

# TRANSALVEOLAR EXTRACTION OF THE MANDIBULAR THIRD MOLARS



Edited by  
Darpan Bhargava



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# Transalveolar Extraction of the Mandibular Third Molars

This practical manual provides details on the clinical and radiographic evaluation, classification, principles of suturing and flaps, intricacies of the transalveolar surgery, newer advances in mandibular third molar surgery and complications that may be encountered during mandibular third molar exodontia. It presents vital surgical skills for the mandibular third molar exodontia in a concise and to-the-point manner. This book is a user-friendly resource for students of dentistry and maxillofacial surgery, as it brings together information from various reputable resources to one single platform for easier understanding and application.

**Key features:**

- Addresses the necessary gap in the literature with a concise yet comprehensive approach.
- Overhauls and updates the content to provide an exam-oriented text with practical tips for students of oral and maxillofacial surgery, and professionals.



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# Transalveolar Extraction of the Mandibular Third Molars

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# Dedicated to

---

William Harry Archer

Geoffrey L. Howe

A. J. MacGregor

For their exemplary contribution towards the art and science of mandibular third molar surgery



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# Foreword

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Surgery for mandibular third molars has long awaited a thorough update. This textbook titled *Transalveolar Extraction of the Mandibular Third Molars* published by the Taylor & Francis Group and CRC Press, with renowned contributors is intended for international readership. This manual is useful for education in the field of maxillofacial surgery and will find its academic place as an authoritative teaching resource. The book is edited and mentored by Professor Darpan Bhargava, Consultant in Oral and Maxillofacial Surgery, who is a renowned academician in the field. This book has received its prologue from M. Anthony Pogrel,

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# Preface

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Let us start this journey to the *Transalveolar Extraction of the Mandibular Third Molars* by thanking the Almighty, the supreme power, that keeps us driving to the limits we ourselves don't realize.

त्वं ज्ञानमयो विज्ञानमयोऽसि

You are wisdom and knowledge personified

It was the need of the hour to compile the updated basics on the topic. As I was a student of Oral and Maxillofacial Surgery, it was necessary to refer to extensive literature from various sources to master the art and science of the *Transalveolar Extraction of the Mandibular Third Molars*. Pioneers such as Charles Edmund Kells, George Winter, Kurt Thoma, William Kelsey Fry, Wilfred Fish, Warwick James, Ward, Gustav Kruger, William Harry Archer, Geoffrey L. Howe, A. J. MacGregor and many others have laid a very strong foundation for the exodontia practice. The responsibility lies on our shoulders to take this science forward.

In a race to learn fascinating advanced surgical skills that involve craniofacial surgery, head and neck surgery, temporomandibular joint-related surgeries and microvascular surgery, the importance of the basics in oral surgery is usually underestimated. "Good" exodontia is the "backbone" of dentistry and it is the life and soul of oral and maxillofacial surgical practice. To knock off someone's tooth and still receiving a compliment of doing a "great job" is the best and satisfying experience. Understanding the importance of learning and executing a refined minor oral surgery practice is a matter of prolonged experience and is usually understood very late by the current generation of

oral and maxillofacial surgeons. The art and science of *Transalveolar Extraction of the Mandibular Third Molars* not only involves executing the surgical procedure in the limitations of the oral cavity in a less accessible area of the posterior mandible but also, the understanding of right indications and managing the complications, when they arise.

I hope this compilation is a reader's delight to understand and master the art and science of the *Transalveolar Extraction of the Mandibular Third Molars* and also, provides a single point reference.

**My piece of advice to a learner or student of maxillofacial surgery is that:**

In the practice of maxillofacial surgery, only reading a book hardly helps. Reading a book, applying it to your surgical practice under the guidance and supervision of an experienced wise teacher is the key to refine the skills, until you are skilled enough to pass on the science to your future generation. Fundamentals and basics to any science including surgical exodontia are static, only the advances remain dynamic. If one develops a strong static base, which no one can shake, the pace of the fast-growing advanced dynamics can be easily matched.

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# Acknowledgements

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I would take this opportunity to express my heartfelt gratitude to my parents, Ragini Bhargava and Dr. Madan Mohan Bhargava, for all their efforts and dedication towards my making. I would not have completed this endeavour without the tireless support of my wife Dr. Preeti G. Bhargava and patience of my son Dear Darsh.

I am thankful to Ms. Shivangi Pramanik, Senior Editor for Medicine, CRC Press and Ms. Himani Dwivedi, Editorial Assistant for Medical, CRC Press and Taylor & Francis Group for their constant

support for this project. In spite of their existing commitments and busy schedule, they pursued the project to make it a reality today. I am also grateful to Ms. Miranda Bromage, Publisher, Surgery and Medicine, Taylor & Francis, Oxfordshire, United Kingdom, for having confidence and belief in this work.

