

*Manual of*  
**Local Anesthesia**  
**in DENTISTRY**



# *Manual of* **Local Anesthesia** **in DENTISTRY**

**Second Edition**

**AP Chitre** MDS

Hon. Oral and Maxillofacial Surgeon to His Excellency  
The Governor of Maharashtra

Hon. Consultant Oral and Maxillofacial Surgeon  
Bombay Hospital and Research Centre  
Formerly – Dean and Prof and Head  
YMT's Dental College and Hospital  
Kharghar, New Mumbai

- Professor and Head  
Nair Hospital Dental College  
Bombay and Examiner  
University of Bombay
- PG Examiner at many universities in India  
Professor and Chairman  
Department of Oral Surgery  
Garyounis University, Ben Ghazi, Libya
- Professor and Head  
Postgraduate teacher  
Manipal College of Dental Surgery and Examiner  
Karnataka University
- Professor and Head  
Padmashree Dr DY Patil Dental College and Hospital  
Navi Mumbai
- Professor and Head  
Postgraduate teacher  
KLES Institute of Dental Sciences  
Belgaum and Examiner, Rajiv Gandhi University, Karnataka

***Past President of***

1. Association of Oral and Maxillofacial Surgeons of India
2. Indian Dental Association
3. Indian Society of Oral Implantologists



**JAYPEE BROTHERS MEDICAL PUBLISHERS (P) LTD**

St Louis (USA) • Panama City (Panama) • New Delhi • Ahmedabad • Bengaluru  
Chennai • Hyderabad • Kochi • Kolkata • Lucknow • Mumbai • Nagpur

*Published by*

Jitendar P Vij

**Jaypee Brothers Medical Publishers (P) Ltd**

***Corporate Office***

4838/24, Ansari Road, Daryaganj, **New Delhi** 110 002, India,

Phone: +91-11-43574357, Fax: +91-11-43574314

***Registered Office***

B-3, EMCA House, 23/23B Ansari Road, Daryaganj, **New Delhi** 110 002, India

Phones: +91-11-23272143, +91-11-23272703, +91-11-23282021, +91-11-23245672

Rel: +91-11-32558559, Fax: +91-11-23276490, +91-11-23245683

e-mail: jaypee@jaypeebrothers.com, Website: www.jaypeebrothers.com

***Branches***

- 2/B, Akruiti Society, Jodhpur Gam Road Satellite  
**Ahmedabad** 380 015, Phones: +91-079-26926233, Rel: +91-079-32988717  
Fax: +91-079-26927094, e-mail: ahmedabad@jaypeebrother.com
- 202 Batavia Chambers, 8 Kumara Krupa Road, Kumara Park East  
**Bengaluru** 560 001, Phones: +91-80-22285971, +91-80-22382956, Rel: +91-80-32714073  
Fax: +91-80-22281761, e-mail: bangalore@jaypeebrothers.com
- 282 IIIrd Floor, Khaleel Shirazi Estate, Fountain Plaza, Pantheon Road  
**Chennai** 600 008, Phones: +91-44-28193265, +91-44-28194897, Rel: +91-44-32972089  
Fax: +91-44-28193231, e-mail: chennai@jaypeebrothers.com
- 4-2-1067/1-3, 1st Floor, Balaji Building, Ramkote Cross Road  
**Hyderabad** 500 095, Phones: +91-40-66610020, +91-40-24758498, Rel: +91-40-32940929  
Fax: +91-40-24758499, e-mail: hyderabad@jaypeebrother.com
- No. 41/3098, B & B1, Kuruvi Building, St. Vincent Road  
**Kochi** 682 018, Kerala, Phones: 0484-4036109, +91-484-2395739, +91-484-2395740  
e-mail: kochi@jaypeebrothers.com
- 1-A Indian Mirror Street, Wellington Square  
**Kolkata** 700 013, Phones: +91-33-22651926, +91-33-22276404, +91-33-22276415  
Fax: +91-33-22656075, e-mail: kolkata@jaypeebrothers.com
- Lekhraj Market III, B-2, Sector-4, Faizabad Road, Indira Nagar  
**Lucknow** 226 016, Phones: +91-522-3040553, +91-522-3040554  
e-mail: lucknow@jaypeebrothers.com
- 106 Amit Industrial Estate, 61 Dr SS Rao Road, Near MGM Hospital, Parel  
**Mumbai** 400 012, Phones: +91-22-24124863, +91-22-24104532, Rel: +91-22-32926896  
Fax: +91-22-24160828, e-mail: mumbai@jaypeebrothers.com
- "KAMALPUSHIPA" 38, Reshimbag, Opp. Mohota Science College, Umred Road  
**Nagpur** 440 009 (MS), Phones: Rel: 3245220, Fax: 0712-2704275  
e-mail: nagpur@jaypeebrothers.com

