40-59 years comprising of 15 patients out of which 13 were male and 02 were female, comorbidities were present in 08(53.33%) and absent in 7(46.66%) patients. 10(66.66%) patients were discharged in this group and 5(33.33%) patients expired, Next age group of 60 or more years comprising of 8 patients out of which 1 was male and 07 were female, comorbid conditions were present in 02(25%) and absent in 6(75%) patients. all the 8 (100%)patients in this group discharged.

Time of presentation	Complication		Outcome		Chi square value	P value
	Present	Absent	Discharge	Expired		
1 day or less (04) (6.66%)	1 (25%)	3 (75%)	04 (100%)		4.8	0.028
2-3 days (36) (60%)	23 (63.88%)	13 (36.11%)	35 (97.22%)	01 (2.77%)	12.8	<0.001
>3days (20) (33.33%)	20 (100%)	-	07 (35%)	13 65%	19.33	<0.001

Table 3:- Time of Presentation, Complication and Outcome.

Table 4:- Time of Presentation, Size of Perforation, Haemodynamic Condition, Complication and Outcome.

Time of Presentation	Size of Perforation		Haemodynamic condition		Outcome		Chi square test	P value
	1*1cm	>1*1cm	Stable	Unstable	Discharge	Expired		
1 day or less (04) (6.66%)	4 100%	-	04 100%	-	04 (100%)	-	**11.1**	**0.011**
2-3days(36) (60%)	26 (72.22%)	10 (27.77%)	27 75%	09 25%	35 (97.22%)	01 (2.77%)	12.4	0.006
>3days (20) (33.33%)	08 (40%)	12 (60%)	03 15%	17 85%	07 (35%)	13 (65%)	32.3	<0.001

Above Table-3 shows that Patients presenting within 1 day or less from the onset of symptoms were 4(6.66%) out of which complications occurred in 1 (25%)patient rest 3(75%) had normal recovery. All the 4 patients in this group got discharged.Chi Square Value was 4.8 and P Value was 0.028 which is significant.In our study Majority of patients presented within 2-3 days from the onset of symptoms 36(60%) out of which complications occured in 23(63.88%) patients and recovery without complication in 13(36.11) patients. In this group 35(97.22%) patients got discharged and 1(2.77%) patient expired. Chi Square Value was 12.8 and P Value was<0.001 which is significant.

Patients who presented after 3 days from onset of symptoms 20 (33.33%) all of them had complications20(100%). However out of 20 patients In this group 7 patients got discharged 7(35%) and 13 patients expired.Chi Square Value was 19.33 and P Value was<0.001 which is significant.Above table 4 and graphs shows that Patients presenting within 1 day or less from the onset of symptoms were 4 (6.66%) out of which all 4(100%) patients had size of perforation 1*1cm or less& .In this group all 04(100%) patients were haemodynamically stable. All the 4 patients in this group got discharged.ChiSquare Value was 11.1 and P Value was 0.011 which is significant.

Table 5:- Showing various clinical features in patients with peritonitis.

SYMPTOMS AND SIGN	Number of Patient (n=60)	Percent
PAIN IN ABDOMEN	60	100 %
CONSTIPATION AND OBSTIPATION	45	75 %
VOMITING	41	68.33 %
FEVER	33	55 %
ABDOMEN DISTENSION	17	28.33 %
TACHYCARDIA (PULSE>110/MINUTE)	42	70 %
HYPOTENSION (SYSTOLIC BLOOD PRESSURE<100MMHG)	26	43.33 %
TACHYPNEA (RESPIRATORY RATE >20/MIN)	23	38.33 %
URINE OUTPUT (<30ML/HR)	21	35 %

TENDERNESS	60	100%
GUARDING	60	100%
RIGIDITY	51	85%
BOWEL SOUND (ABSENT)	47	78.33 %

In our study symptoms in order of prevalence as narrated by patients. Most common symptoms in patients presenting with perforation is Abdominal pain in 60 (100%) patients. 45(75%) patients had constipation& obstipation, 41 (68.33%) patients had vomiting, 33(55%) of patients had fever, 17(28.33%) patients had abdominal distensionas the other common symptoms.

Table 6:- Investigation Table X-ray Erect Abdomen and X-ray chest.

Free Gas Under Diaphragm(N=60)	No. of Patient	Percentage
Present	51	85%
Absent	09	15%

In the present study out of the sample of 60 cases in majority of the cases free gas under diaphragm was seen i.e. in 51 cases. Accounting for 85% was seen in X-Ray Erect abdomen and Chest X-ray PA view.

Table 7:- USG Finding

Free Fluid with Moving Internal ECHOES (N=60)	No of Patient	Percentage
Present	43	71.66%
Absent	17	28.33%

USG whole abdomen was done in all 60 patients out of which in 43 (73%) patient intra-abdominal collection suggestive of perforation peritonitis was reported with internal echoes suggesting sepses with thick collection & septations.

