Clinical Principles of Anaesthesia: A Practical Guide for II B.Sc AT & OT Students

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PREFACE

It is with great pleasure that I present the **first edition of the II B.Sc. Anaesthesia Technology & Operation Theatre Technology (Paper 3) textbook**. This book has been meticulously designed to meet the academic needs of undergraduate students and to serve as a reliable reference for both classroom learning and practical application in clinical settings.

The primary aim of this textbook is to simplify complex concepts, provide clear explanations, and integrate theoretical knowledge with practical insights. Each chapter has been structured to facilitate **progressive learning**, beginning with foundational principles and advancing to clinical applications relevant to anaesthesia and operation theatre technology.

Special attention has been given to **illustrations, flowcharts, and tables**, making difficult topics easier to grasp. Mnemonics and point-wise explanations have been included wherever necessary to enhance memory retention and to support students in **preparing effectively for examinations**.

This first edition is the result of careful compilation, extensive review of current textbooks, guidelines, and my practical experience in the field. While every effort has been made to ensure accuracy and comprehensiveness, I acknowledge that learning is an ongoing process, and I look forward to **feedback from students and faculty** to improve subsequent editions.

I hope that this textbook will serve as a **trusted companion** for students as they progress through their II B.Sc. AT & OT curriculum, bridging the gap between theory and practice, and ultimately contributing to the development of competent, confident professionals in the field.

I sincerely thank my colleagues, reviewers, and students whose insights and encouragement have been invaluable in bringing this work to fruition.

Mangalore
Date:20-11-2025

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FOREWORD

It gives me immense pleasure to write the foreword for the first edition of this II B.Sc. Anaesthesia Technology & Operation Theatre Technology (Paper III) textbook.This textbook is a comprehensive resource that blends theoretical knowledge with practical insights, tailored specifically for students training in anaesthesia and operation theatre technology. The inclusion of flowcharts, illustrations, and mnemonics makes complex concepts easier to understand and retain, which is invaluable in a field where precision and timely action are critical.

I am confident that this book will serve as a trusted guide for students, helping them build a solid foundation in anaesthesia practices, patient monitoring, and perioperative care. It will also inspire future technologists to approach their work with competence, confidence, and a sense of responsibility towards patient safety.I congratulate the author for this valuable contribution and wish all students the very best in their studies and professional growth.

Dr. Anil Shetty, MD (Anaesthesiology)
Professor
Department of Anaesthesiology
KS Hegde Medical College & Hospital
Derlakatte, Mangalore

FOREWORD

It is my privilege to write the foreword for this first edition of the II B.Sc. Anaesthesia Technology & Operation Theatre Technology (Paper III) textbook.

This book provides an excellent blend of theoretical knowledge and practical guidance, which is essential for students working in operation theatres. Understanding the principles of anaesthesia, patient care, and surgical support is critical for the smooth functioning of any surgical team. The structured chapters, mnemonics, and illustrative content make learning both accessible and engaging.

I believe this textbook will be an indispensable resource for students, helping them develop the skills and confidence needed to assist effectively in surgical procedures while ensuring patient safety and efficiency in the operating room.

I commend the author for this significant contribution and extend my best wishes to all students for their academic and professional success.

Dr. MB. Hanumanthappa
MS (General Surgery)
Professor and Consultant General Surgeon
Dr. Moopen's Medical College,
Wayanad, Kerala

I am eternal

"For me, there is no death; I am eternal, for I continue to live in the readers' minds through my books."

AUTHOR'S MESSAGE

Dear Students

I am delighted to share this first edition of the II B.Sc. Anaesthesia Technology & Operation Theatre Technology (Paper 3) textbook with you. This book has been carefully prepared to simplify complex concepts, provide clear explanations, and bridge the gap between theory and practical application.

My aim is to make learning engaging and effective by including flowcharts, illustrations, tables, and mnemonics wherever necessary. I hope this textbook will serve as a helpful guide, support your academic journey, and build confidence in applying knowledge in clinical settings.

