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**INTERNATIONAL JOURNAL OF  
 ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/3006  
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/3006>



### RESEARCH ARTICLE

#### HOW MUCH DOES THE INTRA-ABDOMINAL PRESSURE VARY BY NASOGASTRIC DECOMPRESSION IN PATIENTS WITH INTESTINAL OBSTRUCTION???

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#### Manuscript Info

##### Manuscript History

Received: 28 November 2016  
 Final Accepted: 27 December 2016  
 Published: January 2017

##### Key words:-

IAP (Intra-abdominal pressure),  
 nasogastric decompression, intestinal  
 obstruction.

#### Abstract

**Introduction:** We follow the age-old teaching of inserting nasogastric tube to decompress the stomach and reduce intra-abdominal pressure whenever a patient comes to us with intestinal obstruction. But how much does this decrease the raised intra-abdominal pressure is hardly known and evidence based. So in this study we attempt to find the difference in intra-abdominal pressure that occurs by insertion of nasogastric tube and decompression.

**Aims and objectives:** To find the difference in intra-abdominal pressure on insertion of nasogastric tube and decompression in patients with intestinal obstruction.

**Method of study:** Interventional study. 75 patients with intestinal obstruction who presented to emergency department of Silchar Medical College and Hospital were included in the study. Patient who had no vomiting in the last 2 hours before presentation were only included for this study. Intra-abdominal pressure was measured via Foley's catheter method before and after insertion of nasogastric tube and decompression. Results were obtained based on the difference in intra-abdominal pressure and percentage variation.

**Conclusion:** From this study we found that insertion of nasogastric tube in emergency department in patients with intestinal obstruction reduces the intra-abdominal pressure by 2.81mmHg (mean of 75 patients) in short time even when no other intervention has been carried to reduce the intra-abdominal pressure before operation. On an average there was 18.18% reduction of IAP after nasogastric decompression.

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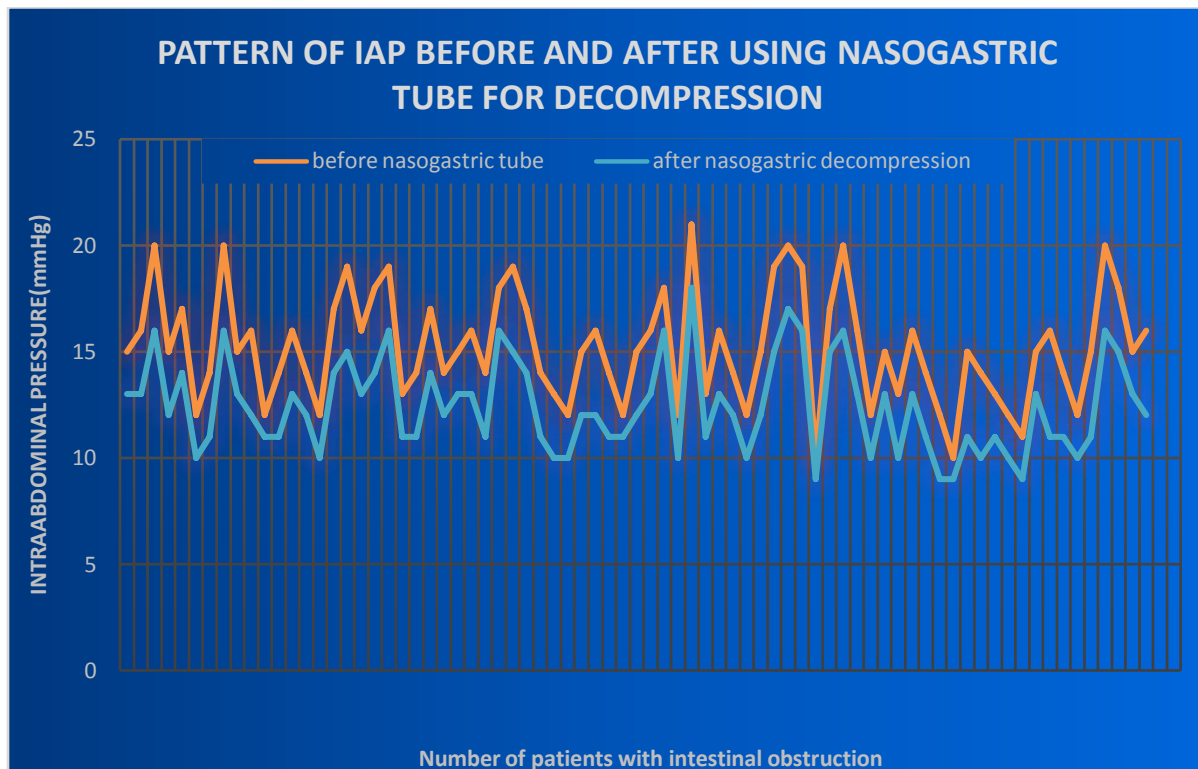
75 patients with intestinal obstruction who presented to emergency department of Silchar Medical College and Hospital were included in the study. Patient who had no vomiting in the last 2 hours before presentation were only included for this study. Intra-abdominal pressure was measured via Foley's catheter method before insertion of nasogastric tube.[1]

