RESEARCH PAPER

Impacted Mandibular Third Molars: A Retrospective Study of 1198 Cases to Assess Indications for Surgical Removal, and Correlation with Age, Sex and Type of Impaction—A Single Institutional Experience

Shital Patel¹ · Saloni Mansuri² · Faizan Shaikh² · Taksh Shah^{2,3}

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Abstract

Aim To study the incidence of mandibular third molar impaction in relation to type and side of impaction, age and sex of patients and indications for its surgical removal through data collected from a single institute over a period of 3 and half years.

Methods The records of 1198 patients who underwent the surgical removal of impacted mandibular third molars were reviewed retrospectively. Records were divided into groups according to sex, age, type and side of impaction. Radiographs were studied to determine angular position of impacted mandible third molar.

Results We found that there was a high incidence of mesioangular lower third molar impaction (33.97 %), highest number of patients were found in 15–30 years of age group (48.33 %), a left side (56.93 %) was more commonly involved, female predominance (63.44 %) was

observed and recurrent pericoronitis (33.81 %) was the most common indication.

Conclusion Awareness of the indications for surgical removal of impacted mandibular third molar to the patients will help to avoid future risk of complications and morbidity associated with the same. This will not only help in saving time and money but also prevents the psychological trauma associated with delayed treatment. Removal of only symptomatic IMTM seems to be the logical choice in view of financial constraint in developing countries like India but at the same time early removal offers freedom from future complications in selected cases. So surgeons should apply a meticulous approach in selecting the patients for SRIMTM.

Keywords Impaction · Indication · Retrospective · SRIMTM (surgical removal of impacted mandibular third molar) · IMTM (impacted mandibular third molar)

✉ Shital Patel
drshital_patel@yahoo.com

Saloni Mansuri
salonimansuri92@gmail.com

Faizan Shaikh
faizanshaikh8238@gmail.com

Taksh Shah
shahtaksh99@gmail.com

¹ Department of Oral and Maxillo-facial Surgery, AMC-MET Dental College and Hospital, J-501, Sumadhur-2 Apartment, Behind Azad Society, Ambawadi, Ahmedabad, Gujarat 380015, India

² Department of Oral and Maxillo-facial Surgery, AMC-MET Dental College and Hospital, Ahmedabad, India

³ University of North Texas School of Public Health, Denton, TX, USA

Introduction

An impacted tooth can be defined as one that is prevented from erupting up to occlusal level because of malposition, physical barrier or lack of space in the arch [1]. Impacted third molars are considered as the developmental, pathological and medical deformities characteristic of a modern civilization [2]. For many years removing or retaining impacted third molar has been a subject of discussion in the dental literature. They are considered as “Waste Bin” in dental practice as they are regarded as functionally nonessential [3].

The SRIMTM is one of the most frequently performed procedure by oral and maxillofacial surgeons. The decision of SRIMTM often may become very complex and

multifactorial consideration is required before contemplating the procedure. A maxillofacial surgeon first must weigh the risk and benefits associated with each individual patient/case requiring SRIMTM in detail keeping the interest of an individual patient above all else [4].

In India, documented studies on third molar impaction are very few. So the present study was undertaken with the following purpose: to evaluate and compare the frequency and distribution of surgical removal of mandibular third molars with regards to age, sex, side, angulations and indications from clinical, historical and radiological data collected from Oral and Maxillofacial Surgery Department of AMC-MET Dental College and Hospital for the period of three and half years. The data of this study can be utilized by the policy makers or the decision makers to implement appropriate measures.

Materials and Methods

In this retrospective study, the records of all patients who were treated for SRIMTM during the period from July 2011 to December 2014 were retrieved, reviewed and analyzed. All the surgical procedures were performed in the Department of Oral and Maxillofacial Surgery, AMC-MET Dental College and Hospital, Ahmedabad, Gujarat, India. This tertiary referral center for specialty cases drains large area of western Gujarat. All the surgical procedures were carried out under local anesthesia with vasoconstrictor.

Inclusion Criteria

- All normal healthy patients with no abusive oral habits presented to Department of Oral and Maxillofacial Surgery irrespective of age, sex and indications for SRIMTM.
- Those records having detailed case history and Orthopantomogram/Intra oral periapical radiograph compulsorily.
- Impacted mandibular third molars which were either fully covered with bone and overlying soft tissue or partially erupted but prevented from reaching the occlusal plane.

Exclusion Criteria

- Records with missing/incomplete clinical history and radiographs.
- Patients with any systemic disorders.
- Patients in whom impacted mandibular third molars had been either involved in any pathology or in fractured mandible.
- Patients who were operated under general anaesthesia for any physical/medical challenge.
- Patients who had undergone multiple/bilateral SRIMTM.
- Patients in whom mandibular third molars fully erupted to the level of occlusal plane and required surgical removal after failed forceps extractions.

