VOLUME - 10, ISSUE - 12, DECEMBER - 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Anaesthesiology

INTRAABDOMINAL PRESSURE IN ICU

Dr. Bharti Choudhary MD Anaesthesia, Civil Hospital Nadaun, Hamirpur, Himachal Pradesh

Dr. Nishchint Sharma* MD Anaesthesia, Civil Hospital Nadaun, Hamirpur, Himachal Pradesh. *Corresponding Author

ABSTRACT Intra-abdominal pressure (IAP) is an important parameter in the surveillance of critical patients, widely used in intensive care units. Increase in IAP commonly observed in critically ill patients as a result of diminished abdominal wall compliance, increased intra- and extra-luminal abdominal content and enhanced capillary permeability along with interstitial fluid accumulation. Incidence of increased IAP is more in trauma, critically injured, pregnancy and postsurgical patients. Abdominal compartment syndrome (ACS) is the most dreaded complication of elevated intra-abdominal pressure. Abdominal compartment syndrome associated with organ dysfunction, multisystem organ failure, high morbidity and mortality.IAP measurement is important in monitoring hemodynamic stability in intensive care units.

KEYWORDS : Intraabdominal pressure, Abdominal compartment syndrome, ICU.

INTRODUCTION:

Intra-abdominal pressure is defined as the steady-state pressure concealed within the abdominal cavity and resulting from the interaction between the abdominal wall and viscera. Intra-abdominal pressure levels up to 5 mmHg are considered physiological in adults. However in patients suffering from conditions devoid of pathophysiological significance such as obesity, IAP may range from 10 to 15 mmHg, while IAP values between 5 and 7 mmHg are expected in critically ill patients. But elevated IAP could also be observed in critically ill patients as a result of diminished abdominal wall compliance, increased intra- and extra-luminal abdominal content and enhanced capillary permeability along with interstitial fluid accumulation.

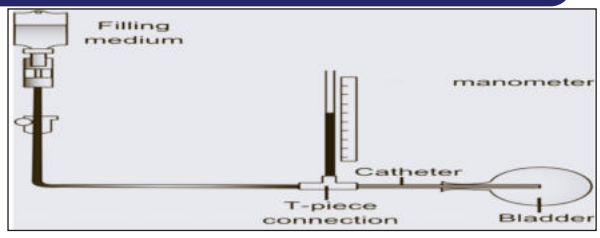
Till date, little is known about normal values of IAP during pregnancy, either in healthy or complicated pregnancies. In 1913, Paramore was the first to investigate IAP during pregnancy.[1] Transrectal measurement of IAP was higher in pregnant women compared to non-pregnant individuals, and values increased throughout the course of pregnancy.

IAP was defined in 2006 by the World Society of Abdominal Compartment Syndrome consensus definition as the steady state pressure concealed within the abdominal cavity. In general, a normal IAP varies from sub-atmospheric values to 7 mmHg in normal-weight individuals, with higher baseline levels in morbidly obese patients of about 9 to 14 mmHg. Intra-abdominal hypertension (IAH) is defined as a sustained increase in IAP ≥12 mmHg and abdominal compartment syndrome (ACS) is defined as IAP >20 mmHg with new onset end organ failure. Both IAH and ACS are associated with organ dysfunction, multisystem organ failure, high morbidity and mortality.[2,3]

IAP can be measured using a wide range of techniques.[4] Assessment of the IAP by intra-bladder pressure (IBP) measurement was first described by Kron et al in 1984 and is currently considered as the gold standard method because of its safety, simplicity and reliability. However, this technique has never been validated in pregnant subjects.[5]

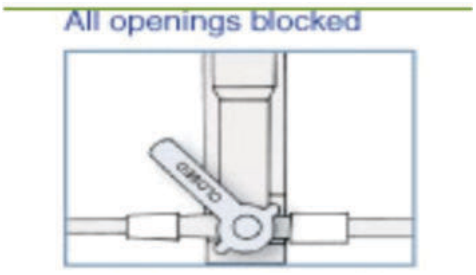
IAP MEASUREMENT:

