IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 12 Ver. XI (Dec. 2017), PP 36-40
www.iosrjournals.org

Abdominal Compartment Syndrome: A Clinicl Study On 50 Patients In Surgical Intensive Care.

*Dr. Rajkamal Kanojiy[1], Dr. Mudunuri RaviTeja[2],
Dr. Ankur Kothari[3], Dr.Sanjay Singha[4], Dr.Pranav Raja Yadav[5],
Dr. Aayushi Kedawat[6]

[1]*Associate professor: Post graduate resident:Professor*
**Corresponding author: Dr Rajkamal Kanojiy*

Date of Submission: 15-12-2017 Date of acceptance: 28-12-2017

I. Introduction

Intra abdominal hypertension, defined as a sustained increase in Intra abdominal pressure can cause direct mechanical impairment of respiratory, hemodynamic, renal and splanchnic function. Organ dysfunction attributable to increased intra abdominal pressure has been termed the abdominal compartment syndrome. The abdominal compartment syndrome has been increasingly recognized as a source of morbidity and mortality in traumatized patient following laprotomy, typically as a result of massive visceral edema, retroperitoneal hemorrhage, or intra abdominal packing[1]. Abdominal compartment syndrome has also been reported in non traumatized patients. Various systems are involved in this syndrome first the increased abdominal pressure is transmitted to the pleural space so that lung compliance decreases. Hypoventilation and alteration of ventilation or perfusion distribution lead to hypoxia and hypercapnia. When mechanical ventilation is done, very high inspiratory pressures are often needed to deliver the tidal volume. Secondly, the increase in abdominal and pleural pressure leads to decrease in venous return, direct compression of heart and increase in after lo Third, perfusion to organs is critically decreased by combined effects of decreased cardiac output, increased interstitial pressure, and increased outflow pressure. This can lead to oliguria and renal failure. Splanchnic ischemia can also occur as reflected by decreased mucosal pH[1] decreased liver metabolism[3] and bacterial translocation[2]. In addition perfusion of abdominal wall may be decreased, so that wound healing may be impaired .Finally, intracranial pressure may also be increased due to decrease in cerebral venous return and increased venous pressure

The level of intra abdominal pressure determines the magnitude of this syndrome and involvement of various organs . The normal intra abdominal pressure ranges between 0 and 5 mmHg. When it is mildly increased to between 10 and 15mmHg cardiac index is usually maintained or even increased because abdominal viscera are mildly squeezed and venous return is increased. Respiratory and renal symptoms are unlikely to occur. Hepato splanchnic blood flow may decrease[4]. At this point , intravascular volume optimization will probably correct these alterations. When intra abdominal pressure is moderately increased between 15 and 25mmHg the full syndrome may be observed, but usually responds to aggressive fluid resuscitation, and surgical decompression should be considered. At high pressures >25 mmHg surgical decompression associated with fluid resuscitation and transient use of vaso constrictive agents is mandatory. When surgical decompression is not feasible, application of negative abdominal pressure should be considered[5]This syndrome usually occurs in critically ill patients with other cases of circulatory or respiratory failuremaking its diagnosis difficult for the surgeon. The number varies in different trauma series from 5.5% to 35%. One should consider the abdominal compartment syndrome in a patient with acute circulatory failure , wide systolic – diastolic pressure variation and elevated filling pressure . First exclude cardiac tamponade and increased pleural pressure, before measuring intra abdominal pressure.

Despite several recent reviews fundamental questions about intra abdominal hypertension and abdominal compartment syndrome remain unanswered . The overall incidence of intra abdominal hypertension and abdominal compartment syndrome, the importance of isolated finding of raised intra abdominal pressure, the clinical progression of intra abdominal hypertension, and level of increased pressure that is associated with clinically significant impairment of respiratory, hemodynamic, renal and splanchnic function are all unknown. This study measured intra abdominal pressure prospectively in a cohort of patients to characterize better the clinical significance of abdominal compartment syndrome and intra abdominal hypertension and the affect of intra abdominal pressure on cardiac , respiratory and renal parameters in critically ill and trauma patients

II. Aims And Objectives

1. To obtain intra abdominal in critically ill patients with abdominal pathology admitted in MAHATMA GANDHI MEDICAL COLLEGE & HOSPITAL
2. To find the incidence of intra abdominal hypertension and abdominal compartment syndrome among those critically ill patients
3. To compare intra abdominal pressures before and after the procedure done

