Letter to the Editor

Abdominal Hypertension: It Is Time for Real Teamwork between Intensivists and Surgeons

Saeed A. MD*

Introduction

In 1863, Marey demonstrated the relationship between respiration and intra-abdominal pressure (IAP). Subsequently, some physicians introduced various methods to measure IAP via the uterus, rectum, and urinary bladder (1). However, it was 40 years later that Emerson identified the potential for IAP to cause cardiovascular collapse and observed that the removal of ascitic fluid could relieve pressure in the splanchnic area. So he could be called as a pioneer in experimental and clinical research on IAP.[1]

The concept of abdominal compartment syndrome (ACS) emerged in the 1980s, sparking increasing interest in the condition, and numerous articles and studies were published, in 2004, the World Society on Abdominal Compartment Syndrome (WSACS) was founded to promote research, enhance education, and improve patient survival by sharing effective management strategies. Two years later, the first consensus definitions were published.[2]

Updated Definitions from the Latest Consensus

1. Intra-abdominal pressure (IAP): The steady-state pressure within the abdominal cavity. In critically ill adult patients, the normal range is 5-7 mmHg, whereas in pediatric patients, it ranges from 4-10 mmHg.

2. Measurement of IAP: Performed by instilling 25 mL of normal saline into the bladder and expressing the pressure in mmHg. In pediatric patients, the volume is adjusted to 1 mL per kilogram of body weight, up to a maximum of 25 mL.

3. Intra-abdominal hypertension (IAH): Defined as a sustained or repeated pathological elevation in IAP ≥12 mmHg (≥10 mmHg in pediatric patients).

4. Abdominal compartment syndrome (ACS): Characterized by sustained IAP ≥20 mmHg in adults and >10 mmHg in children, accompanied by new or worsening organ dysfunction attributable to elevated IAP.

* Researcher,member of scientific association of intensive care,and ICU of Iran, Clinical Research Development Center, Amir Oncology Teaching Hospital, Shiraz University of Medical Sciences, Shiraz, Iran
Received: 14/10/2024

Corresponding Author: Dr. Amir Saeed
Tel: 88774444

E-mail: dr.saeedamir@yahoo.com

Risk Factors for IAH and ACS

According to the WSACS consensus, risk factors can be classified into the following categories:

a) Increased Intra-luminal Contents

- Abdominal surgery
- Major trauma
- Major burns
- Prone positioning

b) Increased Intra-abdominal Contents

- Gastroparesis/gastric distension/ileus
- Colonic pseudo-obstruction
- Volvulus

c) Diminished Abdominal Wall Compliance

- Acute pancreatitis
- Hemoperitoneum/pneumoperitoneum or intra-peritoneal fluid collections
- Intra-abdominal infections/abscesses
- Intra-abdominal or retroperitoneal tumors
- Liver dysfunction/cirrhosis with ascites
- Peritoneal dialysis

d) Capillary Leak/Fluid Resuscitation

- Acidosis
- Damage control laparotomy
- Hypothermia
- Increased APACHE-II or SOFA score
- Massive fluid resuscitation or positive fluid balance

e) Other Miscellaneous Factors

- Advanced age
- Bacteremia
- Coagulopathy
- Increased head-of-bed angle
- Massive incisional hernia repair
- Mechanical ventilation
- Obesity/increased body mass index
- PEEP
- Peritonitis
- Pneumonia
- Sepsis
- Shock or hypotension

It is important to know that IAH and ACS can also develop in non-surgical conditions (secondary IAH or ACS), including post-operative ICU care scenarios such as fluid resuscitation, capillary leak syndrome, mechanical ventilation, and high positive end-expiratory pressure (PEEP) in intubated patients.

Awareness and Management Challenges

Despite the clinical significance of IAH and ACS, the awareness toward definitions, measurement remains low, even in Europe. A Study conducted in Germany, Austria, and Switzerland revealed that the awareness rate was only 58%, with 43% of physicians frequently measuring IAP. However, the implementation of decompressive laparotomies (DLs) increased survival rates which when they are compared to previous studies, demonstrating an overall improvement in diagnosis, and management practices.[3]

Systemic Effects of Elevated IAP

The impact of IAH and ACS extends across multiple organ systems:

- Central Nervous System (CNS): Increased intracranial pressure (ICP), decreased cerebral perfusion pressure
- Cardiovascular System: Decreased cardiac output (CO), increased central venous pressure (CVP)
- Respiratory System: Decreased lung compliance, increased airway pressure, peak inspiratory pressure, and intrathoracic pressure
- Gastrointestinal System: Decreased mucosal blood flow, celiac flow, portal blood flow, and abdominal wall compliance
- Renal System: Decreased renal blood flow and glomerular filtration rate (GFR)

The Need for Multidisciplinary Collaboration

It is now evident why timely measurement of IAP and appropriate management of IAH and ACS are crucial in preventing multi-organ failure. Intensivists, internists, pediatricians, and surgeons must

be well-versed in the risk factors and assessment techniques for IAH and ACS. A frequent challenge in clinical practice is the debate between intensivists, surgeons, and internists regarding the timing of surgical intervention.

According to WSACS guidelines, ACS is not merely defined by a numerical threshold. The presence of new or worsening organ dysfunction is more critical than an absolute IAP value and often necessitates urgent or emergency surgical intervention.[4] In cases of overt ACS, laparotomy is recommended even in medical patients, such as those with burns or septic shock.[4]

Initial Medical Interventions to Reduce IAP

- **Gastrointestinal decompression: Nasogastric and rectal tube placement**
- **Pain management: Adequate sedation and analgesia**
- **Neuromuscular blockade: Considered for intubated patients**
- **Fluid management: Avoidance of volume overload**
- **Percutaneous drainage: For ascitic fluid removal**

And the last point

Surgeons must recognize the critical role of IAP monitoring and the detrimental effects of IAH and ACS on multiple organ systems. Effective teamwork between intensivists and surgeons is essential for early identification and appropriate management to improve patient outcomes.

References:

1. Papavramidis TS, Marinis AD, Pliakos I, Kesisoglou I, Papavramidou N. Abdominal compartment syndrome-Intra-abdominal hypertension: Defining, diagnosing, and managing. Journal of emergencies, trauma, and shock. 2011; 4(2): 279-91.
2. Malbrain ML, Cheatham ML, Kirkpatrick A, Sugrue M, Parr M, De Waele J, et al. Results from the international conference of experts on intra-abdominal hypertension and abdominal compartment syndrome. I. Definitions. Intensive care medicine. 2006; 32: 1722-32.
3. Wiegandt P, Jack T, von Gise A, Seidemann K, Boehne M, Koeditz H, et al. Awareness and diagnosis for intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) in neonatal (NICU) and pediatric intensive care units (PICU) – a follow-up multicenter survey. BMC pediatrics. 2023; 23(1): 82.
4. Kirkpatrick AW, Roberts DJ, De Waele J, Jaeschke R, Malbrain ML, De Keulenaer B, et al. Intra-abdominal hypertension and the abdominal compartment syndrome: updated consensus definitions and clinical practice guidelines from the World Society of the Abdominal Compartment Syndrome. Intensive care medicine. 2013; 39: 1190-206.