Table 8:- CECT Abdomen

Pneumoperitoneum with Fluid (N=11}	Present	Percentage
Present	11	100%
Absent	-	-

CT is done in 11 patients in whom X-ray and USG whole abdomen was inconclusive in all 11 (100 %) patient's positive findings were present in computed tomography in the form of pneumoperitoneum with fluid.

Table 9:- Comorbid Condition, Time Of Presentation , Haemodynamic Conditionand Outcome

Comorbid Condition	Time of Presentation			Haemodynamic Condition		Outcome		Chi square test	P value
	1 Day or Less	2-3 Days	>3 Days	Stable	Unstable	Discharge	Expired		
Present (16) 26.60%	-	4 25%	12 75%	04 25%	12 75%	07 43.75%	09 56.25%	1.75	0.418
Absent(44) 73.33%	4 9.09 %	32 72.7 %	8 18.18 %	30 68.18 %	14 31.81 %	39 88.63%	05 11.36 %	5.54	0.020

Above Table-9 and Graphs shows that in those 16 (26.6%) patients whom comorbid condition present 4 (25%) patient presented with in 2-3 days , 12 (75%)presented after 3 days and none of them presented within 1 days of onset of symptom ,the haemodynamically stable were 04 (25%) patients and unstable were 12 (75%)patients . In this group 07(43.75%) patients got discharged and 9(56.25%) patient expired.Chi Square Value was 1.75 and P Value was 0.418 which is not significant.

Table 10:- Site of Perforation, Duration of Hospital Stay, Complication and Outcome								
Site of perforation	**Duration of hospital stay**		**Complication**		**Outcome**			
	Upto 14 days	**>14 days**	**Present**	**Absent**	**Discharge**	**Expired**	**Chi square test**	**P-value**
Gastric (29) 48.33%	**14 48.27%**	**15 51.72%**	**20 68.96%**	**09 31.03%**	24 82.75%	5 17.24%	16.2	<0.001
Ileum (22) 36.66%	**11 50%**	**11 50%**	**17 77.27%**	**05 22.72%**	16 72.72%	6 27.27%	11.0	0.004
Jejunum(03) 5%	**01 33.3%**	**02 66.6%**	**02 66.6%**	**01 33.3%**	2 **66.66%**	1 **33.33%**	0.900	0.638
Colon(03) 5%	**01 33.33%**	**02 66.66%**	**02 66.6%**	**01 33.3%**	2 66.66%	1 **33.33%**	0.900	0.638
Appendix(01) 1.66%		**01 100%**	**01 100%**		1 100%	0	3.00	0.223
Rectum(01) 1.66%		**01 100%**	**01 100%**		1 **100%**	0	3.00	0.223
Gastric and Ileum(01) 1.66%		**01 100%**	**01 100%**		00	1 **100%**		NA

In our study most common site perforation was gastricperforation 29(49.18%). Duration of hospital stay upto 14 days in 14 (48.27%) patient and more than 14 days in 15(51.72%) patient, complication present in 20(68.96%) and absent in 09(31.03%),24 (82.75%) patients were discharged and 5 (17.24%) were expired.Second most common site ilealperforation 22(36.66%). Duration of hospital stay upto 14 days in 11 (50%) patient and more than 14 days in 11(50%) patient, complication present in 17(77.27%) and absent in 05(22.72%),16 (72.275%) patients were discharged and 6 (27.27%) were expired.P valve is significant for gastric and ileal perforation.

Table 11:- Size of Perforation, Comorbid Condition and Complication						
Size of perforation	Comorbid condition		Complication		Chi square Test	P value
	present	absent	present	Absent		
1*1cm or less (31) (51.66%)	06 19.35%	25 88.64%	16 51.61%	15 48.38%	7.05	0.008
>1*1cm (29) (48.33%)	10 32.25%	19 65.51%	28 96.55%	01 3.44%	24.7	<0.001

Table-11shows that 31 (51.66%) patient has perforation less or upto 1 cm size in this group in 06(19.35%) comorbid condition were present and absent in 25(88.64%), complication occurred in 16(51.61%) patients and no complication observed in 15(48.38%) patients.Chi Square Value was 7.05 and P Value was 0.008 which is significant.

Table 12:- Number of Perforation, Haemodynamic Condition, Complication and Outcome								
Number of Perforation	**Haemodynamic Condition**		**Complication**		**Outcome**		**Chi square test**	**P value**
	Stable	**Unstable**	**Present**	**Absent**	**Discharge**	**Expired**		
Single Perforation**(50) 83.33%**	33 66%	17 34%	35 70%	15 30%	42 84%	08 16%	4.57	0.102
Multiple Perforation**(10) (16.66%)**	01 10%	09 90%	09 90%	01 10%	04 40%	06 60%	13.1	0.001

Our study reveals that 50(83.33%) patients had single perforation out of which 33 (66%) patients were haemodynamically stable and 17(34%) patients were unstable ,complication occurred in 35 (70%) patients and no complication found in 15(30%).In this group 42(84%) patients got discharged and 8(16%) patient expired. Chi Square Value was 4.57 and P Value was<0.102 which is not significant.