III. Methodology

3.1 Study Design

Prospective evaluation study

3.2 Study Population

All the patients admitted to surgical intensive care unit with severe acute abdominal pathology from period starting from June 2016 to April 2017

3.3 Inclusive criterion

Patients admitted with blunt trauma abdomen, peritonitis, intestinal obstruction, intra abdominal growth, pancreatitis, severe ascitis, hypovolemic shock or any other condition which is known to cause abdominal hypertension

3.4 Exclusion criterion

1. Ruptured bladder or any other significant bladder injury
2. Proven or known bladder pathology like cystitis, tuberculosis, tumour, fistula etc
3. Significant pre existing disease which may confuse the clinical picture
4. Patients in severe sepsis at presentation

IV. Methods

OVER 10 months period starting from June 2016 to April 2017 all the patients who were admitted to surgical intensive care unit of Mahatma Gandhi Medical College Hospital with severe acute abdominal problems ranging from blunt trauma abdomen to peritonitis with acute intestinal obstruction, were prospectively monitored for development of intra abdominal hypertension and abdominal compartment syndrome All these patients who were included in study were monitored for their hemodynamic , cardiac , renal and pulmonary status along with measurement of abdominal pressure via an indwelling Foley's catheter in the urinary bladder using Unomedical Abdo-pressure measuring kitUnometer Abdo- Pressure intra abdominal hypertension monitoring system kit is unpacked and its one end is connected to Foley catheter. The end of drainage bag tubing is connected to other end of measuring kit. A 20 ml syringe is used to insert 20ml of sterile water through 3 way connector. Finally the top of symphisis pubic bone is used as zero point with patient in supine position. The manometer tube of kit is placed at 90 degrees at symphisis pubis and fluid or urine level is measured in manometer tubingThe bladder measurements were taken 12 hourly in a method previously mentioned, if intra Abdominal pressure was 25cm H2o or higher and was sustained for two reproducible measurements, the patient was given a diagnosis of intra abdominal hypertension. If intra abdominal hypertension is associated with multiple organ dysfunction syndrome, abdominal compartment syndrome is suspected. All the hemodynamic measurements were also recorded concurrently. All the lab values were recorded as and when done as indicated for particular patient. All the data is entered into a pre-forma and later entered into a master data sheet for final analysis

Despite numerous series in literature, much about abdominal compartment syndrome remains unknown and therefore controversial, in part because of confusion regarding terminology. There are, as yet no universally accepted definitions. This study used a broader definition of intra abdominal hypertension to ensure capture of all patients with a sustained increase in intra abdominal pressure. The threshold for intra abdominal hypertension was defined arbitrarily as sustained intra abdominal pressure of 15cm H2O and above.

Normal Intra abdominal pressure is highly variable in healthy individuals, depending on body position, body habitus and activity. Transient increase in intra abdominal pressure to 80mm Hg have been described in normal subjects.Sustained pneumoperitonium to 15mmhg is routinely used without apparent adverse effects during laproscopic surgery. In the present study15 cm h20 was chosen so that all individuals with even mild, occult intra abdominal hypertension were include and followed, with a goal of characterizing the spectrum of disease, from a mild asymptomatic pressure increased to frank abdominal compartment syndrome , and to ensure that all cases of intra abdominal hypertension were captured. In the absence of baseline data of this kind, no true estimate or overall incidence of intra abdominal hypertension or abdominal compartment syndrome may be made. For the purposes of this study, abdominal compartment syndrome was narrowly defined as Intra abdominal hypertension with associated MODS that improved following abdominal decompression. This very strict definition of abdominal compartment syndrome was to ensure that diagnosis of abdominal compartment

syndrome was accurate. Some patients with intra abdominal hypertension associated with relatively mild organ dysfunction may not require decompressive laprotomy, but will respond to non operative observation; according to present definitions, such patients had intra abdominal hypertension and not true abdominal compartment syndrome.The observations recorded in all the two groups tabulated and statistical analysis carried out by using appropriate statistical software(ANOVA)

V. Observations

Table No 1 Distribution according to age and sex

Age Group	Sex		Total
	Male	Female	
15-24	5 (10.42)	2 (4.17)	7 (14.58)
25-34	6 (12.50)	1 (2.08)	7 (14.58)
35-44	7 (14.58)	4 (8.33)	11 (22.92)
45-54	7 (14.58)	5 (8.33)	12 (22.92)
55+	9 (16.67)	4 (8.33)	13 (25)
Total	34 (68.75)	16 (31.25)	50 (100)

It was observed that out of 50 patients 34 were males and 16 were females. Maximum number of males were seen in age group of 55+ years whereas maximum number of females were seen in group 45-54 years .

