INTRA-ABDOMINAL PRESSURE MONITORING AND OUTCOME IN PATIENTS WITH PERITONITIS

Sambasiva Rao Jampani[1], Srikanth Vattikonda[2], Swetha Jampani[3], Vishwaksen Vasireddi[4]

[1]Associate Professor, Department of General Surgery, GGH, Vijayawada.
[2]Assistant Professor, Department of General Surgery, NRIGH, Kakani, Guntur.
[3]Senior Resident, Department of Obstetrics & Gynaecology, GGH, Vijayawada.
[4]Post Graduate, Department of General Surgery, ASRAMS, Eluru.

ABSTRACT

INTRODUCTION

Intra-abdominal pressure (IAP) is the pressure generated inside the abdominal cavity. Normal IAP is approximately 5 mmHg. The intra-abdominal pressure and abdominal compartment syndrome (ACS) are significantly associated with increased mortality and morbidity. Very little has been known regarding clinical factors leading to ACS.

AIMS AND OBJECTIVES

The aims of this study is to find their prevalence, monitoring and to assess and plan in abdominal compartment syndrome.

MATERIALS AND METHODS

- It is a prospective evaluation study.
- Patients in ICU above 18 years admitted following surgery for peritonitis included in the study.
- Information collected through a proforma and analysed.

RESULTS

- The mean age of the patients 45.6 and incidence more in male.
- There is no statistically significant correlation between the IAP and the cause of peritonitis.
- The patients with IAP had a significantly increased length of stay in the ICU.
- Renal failure and the number of organ failure were significantly high in patients with IAH.

DISCUSSION

- We need to define whether to use mean as maximum IAP.
- SOFA scoring system is good indicator of prognosis in ICU.
- Incidence of IAH and ACS more in peritonitis due to large perforation.
- The ICU length of study correlates with the IAP.

CONCLUSION

- Incidence of IAH is significantly high in peritonitis.
- IAP has significant role in morbidity and mortality.
- IAH associated with higher incidence of organ failure.
- Early recognition and intervention in patients with IAH and ACS can reduce morbidity and mortality.

KEYWORDS

Intra-abdominal Pressure, Intra-abdominal Hypertension, Surgery.

HOW TO CITE THIS ARTICLE: Jampani SR, Vattikonda S, Jampani S, et al. Intra-abdominal pressure monitoring and outcome in patients with peritonitis. J. Evid. Based Med. Healthc. 2016; 3(42), 2064-2067. DOI: 10.18410/jebmh/2016/460

INTRODUCTION: Intra-abdominal pressure (IAP) is the pressure generated inside the abdominal cavity. Several clinical conditions such as blood on ascites accumulation in the abdominal cavity, bowel distension, packing after damage control laparotomy and closure of swollen and non-complaint abdominal wall cause a persistent increase in IAP.[1]

Financial or Other, Competing Interest: None.
Submission 23-04-2016, Peer Review 10-05-2016,
Acceptance 18-05-2016, Published 24-05-2016.
Corresponding Author:
Dr. Srikanth Vattikonda,
GF 3, 4, Kusuma Towers, ITI Road, Vijayawada.
E-mail: creecant@gmail.com
DOI: 10.18410/jebmh/2016/460

Normal IAP is approximately 5 mmHg. The World Society of Abdominal Compartment Syndrome (WSACS) has given consensus definitions on intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) and their management. The prevalence of intra-abdominal hypertension (IAH) is variable depending on the type of population studied (18-80%).[2] Although descriptions of ACS date back to the 19th century[3] only in the last 20 years, ACS has been described in the trauma setting and in surgical and medical ICU's.[4]

The IAH and ACS may be significantly associated with increased mortality and morbidity in surgical patients.[5] Implementation of bedside IAP monitoring and application

of the evolving management strategy may result in significant improvements in patients survived.[6]

AIMS AND OBJECTIVES:

The Aim of this Study:

- True prevalence of abdominal compartment syndrome.
- Intra-abdominal pressure monitoring as a useful tool in clinical evaluation of patients with peritonitis.
- To assess and plan algorithm in terms of laparotomy for patients with abdominal compartment syndrome.

MATERIALS AND METHODS:

Study Design: Prospective evaluation study.

Study Population: All patients above 18 years admitted in the ICU following surgery for peritonitis from April 2011 to September 2013.

Inclusion Criteria: All patients undergoing laparotomy for peritonitis due to duodenal, ileal, caecal, colonic, appendicular perforation and shifted to the ICU.

Exclusion Criteria:

- Patients with laparotomy.
- Patients with pre-existing renal failure.
- Patients with IAH due to other causes like pancreatitis, trauma.

