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Update from the Abdominal Compartment Society (WSACS) on intra-abdominal hypertension and abdominal compartment syndrome: past, present, and future beyond Banff 2017

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Banff, Alberta, Canada is an International Destination known for its mountainous surroundings, natural wildlife, and hot springs, emphasizing spectacular unspoiled beauty that warrants recognition as a United Nations World Heritage Site to preserve for future generations [1].

THE PAST

The WSACS — the Abdominal Compartment Society has chosen Banff for the 8th World Congress of the Abdominal Compartment Society (http://www.wcacs2017.org/). This meeting represents the "coming-out" party and rebirth of the society after its rebranding from the highly successful progenitor, the World Society of the Abdominal Compartment Syndrome (WSACS). At the risk of being considered immodest, it should be recorded that in little over a decade since its 2004 WSACS birth place in Noosa, Australia, the society has cooperated and endeavoured to promote research, foster education, and improve the survival of critically ill patients suffering from severe intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS). In addition to five previous international scientific conferences, the society has published a dedicated textbook [2], highly cited (over 1,000 times on Google Scholar) consensus statements concerning definitions [3], management [4] and classification of the open abdomen [5], along with standards for research concerning IAH/ACS [6]. The society has also produced complete scientific supplements published in *Acta Clinica Belgica, American Surgeon,* and *Anaesthesiology and Intensive Therapy*. Finally, the society has demonstrated its academic credibility and commitment by producing up-

dated consensus statements and clinical practice guidelines in 2013 [3, 4, 7]. However, it is a rare yet satisfying occurrence when a professional society can reflect on a decade of intense academic and educational activity to conclude that one of its fundamental mission statements has largely been accomplished. Indeed, that was precisely the envious position of the WSACS after its meeting in Ghent, Belgium in 2015 [8, 9].

The mission of the WSACS - the Abdominal Compartment Society has always been to promote research, foster education, and improve the survival of patients with IAH/ACS. The most critical "floor" of any patient-orientated activity is clinical outcomes, and in this regard, patients are typically better off clinically compared to ever before. The adoption of the management principles espoused by the WSACS — the Abdominal Compartment Society appear to be highly correlated with significant improved survival and cost efficiency [10]. The coincident evolution in resuscitation with hemostatic or balanced blood component resuscitation strategies [11–14] that limit use of crystalloid fluids are most probably also highly associated with a reduction in the prevalence of ACS (recognizing that excess crystalloid fluids are likely to be central in many cases of IAH/ACS) [15, 16]. In support of these practices, a reduced incidence of open abdomens and ACS [17], and higher rates of abdominal closure with the adoption of damage control resuscitation and the use of negative pressure peritoneal therapy have been noted [18–20]. In 2017, the incidence of overt ACS is significantly lower than previous decades and may even been rare in some institutions. However, this should not breed complacency, as cases do occur, misconceptions abound, while ignorance is not a justification for missing this phenomenon.

However, a de-emphasized focus on the ACS will allow the society to concentrate on an even more much broader coverage of the basic pathophysiology of injury and illness as it relates to the abdominal compartment. It will also allow the society to tackle issues related to the understanding of and avoidance and treatment of IAH [21, 22]. IAH greatly affects perfusion to all intra-abdominal organs which can be shown in carefully conducted experiments that the gut, lungs, cardiovascular organs, kidneys, and even brain are profoundly and negatively impacted by progressive increases in intra-abdominal pressure (IAP). Studies have also confirmed that modest IAH is nearly ubiquitous in critical illness and injury (most frequently at modest levels that are known to affect physiology [23], but lower than those considered to demand immediate decompression). However, the reality is that levels of IAH that have been clearly documented in laboratory settings to dramatically influence organ function [24–27] stay unrecognized, unappreciated, and untreated every day in intensive care units (ICUs) across the world. Bluntly stated, however, it continues to bewilder the authors that the role of IAH in human illness and injury is almost consistently ignored or minimized in most critical care settings world-wide. This dilemma wherein there is a toxic influence that clearly impacts our patients, yet for which the most effective treatments are certainly morbid, should seemingly prompt great attention and therapeutic efforts from everybody caring for these patients, should it not?