***North America Office***

1745, Pheasant Run Drive, Maryland Heights (Missouri), **MO** 63043, USA Ph: 001-636-6279734

e-mail: jaypee@jaypeebrothers.com, anjulav@jaypeebrothers.com

***Central America Office***

Jaypee-Highlights Medical Publishers Inc., City of Knowledge, Bld. 237, Clayton, **Panama City,**

**Panama** Ph: 507-317-0160

***Manual of Local Anesthesia in Dentistry***

© 2010, AP Chitre

All rights reserved. No part of this publication should be reproduced, stored in a retrieval system, or transmitted in any form or by any means: electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the author and the publisher.

This book has been published in good faith that the material provided by author is original. Every effort is made to ensure accuracy of material, but the publisher, printer and author will not be held responsible for any inadvertent error (s). In case of any dispute, all legal matters are to be settled under Delhi jurisdiction only.

**First Edition:** 2006

**Second Edition:** 2010

ISBN 978-81-8448-701-5

Typeset at JPBMP typesetting unit

Printed at

***Dedicated to  
my parents***



**Prof. C. Bhasker Rao** MDS FDSRCPS  
Principal, SDM College of Sciences and Hospital  
Director, Craniofacial Surgery and Research Center  
Vice President, Dental Council of India



## Foreword to the First Edition

---

It gives me great pleasure to write a foreword on the text *Manual of Local Anesthesia in Dentistry*. It is a common practice all over the globe to use dentist's name to quieten a child. This was largely due to the painful experiences one often underwent during dental treatment in the past. The advances in the knowledge of pain mechanisms, thorough understanding of pharmacology has resulted in the development of various strategies for pain control particularly in dentistry. Local anesthesia still remains the most favoured choice of pain control method. It is surprising that in a country like ours, with nearly 200 Dental Schools does not possess a single book on local anesthesia written by any experienced teacher or a clinician of Indian origin.

Professor AP Chitre, an experienced senior Maxillofacial Surgeon in the Country has undertaken the task of putting down his experiences and scripted this manual of local anesthesia. It appears, to be a comprehensive book covering all the aspects related to the subject and I am sure, not only the students but all the dentists will find it useful in day to day practice.

I have no hesitation to recommend this book for both undergraduate students and practicing dental professionals. I congratulate Professor Chitre for this wonderful work, which will benefit the dental profession.

**Prof. C. Bhasker Rao**







# Preface to the Second Edition

---

It gives me great pleasure and sense of satisfaction to present to you the second edition of my book, *Manual of Local Anesthesia in Dentistry*. This has been possible due to the good response given by the students and teaching colleagues. I thank them all.

The new edition has been updated by adding seven new chapters, keeping in mind the present scenario and the curricula of all Indian universities. The new chapters are on Theories of Pain Perception, Methods of Pain Control, Medical Evaluation, Infection Control, Preanesthetic Medications, Newer Injection Techniques, and Management of Dental Clinic Waste.

Some of the old chapters have been revised and upgraded. The notable additions are the newer local anesthetic agents. The maximum recommended doses have been dealt with in details. A lot of new diagrams related with Local Anesthetic Agents, Armamentarium, Injection Techniques have also been added. The chapter on HIV and Guidelines for Occupational Post-Exposure Prophylaxis (PEP) has been totally revised, which includes the latest guidelines given by National AIDS Control Organization (NACO), Ministry of Health and Family Welfare, Government of India.

I gratefully acknowledge the unstinted support and work put in by Dr MI Parkar, without whose efforts this edition would not have been so completed. His son Sa'ad Parkar who with his expert knowledge of computers helped in preparing the manuscripts and diagrams. I remain grateful to Dr Jyotsna Meshri, for guiding and helping to update the chapter on Systemic Complications of Anesthesia and their Management, Dr Amrita Halder, for volunteering to be the charming model for injection techniques, and Professor (Dr) Seema Muzumdar, for her critical assessment of the First edition and the review. I also thank the publishers, Jaypee Brothers Medical Publishers (P) Ltd, for their support.

I am indebted to Padma Bhushan Brigadier Dr Anil Kohli, President Dental Council of India for releasing the First edition.

