Morbid Obesity

Peri-operative Management

Editor in Chief:

Adrian Alvarez

Associated editors:

Jay Bradzky

Martin Alpert

George Cowan

CAMBRIDGE

CAMBRIDGE www.cambridge.org/9781841101880

This page intentionally left blank

MORBID OBESITY

PERI-OPERATIVE MANAGEMENT

Dr Adrian O. Alvarez is at present one of the most recognized experts in the anesthetic management of the morbidly obese patient in the world. Being an anesthesiologist and also general surgeon he early recognized the importance of the multidisciplinary approach to these kind of individuals. He has been working in this scenario in close relationship with experts of other fields (bariatric surgeons, internists, nutritionists) since many years ago, and this spirit is clearly reflected in this work "Morbid Obesity, Perioperative Management".

MORBID OBESITY
PERI-OPERATIVE MANAGEMENT

Editor in Chief

Adrian O. Alvarez
Medical Director, IMETCO (Instituto Multidisciplinario Especializado en el Tratamiento y Cirugía de la Obesidad), Buenos Aires, Argentina

Associate Editors

Jay B. Brodsky
Professor, Department of Anesthesia, Stanford University School of Medicine, Stanford, CA, USA

Martin A. Alpert
Chairman, Department of Medicine, St. John's Mercy Medical Center, St. Louis, Missouri, MO, USA
Clinical Professor of Medicine, University of Missouri School of Medicine, Columbia, MO, USA

George S.M. Cowan Jr.
Professor Emeritus, University of Tennessee, Memphis, TN, USA
Past-President, International Federation for the Surgery of Obesity (IFSO)
Past-President, American Society for Bariatric Surgery (ASBS)
Founder, Obesity Surgery Journal

CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9781841101880

First published in print format 2004

ISBN-13 978-0-511-26480-1 eBook (EBL)
ISBN-10 0-511-26480-1 eBook (EBL)

ISBN-13 978-1-841-10188-0 hardback
ISBN-10 1-841-10188-5 hardback

CONTENTS

CONTRIBUTORS

Shamsuddin Akhtar
Department of Anesthesiology
Yale University School of Medicine
Boston, MA, USA

Alejandro Lepetic
Fundación Centro de Estudios Infectológicos (FUNCEI)
Buenos Aires, Argentina

Martin A. Alpert
Chairman, Department of Medicine
St. John's Mercy Medical Center
St. Louis, Missouri, MO, USA
Clinical Professor of Medicine
University of Missouri School of Medicine
Columbia, MO, USA

María del Rosario González Arzac
Hospital Interzonal de Agudos
Prof. Dr. Rodolfo Rossi
La Plata, Buenos Aires, Argentina

Luc E.C. De Baerdemaeker
Staff Anesthesiologist
Ghent University Hospital
Gent, Belgium

Aniceto Baltasar
Chairman, Department of Surgery
Hospital Virgen de los Lirios
Alcoy, Spain
Past-President
International Federation for the Surgery of Obesity (IFSO)

Vipin Bansal
Resident, Department of Anesthesiology
Upstate Medical University
Syracuse, NY, USA

Carlos A. Barba
Medical Director
Center for Bariatric Surgery
Saint Francis Hospital and Medical Center
Associate Professor of Surgery
Traumatology and Emergency Medicine
University of Connecticut
CT, USA

R.A. Beers
Department of Anesthesia
State University of New York Upstate Medical University
Syracuse, NY, USA

Thomas J.J. Blanck
Professor and Chairman
Department of Anesthesiology
New York University Medical Center
NY, USA

Jay B. Brodsky
Professor, Department of Anesthesia
Stanford University School of Medicine
Stanford, CA, USA

Francisco Brun
Critical Care Fellow
University of Pittsburgh
Pittsburgh, PA, USA

Louis Brusco Jr.
Assistant Professor of Clinical Anesthesiology
Columbia University
College of Physicians and Surgeons
Associate Medical Director
St. Luke's-Roosevelt Hospital Center
New York, NY, USA
Director
Critical Care Anesthesiology
Co-Director
Surgical Intensive Care Unit
St. Luke's-Roosevelt Hospital Center
New York, NY, USA