I would not miss the opportunity to acknowledge the efforts from Mr. Vijay Shanker P, Sr. Project Manager from codeMantra, for swiftly coordinating and organising the contents of this book.

# About the Book

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## **TRANSALVEOLAR EXTRACTION OF THE MANDIBULAR THIRD MOLARS**

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Impacted tooth is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is unlikely, described according to its anatomic position. There are several different radiological evaluation protocols that can be used prior to transalveolar extraction of the mandibular third molars. Conventional intraoral radiography provides surgeons with an overview of the basic information at the surgical site without detailed three-dimensional spatial relationship of the anatomic structures. The incorporation of the cone-beam computer tomography remains new to the field considering acquisition is simple with clinically acceptable exposure to radiation for complicated cases. The manual describes practically oriented details regarding the clinical and radiographic evaluation, classification, principles of suturing and flaps, intricacies of the transalveolar surgery, newer advances for mandibular third molar surgery and complications that may be

encountered while mandibular third molar surgical exodontia. The manual presents the vital surgical techniques for the mandibular third molar exodontia in a concise and to-the-point manner. This compilation will be a delight to the students of dentistry and maxillofacial surgery considering that it will have an amalgamation of information from various resources of repute at a single terminus. The text will serve as a ready reckoner and clinical notes for undergraduate and postgraduate maxillofacial surgery education.

## **UNIQUE ABOUT THIS MANUAL**

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1. Based on available historic oral and maxillofacial surgical literature
2. Short and concise
3. Compilation for undergraduate and postgraduate education as a manual with practical notes
4. Amalgamation of information from various resources of repute in a single compilation
5. Based on exam-oriented approach co-centred on clinical principles and practice



**Association of Oral and Maxillofacial Surgeons of India (AOMSI)**

**PRESIDENTIAL MESSAGE**

It is a pleasure to recommend the manual titled *Transalveolar Extraction of the Mandibular Third Molars* dedicated to the international community of oral and maxillofacial surgeons published by the Taylor & Francis Group and CRC Press. This compilation edited by Professor Darpan Bhargava would provide a comprehensive academic teaching

and learning material. The text has received contributions in the form of 18 sections from 26 renowned international clinical and surgical specialists in the field adding to the excellence in the academic content. I wish and hope this compilation serves as an important and vital surgical learning tool in the field of maxillofacial surgery.

Jai Hind  
Yours Faithfully,

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Professor Bhargava completed his bachelor's in dental surgery and master's in oral and maxillofacial surgery from Meenakshi Ammal Dental College and Hospital, Chennai, India. He is a distinction holder and gold medallist from The Tamil Nadu Dr. MGR Medical University (Undergraduation) and Meenakshi Academy of Higher Education, Chennai (Postgraduation). He has also successfully completed Diploma of Membership in Oral and Maxillofacial Surgery from Royal College of Physicians and Surgeons,

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# Prologue to “Transalveolar extraction of the mandibular third molars”

---

M. ANTHONY POGREL

It gives me the greatest pleasure to write this prologue for this volume entitled *Transalveolar Extraction of the Mandibular Third Molars*.

Problems associated with third molars are one of the most common issues that confront oral and maxillofacial surgeons. In much of the world, it appears that issues related to third molars account for approximately 60% of the business of many oral and maxillofacial surgeons and sometimes over 65% of income. It is therefore a subject of great importance. It does appear that the occurrences of wisdom tooth problems, particularly impactions, have increased considerably over the last 50 years, and there would appear to be a number of reasons for this.

1. There is some evidence that the human jaws have become smaller over the last 200–300 years while the teeth have stayed the same size. Since the third molars are the last teeth to erupt, they are the ones that are pushed out of the arch and become impacted. The reason for the decrease in size of the jaws is not genetic but is more to do with the equivalent of disuse atrophy as we move to a softer diet that requires less chewing, and therefore there is less muscle development and less bone development.
2. As we move to a more processed diet, requiring less chewing, and causing less abrasion, interproximal wear on the teeth is decreased, and there is less mesial drift, allowing less space for the third molars to erupt.
3. Until relatively recently, it was not uncommon for first molars to be extracted between the ages of 8 and 10 due to gross caries, and therefore, the second and third molars would drift forward. Similarly, second molars were sometimes extracted around the age of 13 or 14 and the third molars would again often drift forward and not become impacted.
4. Orthodontic treatment has moved from being carried out in combination with dental extractions to becoming non-extraction cases where the arches are expanded, widened, and proclined. This reluctance to remove any teeth again means that the last teeth to erupt, which are the third molars, are the ones that are most likely to become impacted.