I hope that the new edition fulfils the requirements of students and the teaching staff, as an attempt is made to cover all the aspects of local anesthesia in dentistry.

**AP Chitre**



# Preface to the First Edition

---

Dental treatment has been associated with pain from time immemorial. In fact, patients are scared to sit in the Dental Chair and will prefer to suffer until it becomes worse and unbearable. Dental pain is unique and worst compared to all other pains in the body. In Greek Mythology there is reference to the punishment given to Saint Appolonia who was branded as a witch. It was decreed that her teeth should be removed without anaesthesia only one at a time. Later, however, it was proved that she was not a witch and was granted sainthood. Performance of painless dental procedures is highly appreciated by the patients and is easily possible with the help of available local anaesthetic solutions and techniques. However, sound knowledge of surgical anatomy comprising of osseous landmarks, position of exit foramina of the 5<sup>th</sup> cranial nerve, attachment of muscles, innervation of soft and hard tissues is essential. Correct position of the patient and operator while performing the procedure gives successful results.

Detailed, relevant and meticulous history taking will forewarn the operator and will avoid a mishap. Adequate information about the drug used as local anaesthetic agent with relevance to proper dosage, contraindications and possible side reactions will help the Dental Surgeon to be well prepared for the eventualities. Last but not the least gentle tissue handling will avoid many untoward reactions and unpleasant situations.

Sound local anaesthesia is epitome of successful dental practice hence the need for this treatise for Dental students and practitioners.

**AP Chitre**



# Acknowledgments

---

The completion of this book is the effort of teamwork. Notable to mention would be my two colleagues: Dr MI Parkar, Assistant Professor in Oral and Maxillofacial Surgery, at YMT's Dental College and Hospital, Kharghar, Navi Mumbai, who prepared and corrected the manuscripts after the basic format was prepared. He also collected the various references and prepared the bibliography for every chapter. Dr Raj Shekhar Halli, Associate Professor in Oral and Maxillofacial Surgery, at KLES's Institute of Dental Sciences, Belgaum, Karnataka, who prepared the various diagrams on computers showing the basic anatomy for various injection techniques. The photographer and the model who spent their time patiently. Last but not the least the Publishers, Jaypee Brothers Medical Publishers (P) Ltd, and their representative, Mr CS Gawde of Mumbai Branch, who approached me for writing the book and their subsequent cooperation.

I am deeply indebted to Professor C Bhasker Rao, Dean, SDM Dental College and Hospital, Dharwad, Karnataka; and Vice-President, Dental Council of India, for writing the foreword.

I thank all the concerned people who have made the publication of this book a reality.



# Contents

---

---

## **SECTION 1: HUMAN RACE AND PAIN RELIEF**

1. History of Anesthesia .....3

## **SECTION 2: APPLIED ANATOMY OF MAXILLA AND MANDIBLE, NEUROPHYSIOLOGY AND PHARMACOLOGY**

2. Osteology of Maxilla and Mandible ..... 15
3. Neuroanatomy .....27
4. Fundamentals of Nerve Impulse Generation and Transmission ...56
5. Theories of Pain Perception .....72
6. Mode of Action of Local Anesthetic Agents .....77
7. Local Anesthetic Agents .....80
8. Vasoconstrictors ..... 104
9. Local Anesthetic Cartridges and Vials ..... 119

## **SECTION 3: LOCAL ANESTHESIA IN DENTISTRY**

10. Indications, Contraindications, Advantages and Disadvantages .....125
11. Methods of Pain Control ..... 130

## **SECTION 4: ARMAMENTARIUM**

12. Syringes, Cartridges and Needles ..... 141

## **SECTION 5: PRACTICE OF LOCAL ANESTHESIA**

13. Medical Evaluation ..... 161
14. Infection Control .....172

15. Preanesthetic Medications .....	185
16. Basic Techniques of Local Anesthesia .....	186
17. Injection Techniques for Maxillary Nerve and its Branches .....	207
18. Injection Techniques for Mandibular Nerve and its Branches .....	241
19. Newer Injection Techniques .....	267
20. Management of Dental Clinic Waste .....	272

**SECTION 6: COMPLICATIONS OF LOCAL ANESTHESIA  
AND THEIR MANAGEMENT**

21. Local Complications .....	279
22. Systemic Complications of Anesthesia and their Management ...	305
23. National AIDS Control Organization (NACO) .....	338
(Guidelines for Occupational Post-Exposure Prophylaxis (PEP))	
<i>Index</i> .....	351