With the patient lying supine, 100 ml of sterile water were instilled via manometer tubing into the bladder following drainage of viscera. The mid-axillary line was used as the zero reference, and cavity pressure noted in centimeters of water (cmH<sub>2</sub>O) at end expiration.[2] The IAP was converted to mmHg by multiplying with 0.735

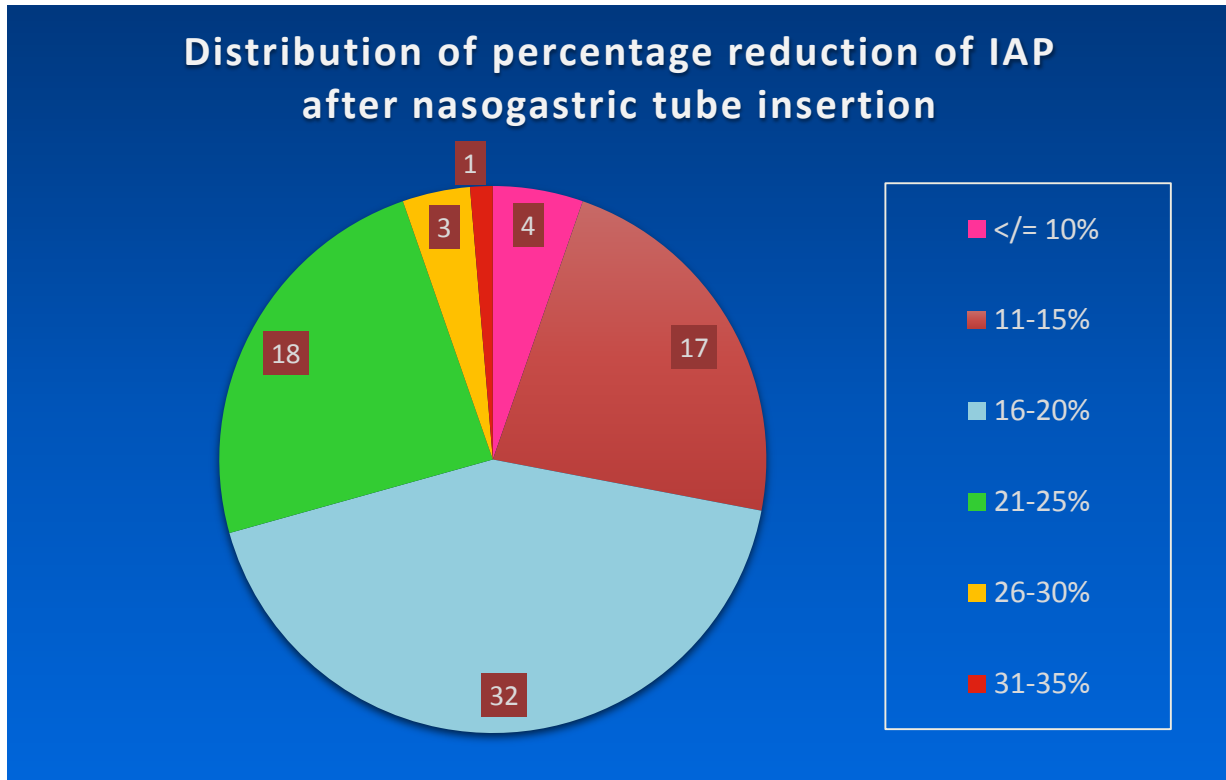
Then nasogastric tube of 16F size, was inserted till 55 cm marking and maximum decompression done. After ten minutes of decompression IAP was measured again. The difference in IAP was found in all cases. No other intervention that alters the IAP were done before taking these values. In all patients IAP was measured by same method in supine position. Pediatric patients and pregnant women were excluded.