Table13:- Intra-peritoneal Collection, Complication, Haemodynamic Condition, Duration of Hospital Stay and Outcome

Intra Peritoneal Collection	Complication		Haemodynamic Condition		Duration of Hospital Stay		Outcome			
	Present	Absent	Stable	Unstable	Upto 14 Days	>14 Days	Discharge	Expired	Chi square test	P value
UPTO 500ml 36 (60%)	20 55.55%	16 44.44 %	28 77.77 %	8 22.22%	17 47.22 %	19 52.77 %	35 97.22%	01 2.77%	25.9	<0.00 1
>500 ml 24 (40%)	24 100%	-	06 25%	18 75%	10 41.66 %	14 58.33 %	11 45.83%	13 54.16%	42.8	<0.00 1

In our study intraperitoneal collection upto 500 ml is found in 36(60%) patient out of the group complication developed in 20(55.55%)patient and no complication seen in 16(44.44%) patients, haemodynamic stability seen in 28(77.77%)patients &unstability present in 8(22.22%) patients ,duration of hospital stay upto 14 days in 17(47.22%) and more than 14 days in 19(52.77%)patients.In this group 35(97.22%) patients got discharged and 1(2.77%) patient expired. Chi Square Value was 25.9 and P Value was<0.001 which is significant.

Table 14:-Various Surgical Procedures According to Perforation Site and Outcome in Relation to Clavien- Dindo Classification

Site of Perforation	No, of Patients	(%)	Surgical Procedure	Better Outcome (clavien- dindo classification No Complication, Grade-I, Grade-II,) N (%)	Worse Outcome (ClavienDindo Grade III, IV and V) N (%)	
GASTRIC*	**30**	**49.18%**	**Grahm's Patch Repair (11) (36%)**	**05 (45%)**	**06 (54%)**	Chi square Test- 0.031, Df- 01,P value- 0.858
			Modified Grahm's Patch Repair (19) (63%)	**08 (42%)**	**11(57.89%)**	
ILEUM*	**23**	**37.7%**	**Primary Repair (15) (65.21%)**	**06(40%)**	**09 (60%)**	Chi square Test- 1.84, Df- 02, P value- 0.399
			Ileostomy With/Without Primary Repair (03) (13.04%)		**03 (100%)**	
			Resection and Anastomosis (05) (21.74%)	**02 (40%)**	**03(60%)**	
JEJUNUM	**03**	**4.91%**	**Primary Repair (02) (66.66%)**	**01 (50%)**	**01(50%)**	Chi square test-0.750, df-

			Resection and Anastomosis (01) (33.33%)		**01(100%)**	1, P value- 0.386
COLON	**03**	**4.91%**	**Colostomy (01) (33.33%)** **colostomy with Primary Repair (02) (66.66%)**	**01(100%)**	**02(100%)**	Chi square test- 3.00, df- 1, P value- 0.083
APPENDIX	**01**	**1.63%**	**Appendectomy (01) (100%)**		**01 (100%)**	NA
RECTUM	**01**	**1.63%**	**Hartmans Procedure (01) (100%)**		**01(100%)**	NA
One patient had both gastric and ileal perforation therefore n=61 in above observation table						

Table-14 shows that Most of gastric perforation 30(49.18%) was managed by grahm's patch repair11 (36 %), 5 (45%) patient had better outcome and 6(54%) patient had worse outcome. modified grahm's patch repair in 19 (64%),8 (42%) patient had better outcome and 11 (57.89%) patient had worse outcome.Next major group was ilealperforation 23(37.7%) was managed by primary repair15 (65.21%) , 6 (40%) patient had better outcome and 9 (60%) patient had worse outcome. Ileostomy with or without primary repair done in 03 (%), all 3(100%) had worse outcome and resection and anastomosis done in 05(21.74%) patients, 2 (40%) patient had better outcome and 3 (60%) patients had worse outcome.P valve is significant for gastric and ileal perforation.