THE PRESENT

The reality is gross omissions continue to be published in the highest ranked journals [28], while global surveys continue to confirm the apathy reflecting misconceptions, misunderstanding, and ambivalence concerning the active surveillance and treatment of IAH [29–35]. Is this apathy because the topic is too broad or too complex? If this "toxic factor", was a simple bacterium, or a gene mutation, or a chemical toxin, would there be a greater outcry and thus a more concerted effort to understand and mitigate its immense harm? In addition, if there was a biomarker or tool to quantify IAH and its effects, would there be more willingness to consider IAH as a relevant and independent contributor to organ dysfunction? There appears to be no question that IAH is a toxic factor that might be more easily understood if it was equated with visceral ischemia. Thus, we believe it is critical that we continue to advocate in a multi-disciplinary and global fashion, to study and attempt to understand and educate regarding the role of IAH in critical illness/injury. This mission, as a primary obligation of the society prompted serious discussion to actually rebrand it under the designation of the "World Society for the Understanding of Intra-Abdominal Hypertension". While this moniker might have captured the central relevance of understanding IAH, it would be insufficient to properly reflect upon the scope of the art and science that the WSACS — the Abdominal Compartment Society has committed to study under the comprehensive umbrella of the Abdominal Compartment.

We believe that patients have suffered from the failure of scientists, clinicians, and allied caregivers to holistically consider the unique anatomy and physiology of the abdominal compartment. In this unique compartment there is an exquisite susceptibility to pressure, perfusion, function, and infection. Thus, an infection is not just an infection, but is one with the primary effects of an abscess compounded by the secondary effects of visceral swelling from resuscitation. A repair of a massive hernia is not just a cosmetic repair of a bulge, but is also a dramatic resetting of the thoracoabdominal compliance with potentially catastrophic organ dysfunction. An intra-abdominal infection is not just a local problem, but also a potential reservoir/generator of toxic systemic mediators that might be abrogated by therapies applied to an open abdominal cavity.

THE FUTURE

The present day constitutes an exciting time as there have been major advances in understanding the epidemiology, anatomy, function and pathophysiology of the abdomen as a complete whole. Less morbid therapies have been described to manage or prevent IAH without the need to proceed to a full decompressive laparotomy [36–39]. It is now possible that we may wish to have an open abdomen in the sickest septic patient not because we have to, but because we want to. It is now theorized that having an open abdomen to allow for greater peritoneal drainage in intra-abdominal sepsis may fundamentally ameliorate the course of systematic sepsis [19, 20, 40, 41]. In this context, the emerging role of the microbiome in critical illness, and how it is affected by changes within the abdominal compartment, is a dimension that has been ignored for many years and requires our urgent attention. Moreover, the abdominal wall itself has recently assumed a greater appreciation in clinical practice and science. Newer thinking very much includes abdominal characteristics and health in conceptualizing models of thoracoabdominal physiology, culminating in the most recent work on abdominal compliance [42, 43]. Furthermore, as a frequent and direct consequence of earlier surgery, the burden of disease of abdominal wall failure has been appreciated in both its scope and challenge. Although surviving an open abdomen (OA) is a dramatic but less common cause of abdominal wall failure, there is a less dramatic, but greater population of these patients representing the often unappreciated scourge of incisional hernia following laparotomy which, when carefully followed, affects 20% of unselected patients and up to 50% of high-risk patients [44–46]. Advanced biomaterials and advanced surgical techniques now allow many patients previously deemed inoperable to undergo abdominal wall reconstruction [47, 48]. There remain however many critical questions in order to manage these patients' physiology. Experienced clinicians have recognized that if there is no ongoing ischemia or shock requiring aggressive resuscitation, mild-moderate IAH after AWR may be permissive and mitigated by spontaneous post-operative accommodation in intra-abdominal compliance [49, 50]. Such thinking would have been heretical at best a decade ago.

AND BEYOND

Thus, in order to reflect the evolving science and to embrace important concepts related to abdominal wall anatomy and function, the World Society of the Abdominal Compartment Syndrome, has officially changed its name to the WSACS — the Abdominal Compartment Society. This society is dedicated to the education and study of the form, function, and physiologic behaviour of the abdominal compartment in the interest of furthering patient care. Although we hope that our previous efforts studying catastrophic abdominal compartment syndrome may become historical, our need to individually study IAH, and to collectively advocate for its recognition as an important concern for all in critical illness and injury have never been greater. To this end, we have been fortunate to recruit the world's thought leaders with a highly acclaimed and published faculty of over 50 scientists, researchers, and clinicians joining us in Banff. Furthermore, nearly 100 original scientific investigations have been submitted for presentation. We thus invite all interested in the science, physiology and pathophysiology of the Abdominal Compartment to join us in Banff. Although meeting, discussing and learning are planned, the ultimate goal will be plan our further efforts towards better research and understanding in the future.

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