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Basic Clinical Anesthesia

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Preface

Basic Clinical Anesthesia is designed as an all-in-one resource for medical students, residents, and practitioners who seek comprehensive and up-to-date coverage of fundamental information and core clinical topics in anesthesiology. The book comprises 57 chapters organized into five parts and addresses ambulatory and non-operating room anesthesia, pain management and regional anesthesia, preoperative evaluation and intraoperative management, specialty anesthesia, and critical care. It encompasses the full range of anesthetic knowledge from clinically relevant basic science including system physiology and pharmacology to the anesthetic management of very sick patients. Experts have written each chapter to enable new and seasoned anesthesia practitioners alike to keep abreast of the latest information.

A great effort has been made to present information in a succinct and easy-to-read style, and numerous tables and color images and illustrations enhance the text. Multiple choice questions at the end of each chapter allow readers to test themselves and quickly review important facts.

We are pleased to present this brand new textbook and hope that it proves useful to anesthesiology residents, practitioners, and medical students as a core text, a clinical refresher, and/or an examination preparation tool. The editors gratefully acknowledge the contributions of the chapter authors and the editorial staff at Springer Science+Business Media. We welcome readers' constructive suggestions to improve the book in future editions and can be reached at the email below.

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Contents

Part I

The Basics

History of Anesthesia

Paul K. Sikka

"Gentlemen this is no humbug"

The desire to relieve pain has been a never-ending quest for humans and is, therefore, responsible for the birth of the specialty "anesthesiology." From the earliest records when opium sponges were used to relieve pain until today, the desire to relieve human pain and suffering has been second to none.

Inhalational Anesthetic Agents

The road to developing modern inhalational anesthetic agents started with ether (Table 1.1). The abovementioned words were used by John Warren, a surgeon, to describe a successful "public" demonstration of ether anesthesia administered by William Morton (Figs. 1.1 and 1.2) at the Massachusetts General Hospital on October 16, 1846. The patient was Edward Gilbert Abbott. Warren performed a painless surgery on Abbott's neck tumor, even though Abbott was aware that the surgery was proceeding. This marked the inauguration of the specialty "anesthesiology."

The quest for a pleasant and rapid-acting inhalational agent leads to the discovery of chloroform which was first used by J. Y. Simpson for obstetric anesthesia. However, the administration of chloroform for obstetrics was brought into fame by John Snow who administered the agent for Queen Victoria's deliveries. Ether (unpleasant) and chloroform (liver and cardiac toxicity) were replaced by ethylene gas (high concentration requirement and explosive potential), which was in turn replaced by cyclopropane (more stable). Finally, came the era of fluorinated inhalational agents (increased stability, decreased toxicity). Trifluoroethyl vinyl ether (toxic metabolite) was the first fluorinated anesthetic agent to be used which was followed by halothane (hepatitis), methoxyflurane (nephrotoxicity), enflurane (cardiac depression, convulsant properties), and finally isoflurane (synthesized by Ross Terrell in 1965, clinically used in 1971).

John Snow (1813–1858, England) was popularly known as "the first anesthesiologist" (Fig. 1.3). His research leads to the development of the concept of minimum alveolar concentration (MAC). He administered ether and chloroform in various concentrations to anesthetize animals and determined the concentration to prevent movement to a sharp stimulus. He also described the stages of ether anesthesia and invented the ether face mask. Joseph Clover (1825–1882, England) was a leading anesthesiologist in London after Snow's death. He favored a nitrous oxide-ether sequence for anesthesia and introduced pulse monitoring during anesthesia. He designed the Clover-respirator bag (to deliver known quantities of chloroform), introduced airway management skills and use of airway cannulas, and designed a portable anesthesia machine.

The Story of Nitrous Oxide

Joseph Priestly, an Englishman and one of the greatest pioneers of chemistry, first prepared nitrous oxide in 1773. Horace Wells (Fig. 1.4) of Hartford, CT, was one of the first to recognize the anesthetic potential of nitrous oxide. On December 10, 1844, while attending an exhibition where nitrous oxide was made available to the audience for inhalation, he noticed that Samuel Cooley, one of the guests, was unaware that his leg was injured while dancing. The next day Horace Wells allowed Gardner Colton, a dentist, to extract his tooth under nitrous oxide inhalation. Horace Wells described his procedure as a success. A few weeks later Wells tried to simulate the same procedure for dental extraction in a medical student in Boston. The medical student screamed and Wells was labeled as a failure. He finally committed suicide in 1848. After his death, Colton led the revival of nitrous oxide, one of the oldest anesthetic agents, which is still being used.

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Table 1.1 Ether milestones

William E. Clarke	January 1842, Rochester, NY	Teeth extraction of Ms. Hobbie by dentist E. Pope
Crawford W. Long	March 1842, Jefferson, Georgia	Neck tumor excision of Mr. Venable. Fee charged $2.00
James Y. Simpson	November 1847, Edinburgh, Scotland	Among the first to use ether and then chloroform for labor pain relief

Fig. 1.1 William T. G. Morton 1819–1868 (courtesy of the Wood Library-Museum of Anesthesiology, Park Ridge, Illinois)

Fig. 1.2 A replica of William Morton's ether inhaler as used at the first public demonstration of ether anesthesia on October 16, 1846 (courtesy of the Wood Library-Museum of Anesthesiology, Park Ridge, Illinois)

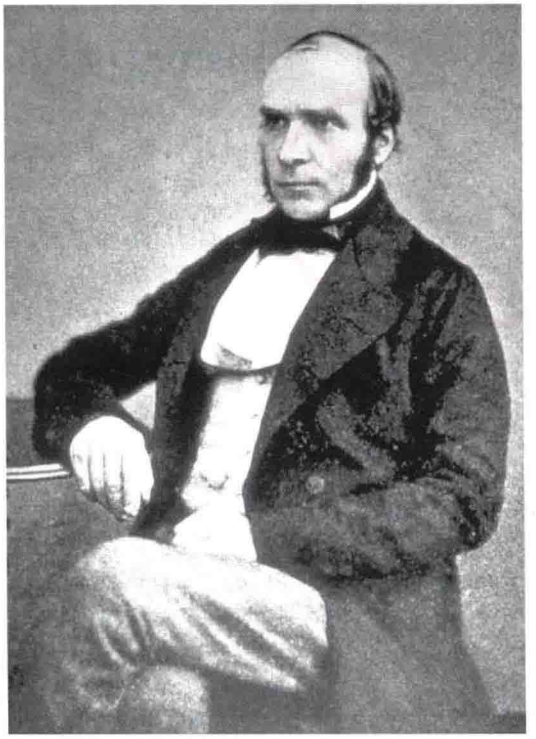

Fig. 1.3 John Snow 1813–1858, the first anesthesiologist (courtesy of the Wood Library-Museum of Anesthesiology, Park Ridge, Illinois)

Fig. 1.4 Horace Wells 1815–1848 (courtesy of the Wood Library-Museum of Anesthesiology, Park Ridge, Illinois)

Intravenous Anesthetics

Phenobarbital, a barbiturate, was the first intravenous induction agent developed. It was synthesized by Emil Fischer and Joseph von Mering in 1903. Phenobarbital caused prolonged periods of unconsciousness and was associated with slow