Table 15:- Clavien-Dindo classification system for surgical complication and management of complication

complication	**management**	**clavien-dindo's classification (grades i, ii, iii, iv, v)**
no complication	no additional mangement	no complication (14) (23.33%)
wound infection/wound dehiscence	opened at bed side & dressing	grade i (4)(6.66%)
loss of blood and catabolism	blood transfusion & total parentral nutrition	grade ii (5) (8.33%)
(a)pleural effusion (b) burst abdomen/ leak	pleural tapping secondry closure/re-exploration	grade iii-a (3) (25%) (12) (20%) grade iii-b (9) (75%)
(a)single organ failure (b) mods/ septicemia	icu care icu care/ventillatory support/dialysis	grade iv-a (11) (18.33%) grade iv-b
death (14) (23.33%)	-	grade v (14) (23.33%)

Above table shows the management of complications during hospital stay and from the study it was found that 14 out of 60 (23.33%) patients are discharge with no complications, 4 (6.66%) cases of wound infection/wound dehiscence were managed by sutures opened at bedside and regular sterile dressing done (grade I complication), 5 (8.33%) patients had anaemia and catabolism were managed by blood transfusion and total parenteral nutrition (grade II complications),out of 12 (20%), 3(25%) patients had pleural effusion managed by pleural tapping and 9 (75%) had burst abdomen or leak managed by secondary closure /re-exploratory(grade IIIcomplications),11(18.33%) patients of single organ failure, MODS/septicaemia managed in ICU care/ventilator support/dialysis (grade IV complications), and 14 (23.33%) patients expired (grade V complication rates).
Using the Clavien–Dindo classification, 14 out of 60 (23.33%) patients had no complications, 4 (6.66%) had grade I complication, 5 (8.33%) had grade II complications, 12 (20%) had grade III complications, 11 (18.33%) had grade IV complications, and 14 (23.33%) had grade V complication rates.

Results:-

This was an observational prospective study was carried out in Department of General Surgery, Sri Aurobindo Medical College and P.G. Institute, Indore, which includes total 60 patients of perforation peritonitis admitted and treated in the department, During the period of November 2017 to May 2019. End of the study concludes the following points:In my study, most of the cases were between age group 20-39[50%].Perforation peritonitis more common in males 41 [68.33%], male: female ratio being 2.1:1.Comorbidities were present maximum in age group 40-59 years in (53.33%) patients and absent in (46.66%) patients. (66.66%) patients were discharged in this group and (33.33%) patients expired. In our study Majority of patients presented within 2-3 days from the onset of symptoms 36(60%). patients who presented after 3 days from onset of symptoms 20 (33.33%) all of them had complications 20(100%). In this group 7 patient got discharged 7(35%) and 13 (65%) patients expired. P Value was<0.001 which is significant.In our study Most common symptoms in patients presenting with perforation is Abdominal pain in 60 (100%) patients. 45(75%) patients had constipation &obstipation, 41 (68.33%) patients had vomiting ,33(55%) of patients had fever 17 (28.33%) patients had abdominal distensions the other common symptoms. Out of 60 patients, all 60(100%) patients had abdominal tenderness and guarding, 47 (78.33%) patients had absent bowel sounds, 42(70%) patients had tachycardia, 26 (43.33%) patients had hypotension, 23 (38.33%) patients had tachypnoea and 21 (35%) patients had low urinary output.In 16 (26.6%) patient's comorbid conditions were present, out of them 12(75%) patients presented after 3 days of onset of symptoms. 12 (75%) patients were haemodynamically unstable. In this group 07(43.75%) patients got discharged and 9(56.25%) patient expired. In the present study in majority of the cases free gas under diaphragm was seen i.e. in 51 cases. accounting for 85% was seen in X-Ray Erect abdomen and Chest X-ray PA view. This still remains important diagnostic imaging. In 29 (48.33%) patient size of perforation was more than 1 cm out of which in 10(32.25%) patients comorbid condition were present, absent in 19 (65.51%) patient, complication observed in 28(96.55%) patient and in only 01 (3.44%) patient there was no complication. P Value was <0.001 which is significant. In 10 (16.66%) patients multiple perforations were found out of which only 01 (10%) patient is haemodynamically stable and 09 (90%) patients were unstable. Complication occurred in 09(90%) patients and no complication were only in 01 (10%) patients. In this group 04(40%) patients got discharged and 6(60%) patient expired. P Value was 0.001 which is significant.In 24(40%) patients more than 500 ml intraperitoneal collection was found, out of which complications developed in all 24(100%) patients, haemodynamicunstability was present in 18(75%) patients,duration of hospital stay was more than 14 days in 14(58.33%) patients. In this group11(45.83%) patients got discharged and 13(54.16%) patients expired. Chi Square Value was 42.8 and P Value was<0.001 which is significant.In our study most common site of perforation was gastric perforation 30(49.18%) out of which11 (36 %) patients were managed by grahm's patch repair, 5 (45%) patient had better outcome and 6 (54%) patient had worse outcome. modified grahm's patch repair in 19 (64%), 8 (42%) patient had better outcome and 11 (57.89%) patient had worse outcome.Next major group was ileal perforation 23(37.7%) was managed by primary repair 15 (%) , 6 (40%) patient had better outcome and 9 (60%) patient had worse outcome. Ileostomy with or without primary repair done in 03 (%), all 3(100%) had worse outcome and resection and anastomosis done in 05() patients 2 (40%) had better outcome and 3 (60%) patients had worse outcome.P valve is significant for gastric and ileal perforation.Most common procedure performed was exploratory laparotomy with modified grahm's omental patch repair in 19 (31 %) patients followed by primary repair in 17(27.86%) patient for ileal and jejunal perforation, grahm's patch repair done in 11(18.03%) patients, Complication according to clavien -dindo classification 14 out of 60 (23.33%) patients had no complications, 4 (6.66%) had grade I complication,5 (8.33%) had grade II complications,12 (20%) had grade III complications, 11 (18.33%) had grade IV complications, and 14 (23.33%) had grade V complication rates.