We reviewed records of 1198 patients, in which 760 were females and 438 were males. Patients were aged between 17 and 80 years. The variables that we recorded were age, sex, side and angulations of impacted mandibular third molars and indications for surgical removal. The angular position of each mandibular third molar was recorded as vertical, mesioangular, distoangular or horizontal according to criteria laid down by Winter [5]. The extent of eruption was classified as: (1) Fully erupted; (2) Partially covered by soft tissue; (3) Completely covered by soft tissue; (4) Partially covered by bone; (5) Completely covered by bone.

Results

Of the 1198 case records examined, 438 (36.56 %) were males and 760 (63.44 %) were females with definite female gender predominance in almost all age groups. The distribution of cases according to the age and sex has been shown in Table 1. The male- female ratio was 57.63 %. Majority of patients (48.33 %) were in the age group of 15–30 years (age range 17–80 years). The median age of the group was 31.54 years. The mean age of the male subjects was 31.91 years and female subjects was 30.70 years.

Table 2 show indications for SRIMTM. The most frequent indication was recurrent pericoronitis (33.81 %) of the partially erupted lower third molars. Caries and pulpitis of the lower third molar accounted for 24.96 % of the indications, while the same for the second molar was

Table 1 Age and sex distribution

Age group in years	Number of patients	Male	Female
15–30	579	48.33 %	47.26 %
31–40	368	30.72 %	29.91 %
41–50	152	12.69 %	11.64 %
Above 50	99	8.26 %	11.19 %
Total	1198	100.00 %	100.00 %

Table 2 Indications for removal of third molar

Indications		Number n	Percentage
1	Recurrent pericoronitis	405	33.81
2	Unrestorable caries in third molar	299	24.96
3	Unrestorable caries in second molar	253	21.12
4	Orthodontic purpose	64	5.34
5	Prosthodontic purpose	31	2.59
6	Internal/external tooth/root resorption of second molar	25	2.09
7	Unexplained facial pain	3	0.25
8	Prophylactic	60	5.01
9	Involvement in facial space infection (periapical abscess)	46	3.84
10	Preparation of orthognathic surgery	12	1.00
Total		1198	100.00

Table 3 Angular position of third molar

Angulations	Numbers	% p value	Percentage
1 Vertical	327		27.30
2 Mesioangular	407		33.97
3 Distoangular	254		21.20
4 Horizontal	207		17.28
5 Unusual position (transverse)	3		0.25
Total	1198		100.00

21.12 %. Orthodontic purpose and prophylactic removal of lower third molars share nearly the same percentages, 5.34 % and 5.01 % respectively. Periapical infection 3.84 %, prosthodontic purpose 2.59 %, internal/external root/tooth resorption of second molar 2.09 %, preparation for orthognathic surgery 1.00 % and unexplained facial pain 0.25 % follows in descending order.

Table 3 presents the distributions of SRIMTM as per the angular position. Mesioangular impaction was recorded as the most common (33.97 %) type among all the cases included in this study followed by vertical impaction (27.30 %) with closed share.

Table 4 shows involvement of side and sex distribution. It shows clear female predilection, 63.44 % for left side 56.93 %.

Discussion

Third molar impaction in its most severe state prevents an individual from carrying out his routine activities, making impact on his physical, financial and

psychological state and thus gaining public health importance. The recent surveys have reported that IMTM has been documented in countries with high standard of living with a prevalence ranging from 9.5 and 25 % [6]. The reasons for SRIMTM has been given by various authors [3, 7–12]; pain, infection, acute or chronic pericoronitis, presence of cyst or tumor, unrestorable caries, involvement in fracture line of mandibular angle, pulpal involvement, periodontal problem, external or internal tooth/root resorption and destruction of adjacent tooth, orthodontic consideration, systemic health consideration, economic consideration and preparation of orthognathic surgery to name a few.

Recurrent pericoronitis was found to be most the common indication for SRIMTM in our study, this finding is supported by other studies [13, 14] and is in disagreement with some studies too [4, 7]. As supported by current trend, more conservative approach of managing acute infection in patients with a single episode of pericoronitis and surgical approach with multiple episodes were practiced in our institute as well.