I encourage you to approach learning with curiosity and dedication. Your feedback will be invaluable for improving future editions of this work.

Wishing you success in your studies and professional journey.

Dr. Chandrashekar R.
Author

Dedication

This book is dedicated to my

Father

Late Rajan. C

Mother

Nagamani R.

Wife

Mrs. Rashmi B.R

Son

Thrijal Raj

Daughter

Bhanvi Raj

SYLLABUS

II BSC AT & OT : PAPER III
PRINCIPLES OF ANAESTHESIA – I

MEDICAL GAS SUPPLY

- Compressed gas cylinders
- Colour coding
- Cylinder valves; pin index.
- Gas piping system
- Recommendations for piping system
- Alarms & safety devices.

ANAESTHESIA MACHINE

- Hanger and yoke system
- Cylinder pressure gauge
- Pressure regulator
- Flow meter assembly
- Vapourizers - types, hazards, maintenance, filling and draining, etc.

BREATHING SYSTEM

- General considerations: humidity & heat
- Common components - connectors, adaptors, reservoir bags.
- Capnography ETC o2
- Pulse oximetry
- Methods of humidification.
- Classification of breathing system Mapleson system - a b c d
- E f Jackson Rees system, Bain circuit
- Non-rebreathing valves - ambu valves
- The circle system Components Soda lime, indicators

FACE MASKS & AIRWAY LARYNGOSCOPES

- Types, sizes
- Endotracheal tubes - Types, sizes.
- Cuff system
- Fixing, removing and inflating cuff, checking tube position Complications.
- Bousie
- LMA

ANAESTHESIA VENTILATOR AND WORKING PRINCIPLES MONITORING

- ECG
- Sp02
- Temperature
- IBP
- CVP
- PA Pressure
- LA Pressure
- Bio Medical engineering of Trouble sorting Management, care of cleaning

BASIC ANAESTHETIC TECHNIQUES

- Definitions
- General anaesthesia and anaesthetics
- Local anaesthetics

INTRODUCTION TO ANAESTHESIA

- General
- Anaesthesia *
- Regional
- Anaesthesia *
- Local
- Anaesthesia
  - Intravenous Anaesthesia
- Minimum standard of anaesthesia
- Who should give anaesthesia?

PRE-OP PREPARATION

- Pre anaesthetic assessment~ History –, past history - disease / Surgery /
- And personal history - Smoking / alcohol
- General physical assessment, systemic examination – CVS, RS, CNS

INVESTIGATIONS

- Chest X - ray- Echocardiography- Angiography
- Haematological - their significance E.C.G.- Liver function test- Renal function test- Others
- Case acceptance: ASA grading - I, II, III, IV. V

PRE - ANAESTHETIC ORDERS:

- Patient - Informed consent- Npo guidelines- Premedication - advantages, drugs used- Special instructions - if any
- Machine - Checking the machine
- 02, N20, suction apparatus
- Laryngoscopes, et tubes, airways- Things for IV accessibility- Other monitoring systems
- Drugs -Emergency drugs
- Anaesthetic drugs

INTRAOPERATVE MANAGEMENT

- Confirm the identification of the patient
- Monitoring - minimum
- Non-invasive & Invasive monitoring
- Induction - drugs used
- Endotracheal intubation
- Maintenance of anaesthesia
- Positioning of the patient
- Blood / fluid & electrolyte balance
- Reversal from anaesthesia - drugs used
- Transferring the patient
- Recovery room – set up and things needed

POST OPERATIVE COMPLICATIONS & MANAGEMENT

- Recovery and Delayed recovery
- Hypoxia and Oxygen Theraphy
- PONV

BASIC LIFE SUPPORT

- Cardio Pulmonary
- Resuscitation

SYLLABUS FOR PRACTICALS

- Instruments
- Gas cylinders

PHYSICAL LAYOUT OF SURGICAL SUITE

- Transition zones
- Location
- Peripheral support areas
- Layout of operation theatre
- Special procedure rooms