METHODS:

- All the patients who were admitted to the ICU during the above-mentioned period with peritonitis were prospectively monitored for the development of intra-abdominal hypertension and abdominal compartment syndrome.
- All the patients were monitored for their haemodynamic status, cardiac renal and pulmonary status along with the measurement of IAP, according to the modified Kron technique described by Cheatham and Soksak.[7]
- The IAP was measured 4 times, at 6 hour intervals in stable measurement conditions, and for each acquisition time point one IAP measurement was done. IAP was measured intermittently at least every 6 hour in patients with an IAP > 12 mmHg or at least every 12 hr. in patients with an IAP < 12 mmHg.
- The mean and maximum values of daily measurements were recorded. As per the WSACS guidelines IAH definition was given as sustained or repeated IAP > 12 mmHg.[8]
- All the data is entered in to a proforma and later entered into a master data sheet for analysis.

RESULTS:

- The mean age of the patients was 45.6. The minimum age was 24 and maximum age was 73 years.
- Sex Distribution: Males were most affected (77.5%) than female (22.5%).
- Increased BMI is shown to correlate with increased IAP.
- Distribution among cause for peritonitis: The most common presentation of the subjects included in the study was peritonitis due to various causes like duodenal perforation, (37.5%) ileocaecal perforation (27.5%), appendicular perforation (20%), among which duodenal perforation was most common.
- According to this study, there is no statistically significant correlation between the IAP and the cause of peritonitis.
- The data show that though intra-abdominal hypertension (25%) and ACS (7.5%) is quite common among the critically ill patients, the incidence of IAH was in argument with the previous studies by Daniel R. Meldrum et al[9] who in their studies found the incidence of IAH to be 32%.
- Analysis was done between groups of IAP <12 and mean IAP ≥ 12 considering IAP max as cut-off parameter. Patients with IAP more than 12 were defined as having IAH (intra-abdominal hypertension).
- The patients with IAH had a significantly increased length of stay in the ICU.
- Burst abdomen was seen in 8 patients of which 6 patients (75%) had IAH and only 2 patients (25%) did not have IAH, which is statistically significant (p= 0.004)
- Re-laparotomy was done in 2 patients (55), both of whom had an IAP of more than 20 and fill under ACS.
- Renal failure and the number of organ failure were significantly high in patients with IAH. Both were described using the sequential organ failure assessment score (SOFA).

DISCUSSION: In the present discussion, comparisons were limited to the studies in which IAP was measured by an including Foley's catheter in the urinary bladder.

IAP Max or IAP Mean: We need to define whether to use mean, median, or maximal IAP values in there definitions. Most of the studies are based on maximal IAP values instead of mean or median; the prevalence of IAH instead of the maximum. It would not be correct to withhold surgery because the mean IAP value for that given day did not reach the cut-off value to initiate surgical decompression. On the contrary, surgery is most often based on the maximal IAP value or an IAP trend together with the presence of end-organ failure.[7] Therefore, the maximal IAP value in the study was withheld in the definition of IAH.

We suggest to use maximal IAP values for diagnosis of IAH and ACS and prognostic implication.

SOFA Scoring System: The sequential organ failure assessment score, or just SOFA score, is used to track a patient's status during the stay in an ICU.

The score is based on 6 different scores, one each for the respiratory, cardiovascular, hepatic, coagulation, renal and neurological systems.

SOFA scoring during the first few days of ICU admission is a good indicator of prognosis. Independent of the initial score, an increase in SOFA score during the first 48 hours in the ICU predicts a mortality rate of at least 50%.

Incidence of IAH and ACS: In the present study, 27.5% of patients developed IAH and 7.5% of patients went into ACS.

Among our patients, the patients with colonic and caecal perforation had increased incidence of IAH followed by duodenal perforation, ileal perforation and appendicular perforation having the least incidence.

Morbidity and Mortality: In our study, the ICU length of stay correlated with the IAP, i.e., patients with increased IAP had increased length of stay in the ICU (p = 0.001).

The incidence of complications like re-laparotomy (p = 0.037) and burst abdomen (p =0.004) correlated with increased IAP.

The incidence rate of renal failure (p = 0.001) and other organ failure (p=0.001) was again found to correlate with increased IAP.

Out of 3 patients who developed ACS 2 died and the IAP at presentation in these patients was significantly higher than the survivors. The higher the IAP, the poorer survival rate.

CONCLUSION: Incidence of intra-abdominal hypertension is significantly high in patients with peritonitis. Elevated intra-abdominal pressure has a significant role to play in morbidity and mortality.

Our study emphasised the importance of IAP monitoring in patients with peritonitis. Who are admitted in ICU after surgery? IAH is associated with higher incidence of organ failure in patients with peritonitis, it being on independent risk factors.

Early recognition and intervention in patients with IAH and ACS can reduce morbidity and mortality.

