Severe Trauma and Sepsis

Organ Damage and Tissue Repair

Xiaobing Fu
Liangming Liu
Editors

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Preface

The prevention, early management, tissue repair, regeneration and rehabilitation of severe trauma are a systematic project with great clinical and social significance. In recent years, great success has been achieved not only in China but also in the world. In the whole management process, early life saving and later rehabilitation management play a key role in effective, timely, and high-quality treatment of severe trauma.

In 2017, we have published a book titled *Advanced Trauma and Surgery*. That book was a summary of new advances in trauma and surgery, especially in early medical rescue, wound care, traumatic or burn shock, pathogenesis of sepsis, and tissue repair and regenerative medicine. However, many aspects of trauma were not included in that book, such as severe complications, wound care, and latest advances of stem cells in wound management. Thus, it is our desire that another book be published to make up for this deficiency; hence this new book titled *Severe Trauma and Sepsis: Organ Damage and Tissue Repair* was edited and published. In this book, there are 20 chapters and some new advances such as damage control in wound management and stem cell application in trauma treatment are included. The main theme of this book is to promote the understanding of these new advances and potential applications in basic research and clinical use. The authors contributed to this book are scientists or doctors from fields such as early trauma rescue, vascular surgery, cardiology, neurology, orthopedics, burns, plastic surgery, rehabilitation medicine, stem cells, and biomaterials. All of them are very experienced in their professional fields, and most of the content are their own work.

We would like to thank all the authors for their contribution to this new book. Also, our special thanks go to all those who have provided support for the successful publication of this book.

Beijing, China — Xiaobing Fu
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Xiaobing Fu, MD, PhD is an academician (Chinese Academy of Engineering, Division of Medicine and Health) and Foreign Member of French Academy of Medicine; president of the College of Life Science; and director of the Key Laboratory of Wound Repair and Regeneration of PLA, the PLA General Hospital and PLA Medical College.He has made great contributions on trauma, especially in trauma prevention and tissue repair and regeneration. His works were supported in part by the National Basic Science and Development Programme (973 Programme), National High-Technique Programme (863 Programme), Grant for National Distinguished Young Scientists, and Grant for National Natural Science Foundation of China. He has published more than 600 scientific papers, including papers published in the *Lancet* (1998, 2001), and 26 books as the editor in chief, and won 25 international and national prizes of Sci-Tech Progress from 1989 to 2015.He was a member of the Scientific Committee of the Third Joint Meeting of the European Tissue Repair Society and the Wound Healing Society held in Boudreaux in 1999; the Scientific Committee Member and Advisor or Member of the International Faculty from the First World Union of Wound Healing Societies (WUWHS) Congress to 5th WUWHS Congress, held in Melbourne in 2000, Toronto in Canada in 2008, Yokohama in Japan in 2012, and Florence in Italy in 2016. He was the Vice Chairman of Trauma and Burn Section of the International Conference on Life Science and Clinical Medicine in 2000.

Now, he is the Chairman of the Asian Wound Care Association (AWCA), the President of the Chinese Tissue Repair Society (CTRS), President of the Chinese Tissue Repair and Regeneration Society (CTRRS), and the President of Chinese Society for Biomaterials.Professor Fu was awarded the International Lifetime Achievement Award in Wound Repair and Regeneration in 2008. He was selected as the Academician (Chinese Academy of Engineering, Division of Medicine and Health) in 2009 and Foreign Member of French Academy of Medicine in 2018.

Liangming Liu, MD is director of Shock Research Lab of Research Institute of Surgery at the Third Military Medical University, research professor, and doctoral supervisor. He is a shock research specialist, distinguished young scholar of National Science Foundation of China. He is the committee member of the International Federation of Shock Society and Chinese Trauma Society; the vice chairman of Shock Society of China and War Wound and Trauma Committee of PLA; the standing member of Cardiovascular Committee of Chinese Pharmacology Society; the editorial board member of *Shock*, *Annals of Cardiology and Cardiovascular Diseases*, *Frontiers of Medicine*, *Chinese Journal of Traumatology*, *Military Medical Research*, and so on. He is invited reviewer of several journals such as *International Journal of Cardiology*, *Cell Biology International*, *Journal of Endocrinology*, *Experimental and Therapeutic Medicine*, and *Pharmacol Reports*. He is also the evaluation expert of National Natural Science Foundation of China and Yangtze River Scholars of Education Ministry in China.He has long been undertaking the study of pathogenesis, prevention, and emergency care of traumatic shock and responsible for over ten state and military major projects such as the key project of the National Natural Science Foundation of China, the National Major New Drug Development Plan, and the National Major Research Program of Basic Science (973 plan). In shock research, he raised the calcium

desensitization mechanism of vascular hyporeactivity for critical illness such as severe trauma and shock and the prevention and treatment measures; raised the new concept of permissive hypotensive resuscitation for uncontrolled hemorrhagic shock; and developed a series of emergent care devices for war wound and trauma. He has published over 350 papers in journals such as *Ann Surg*, *Cardiovasc Res*, *Crit Care Med*, *Crit Care*, *Anesthesiology,* and *Shock* and has obtained 12 national and provisional science and technology progress awards.

Damage Control in Abdominal Compartment Syndrome

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Cheng Zhao and Jianan Ren

Abstract

Abdominal compartment syndrome (ACS) is the endpoint of increased intra-abdominal pressure (IAP) which is the result of massive interstitial swelling in the abdomen or rapid development of a space-filling lesion within the abdomen. The intra-abdominal hypertension (IAH) leads to decreased abdomen perfusion pressure (APP) resulting in abdominal viscera dysfunction contributing to multi-organ dysfunction (MOD) and ischemia which lead to high mortality. Measurement has been taken to monitor the IAP for the contradiction between resuscitation and the massive interstitial swelling which lead to IAH. Besides the monitor measurements, damage control was introduced to save the severely injured patients who are on the edge of physiological limit. Damage control resuscitation and damage control surgery were conducted to maintain the balance among physiological limit, resuscitation, and controllable IAP. There is minimal original article about the pathophysiology of ACS. Most results were from clinical trial. Many early studies of IAH and ACS used discordant definitions or cutoff pressure values. In this review, nomenclature will follow the terminology established by the World Society of the Abdominal Compartment Syndrome (WSACS) which has recently been standardized and accepted widely. This chapter reviewed the history and the pathophysiology of ACS and the application of damage control.

Keywords

Abdominal compartment syndrome · Damage control surgery · Intra-abdominal hypertension · Multi-organ dysfunction · Open abdomen

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