**Results and observations:-**

The recording of intra-abdominal pressure in all the patients with intestinal obstruction before and after nasogastric decompression is plotted in the form of graph below:



The maximum change in intra-abdominal pressure observed was 5 mmHg in one out of 75 patients. Minimum change in intra-abdominal pressure observed was 1 mmHg in 4 out of 75 patients. Among the patients who presented to us with intestinal obstruction the maximum intra-abdominal pressure noted was 21 mmHg and minimum IAP at presentation was 10mmHg. The difference in IAP of 2mmHg, 3mmHg and 4mmHg were noted in 24 patients, 32 patients and 14 patients respectively. So difference of 3mmHg was found in maximum number of patients in our study due to nasogastric decompression. Through this study we observed that maximum of 31.25% reduction of IAP occurred after nasogastric decompression and minimum of 8.3% reduction of IAP in two patients. 16-20% reduction of IAP occurred in maximum number of patients (32). Percentage reduction of IAP were divided into 6 categories and mentioned in diagram below.



### Discussion:-

Since the 1930s routine use of the nasogastric tube to achieve postoperative gastric decompression has enjoyed widespread acceptance, and for decades patients' complaints were not taken into consideration by anesthesiologists and surgeons. Nasogastric decompression facilitate exposure of operative field during surgeries for intestinal obstruction. It helps to drain the gastric remnant which can relieve nausea and abdominal distension. Besides, it may help decrease diaphragmatic splintage and hence decrease chance of chest infection when ileus occurs. Perceived importance in earlier years was well expressed by WJ Mayo: 'Would rather have a resident with a nasogastric tube in his pocket than a stethoscope.'[9]

However, nasogastric intubation could cause patient discomfort; also it has been shown that it would cause gastro-esophageal reflux which may be associated with chest complication. At one point or the other each surgeon would have experienced to see the patient who removed nasogastric tube himself due to discomfort. So it is highly essential to have evidence based establishment of influence of nasogastric decompression on Intra-abdominal pressure.

Since the abdomen and its contents can be considered as relatively non-compressive and primarily fluid in character, subject to Pascal's law, the IAP can be measured in nearly every part of the abdomen. In 1875, Oderbrecht measured IAP within the urinary bladder.[3] Different direct and indirect measurement methods have been reported. In this study we have used the intra-vesical method which is considered gold standard in most of the studies and cost effective as well.

Normal IAP ranges from sub-atmospheric to 0 mmHg. Normal IAP is approximately 5–7 mm Hg in critically ill patients. The World Society of the Abdominal Compartment Syndrome (<http://www.wsacs.org>), in its latest consensus statement [2], defined IAH as sustained or repeated IAP of  $\geq 12$  mmHg. Likewise, abdominal compartment syndrome (ACS) was defined as IAP  $> 20$  mmHg in combination with at least one new end-organ failure.

IAP increases with inspiration (diaphragmatic contraction) and decreases with expiration (diaphragmatic relaxation).[4] Thus all the measurement in our study was taken just after expiration of patient. It is also directly affected by the volume of the solid organs or hollow viscera (which may be either empty or filled with air, liquid or

fecal matter), the presence of ascites, blood or other space-occupying lesions (such as tumors or gravid uterus), and the presence of conditions that limit expansion of the abdominal wall (such as burn or third-space edema). But how much does the nasogastric decompression help in reducing IAP is the main interest of this study.

The potential contribution of body position in elevating IAP should be considered in patients with moderate to severe IAH or ACS. Other studies say Head of bed elevation can significantly increase IAP compared to supine position, especially at higher levels of IAH.[5] Such increases in IAP become clinically significant (increase >2 mmHg) when the patient's head of bed elevation exceeds 20°. To avoid error in measurement due to change in posture, all our readings were taken in supine position.

