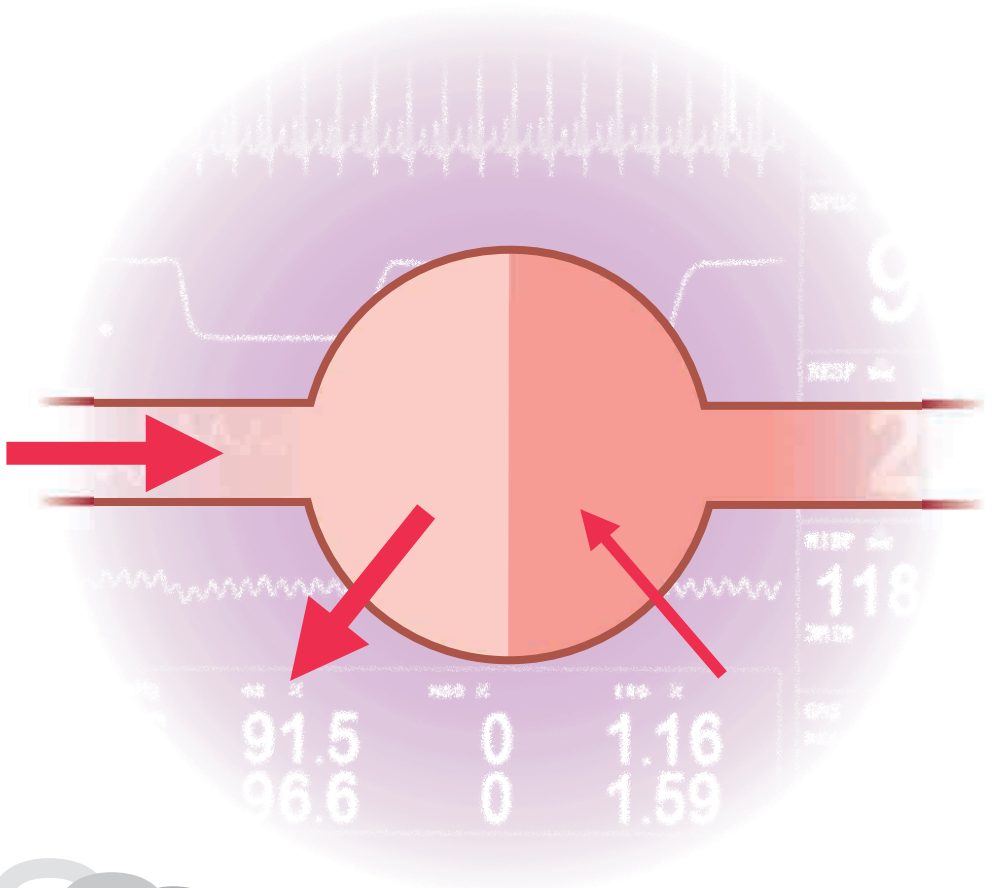


Shock – modern clinical treatment concepts

Heinrich Volker Groesdonk
Matthias Heringlake



Shock – modern clinical treatment concepts



UNI-MED Verlag AG
Bremen - London - Boston

Groesdonk, Heinrich Volker:

Shock – modern clinical treatment concepts/Heinrich Volker Groesdonk and Matthias Heringlake.-

1st edition - Bremen: UNI-MED, 2021

(UNI-MED SCIENCE)

ISBN 978-3-8374-5598-4

© 2021 by UNI-MED Verlag AG, D-28323 Bremen,
International Medical Publishers (London, Boston)
Internet: www.uni-med.de, e-mail: info@uni-med.de

Printed in Europe

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way and storage in data banks. Violations are liable for prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Product liability: The publishers cannot guarantee the accuracy of any information about the application of operative techniques and medications contained in this book. In every individual case the user must check such information by consulting the relevant literature.

MEDICINE - STATE OF THE ART

UNI-MED Verlag AG, one of the leading medical publishing companies in Germany, presents its highly successful series of scientific textbooks, covering all medical subjects. The authors are specialists in their fields and present the topics precisely, comprehensively, and with the facility of quick reference in mind. The books will be most useful for all doctors who wish to keep up to date with the latest developments in medicine.

Preface and acknowledgements

The patient in shock continues to be a major challenge in daily acute medical care. For this reason, a basic understanding of physiology, pathophysiology and pharmacology is necessary in order to treat these critically ill patients in a targeted manner and thus ensure high-quality care.