Discussion:-

Perforation peritonitis is one of the most common surgical emergencies across the globe.Gastrointestinal perforations have very high morbidity and mortality rates, irrespective of the type of operative procedure performed. The aim of the present study is to assess thecomplications and factors responsible for outcomes in cases ofgastrointestinal perforations in tertiary care centre and also, to find out various determinants for safe outcomes in gastrointestinal perforation in terms of decreased morbidity and mortality and applying Clavien–Dindoclassification for postoperative complications for evaluating the outcome.Despite of modern treatment, complications are very common in cases of perforated gastrointestinal tract, even at centers with best facilities,in this study, an attempt is made to find out various preoperative and intra operative factors that may responsible for adverse outcome and to identify the best management that could decrease the complication rate. In the present work entitled "Clinical Study of Clavien-Dindo Classification to Assess the Grades of Complication and Factors Responsible in Cases of Gastrointestinal Perforations in Tertiary Care Centreconducted in Sri Aurobindo Medical College and Post Graduate

Institute, Indoreduring the period of one and half years i.e. From November 2017 to May 2019" have been studied. In the present study following observations were recorded. Which are compared with similar studies performed.

Age And Comorbid Condition Wise Distribution:

In our studythe age group 20-39 years was the largest group comprising of 34 (56%)patients out of which 19 (55.88%)were male and 15(44%) were female, comorbid conditions were present in 05(14.70%) and absent in 29 people (85.29%). 25(73.52%) patients were discharged in this group and 9(26.47%) patients expired.Secondlargest age group was 40-59 years comprising of 15 patients out of which 13 were male and 02 were female comorbidities were present in 08(53.33%) and absent in 7(46.66%) patients. 10(66.66%) patients were discharged in this group and 5(33.33%) patients expired.Next age group of 60 or more years comprising of 8 patients out of which 1 was male and 07 were female, comorbid conditions were present in 02(25%) and absent in 6(75%) patients. all the 8 (100%)patients in this group expired.The age group 20 or less had least number of patients, i.e. 3 out of which 2 were male and 01 was female. No patients had comorbidity 3(100%) and all the 3 (100%) patients were discharged.Abdulhameed MME, et al. (2016)[24]study shows that Maximum patients were in the age group **of**20-39 year has 47 patient out of which 46(98%) patients recovered and 1(2%) patient expired, followed by age group 40-59 year has 28 patients out of which 20(71.5%) patients recovered and 8(28.5%) patient expired, Next age group of more than 60 year comprising of 21 patient out of which 15(71.5%) patients recovered and 6 (28.5%)patient expired. The age group 20 year or less has 4 patient only out of which 4(100%) all patients are recovered and discharge**.** Nabi I, et al. (2016)[25] study shows that the patients varied from 19 to 60 years with most of the patients falling within the age range of 21-30 years. Their mean age was 34.42 years. The majority of patients were male (77.6% male vs. 22.4% female).

Time Of Presentation:-

In our study Majority of patients presented within 2-3 days from the onset of symptoms 36(60%)out of which complications occured in 23(63.88%) patients and recovery without complication in 13(36.11%) patients. In this group 35(97.22%) patients got discharged and 1(2.77%) patient expired, P Value was<0.001 which is significant.Next group was of patients who presented after 3 days from onset of symptoms 20 (33.33%)all of them had complications 20(100%). However out of 20 patients. In this group 7 patient got discharged 7(35%) and 13 (65%) patients expired P Value was<0.001 which is significant.Smallest group was of Patients presenting within 1 day or less from the onset of symptoms were 4 (6.66%) out of which complications occurred in 1 (25%) patient rest 3(75%) had normal recovery. All the 4 patients in this group got discharged P Value was 0.028 which is significant. Abdulhameed MME, et al. (2016)[24] - Out of 100 patients time of presentation 1 day or less is 29(29%) patients out of which 29(100%) is recovered and 0(0%) is expired,2-3 days 55(55%) patients out of which 49(89%) is recovered and 6(11%) is expired and more than 3 days 16(16%) patients out of which 6(37.5%) is recovered and 10(62.5%) is expired. Mean Time of presentation 2.27 days and standard deviation is 1.12. Recovered 84 (84%) patient and death 16 patient. Statistical test is 't' test and p value are< 0.001 implies mortality increases with delayed presentation.Jobta R, et al. (2006)[26]study shows that the time taken by the patient between onset of symptoms and presentation to the hospital was less than 24 hours in 235(47%) cases and more than 24 hours in 269(53%) cases.