Foley's catheter needs to be inserted in all patients under sterile technique. IAP measurements recorded using intra-bladder pressure (IBP) measurement. IBP is measured using Foley's manometer. This technique uses patient's own urine as pressure transmitting medium and presents a closed sterile circuit between patient's Foley's catheter and manometer using high pressure tubing

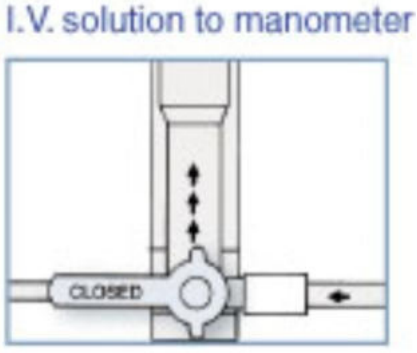


Mid axillary line at the level of iliac crest was taken as zero reference point.

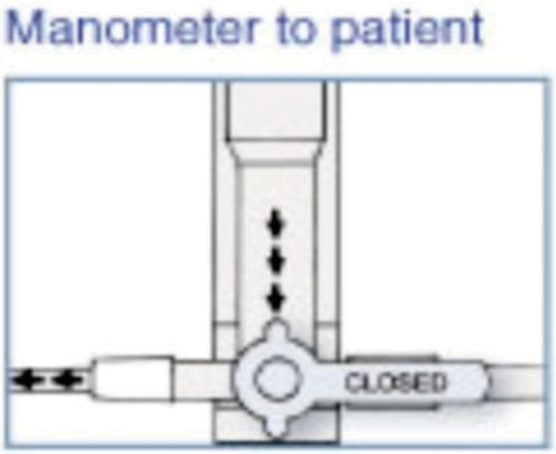
Step 1: A three-way tap was used to connect the manometer to an intravenous drip set with N.S. on one side and via high pressure tubing to patient's Foley's catheter on the other side. It was also ensured that there were no air bubbles in the tubing. In cases of empty bladder or presence of air bubbles, 20 ml of 0.9% sterile N.S. was injected to ensure an open pressure conductive fluid column and it was also checked that the catheter tubing was not kinked or blocked.



Step 2: The three-way tap was then turned so that it was open to N.S. bag and the manometer but closed to the patient, allowing the manometer column to fill with fluid. Precaution was also taken to not overfill the manometer.



Step 3: After manometer has filled adequately the three-way tap was turned again this time such that it is open to the catheter and the manometer, but closed to the N.S. bag. The fluid level within the manometer column will fall to the level of the IBP, the value of which can be read on the manometer scale which is marked in centimetres, therefore giving a value for the IBP in centimetres of water (cm of H_2O).



While measuring IBP, tone of abdominal muscles was evaluated by palpation, patient asked to hold breathing at the end of expiration and corresponding end expiration value of IBP was registered when meniscus has stabilised after about 10 seconds.

All readings were then converted into millimetre of mercury values by multiplying with conversion factor of 0.73 [1 cm of H_2O = 0.73 mmHg].

Corresponding IBP values were then recorded as the IAP values (in mmHg).

CONCLUSION:

Intraabdominal pressure if increased leads to pathophysiologic changes that results in ACS, which is a life-threatening condition caused by sustained acute elevation of IAP more than 20 mmHg with organ dysfunction, multisystem organ failure, high morbidity and mortality. Early identification of the risk factors for the development of intra-abdominal hypertension, timely measurement of intra-abdominal pressure in high-risk patients and promptly implementation of treatment can significantly reduce the morbidity and mortality associated with abdominal compartment syndrome. Surgical abdominal decompression is the mainstay of treatment. However nonsurgical steps include gastric and bowel decompression, evacuation of intraluminal contents, diuresis, sedation, which can be done in ICU.

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