The aim of this textbook is to convey this understanding in an entertaining manner, to report the scientific evidence and to impart modern therapy concepts that can be used in daily work.

Erfurt and Karlsburg, November 2020

*Heinrich Volker Groesdonk
Matthias Heringlake*

Authors

Prof. Dr. Heinrich Volker Groesdonk
Chief Physician of the Clinic for Interdisciplinary Intensive Care Medicine and Intermediate Care
Helios Hospital Erfurt
Nordhäuser Straße 74
D-99089 Erfurt, Germany

Prof. Dr. Matthias Heringlake
Chief Physician of the Department of Anesthesiology and Intensive Care Medicine
Heart and Diabetes Center Mecklenburg-Vorpommern
Klinikum Karlsburg
Greifswalder Straße 11
D-17495 Karlsburg, Germany

Contents

1.	Physiological basics of circulatory regulation	12
1.1.	Introduction	12
1.2.	Regulation of organ blood flow	12
1.2.1.	General principles	12
1.2.2.	Biochemical principles	13
1.2.3.	Physiological basics	15
1.3.	Importance of the autonomic nervous system in cardiovascular regulation	20
1.3.1.	Neurotransmitters and hormones	21
1.3.1.1.	Neurotransmitters	21
1.3.1.2.	Hormones	22
1.3.2.	Specific types of receptors	22
1.3.3.	Sympathetic nervous system	23
1.3.4.	Parasympathetic nervous system	23
1.4.	Conclusion	24
2.	General response of the body to a circulatory disorder	26
2.1.	Cardiovascular system	26
2.2.	Inflammation and organ dysfunction	26
2.3.	The inter-organ crosstalk concept	27
2.4.	Compensatory mechanisms of the organism	28
2.5.	References	28
3.	Pharmacological basics	30
3.1.	Introduction	30
3.1.1.	Preload and afterload	30
3.1.2.	Mechanical and electrophysiological criteria of cardiac activity	31
3.2.	Adrenaline	32
3.2.1.	Basics	32
3.2.2.	Medical use of adrenaline	33
3.3.	Noradrenaline	33
3.3.1.	Basics	33
3.3.2.	Medical use of noradrenaline	33
3.4.	Dobutamine	33
3.4.1.	Basics	33
3.4.2.	Medical use of dobutamine	34
3.5.	Dopamine	34
3.5.1.	Basics	34
3.5.2.	Medical use of dopamine	34
3.6.	Vasopressin	34
3.6.1.	Basics	34
3.6.2.	Medical use of vasopressin	35
3.7.	Terlipressin	35
3.8.	Selepressin	35
3.9.	Angiotensin	36
3.10.	Levosimendan	37
3.11.	Milrinone	37

3.12.	Methylene blue	37
3.13.	Adrecizumab	38

4. Shock as medical emergency 40

4.1.	Definition and pathophysiology of shock	40
4.1.1.	Definition	40
4.1.2.	Centralisation of blood circulation	40
4.1.2.1.	Consequences for metabolism	41
4.1.2.2.	Consequences for coagulation and hemostasis	41
4.2.	Diagnostics in questionable shock	43
4.3.	Types of shock	46
4.3.1.	Hypovolemic shock	48
4.3.1.1.	Pathophysiology	48
4.3.1.2.	Diagnostics	49
4.3.1.3.	Treatment options	49
4.3.2.	Distributive shock	50
4.3.2.1.	Pathophysiology	51
4.3.2.2.	Diagnostics	52
4.3.2.3.	Treatment options	53
4.3.3.	Cardiogenic shock	54
4.3.3.1.	Pathophysiology	55
4.3.3.2.	Diagnostics	55
4.3.3.3.	Treatment options	55
4.3.4.	Obstructive shock	56
4.3.4.1.	Pathophysiology	56
4.3.4.2.	Diagnostics	56
4.3.4.3.	Treatment options	56
4.3.5.	Special type: vasoplegia	57
4.3.5.1.	Pathophysiology	57
4.3.5.2.	Diagnostics	58
4.3.5.3.	Treatment options	58
4.4.	References	58

5. Concept of decatecholaminisation 64

5.1.	Basics and theoretical concept	64
5.2.	Concepts for medical practice	65
5.2.1.	Cadiac surgery	65
5.2.2.	Patients with sepsis	67
5.3.	Angiotensin II	68
5.4.	Methylene blue	68
5.5.	Conclusion	68
5.6.	References	69

6. Summary and conclusion 72

7. Abbreviations 74

Index 76