Carious involvement of lower second molar and third molar were the second most common indication observed. Reasons for them being carious are most likely food trapped between them causing difficulty in cleaning due to relative inaccessibility. This ultimately leads to formation of carious lesion either to the occlusal surface of partially impacted third molar or to the distal radicular portion of second molar making restorative procedure difficult. So it requires either SRIMTM or extraction of second molar depending upon carious involvement. Study carried out by McArdle and Renton [14] proposes prophylactic removal

Table 4 Involvement of side

Side	Number total	Percentage	Male	Percentage	Female	Percentage
Right	516	43.07	193	44.06	323	42.50
Left	682	56.93	245	55.94	437	57.50
	1198	100.00	438	100.00	760	100.00

of third molar to avoid consequences of distal cervical caries in lower second molar.

We found a low frequency (2.09 %) of root resorption of adjacent teeth. This agrees with the findings of most previous studies [4, 15, 16] but contrasts with the findings of earlier investigators [17, 18].

Guidelines for the management of IMTM have been proposed by the National Institute for Clinical Excellence (NICE), who have advised against the prophylactic removal of third molar teeth [19]. One of the controversial topics debated over the years and observed keenly by one and all is advisability of prophylactic SRIMTM. There has been evidence based reasoning by surgeons for and against SRIMTM, as a result of which the topic yet remains controversial and confusing [4]. Proponents of routine SRIMTM believe that early extraction is preferable, as it defers the margin of doubt regarding the possibility of associated pathology later in life. Other surgeons who do not advocate the routine SRIMTM feel that the possibility of developing a pathology later in life does not justify the physical and psychological trauma a patient undergoes during the procedure. But if the decision is not to routinely perform SRIMTM, then there is possibility of an even more traumatic surgical procedure in future if pathology arises with the IMTM later in life [20].

Justifications for prophylactic SRIMTM include the need to minimize the risk of disease development, reduction of the risk of mandibular angle fracture, increased difficulty of surgery with age and as the third molars have no definite role in the mouth [21]. A study on dentigerous cystic changes with radiographically normal IMTM carried out by Greeshma et al. [22] supports routine SRIMTM. Studies were reported in favor of prophylactic removal [5, 23] and against it too [24]. It is interesting to note that we found significantly larger number of patients ($n = 60$, 5 %) who underwent prophylactic removal of IMTM for one or other reasons. Many of those patients were in younger age group (15–30 years) and travelling abroad. Still we discouraged patients with deeply impacted teeth without any evidence of pathology to undergo prophylactic SRIMTM. Instead we advised to report as and when they experience any symptoms and kept them on regular follow ups.

IMTM were more consistently implicated as a cause of crowding and were therefore more likely to be recommended for removal by both orthodontist and Oral and Maxillofacial Surgeon. Distalization of the molar appears to be the only scientifically valid indication for SRIMTM for orthodontic reasons [13]. While there is hardly any convincing evidence that IMTM contribute to late lower incisor crowding [24], a considerable number of orthodontists and oral and maxillofacial surgeons who graduated before 1980s are believed to continue to recommend prophylactic SRIMTM for lower incisor crowding

[23]. Most recent graduates are unsupportive of prophylactic orthodontic SRIMTM. In our study, SRIMTM for orthodontic reasons account for large number of patients ($n = 64$, 5.34 %) which itself is a type of prophylactic SRIMTM. Study carried out by Krishnan et al. [13] found $n = 14$, 2 % for similar reason.

In this study, subjects above 17 years were preferred keeping in view the chronology of eruption of third molars [25] i.e., 17–21 years. At the same time, there was a need to compensate for the huge sample size of 1198. Therefore, a sampling frame with a large interval (15–30; 31–40; 41–50; above 50) was selected. In the eruption sequence, third molars are the last to erupt and when properly positioned they emerge between the ages of 18 and 24 years [26]. Approximately 40 % of this fail to erupt and become partially or completely impacted in bone, which is mainly attributed to tooth-jaw size discrepancy [27–29].

The American Association of Oral and Maxillofacial surgeons recognizes the existence of post-operative discomfort following third molar surgery in older patients which is consistent with the findings of the National Institutes of Health consensus development conference on third molar disimpaction [9]. They maintained that to give patients the advantage of rapid healing and the lowest incidence of morbidity, impacted teeth should be treated as soon as it is apparent that they will not properly erupt and occlude within the oral cavity. This is because treatment at older ages may increase the incidence and severity of post-operative discomforts such as a longer period of post-surgical recovery and greater risk of anesthetic complications [30]. Chukwunneke et al. had concluded that pain, swelling and trismus following SRIMTM increases as the length of surgical intervention increases and the older patients are at higher risk. Therefore, early SRIMTM in young adult is recommended to avoid treatment at older age, which has higher risk of morbidity [30].