When third molars need to be removed, I have watched a transition of techniques. In times when drills were expensive and unreliable, reliance was placed on the mallet and chisel and the lingual split technique was often employed, taking away a portion of the lingual plate and delivering the third molar on the lingual side.<sup>1</sup> This technique required less bone removal than the buccal technique and healing was generally straightforward. However, removal of bone with a mallet and chisel is less predictable than with a drill, and there is higher lingual nerve involvement, although this is often attributed to the use of a narrow lingual retractor, such as a Howarth’s nasal raspator, rather than a broader lingual retractor, such as Walter’s

retractor,<sup>2</sup> specifically designed for third molar removal. From the 1980s, as surgical drills became more reliable, it was suggested that third molar removal should be carried out from the buccal approach, carrying out all incisions and surgery on the buccal side of the mandible and avoiding the lingual side altogether in order to attempt to decrease the incidence of lingual nerve involvement. This is the technique largely taught today, though proponents of the lingual technique would state that providing a wide enough retractor is utilized, the incidence of permanent lingual nerve involvement is the same as with the buccal approach, though temporary involvement may be greater.

More recently, alternative techniques to conventional removal of the third molar have been suggested. These include coronectomy or intentional root retention,<sup>3</sup> orthodontic extrusion of the third molar,<sup>4</sup> and sequential removal of the impacted portion of the crown of the tooth to allow it to partially erupt.<sup>5</sup> All three of these techniques are proposed to decrease the problem of inferior alveolar nerve involvement when there is evidence of a close relationship between the roots of the third molar and the inferior alveolar nerve. The advent of the cone-beam computed tomography (CBCT) technique allows accurate three-dimensional imaging of the third molar and all associated structures at a relatively low price with low radiation dosage and is now widely employed.

The technique of lateral trepanation also has its advocates where third molar follicles are “scooped

out” of the crypt from a lateral approach at the age of 13 or 14. One must accurately assess radiographically the exact state of teeth development in this case, and the correct choice of anaesthesia can be an issue at that age.

I hope this gives the reader some flavour of the subjects to be covered in this volume and the scope of issues related to third molars and their removal.

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# Antiquity and introduction to the third molar or the “wisdom” tooth

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BEENA SIVAKUMAR AND DARPAN BHARGAVA

Treatment of a decayed tooth dates back to prehistoric evidence in the Neolithic era (10,000–4,500 BC). The first documented tooth extraction was performed by Hippocrates with an instrument named “Plumbeum odontogagon”. Aristotle was the first person to use a forceps for teeth extraction and described the forceps in detail in his book titled “Mechanics”. Aulus Cornelius Celsus was the first physician who proposed the technique of gingival detachment from the bone to extract a tooth. He also explained that incomplete tooth/root removal from the socket can lead to a possible swelling in the maxilla or mandible [1].

The procedure of third molar extraction gained popularity towards the end of the 18th century. The initial techniques to remove the third molar can be traced to being developed in Germany in the 1800s. In early 1903, National Dental Association published the first official manuscript on third molar extraction. But it is Charles Edmund Kells (1856–1928) who fostered a comprehensive technique for a wisdom tooth removal. Kells in 1918 opined that clinicians should think of them as an engineer to design their extraction technique in such a way that it should be tailor-made for every individual requiring the extraction. Although there are numerous contributors to this science, a few vital ones towards various techniques and procedures to remove the third molar and various soft tissue access incisions to facilitate the tooth removal have been summarized in Table 2.1 [1,2,3,4].

## ROLE OF GENETICS IN RELEVANCE TO THIRD MOLAR TOOTH

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The natural history of the eruption of third molars is such that it is not possible to foresee the fate predictably among individuals. Various factors, such as adequate space between the anterior mandibular border and the distal of the mandibular second molar, are necessary to allow successful eruption of the wisdom tooth to reach the occlusal plane [1,3,4].

Third molar teeth are unique as they erupt last in the oral cavity with their eruption time ranging from 17 to 24 years, depending on the ethnographic region and race. Understanding various regulatory mechanisms of its variable development patterns is of great clinical importance in terms of decision-making regarding the timing of third molar surgical removal, autologous transplantation, orthodontic treatment planning, and chronological age estimation for medico-legal purposes. Several studies have demonstrated the role of genetics in the agenesis of lateral incisors, central incisors, or second bicuspid, but this aspect is not clearly understood in regard to the hereditary influence on third molars, which could possibly be highly different from the other teeth because of their course of unique development. This area still needs further research to obtain conclusive evidence [5].