Symptoms:-

In our study most common symptoms in patients presenting with perforation is Abdominal painin 60 (100%) patients. 45(75%) patients had constipation & obstipation, 41 (68.33%) patients had vomiting,33(55%) of patients had fever,17(28.33%) patients had abdominal distensions the other common symptoms. Malik P, et al. (2014) [27]study shows that there isabdominal pain in 99% patient, nausea in 92% patient, vomiting in 55% patient, abdominal distension in 71% patient, fever in 64% patient, altered bowel habit in 42% patient and shock in 12% patient. Nabi I, et al. (2016)[25]study shows that there is abdominal pain in 97.3% patient, abdominal distension in 75% patient, altered bowel habit in 56.6% patient, nausea or vomiting in 52.6% patient, fever in 34% patient, and shock in 30% patient due to septicaemia.

Sign:

In our study signs in order of prevalence as noted.Out of 60 patients, all 60(100%) patients had abdominal tenderness and guarding, 47 (78.33)% patients had absent bowel sounds,42(70%) patients had tachycardia, 26 (43.33%) patients had hypotension, 23 (38.33%)patients had tachypnoea &21 (35%) patients had low urinary output.Manikanta K S et al. (2016) [28] study shows that out of 50 patient there is Dehydration in 33(66%) patient , Tenderness in 50(100%) patient, Guarding in 50 (100%) patient, Distension of the abdomen in 50 (100%) patient, Free Fluid in 50 (100%)patient and Shock in 16 (32%) patient.

Free gas under Diaphragm:
In the present study out of the sample of 60 cases in majority of the cases free gas under diaphragm was seen i.e. in 51 cases. accounting for 85% was seen in X-Ray Erect abdomen and Chest X-ray PA view. This still remains important diagnostic imaging in 09 (15 %) patients absence of gas might be in cases of distal perforation.Singh SK, et al. (2019)[29]study shows that presence of free air under diaphragm in 62.67 % of patients.

Comorbid Condition:
In our study comorbidities were absent in 44(73.33%) patient in those 32 (72.7%) presented with in 2-3 days , 08 (18.18%)presented after 3 days and 4 (9.09%) patient presented within 1 days of onset of symptom ,of these the haemodynamically stable were 30 (68.18%) patients and unstable were 14 (31.81%) patients. In this group 39(88.63%) patients got discharged and 5(11.36%) patient expired. and P Value was 0.020 which is significant.[for comorbid condition,haemodynamically condition &outcome]. In those whom comorbid condition present 16 (26.6%) patients in those 4 (25%) patient presented with in 2-3 days, 12 (75%)presented after 3 days and none of them presented within 1 days of onset of symptom, the haemodynamically stable were 04 (25%) patients and unstable were 12 (75%)patients. In this group 07(43.75%) patients got discharged and 9(56.25%) patient expired. Chi Square Value was 1.75 and P Value was 0.418 which is not significant[increase in haemodynamicallyunstability and mortality in presence of comorbid condition].Abdulhameed MME, et al. (2016) [24]study shows thatComorbid condition present in 25 patient out of which 15 (60%) patient is recoverd and 10 (40%) is expired and absent in 75 out of which 69(92%) patient is recoverd and 6(8.1%). Statistical test is chi-square test and p-value 0.001, which shows that comorbid conditions like diabetes, hypertension, COPD and renal failure increase mortality.

Haemodynamic Condition:
Majority of patients presented within 2-3 days from the onset of symptoms 36(60%) out of which in 26(72.22%) patients size of perforation was 1cm or less and in 10 (27.77%) patient it was more than 1*1cm.In this group haemodynamically stable patient were 27(75%)and haemodynamically unstable were 09 (25%) patients.out of total patients in group 35(97.22%) patients got discharged and 1(2.77%) patient expired. Chi Square Value was 12.4 and P Value was0.006 which is significant.

Next group of patients who presented after 3 days from onset of symptoms 20(33.33%), out of which in 08(40%) of them size of perforation was 1cm or less& in 12 (60%) more than 1*1cm size.In this group haemodynamically stable patient were 03(15%)and haemodynamically unstable were 17 (85%) patients.out of total patients In this group 7 patients got discharged 7(35%) and 13 patient expired. Chi Square Value was 19.33 and P Value was<0.001 which is significant.Paryani JJ, et al. (2013) [73] found that mortality rate was 80% for patients with blood pressure <100 mmHg. Kamble R S, et al. (2016) [31]study shows that 7.69% of the cases with heart rate <100/min died which was significantly less as compared to 25% of cases with heart rate>/=100/min, but difference was not statistically significant and 29.17% of the cases with heart rate <100/min had hospital stay >10 days which was less as compared to 61.11% of cases with >/=100 heart rate, and the difference was statistically significant.