The age wise distribution of IMTM in present study was pointing towards younger age groups with majority (48.33 %) of them being noticed amongst subjects of 15–30 years and these findings are similar to the studies carried out by previous authors [2, 4–7, 14, 15, 26, 30–32].

In the present study, the distribution of SRIMTM were comparatively more in favor of females which is explained by Hellman's theory [33], that the jaws of females stop growing when the third molars just begin to erupt, whereas in males the growth of the jaws continues beyond the time of eruption of third molar resulting in decreased incidence of IMTM in males compared to females. Our observations are supported by previous authors [4, 5, 13, 15] and is in disagreement with some other studies too [2, 7, 26, 32].

In our study, we found IMTM more commonly on left side which is supported by some authors [32, 34] and is in disagreement with the study carried out by Deshpande

et al. [26]. This could be attributed to the variations and sample sizes involved.

We have found mesioangular impaction to be more common amongst other types which could be attributed to the fact that the normal development and path of eruption of mandibular third molar is anterosuperior [31]. This is in agreement with the findings of most previous studies [5, 13, 15, 26, 31] and in disagreement with few studies also [2, 4, 6].

With increasing scientific and proven methods, with evidences to perform SRIMTM with greater success rate and less complication, we believe that it is essential to be aware of the indications for SRIMTM and their age, sex, side and type of distribution to ensure a better visualization of available resources in a developing nation like India.

Conclusion

From the results obtained in our study, we concluded that there is a high incidence/probability of mesioangular lower third molar impaction, the age group most commonly involved was 15–30 years, left side was more common with female predominance and recurrent pericoronitis being the most common reason for SRIMTM. Management of unexplained facial pain offer less convincing evidence as the single reason for SRIMTM, as axiomatically it is not a good practice to treat any pain with surgical intervention in the absence of demonstrated disease. Though some of the literature does offer support for SRIMTM for resolution of unexplained facial pain, it is not a forthcoming practice. Patient should be informed that the pain may or may not be relieved and adverse consequences of SRIMTM appropriate to their case should be stressed clearly. A significant association was noticed between the side and the gender distribution for surgical removal of mandibular third molar but applying Chi square test, *p* value is 0.60, which is very high. We do not reject the null hypothesis leading to empirical conclusion that there is no relationship between gender and side of lower third molar impaction.

Awareness of the indications for SRIMTM along with elevation of fear for dentistry will help in successful management of patients requiring SRIMTM and thereby minimizing potential post-operative complications associated with delayed management for the same. However, SRIMTM after the complications occur is the most common mind set of patients in India because of poor socio-economic conditions, restrictions in the health service budget, negative response towards the possibility of post-operative complications and unawareness/fear of oral surgery. To get the maximum outcome with minimum complications, root cause needs to be treated and for that awareness about oral surgery should be increased not only

in the patients but also in people like general physicians and dentists who refer them to specialist (oral surgeon) to guide them properly.

The study can further expand regarding correlations between angulations of IMTM in both the sexes and involvement of sides.

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Compliance with Ethical Standards

Conflict of interest None.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors. The Ethics Committee of the institute where the study was conducted had not been formed from the inception of the study till its submission to the journal.

References

1. James RH, Edward E, Myron RT (2008) Principles of management of impacted teeth. Contemporary oral and maxillofacial surgery, vol 6. Elsevier, Mosby, pp 143–167
2. Venu Gopal Reddy K (2012) Distribution of third molar impaction among rural and urban dwellers in the age group of 22–30 years in South India: a comparative study. *J. Maxillofac Oral Surg* 11(3):271–275
3. Kaveri GS, Prakash S (2012) Third molar: a threat to periodontal health?? *J Maxillofac Oral Surg* 11(2):220–223
4. van der Linden W, Cleanton-Jones P, Lownie M (1995) Disease and lesions associated with third molar: review of 1001 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 79:142–145
5. Liedholm R, Knutsson K, Lysell L, Rohlin M (1999) Mandibular third molar: oral surgeon's assessment of the indications for removal. *Br J Oral Maxillofac Surg* 37:440–443
6. Olasoji HO, Odusanya SA (2000) Comparative study of third molar impaction in rural and urban areas of south western Nigeria. *J Odontostomatol Trop* 23(90):25–28
7. Al-Khateeb TH, Bataineh AB (2006) Pathology associated with impacted mandibular third molar in group of Jordanians. *J Oral Maxillofac Surg* 64:1598–1602
8. Babu HSC, Reddy PB, Pattathan RKB, Desai R, Shubha AB (2013) Factors influencing lingual nerve paraesthesia following third molar surgery: a prospective clinical study. *J. Maxillofac Oral Surg* 12(2):168–172
9. National Institute of Health (1980) Consensus development conference for removal of third molar. *J Oral Surg* 38:235–236
10. Kandasamy S, Rinchuse DJ (2009) The wisdom behind third molar extractions. *Aust Dent J* 54:284–292
11. Blondeau F, Daniel NG (2007) Extraction of impacted mandibular third molar: postoperative complications and their risk factors. *J Can Dent Assoc* 73:325
12. Brann CR, Brickley MR, Shepherd JP (1999) Factors influencing nerve damage during lower third molar surgery. *Br Dent J* 86:514–516
13. Krishnan B, El Sheikh MH, El-Gehani R, Orafi H (2009) Indication for removal of impacted mandibular third molar: a single institutional experience in Libya. *J Maxillofac Oral Surg* 8(3):246–248
14. McArdle LW, Renton TF (2005) Distal cervical caries in mandibular second molar: an indication for the prophylactic removal of the third molar? *Br J Oral Maxillofac Surg* 44:42–45