Abdominal Compartment Syndrome (ACS) and Intra-abdominal Hypertension (IAH) affect all body systems, most notably the cardiac, respiratory, renal, and neurologic systems. ACS/IAH affects blood flow to various organs and plays a significant role in the prognosis of the patients. Abdominal perfusion pressure is the difference in mean arterial pressure and the intra-abdominal pressure in mmHg. So for each mmHg of decrease in abdominal pressure there is chance for intra-abdominal perfusion to increase. Literature shows reduction of mesenteric blood flow and higher chance of gut mucosal ischemia and reduction in portal circulation with increase in IAP more than 10mmHg. There are studies showing reduction bowel tissue oxygenation with normal cutaneous oxygenation in patients with intra -abdominal hypertension. [6] In our study we observed that 15 out of 75 patients reached IAP of 10mmHg and below following nasogastric decompression.

For every mmHg rise in IAP there is incremental reduction in renal plasma flow which is irreversible by just fluid management[7], [8]. So reduction of IAH in the earliest can help renal system to recover its flow and function.

It has been established already that there is direct relationship between duration of increased IAP and morbidity of patient. In our study the mean difference found was 2.81mmHg of reduction in IAP just by nasogastric decompression in ten minutes interval. On an average there was 18.18% reduction of IAP after nasogastric decompression. Even when mean reduction in IAP of 2.81mmHg by nasogastric decompression appears to be smaller, it can highly contribute for reducing IAP apart from non-operative techniques like per rectal evacuation in patients with intestinal obstruction. This reduction of IAP will help to maintain perfusion of intra-abdominal organs during the time spent before operative intervention.

### **Conclusion:-**

From this study we found that insertion of nasogastric tube in emergency department in patients with intestinal obstruction reduces the intra-abdominal pressure by 2.81mmHg (mean of 75 patients) in short time even when no other intervention has been carried to reduce the intra-abdominal pressure before operation. If the study can be carried on large scale an evidence based value of difference in intra-abdominal pressure following nasogastric decompression by Ryle's tube can be firmly established.

**Conflict of interest:** none

### **References:-**

1. Fusco MA, Martin RS, Chang MC. Estimation of intra-abdominal pressure by bladder pressure measurement: validity and methodology. *J Trauma*. 2001;50(2):297–302. doi: 10.1097/00005373-200102000-00016.
2. Malbrain ML, Cheatham ML, Kirkpatrick A, Sugrue M, Parr M, De Waele J, Balogh Z, Leppaniemi A, Olvera C, Ivatury R, D'Amours S, Wendon J, Hillman K, Johansson K, Kolkman K, Wilmer A. Results from the International Conference of Experts on Intra-abdominal Hypertension and Abdominal Compartment Syndrome. I. Definitions. *Intensive Care Med*. 2006;32(11):1722–1732. doi: 10.1007/s00134-006-0349-5.
3. Odebrecht E. *Aus der gynäkologischen Klinik des Herrn Prof. Hegar in Freiburg i.B. Beitrag zur Lehre von intraabdominellen Druck*. Berl. klin. Wochenschr. 1875; 12: 175-8.
4. Hess D, Maclyntyre N, Galvin W, Mishoe S. *Respiratory care: Principles and practice*: Jones & Bartlett Learning; 3<sup>rd</sup>edn: 2015. ISBN-13: 9781284050004
5. Cheatham ML, De Waele J, De Laet I, De Keulenaer BL, Widder S, Kirkpatrick AW, Cresswell AB, Malbrain MLNG, Bodnar Z, Mejia-Mantilla JH, Reis R, Parr M, Schulze R, Puig S: The impact of body position on intra-abdominal pressure measurement: a multicenter analysis. *Crit Care Med* 2009, 37: 2187-2190. 10.1097/CCM.0b013e3181a021fa

6. Bongard F, Pianim N, Dubecz S, Klein SR. Adverse consequences of increased intra-abdominal pressure on bowel tissue oxygen. *J Trauma* . 1995;39:519–525.
7. Bradley SE, Bradley GP. The effect of increased abdominal pressure on renal function. *J Clin Invest*. 1947;26:1010–1015.
8. Harman PK, Kron IL, McLachlan HD, et al. Elevated intra-abdominal pressure and renal function. *Ann Surg*. 1982;196:594–597.
9. Tanguy, Michèle, Philippe Seguin, and Yannick Mallédant. “Bench-to-Bedside Review: Routine Postoperative Use of the Nasogastric Tube – Utility or Futility?” *Critical Care* 11.1 (2007): 201. PMC. Web. 25 Jan. 2017.