

Special Commentary on Kirkpatrick et al. Intra-Abdominal Hypertension and Abdominal Compartment Syndrome after Abdominal Wall Reconstruction: Quaternary Syndromes?

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Abstract

Reconstruction with reconstitution of the container function of the abdominal compartment is increasingly being performed in patients with massive ventral hernia previously deemed inoperable. This situation places patients at great risk of severe intra-abdominal hypertension (IAH) and the Abdominal Compartment Syndrome (ACS) if organ failure ensues. IAH and especially ACS may be devastating systemic complications with systematic and progressive organ failure and death. Surgeons should thus consider and carefully measure intra-abdominal pressure (IAP) and its resultant effects on respiratory parameters and function during abdominal wall reconstruction (AWR). The IAP post-operatively will be a result of the new intra-peritoneal volume and the abdominal wall compliance. Strategies surgeons may utilize to ameliorate IAP rise after AWR including temporizing paralysis of the musculature either temporarily or semi-permanently, pre-operative progressive pneumoperitoneum, permanently removing visceral contents, or surgically releasing the musculature to increase the abdominal container volume. In patients without complicating shock and inflammation, and in whom the abdominal wall anatomy has been so functionally adapted to maximize compliance, IAH may be transient and tolerable. IAH/ACS in the specific setting of AWR without other complication may be considered as a quaternary situation considering the classification nomenclature of the Abdominal Compartment Society. Greater awareness of IAP in AWR is mandatory and on-going study of these concerns is required.

Keywords: Abdominal compartment syndrome; Intra-abdominal hypertension; Abdominal wall reconstruction

Commentary

This special commentary is prepared on original article entitled “Intra-Abdominal Hypertension and Abdominal Compartment Syndrome after Abdominal Wall Reconstruction: Quaternary Syndromes?” published in Scandinavian Journal of Surgery in 2016 [1].

This manuscript attempts to comprehensively review the pathophysiology, surgical techniques, and the management of intra-abdominal hypertension (IAH) and the abdominal compartment syndrome (ACS) in relation to the functional repair of massive ventral hernia. Advances in surgical technique aided by improvements in biomaterials and the understanding of resuscitation and fluid management have allowed for true abdominal wall reconstruction (AWR) in cases that previously could not safely be repaired or were simply patched with bridging techniques previously. However, repairs that do not re-approximate the midline rectus muscles of the abdominal wall are neither anatomically functional and they are prone to early and repeated recurrence [2].

A major message of the manuscript was that the issue of IAP needed to be carefully considered in reconstructing the abdominal wall. Often surgeons and physicians who would carefully consider IAH and insist on measuring IAP in the ICU after an acute illness/injury do not consider measuring IAP after AWR. Even the Abdominal Compartment Society which has promulgated International Consensus Definitions and Guidelines [3-6], on all other aspects of IAP in the critically ill/injured has not specifically considered IAP after AWR. It was for this reason that the specific nomenclature of the quaternary abdominal compartment syndrome and quaternary intra-abdominal hypertension were discussed to raise expectations and awareness of physical pressure changes after AWR [7].

Several newer and conceptually fundamental concepts are discussed in this review. These concepts included the topics of

abdominal compliance, permissive intra-abdominal hypertension, the relative population-based importance of intra-abdominal hypertension, and the re-branding of the world society of the Abdominal Compartment Syndrome to focus more generally on the function and form of the abdominal compartment and its contents as a whole.

The concept of abdominal compliance (AC) is critical to appreciate for anybody operating on the abdominal compartment or caring for those after surgery on the abdominal compartment. It is now understood that intra-abdominal pressure is the direct result of both the abdominal volume and the abdominal compliance [8-10]. The volume of the abdominal contents can actually be modified by good surgical technique and avoiding bleeding and subsequent shock requiring resuscitation. By minimizing the volume of crystalloid fluids administered subsequent edema generation may be ameliorated. Rarely, if required, viscera may be resected [11]; but the general goal of major AWR is to reduce the abdominal contents back into an anatomically intact and functional container. The most remarkable advance in surgical technique is now surgical therapies which coupled with anatomic knowledge allow for an actual increase in size of the abdominal container [12].

The second paradigm changing concept is the related appreciation that abdominal compliance is not fixed. Abdominal compliance is a dynamic property reflecting the underlying tissue properties and health of the abdominal wall, which also reflects the therapies administered to any patient in the inter- and peri-operative periods [9,10,13]. It has been theorized that patients become tolerant to modest IAH immediately after AWR with flap advancement techniques, as the abdominal wall can continue to stretch in the post-operative period such that IAP decreases in the hours to days after major AWR [7,14-16]. Other therapies such as botulinum toxin injection may also improve AC [17,18] while excessive edema or surgical complications within the abdominal wall may decrease the AC.

The seemingly unique behaviour of “permissive IAH’ after uncomplicated AWR is a novel concept to consider especially as this is in distinction to the other classifications of primary, secondary, and recurrent IAH that have been described by the former world society of the Abdominal Compartment Syndrome [4,5]. The epidemiology of post-injury ACS has dramatically changed in the last decade, largely related to dramatic changes in resuscitation and the adoption of high colloid, blood-product and low crystalloid based resuscitation strategies [19-21]. With perspective, it has become apparent that any overt ACS, whether primary, secondary, or tertiary, was largely related to crystalloid resuscitation and that with more rational practices, overt ACS is becoming less common clinically [22]. However, as quaternary IAH/ACS is not typically resuscitation related conditions there are more rationale to classify them separately.

This evolution in classification is symbolic of a major evolution of the WSACS to become the Abdominal Compartment Society [23]. As the incidence of the overt ACS becomes less paramount [24,25] it became apparent to the Executive Committee of the WSACS that the actual name of the society was limiting in terms of reflecting the true breadth and depth of the Society’s mission.

From the Society’s inception, attention has been paid to the anatomy and clinical management of all stages of IAH/ACS Management, including abdominal reconstruction and long-term outcomes of IAH/ACS survivors. While naming the Society after the ACS emphasized the most dramatic condition to be addressed, it does not reflect upon the full scope of the Society’s interests and activities. 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 World Society of the Abdominal Compartment—or abbreviated, the Abdominal Compartment Society.

Thus, reviewing the newly appreciated science and physiology of abdominal wall reconstruction as a distinct body of work is closely congruent with the mission of the Abdominal Compartment Society to formally appreciating the abdominal compartment as a whole within all the body’s inter-related compartments [23]. Such combined considerations of abdominal physiology with anatomy, surgical technique, and post-operative care are what attendees at the 8th World Congress of the Abdominal Compartment Society in Banff, Alberta, Canada, in June 2017 (<http://www.wcacs2017.org>), will learn and discuss further.

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