15. Knutsson K, Brehmer B, Lysell L et al (1996) Pathoses associated with mandibular third molars subjected to removal. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 82:10
16. Yamaoka M, Furusawa K, Ikelada M et al (1999) Root resorption of mandibular second molar teeth associated with presence of third molars. *Aust Dent J* 44:112
17. Nitzan D, Karen T, Marmary Y (1981) Does an impacted tooth cause root resorption of adjacent one. *Oral Surg Oral Med Oral Pathol* 51:221
18. Nordenram A, Hultin M, Kjellman O et al (1987) Indication for surgical removal of the mandibular third molar. *Swed Dent J* 11:23
19. Guidance on the extraction of wisdom teeth. In: NICE technology appraisal guidance 1. 2000. guidance.nice.org.uk/ta Accessed 1 March 2000
20. Berge TI (1997) Inability to work after surgical removal of mandibular third molar. *Acta Odontol Scand* 55(1):64–69
21. Adeyemo WL (2006) Do pathologies associated with impacted lower third molar justify prophylactic removal? A critical review of literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 102(4):448–452
22. Greeshma GW, Shridhar V, Shyla HN (2012) A study on dentigerous cystic changes with radiographically normal impacted mandibular third molars. *J Maxillofac Oral Surg* 11(4):458–465
23. Lindauer SJ, Laskin DM, Tufekci E, Taylor RS, Cushing BJ, Best AM (2007) Orthodontist's and surgeon's opinion on the role of third molar as a cause of dental crowding. *Am J Orthod Dentofac Orthop* 132:43–48
24. Richardson ME (2002) Late lower arch crowding: the aetiology reviewed. *Dent Update* 29(5):234–238
25. Ash M, Nelson J (2003) Development and eruption of the teeth. In: Dolan JJ (ed) *Wheeler's dental anatomy, physiology and occlusion*, 8th edn. Elsevier, Missouri, p 53
26. Deshpande P, Guledgud MV, Patil K (2013) Proximity of impacted mandibular third molar to the inferior alveolar canal and its radiographic predictors: a panoramic radiographic study. *J Maxillofac Oral Surg* 12(2):145–151
27. Niedzielska IA, Drugacz J, Kus N, Kreska J (2006) Panoramic radiographic predictors of mandibular third molar eruption. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 102:154–158
28. Yamalik K, Bozkaya S (2008) The predictivity of mandibular third molar position as a risk indicator for pericoronitis. *Clin Oral Invest* 12:9–14
29. Ash MM, Nelson SJ (2003) The permanent mandibular third molar. In: Dolan JJ (ed) *Wheeler's dental anatomy, physiology and occlusion*. 8th edn Saunders, Elsevier, Missouri, pp 297–331
30. Chukwuneke FN, Saheeb BD (2008) The effect of patient's age and length of surgical intervention on postoperative morbidity following lower third molar surgery. *J Maxillofac Oral Surg* 7(4):420–423
31. Mwaniki D, Guthua SW (1996) Incidence of impacted mandibular third molar among dental patients in Nairobi, Kenya. *Trop Dent J* 19(74):17–19
32. Gupta S, Bhowate RR, Nigam N, Saxena S (2011) Evaluation of impacted mandibular third molar by panoramic radiography. *ISRN Dent*. doi:[10.5402/2011/406714](https://doi.org/10.5402/2011/406714)
33. Hellman MO (1961) Our third molar teeth: their eruption, presence and absence. *J Dent Cosmos* 78:750–762
34. Tay ABG, Go WS (2004) Effects of exposed inferior alveolar neurovascular bundle during surgical removal of impacted lower third molars. *J Oral Maxillofac Surg* 63:592–600