Suzanne M. Burns
Professor of Nursing (APN 2)
MICU
McLeod Hall School of Nursing
Charlottesville, VA, USA

Aníbal Calmaggi
Unidad de Transplante de Médula Ósea
Hospital Interzonal de Agudos Prof. Dr. Rodolfo Rossi. La Plata
Buenos Aires, Argentina

Enrico M. Camporesi
Professor and Chairman
Department of Anesthesiology
Upstate Medical University
Syracuse, NY, USA

Michael A. Campos
Assistant Professor of Medicine
Division of Pulmonary and Critical Care Medicine
University of Miami School of Medicine
FL, USA

Lawrence J. Caruso
Associate Professor of Anesthesiology
University of Florida College of Medicine
Gainesville, FL, USA

Donna Charlebois
Pulmonary Transplant Coordinator and APN 1
University of Virginia Health System
Charlottesville, VA, USA

George S.M. Cowan Jr.
Professor Emeritus
University of Tennessee
Memphis, TN, USA
Past-President
International Federation for the Surgery of Obesity (IFSO)
Past-President
American Society for Bariatric Surgery (ASBS)
Founder, Obesity Surgery Journal

Mervyn Deitel
Editor-in-Chief, *Obesity Surgery*
Past Executive Director,
International Federation for the Surgery of Obesity
Toronto, Canada

Mary Deivert
Trauma Care Coordinator
University of Virginia Health System
Charlottesville, VA, USA

Ezz Fam
Critical Care Fellow
University of Pittsburgh School of Medicine
Department of Critical Care
Pittsburgh, PA, USA

Juan C. Flores
Chairman, Anesthesia Department
Hospital de Clinicas Jose de San Martin
Universidad de Buenos Aires
Argentina
Past-President
Federación Argentina de Asociaciones de Anestesiologia
Argentina

Martin Fried
Associate Professor of Surgery
1st Medical Faculty
Charles University
Prague, Czech Republic
Chief surgeon
Obesity Treatment Center
Prague, Czech Republic
Past-President
International Federation for the Surgery of Obesity (IFSO)

Andrea Gabrielli
Associate Professor of Anesthesiology and Surgery
University of Florida College of Medicine
Gainesville, FL, USA

Graciela M. Guerrini
Unidad de Transplante de Médula Ósea
Hospital Interzonal de Agudos Prof. Dr. Rodolfo Rossi
La Plata, Buenos Aires, Argentina

Gabriel M. Gurman
Division of Anesthesiology, Ben Gurion University of the Negev, Faculty of Health Sciences,
Soroka Medical Center, Beer Sheva, Israel

Alejandro G. Haidbauer
Vice-Chairman
Anesthesiology Department
Hospital Alemán
Buenos Aires, Argentina

Leland H. Hanowell
Department of Anesthesia
Stanford University School of Medicine
Stanford, CA, USA

Lars Helgeson
Department of Anesthesiology
Yale University School of Medicine
Boston, MA, USA

David C. Kramer
Assistant Professor of Anesthesiology
Mount Sinai School of Medicine
New York, NY, USA

Joe Krenitsky
Clinical Nutritionist
University of Virginia Health System
Charlottesville, VA, USA

Viji Kurup
Department of Anesthesiology
Yale University School of Medicine
Boston, MA, USA

Fernando N. Lamounier
Chief Surgical Resident
University of Connecticut Connecticut, CT, USA

A. Joseph Layon
Professor of Anesthesiology, Surgery, and Medicine
University of Florida College of Medicine
Gainesville, FL, USA

Peter Marko
Department of Anesthesia
Intensive Care Unit
Taranaki Base Hospital
New Plymouth, New Zealand

Paul E. Marik
Professor of Critical Care and Medicine
University of Pittsburgh
Pittsburgh, PA, USA

Frederick G. Mihm
Professor of Anesthesia
Associate Medical Director
Intensive Care Units
Stanford University School of Medicine
Stanford, CA, USA

Eric P. Mortier
Professor and Chairman of Anesthesia
Department of Anesthesia
Ghent University Hospital
Ghent, Belgium