CARE OF PERIOPERATIVE ENVIRONMENT

- Establishing surgical environment
- Transportation of patient to the O.T
- Environmental, physical, chemical, and biological hazards
- Appropriate operating room attire

STERILIZATION OF INSTRUMENTS AND O.T CLEANING

- Daily terminal cleaning
- Decontamination and disinfection & sterilization
  - Definition
  - Thermal sterilization
  - Autoclaving
  - CSSD & its functioning
- General care and testing of instruments
  - Assembly and packing of instruments
  - WHO checklist (safe surgery)

BIOMEDICAL WASTE MANAGEMENT

- Definition
- Categories of biomedical waste
- Segregation of waste
- Hazards of poor biomedical waste management

ANAESTHESIA MACHINE

- Central gas supply
- Safety features of anaesthesia machine
- Medical gas cylinders
- Pressure control system
- Flow meters
- Vaporizers

ANAESTHESIA TECHNIQUES

- History
- Pre-operative, intra-operative and post- operative care of patients
- General anaesthesia
- Regional anaesthesia
- Combined spinal and epidural anaesthesia
- Neuraxial blockades
- Positioning the patients

INTRAOPERATIVE MONITORING

- Pulse-oximetery
- Capnography
- ECG monitoring
- NIBP
- IBP
- CVP
- Temperature
- TEE
- BIS
- Neuromuscular monitoring

AIRWAY EQUIPMENT'S

- Supraglottic airway devices including igel, LMA, BASKA MASK, etc
- Face mask
- Airways
- Combitube
- AMBU bag
- Intubation devices
- Different types of Laryngoscopes
- Endotracheal tubes
- Flexible fiberoptic bronchoscope

BREATHING SYSTEMS

- Classifications
- Oxygen therapy
- Mechanical ventilation

DIFFICULT AIRWAY MANAGEMENT DEVICES

- Indications and contraindications
- Retrograde intubation
- Cricothyroidectomy
- Tracheostomy
- Styllet, bougies
- Jet ventilation
- Video laryngoscopes

EQUIPMENT'S USED INSIDE OT

- Humidifier
- Warming devices
- Suction equipment

- Peripheral nerve stimulator
- Defibrillator
- Infusion pump
- Nerve locator
- Diathermy or cautery device
- OT lights
- Scavenging systems
- Basic introduction to laparoscopy unit including insufflators, cameras, telescope etc

ANAESTHETIC AGENTS

- Premedication
- Analgesics
- Muscle relaxants
- Inhalational agents
- Emergency drugs
- Induction agents
- Sedatives
- Local anaesthetics
- IV fluids
- Blood transfusion
- Antiemetics

PRINCIPLES OF MONITORED ANAESTHESIA CARE-MAC

- Definition
- Drugs used
- Safety Measures

INTRODUCTION TO CPR/RESUSCITATION- BLS

- Goals
- Golden Rules
- Steps of BLS / CPR in Adults
- Advanced cardiac life support
- Glasgow coma scale

CONTENT

ABBREVIATIONS

ABG	Arterial blood gas
ACLS	Advanced cardiac life support
ALS	Amyotrophic lateral sclerosis
BLS	Basic life support
BMW	Biomedical waste management
BVM	Bag-valve-mask
CDC	Centres for Disease Control and Prevention
CSSD	Central sterile supply department
CTZ	Chemoreceptor trigger zone
CVP	Central venous pressure
EMO	Epstein macintosh oxford
ET	Endotracheal
ETO	Ethylene oxide
ETT	Endotracheal tube
HEPA	High-efficiency particulate air
ICU	Intensive care unit
ID	Intradermal
IM	Intramuscular
IO	Intraosseous
IV	Intravenous
MAC	Monitored anaesthesia care
N2	Nitrogen
N2O	Nitrous oxide
NS	Normal saline
O2	Oxygen
OT	Operation theatre
PR	Per rectal
RL	Ringer lactate
SC	Subcutaneous
SGADS	Supraglottic airway devices
SL	Sublingual
TEE	Transoesophageal echocardiography
TSSU	Theatre sterile supply unit
WHO	World health organization