Size Of Perforation:-
In our study 31 (51.66%) patient has perforation less or upto 1 cm size in this group in 06(19.35%) comorbid condition were present and absent in 25(88.64%)complication occurred in 16 (51.61%) patients and no complication observed in 15(48.38%) patients.Chi Square Value was 7.05 and P Value was 0.008 which is significant. In 29 (48.33%) patient size of perforation was more than1cm out of which in 10(32.25%) patients comorbid condition were present, absent in 19 (65.51%)patient, complication observed in 28(96.55%)patient and in only 01 (3.44%)patient therewas no complication.Abdulhameed MME et al. (2016)[24] study shows that Size of perforation Up to 1 cm in 77 patient (77%) out of which 71 (92%) patient recovered and 6(8%)patient expired and size of perforation is more than 1 cm in 23 patient out of which 15(65%) patient recovered and 8(35%) patient expired. Mean size of perforation is 1.29 cm and standard deviation is .518. Statistical test is 't' test and p value are 0.001 implies size of perforation influence outcome. Gupta Set al. (2010)[32] study shows that Size of perforation is between 0-<0.5 cm in 293 patient, 0.5-<1cm in 57 patient, 1-<2 cm in 35 patient and more than 2 cm in 15 patients.

Number Of Perforation:
Our study reveals that 50(83.33%) patients had single perforation out of which 33 (66%) patients were haemodynamically stable and 17(34%) patients were unstable,complication occurred in 35 (70%) patients and no complication found in 15(30%).In this group 42(84%) patients got discharged and 8(16%) patient expired.Chi Square Value was 4.57 and P Value was<0.102 which is not significant.In 10 (16.66%) patient's multiple

perforations were found out of which only 01 (10%) patient is haemodynamically stable and 09 (90%) patients were unstable,complication occurred in 09(90%) patients and no complication were only in 01(10%) patients. In this group 04(40%) patients got discharged and 6(60%) patient expired. Rao R et al. (2016) [33] study shows that there is single perforation in 79% patient, two perforation in 4% patient and multiple perforation in 17% patient. Manikanta K S et al. (2016)[28] study shows that Single perforations were observed in 33(66%) patients, two perforations were found in 7(14%) patients, three perforations in 6(12%) patients, whereas four perforations were seen in 4(8%) patients.

Intraperitoneal Collection:

In our study intraperitoneal collection upto 500 ml is found in 36(60%) patient out of the group complication developed in 20(55.55%)patient and no complication seen in 16(44.44%) patients ,haemodynamic stability seen in 28(77.77%)patients &unstability present in 8(22.22%) patients ,duration of hospital stay upto 14 days in 17(47.22%) and more than 14 days in 19(52.77%)patients**.**In this group 35(97.22%) patients got discharged and 1(2.77%) patient expired.Chi Square Value was 25.9 and P Value was<0.001 which is significant.**Kamble R S et al. (2016) [31]**Out of 50 patients 16 patients had >/= 1000 ml of contamination out of which 5 died which was more than the patients died of having <1000 ml contamination. There result reveals that, 8.8% of cases with <1000 ml of contamination died which was significantly less as compared to 31.2% of cases with >/=1000 ml, and the difference is statistically significant and 29.0% of the cases with <1000 ml contamination had >10 days hospital stay which was significantly less as compared to 81.8% of cases with >/=1000 ml and the difference is statistically significant.

Site Of Perforation:

In our study most of gastric perforation 30(49.18%) out of which11 (36 %) patients were managed by grahm's patch repair, 5 (45%) patient had better outcome and 6 (54%) patient had worse outcome. modified grahm's patch repair in 19 (64%), 8 (42%) patient had better outcome and 11 (57.89%) patient had worse outcome**.**Next major group was ileal perforation 23(37.7%) was managed by primary repair 15 (%) , 6 (40%) patient had better outcome and 9 (60%) patient had worse outcome. Ileostomy with or without primary repair done in 03 (%), all 3(100%) had worse outcome. resection and anastomosis done in 05() patients 2 (40%) had better outcome and 3 (60%) patients had worse outcome.Next was jejunum perforation 3(4.91%) was managed by primary repair 02(%) patients, 01(50%) patient had better outcome , 1 (50%) patient had worse outcome and resection and anastomosis done in 01() patients 1(100%) patients had worse outcomeColon perforation seen in 3 (4.91%) patients managed by colostomy in 1 () had better outcome whereas 2 patient with primary repair 2 ()patients both had worse outcome. Appendix and rectum perforation seen in one(1.63%) patient each,both of them had worse outcome . **P valve is significant for gastric and ileal perforation.** Most common procedure performed was exploratory laparotomy with modified grahm's omental patch repair in 19 (31 %) patients followed by primary repair in 17(27.86%) patient for ileal and jejunal perforation ,grahm's patch repair done in 11(18.03%) patients, resection and anastomosis in 06 (9.83%),ileostomy performed in 5(8.19%) patient, colostomy,appendectomy and Hartsmansprocedure in 1(1.63%) patientrespectively.**Malik P, et al.(2014)[27]**study shows thatsite of perforation was duodenum 35.8%, ileum 27.6%, gastric 0.85%, esophageal 0.14%, jejuna 13.3%, appendicular 18.4%, colonic perforation 3.8%. **Nabi I,** et al. (2016) **[25]** study shows that ileum 43.4%, duodenum 30.2%, jejunum 5.3%, stomach 11.8%, large bowel perforations, colon 3.9%, appendix 2.6%, and caecum 2.6%.