Igor Muntyan
Department of Anesthesiology
New York University School of Medicine
NY, USA

Arvind Rajagopal
Assistant Professor
Department of Anesthesiology
Rush University Medical Center
Chicago, IL, USA

Allan P. Reed
Associate Professor of Anesthesiology
Mount Sinai School of Medicine
New York, NY, USA

M.F. Roizen
Professor of Anesthesia and Critical Care
Professor of Medicine
State University of New York Upstate Medical University
Syracuse, NY, USA

David M. Rothenberg
Professor
Department of Anesthesiology
Associate Dean
Rush University Medical Center
Chicago, IL, USA

Michel M.R.F. Struys
Professor in Anesthesia
Coordinator of Research
Ghent University Hospital
Ghent, Belgium

John T. Sullivan
Assistant Professor
Associate Chair for Education
Department of Anesthesiology
Northwestern University Feinberg School of Medicine
Chicago, IL, USA

Michael Tucci
Chef de Clinique
Department of Anesthesiology
University Hospital (CHUV)
Lausanne, Switzerland
Visiting Scholar
Department of Anesthesiology
Upstate Medical University
Syracuse, NY, USA

Claudia Vujacich
Fundación Centro de Estudios Infectológicos (FUNCEI)
Buenos Aires, Argentina

Adam Wanner
Chief, Division of Pulmonary and Critical Care
Joseph Weintraub Professor of Medicine
Pediatrics and Biomedical Engineering
University of Miami School of Medicine
FL, USA

Debra Wilmoth
Performance Improvement Program
University of Virginia Health System
Charlottesville, VA, USA

Cynthia A. Wong
Associate Professor, Section Chief
Obstetrical Anesthesiology
Department of Anesthesiology
Northwestern University Feinberg School of Medicine
Chicago, IL, USA

Hatem Zayed-Moustafa
Department of Anesthesiology
New York University School of Medicine
NY, USA

FOREWORD

In the last 25 years, overweight (body mass index, BMI $> 25\,kg/m^2$) and obesity (BMI $>30\,kg/m^2$) have developed into a global epidemic. This increase in obesity cannot be attributed to genetics alone; rather, complex fast-food and nutritional causes, lifestyle changes and physical inactivity have become important factors.

The severe form of obesity, called *morbid obesity*, occurs in patients with BMI > 40 (or $>35\,kg/m^2$ with severe co-morbidities) and is associated with serious, debilitating and progressive sequelae.

Morbid obesity and super-obesity (BMI $> 50\,kg/m^2$) have significant co-morbidities – type 2 diabetes, cardiovascular disease, hypertension, deep vein thromboses and pulmonary embolism, debilitating arthritis of weight-bearing joints and low back, an increased incidence of certain cancers, alveolar hypoventilation (Pickwickian) and/or obstructive sleep apnea, foul intertrigos under skin folds, abdominal and hiatal hernias, gastroesophageal reflux disease, stasis leg ulcers, accident proneness, plethora and diaphoresis, immobility, gallbladder disease, amenorrhea, increased incidence of Caesarian section, urinary stress incontinence in females, psychosocial and economic problems, etc.

These patients require medical assistance by multiple allied health fields – internal medicine, endocrinology, pulmonology, psychiatry and psychology, eating disorder specialists, nutritionists and dietitians, specialized nursing care, plastic surgery, intensive care specialists, social workers and governmental assistance for disability, among others. Specific operations (known as bariatric surgery) have been the only means of achieving significant sustained weight loss in these unfortunate individuals. Weight loss is associated with reversal of these serious co-morbidities.

The morbidly obese population especially presents a challenge for the anesthesiologist during surgery. Their multiple associated diseases are integrally dependent on specialized expertise of the anesthesiologist to undergo this surgery, as well as the multidisciplinary care from the allied health professionals.

The practice of anesthesia must keep abreast with the surgery which has developed and is necessary for these special individuals.

Dr. A.O. Alvarez being an anesthesiologist and general surgeon also, understood early the importance of the close relationship between surgeons and anesthesiologists in the difficult task of managing these patients. He has an important experience in this field, and the spirit of the multidisciplinary approach to the morbidly obese has been reflected during Sao Paolo International Federation for the Surgery of Obesity (IFSO) World Congress, in which for the very first time, surgeons and anesthesiologist (represented by Dr. A.O. Alvarez) got together in a special experts table.