Table 2 Distribution of patients according to diagnosis.

Diagnosis	Number of patients	Percentage
Perforation peritonitis	22	44
Intestinal obstruction	12	24
Blunt trauma	16	32
Total	50	100

Table 3 Incidence of intra abdominal hypertension

Observation	Number of patients	Percentage
Intra abdominal hypertension	24	48
Normotensive	26	52
Total	50	100

It was observed that out of 50 patients 24 cases (48%) had intra abdominal hypertension whereas 26 cases (52%) were found to be normotensive

Table no 4 Mean ± Sd of Intra abdominal pressure at various intervals

	Level						
	Pre op	12 hrs	24 hrs	36 hrs	48 hrs	60 hrs	72 hrs
Mean ± *Sd*	19.89± 8.01	14.75± 6.73	15.35± 7.21	16.06± 7.18	15.12± 7.09	13.62± 5.22	12.81± 5.81

The mean intra abdominal pressure at pre operative level was 19.89± 8.01. It was observed that after surgery the mean intra abdominal pressure at 12,24,36,48,60 and 72 hours was 14.75±6.73 , 15.35± 7.21 , 16.06±7.18, 13.62±5.22, 12.81 ±5.81 respectively .after surgery it was observed that intra abdominal pressure was decreased at 12 hours but again increased on the observation at 24 and 36 hours , however it decreased thereafter in readings t 48,60 and 72 hours .

VI. Discussion

Although the number of studies published on this topic is steadily increasing and confirms and patho physiologic implications of intra abdominal hypertension on end organ function with and outside the abdominal cavity methods and definitions used are not uniform . In the present discussion , hypertension was measured by an indwelling Foley catheter in the urinary bladder. Liberty was taken in converting the readings from mm of Hg to cm of H_2O(1 mm Hg= 1.36cm of H_2O)

6.1 Incidence Of Abdominal Compartment Syndrome

In the present study the incidence of abdominal compartment syndrome among the critically ill patients admitted to surgical intensive care unit was 16%, similar incidence was noted in a study done by Meldrum DR, Moore FA et al and Ivatury RR who reported the incidence of 14% and 33%respectively[6,7]. But in contrast, these results were far above the findings of Hong JJ et al and Kron et al who reported the incidence to be 2% and 4% respectively.[8,9]

The possible explanation for this discrepancy is , by measuring intra abdominal pressure in all patients admitted in ICU, this study included low risk as well as high risk patients, where as the previous studies confined data collection to low risk patients.While the latter approach ensures a poor yield of patients with abdominal compartment syndrome, it may result in very low incidence compared with that seen clinically in ICU population overall.

6.2 Abdominal Compartment Syndrome And Intra Abdominal Hypertension Patient Profile

Peritonitis was the most common cause of Abdominal compartment syndrome and Intra abdominal Hypertension in the present study followed by intestinal obstruction in the present study group (66% and 42.8 %respectively), this is not in agreement with the studies done by Shafik A et al who reported that blunt trauma as the cause in 72.5 % of the cases of Abdominal compartment syndrome in critically ill patients[10]. Similar findings were reported in other studies by Hong et al and Malbrain et al[9]

6.3 Effects Of Intra Abdominal Hypertension On Organ Function

The mean Intra abdominal hypertension at presentation in the present study was 19.89cm of H@O, and mean Intra abdominal hypertension at which the patients developed Abdominal compartment syndrome was 24.8 cm of H2O, in a similar study by Daniel R.Meldrum the mean was found to be 27.1 and the mean Intra abdominal pressure at which abdominal compartment syndrome was noted was 36.72cm of H2O[6]. The mean Intra abdominal hypertension at which patients developed pulmonary and renal compromise was 25.4 and 27.67 cm of H2O respectively. These findings were in concurrence with observations made by Ridings et al where pulmonary compromise was noted at a mean Intra abdominal hypertension of 20cm of H2O[11]. In a similar study Harman et al reported renal compromise at mean intra abdominal pressure of 25 cm of H20. Intra abdominal hypertension does not inevitably progress to abdominal compartment syndrome, and may be associated with relatively benign conditions , such as constipation. In general , asymptomatic Intra abdominal hypertension had a benign clinical course[12]. Abdominal compartment syndrome was also associated with a significantly higher Inter abdominal pressure than asymptomatic intra abdominal hypertension . Although not unexpected, this is a meaningful worrisome than one of 20 cm of H2O, especially when associated with MODS . Cardiopulmonary deterioration is the most frequent reason prompting decompression in most cases with Intra abdominal Hypertension as was noted by DanielR. Meldrum et al.[1]