	N	Minimum	Maximum	Mean	Std. Deviation
Age	40	24	73	42.63	11.491
BMI	40	17	28	23.75	2.550
Ventilator Days	40	0	4	1.25	1.296
Ventilator-free days ICU length of	40	0	3	1.53	.640
Stay (LOS)	40	1	6	2.80	1.400
ICU free days	40	0	6	3.73	1.132
Hospital Length of stay	40	3	11	6.33	1.845
APACHE 2	40	7	23	11.50	3.266
Mean IAP	40	3	17	8.18	3.485
IAP max	40	6	24	10.80	4.450
Renal SOFA	40	0	3	.48	.679
SOFA max	40	0	14	3.60	3.608
Number of organ					
Failure	40	0	3	.48	.816
Valid n (List wise)	40				
Descriptive Statistics					

Sequential Organ Failure Assessment (SOFA): Parameters:

Score	PaO2/FiO2 (mmHg)
1	<400
2	<300
3	<200
4	<100
Respiratory	

Score	Plat x 10^3 /mm^3
1	<150
2	<100
3	<50
4	<20
Coagulation	

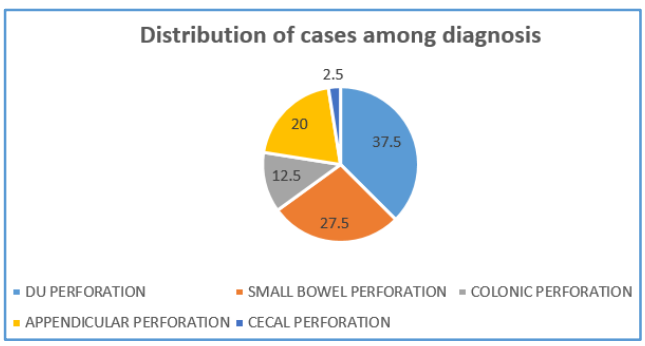
Score	Score
1	13-14
2	10-12
3	6-9
4	< 6
Glasgow	

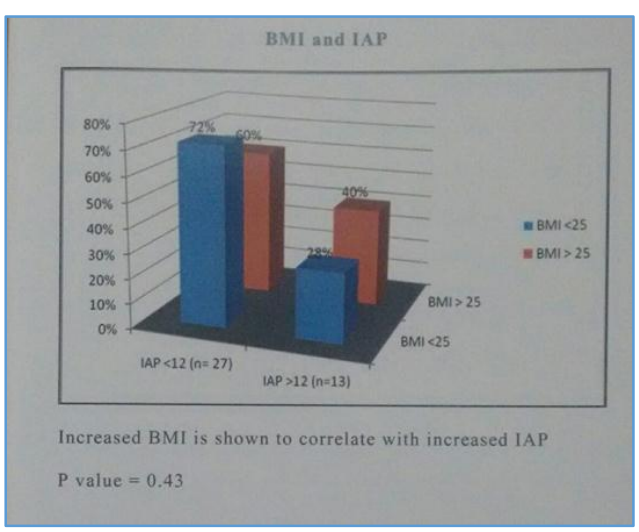
Score	
1	MAP < 70 mmHg
2	Dopa < 5
3	Dopa 5 - 15
4	Dopa > 5
Cardiovascular	

Score	Creatinine (mg/dL)
1	1.2 -1.9
2	2.0 – 3.4
3	3.5 - 4.9
4	>5
Renal	

Score	Bilirubin (mg/dL)
1	1.2 – 1.9
2	2.0 – 5.9
3	6.0 – 11.9
4	>12
Liver	

Distribution among Cause for Peritonitis:





REFERENCES

1. Malbrain MLNG. Intra- abdominal pressure in the intensive care unit: clinical tool or toy? In year book in intensive care and emergency medicine. Springer Berlin Heidelberg New York 2001;547-585.
2. Malbrain ML, Chiumello D, Pelosi P, et al. Prevalence of intra-abdominal hypertension in critically ill patients: a multicentre epidemiological study. Intensive care med 2004;30(5):822-829.
3. Emerson H. Intra-abdominal pressure. Arch Intern Med 1911;7(6):754-784.
4. Reintam A, Parm P, Kern H, et al. Gastrointestinal failure and intra-abdominal hypertension in medical and surgical patients. Intensive care Med 2005;31(suppl 1):5175-5182. Doi:10.1007/ s00134 - 005-2780-4.
5. Busani S, Soccorsi MC, Poma C, et al. Intra-abdominal hypertension in non-elective surgery: a preliminary report. Transplant Proc 2006;38(3):836-837.
6. Biancofiore G, Bindi ML, Romanelli Am, et al. Post-operative intra-abdominal pressure and renal function after liver transplantation. Arch surg 2003;138(7):703-706.
7. Cheatham ML, Malbrain ML, Kirkpatrick A. Results from the international conference of experts on intra-abdominal hypertension and abdominal compartment syndrome II recommendations. Intensive Care Med 2007;33(6):951-962. Doi=10.1007/S 00134-007-0592-4.
8. Moreno R, Vincent JL, Matos R, et al. The use of maximum SOFA score to quantify organ dysfunction/failure in intensive care. Results of a prospective, multicentre study. Working group on sepsis related problems of the ESICM. Intensive care Med 1999;25(7):686-696.
9. Malbrain ML, De laet I, Viaene D, et al. In vitro validation of a novel method for continuous intra-abdominal pressure monitoring. Intensive Care Med 2008;34(4):740-745.