

## EDITORIAL

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# The abdominal compartment syndrome: evolving concepts and future directions

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The modern-era abdominal compartment syndrome (ACS) was first described as a 'new' clinical entity in the 1980s in emergency surgery patients, despite being described over 100 years earlier [1]. This stimulated scientific research leading to a better understanding of ACS, and the development of strategies to prevent and treat the condition [2]. Simultaneously, several investigators described the impact of the prelude to ACS – intra-abdominal hypertension (IAH), where organ function is impaired at lower intra-abdominal pressure (IAP) in the range of 12–20 mmHg [3]. This new knowledge has improved our understanding of the interactions between the different body compartments and new pathophysiologic terms have been coined, such as the polycompartment syndrome [4]. Within this concept, abdominal wall compliance seems to be a key factor that has only recently been better investigated [5].

Although controversial initially, IAH is now widely accepted as a cause of organ dysfunction and ACS is recognized as a catastrophic disturbance of a patient's physiology that requires urgent intervention and guided therapies [6]. Over the years, several strategies have been developed to attempt to mitigate IAH and to prevent progression to ACS [2]. IAP monitoring in patients at risk is the key element in early detection. IAP measurement methods are now universally available and have become safe, reliable and reproducible [7].

IAH does not only affect abdominal organs – raised IAP affects the different organ systems [6]; it greatly impacts the respiratory system, hemodynamics, and even cerebral perfusion. IAH is an important determinant of the compliance of the respiratory system, and practical consequences for mechanically ventilated patients are important [8]. IAH influences our traditional filling pressures, and volumetric preload indices better reflect the true preload status in IAH [9].

Improved insights into the pathophysiology and causes of IAH and ACS have led to improved management of patients at risk [10]. Open abdomen management and parallel changes in resuscitation strategies have now dramatically reduced the incidence of full-blown ACS [11], which has been observed most dramatically in trauma patients [12]. This integrated, IAH-focused approach has almost completely abolished ACS in some hospitals [13].

Whereas the incidence of end-stage, highly lethal, overt ACS is decreasing, IAH persists and is likely to increasingly do so as critically ill patients increasingly survive initial insults. Better understanding of the risks associated with IAH is thus necessary, as well as recognizing clinically important thresholds [14] and critically assessing the impact of different interventions aimed at IAP.

One of the major challenges currently in our ICUs is the management of open abdomen patients. An open abdomen is at high risk of a myriad of complications and planning for a safe same-admission closure begins immediately after opening [15]. It has become clear that ICU management also impacts the feasibility of closure, and more information is needed on how intensivists and surgeons can collaborate to reach this goal. Avoiding massive fluid overload and initiating de-resuscitation as soon as possible should be considered [12].

As a highly focused specialist society, the World Society of the Abdominal Compartment Syndrome (WSACS) has been assisting healthcare workers to better understand IAH and ACS; the WSACS's efforts have certainly contributed to many advances that have been made in the past [2]. As ACS is no longer the main challenge in this context, the WSACS recently changed name to the WSACS – the Abdominal Compartment Society in order to maintain relevance and concordance between the priorities of the society and the reprioritization in the challenges that are ahead of us. WSACS – the Abdominal Compartment

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Society is thus ready to address the challenges of truly appreciating the physiology, pathophysiology, and reconstructive anatomy of the abdominal compartment within the overall context of human injury and illness.

WSACS – the Abdominal Compartment Society remains a dedicated multidisciplinary international society of clinicians, scientists, clinician-scientists, and other healthcare workers dedicated to understanding the holistic implications of IAH. Further, the society understands and promotes health through championing anatomically functional abdominal compartment reconstruction at the earliest time after critical illness/injury, balancing the needs at all times for physiologic decompression and avoidance of IAH with anatomic reconstruction.

Understanding the subtle implications of modest IAH on all critically ill/injured patients and especially validating potential therapeutic interventions with new sound evidence remain our biggest challenges. A new emphasis will be placed upon embracing those engaged in the emerging surgical subspecialty of abdominal wall reconstruction. Ultimately, complete integration of these findings in the management of patients with relevant abdominal conditions affected by IAH remains the final goal.

In conclusion, IAH and ACS have evolved from poorly understood and inconsistently diagnosed disorders. Overall, ACS is decreasing through early recognition and directed management of IAH. In this context, WSACS – the Abdominal Compartment Society will continue its educational activities, support research, and promote evidence-based guidelines in order to continue to improve outcome in critically ill patients.

#### Abbreviations

ACS: Abdominal compartment syndrome; IAH: Intra-abdominal hypertension; IAP: Intra-abdominal pressure; WSACS: World society of the abdominal compartment syndrome.

#### Competing interests

JJDW is President of WSACS – the Abdominal Compartment Society and has consulted for Smith&Nephew, and Kinetic Concepts Inc. MLNGM is Past President and current Treasurer of WSACS – the Abdominal Compartment Society and has consulted for Convatec, Holtech Medical, Spiegelberg, and Kinetic Concepts Inc.; he is member of the Medical Advisory Board of Pulsion Medical Systems, a monitoring company. AWK serves as a Major in the Canadian Force Reserves and consults with the Canadian Space Agency; he conducted a randomized trial on open abdomen management supported by the Kinetic Concepts Corporation, received an ultrasound machine from the Sonosite Corporation for research purposes, received travel assistance from the Innovative Trauma, Synthese, and LifeCell Corporations, and is the President Elect of the WSACS.

#### Authors' contributions

JJDW, MLNGM and AWK drafted the manuscript. All authors read and approved the final manuscript.

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