Dr. A.O. Alvarez has also undertaken a major accomplishment by this book with chapters by renowned contributors.

The anesthetic challenges, poor veins, potentially difficult intubation, the premedication, the various techniques and means of anesthetic and analgesic delivery, the positioning, thromboprophylaxis, monitoring, the post-anesthetic surveillance and intensive care, the ability of the hospital personnel to move these individuals, potential atelectasis, wound care, are all challenges for the anesthetic and allied hospital staff. These aspects are covered in this monumental volume. We applaud Dr. A.O. Alvarez for undertaking this original and necessary project.

M. Deitel
Editor-in-Chief
OBESITY SURGERY
Past Executive Director of the International
Federation for the Surgery of Obesity
journal@obesitysurgery.com

PREFACE

There is a global epidemic threatening the health of people throughout the world. That epidemic is "obesity". Whereas at one time the problems of obesity were confined to only wealthy industrialized countries, today the incidence of obesity is rising in both developed and developing countries. Obesity-related medical problems are now even affecting the children of those countries. The International Obesity Task Force (IOTF), a collaborative program of the International Association for the Study of Obesity (IASO) and the World Health Organization (WHO) recently estimated that over 1.7 billion people are either overweight (body mass index, BMI $> 25\,kg/m^2$) or obese (BMI $> 30\,kg/m^2$).

Obesity is associated with many medical co-morbidities including type 2 diabetes, hypertension and cardiovascular disease, respiratory problems and obstructive sleep apnea, arthritis on weight-bearing joints, liver and gallbladder disease, and several types of cancer. In addition there are "quality of life" issues that are of great importance but which cannot be quantified.

These obesity-related health problems have major implications for the individual, and have an enormous impact on the health resources of every country. The costs of obesity are staggering and threaten to overwhelm health services everywhere. The incidence of obesity in the adult population of the US rose from 14.25% in 1978 to over 31% in 2000. One in five Americans now has a BMI $> 30\,kg/m^2$, and at the current rate that figure is expected to double to 40% by 2025. In 1990 it was estimated that 46 billion dollars, or 6.7% of all healthcare costs, were spent on obesity-related health problems in the US. Today, those costs are much higher.

The precursors of obesity are multifactorial. They include genetic tendency, environmental effects, education, sex, race and socioeconomic status. There is no precise definition of when obesity begins. A person is usually considered to be obese when the amount of their body fat increases beyond the point where physical health deteriorates. Extreme obesity, that is, obesity that if untreated significantly shortens the individual's life expectancy is termed "morbid obesity". In the US one out of 16 women is "morbidly obese". The World Health Report for 2002 estimated that there were more than 2.5 million annual deaths due to weight-related problems, with 220,000 of those deaths in Europe and more than 300,000 obesity-related deaths in the US.

The obesity epidemic reflects changes in behavioral patterns, including decreased physical activity and overconsumption of high-fat foods. There are simple solutions to the problem – early education, sensible long-term diets, increased physical activity and exercise, and in some cases medications. Unfortunately, these easy answers are usually not practical. Therefore, healthcare providers must turn to the only treatment of extreme obesity that is effective – bariatric surgery.

The United States National Institutes of Health Consensus Panel (Gastrointestinal Surgery for Severe Obesity. Consensus Development Conference Panel) convened surgeons, gastroenterologists, endocrinologists, psychiatrists, nutritionists and other healthcare professionals in 1991 to consider the treatment options for severe obesity. That panel recommended that patients first be treated in a program that integrates a dietary regimen, appropriate exercise, behavior modification and psychological support. If these non-surgical interventions failed, as they usually do, then vertical banded gastroplasty and gastric bypass should be considered. Bariatric surgery today with a wider range of acceptable procedures remains the only effective treatment for patients with morbid obesity.