**Table 2.1** Contributions to the art and science of exodontia

S. No.	Technique	Year	Described by
1	First documented extraction	Between 500 and 300 BC	Hippocrates – Using an instrument named plumbeum odontogagon
2	Forceps extraction	(384–322 BC)	Aristotle
3	Detaching the gingiva from bone	–	Aulus Cornelius Celsus
4	Incisions for difficult extractions	late 1700s	Walter Harris
5	Published first official manual for extraction of third molars	1903	National Dental Association
6	First to foster a comprehensive approach to third molar removal	1856–1928	Charles Edmund Kells
7	Described a more “humane” approach to removal of third molars	1918	Kells
8	Published <i>Principles of Exodontia as Applied to the Impacted Mandibular Third Molar</i> Described three flap designs for the extraction of lower third molars depending on the axial orientation of the teeth	1926	George B. Winter
9	Proposed the term odontectomy to describe the surgical removal of teeth	1932	Kurt H. Thoma
10	Split bone technique	1933	William Kelsey Fry
11	Officially published split bone technique	1956	Terrence George Ward
12	Concept of sectioning the tooth with a chisel and mallet	1957	Wilfred Fish
13	Wide flaps were to be sutured only once and with little tension	1937	Warwick James
14	Described three incisions that are widely used today for both upper and lower third molar surgery	1956	Ward
15	First to compare the use of chisel and mallet, low-speed burr, and high-speed burr	-	Harold C. Kilpatrick
16	Described an envelope flap where a distal-buccal incision is made and continued into a crevicular incision Described an approach for distally angled maxillary third molars	1959	Gustav Otto Kruger
17	Provided an in-depth description of all of the surgical approaches to the impacted lower third molar	1960	Guillermo Ries-Centeno
18	Described a flap that provided a good blood supply, vision for instrumentation and minimum trauma	1966	Alistair Berwick
19	Described numerous techniques to section impacted lower molars to facilitate extractions	1971	Lucian Szmyd
20	Published an approach for third molar that was a novelty at the time	1972	Walt W. Magnus
21	Published a minimally invasive incision	1999	Donlon and Triuta
22	Proposed comma-shaped incision	2002	Iyer Nageshwar
23	Introduction of twin-mix anaesthesia for transalveolar mandibular extractions	2013	Darpan Bhargava

## CURRENT TRENDS

Some additional therapies being investigated which can be beneficial to the patient for uneventful post-operative outcomes are ozone gel, cryotherapy, platelet-rich plasma (PRP), platelet-rich fibrin (PRF), piezoelectric surgery, and lasers. Ozone gel has shown beneficial outcomes after third molar surgery, but it is not a popular choice owing to the cost factor involved and lack of evidence-based literature currently. There has been renaissance on studies related to cryotherapy or ice application causing vasoconstriction, thereby decreasing post-operative swelling. It diminishes the nerve conduction velocity producing an analgesic effect. However, its use is controversial in relation to third molar surgery. Benefits of cold fomentation or cold compress following a third molar surgical extraction are well documented and clinically demonstrated. PRP and PRF are proven to be effective in third molar surgery in terms of enhanced post-operative outcomes. Low-level laser therapy (LLLT) is a therapeutic laser evoking cellular bio-stimulation, thereby accelerating wound healing and tissue regeneration. LLLT is being studied for its effects to reduce discomfort post-operatively and promote healing following wisdom tooth extraction. Piezoelectric surgical interventions are being studied and incorporated for the transalveolar mandibular extraction surgeries with the benefit of minimal damage to the soft tissues including abating the chances of nerve damage [6,7] Recently, “Twin-Mix Anaesthesia” has been studied for surgical removal of impacted mandibular third molars [8–10].

The newer interventions and surgical modifications in terms of technique, equipment, and utilizing pharmacological or physical agents would require a more robust investigation utilizing well-designed multicentric randomized controlled trials for their endorsement for incorporation for these surgical procedures.

The future of third molar surgery is still undergoing transformation to this present day. Advancements with transoral robotic surgery (TORS) may produce a significant paradigm shift and impact on third molar surgery in the future, similar to its use in procedures such as tonsillectomies, retromolar trigone tumours, and base of tongue neoplasms.

The intention towards any surgery remains directed to reduce complications using a single or multimodal approach which includes the administration

of antibiotics, analgesics, steroid-based pharmacological agents along with the execution of an appropriately planned surgical procedure. This holds true for transalveolar extractions too. Conventionally, operator considerations in pre-operative planning include flap design, judicious handling of soft and hard tissues followed by appropriate suture placement and drainage are vital aspects for a successful mandibular third molar surgery.

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