Hospital Stay:

In our study Most of gastric perforation 29(49.18%). Duration of hospital stay upto 14 days in 14 (48.27%) patient and more than 14 days in 15(51.72%) patient Followed by ileal perforation 22(36.66%). Duration of hospital stay upto 14 days in 11 (50%) patient and more than 14 days in 11(50%) patient Next was jejunum perforation 3(5%)Duration of hospital stay upto 14 days in 1 (33.33%) patient and more than 14 days in 02(66.66%) patient, Colon perforation seen in 3 (5%) Duration of hospital stay upto 14 days in 1 (33.33%) patient andmore than 14 days in 02(66.66%) patientAppendix,rectum perforation and gastric and ileal perforation both seen in 1(1.63%) patient each of them had duration of hospital stay more than 14 days with complication present. **ManikantaKS,et al. (2016) [28]**study shows that the length of hospital stay ranged from 6 days to 22 days, the average hospital stay being 13.28 days. The patients who underwent simple primary closure had an average stay of 12.7 days. Their counterparts who had the procedure of resection anastomosis had an average stay of 14.4 days

Complication:

In our study 14 out of 60 (23.33%) patients had no complications, 4 (6.66%) patient had wound infection/wound dehiscence, 5 (8.33%) patient had loss of blood and catabolism, 12 (20%) patient had pleural effusion or burst

abdomen/ leak, 11 (18.33%) patient had single organ failure or Mods/ Septicemia, and 14 (23.33%) patient had death.**Nabi I, et al. (2016)**[34] study shows thatthe postoperative complications are wound infection 18.4%, wound dehiscence 3.9%, respiratory complications 10.5%, septicaemia 5.2%, and abdominal collection 3.9%. An anastomosis leak occurred in 2.6% of patients with typhoid ileal perforation and ileocaecal tuberculosis managed by resection anastomosis in emergency surgery (Table 3). Redo surgery and tension suturing was required in 3.9% of patients. The overall mortality was 3.9%. Postoperative complications were noticed mostly in those patients who presented late with faecal peritonitis, septicaemia, and associated comorbidity.

Clavien- Dindo Classification:
In our study Using the Clavien–Dindo classification, 14 out of 60 (23.33%) patients had no complications, 4 (6.66%) had grade I complication, 5 (8.33%) had grade II complications, 12 (20%) had grade III complications, 11 (18.33%) had grade IV complications, and 14 (23.33%) had gradeV complication rates.Singh A, et al. (2016) [35] study shows thatUsing the Clavien–Dindo classification, 134 out of 350 (38.28%) patients had no complications, 63 (18%) had grade I complication, 58 (16.57%) had grade II complications, 32 (9.14%) had grade III complications, 25 (7.14%) had grade IV complications, and 38 (10.85%) had grade V complication rates Discussion Intestinal perforation is the most dreadful complication in developing countries leading to diffuse peritonitis.

Conclusion:-

Perforation peritonitis is a life-threatening condition and requires urgent hospital care, resuscitation and surgery. Early resuscitation and surgery are required to decrease morbidity and mortality. Management and outcomes of perforation peritonitis depends on various factors such as perioperative and intra operative condition.Post-operative complications increases due to comorbid conditions, size and number of perforations and it also affects the outcome of the patient. It is observed that with the increase in contamination (intraperitoneal collection) morbidity increases.On the basis of risk stratification in Peritonitis patients its management requires lots of expensive modalities, skill, monitoring and treatment to provide better care to the patient.For the classification of complications, a new system is proposed by Clavien–Dindo which is very helpful during perforation surgery, it is used in all over the world and facilitates in comparisons or evaluation of various surgical outcomes between different centres , therapies or surgeons. Clavien- Dindo classification helps us to distinguish a normal postoperative course and the severity of complications, which allows us to compare postoperative morbidity and evaluate the outcomes. The new classification mainly focuses on the medical perspective, with a major emphasis on the risk, type of anaesthesiaand procedures or therapy used to correct a complication.We therefore recommend the use of clavien-dindo classification of complications. We also recommend a larger study with a bigger sample size for better analysis of clavien-dindo classification of complications and to confirm the findings of our study.

Sponsorship:
No.

Conflict of interest:
No.

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