Bariatric surgery is a cost-effective alternative to no treatment. Surgery is associated with sustained weight loss for patients who uniformly fail non-surgical treatment. Following the weight loss there is a high cure rate for diabetes and sleep apnea, with significant improvement in other complications of obesity, such as hypertension and osteoarthritis. It is estimated that nearly 200,000 bariatric surgical procedures will be performed in the US in 2004.

Everyday, every anesthesiologist must be ready to deal with morbidly obese surgical patients. Since morbid obesity is present in such a high percentage of the general population, it is also not unusual to be presented with

them for non-bariatric surgical procedures. In my own practice at a major university medical center, I estimate that at least 25% of our routine surgical patients are obese and at least 10% of all patients are morbidly obese.

The global nature of the problem is reflected in the worldwide growth of interest in this problem. The International Federation for the Surgery of Obesity (IFSO) now holds a well-attended annual meeting, and the organization has a membership that includes over 30 national bariatric surgical organizations and members from 53 countries. The journal *Obesity Surgery*, now in its second decade, is dedicated to the field of bariatric surgery. So why have we not had a book on the anesthetic management of these patients?

The risks associated with anesthesia and surgery are believed to be higher for obese patients than for normal weight patients. Every anesthesiologist and surgeon must be prepared to safely manage these patients. That requires an understanding of the pathophysiology of obesity and its associated medical problems. The only book I could find dedicated solely to the anesthetic management of obesity is a small monograph (*Anesthesia and the Obese Patient* in the *Contemporary Anesthesia Practice Series*) edited by Brown and Vaughan and published over 20 years ago. Obviously, the techniques of anesthesia and surgery (laparoscopy, epidural opioids, total intravenous anesthesia, etc.) have changed markedly over the past two decades.

When Dr. Alvarez first approached me and asked me to contribute to this book, I was both pleased and honored. A comprehensive book dealing with the anesthetic management of the morbidly obese patient is long overdue. This book covers all areas of anesthesia for the morbid obese surgical patient, from pre-operative evaluation and preparation to intra-operative and post-operative management. The authors, all experts in their respective areas, present the most up-to-date information in their chapters. The international group of the contributors emphasizes the international scale of the obesity epidemic. The reader is encouraged to use this book as a guide and a reference, and continue to follow the medical journals and the Internet for the rapidly developing changes in the field of anesthesia for the obese patient.

We are all indebted to Dr. A.O. Alvarez for bringing this important project to fruition.

J.B. Brodsky
Stanford University School of Medicine
Stanford, CA, USA
December 2003

ACKNOWLEDGMENTS

To my wife Gabriela for her love, patience and support.

To my sons Rodrigo, Ramiro and Imanol because they are the reason of my life.

To my parents Enrique and Josefina for their unconditional comprehension and help.

To Dr. J.B. Brodsky, Dr. M. Alpert and Dr. G.S.M. Cowan Jr. whom I consider a permanent ideal to be followed.

To all the contributors for their dedication and courage to face this challenge, and especially to my friend Louis Brusco; we both know why.

To Mr. Geoffrey Nuttall and his colleagues from Cambridge University Press, for their faith in the project and their exceptional professionalism.

To my dear friends from International Federation for the Surgery of Obesity (IFSO), Dr. Aniceto Baltasar, Dr. Rafael Alvarez Cordero, Dr. Arthur Garrido, Dr. M. Deitel and Dr. G.S.M. Cowan Jr. for helping and encouraging me in all my projects.

Finally to my partners in this unique experience of working in a bariatric team, Dr. Albarracin Silvio and Dr. Antonio Cascardo who shared with me all the exceptional emotional experiences of this monumental task, the peri-operative management of the morbidly obese patient.

A.O. Alvarez
Buenos Aires
April 2004

"*En la vida existe un valor que permanece muchas veces invisible para los demás, pero que el hombre escucha en lo hondo de su alma; es la fidelidad o traición a lo que sentimos como un destino o una vocación a cumplir.*"

Ernesto Sábato
Mayo del año 2000

"*There exists in life a value which, while often invisible to all others, an individual feels deep within his soul: it is an acceptance or rejection of a calling to what they feel is their destiny or vocation*."

Ernesto Sabato
May 2000

GENERAL ASPECTS

SECTION 1