6.4 Morbidity And Mortality

Out of the 50 patients who were monitored , 2 died and the mean intra abdominal hypertension at presentation in these patients was significantly higher than survivors

Te higher the Intra abdominal hypertension , the poorer is the survival rate. Mortality associated with this condition has been reported in 10.6- 68% of patients in various other studies done elsewhere.

VII. Summary

The abdominal compartment syndrome has been increasingly recognized as a source of morbidity and mortality in critically ill patients typically as a result of massive visceral edema , retro peritoneal hemorrhage or Intra abdominal packingSummarizing the evidence, abdominal compartment syndrome though a common phenomenon following trauma, is not a frequent finding among the rest of the patients who were admitted to surgical ICU. Routine measurement of Intra abdominal pressure and early detection abdominal compartment syndrome in high risk patients followed by prompt decompression will help in reducing the mortality and morbidity in these patients

VIII. Conclusion

1. Abdominal compartment syndrome is common phenomenon in perforation peritonitis
2. Given the rarity and benign nature of asymptomatic Intra abdominal hypertension routine measurement of intra abdominal hypertension is not warranted in all patients
3. Routine measurement of intra abdominal hypertension in high risk patients and early intervention is associated with significant improvement in morbidity and mortality

Reference

[1]. Chang MC , Miller PR, D'Agostino RJ, Meredith JW. Effects of abdominal decompression on cardio pulmonary function and visceral perfusion in patients with intra abdominal hypertension. J trauma 1998;44:440-445

[2]. Diebel LN , Dulchavsky SA ,Brown WJ .Splanchnic ischemia and bacterial translocation in the abdominal compartment syndrome. J Trauma 1997;43:852-855

[3]. Nakatani T , Sakamoto Y, Kaneko I, Ando H. Effects of intra abdominal hypertension on hepatic metabolism in a rabbit model.J Trauma 1998;44:446-453

[4]. Saggi BH et al .Abdominal compartment syndrome. J Trauma 1998:45:597-609

[5]. Saggi BH, Bloomfield GL ,Sugarman HJ, et al. Treatment of intracranial hypertension using non surgical abdominal decompression. J Trauma 1999;46:646-651.
[6]. Meldrum DR, Moore FA, Moore EE, et al. Prospective characterization and selective management of the abdominal compartment syndrome. Am J Surg1997;174;667-673
[7]. Ivatuary RR, Porter JM, Simon RJ, et al. Intra abdominal hypertension after life threatening penetrating abdominal trauma: prophylaxis, incidence and clinical relevance to gastric mucosal ph and abdominal compartment syndrome. J Trauma 1998; 44;1016-1021
[8]. Kron IL, Harman PK, Nolan SP. The measurement of intra-abdominal pressure as a criterion for abdominal re-exploration. Ann Surg . 1984;199:28–30. [PMC free article] [PubMed
[9]. Hong JJ , Cohn SM, Perez JM, Dolich MO, Brown M ,McKennyMG et al. Elevated intra abdominal pressure and renal function. Ann surg 1982; 196; 594-597
[10]. Shafik A, El- Sharkawy A, Sharaf WM . Direct measurement of intra abdominal pressure in various conditions. Eur J surg 1997;163 :883-7.
[11]. Ridings P C, Blocher C R, Sugerman H J. Cardiopulmonary effects of raised intra-abdominal pressure before and after intravascular volume expansion. J Trauma. (1995);39:1071–1075. [PubMed]
[12]. Harman P K, Kron I L, McLachlan H D. et al. Elevated intra-abdominal pressure and renal function. Ann Surg.(1982);196:594–597. [PMC free article] [PubMed]

*Dr. Rajkamal Kanojiy. "Abdominal Compartment Syndrome: A Clinicl Study On 50 Patients In Surgical Intensive Care." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.12 (2017): 36-40