Reasons Why Erupted Third Molars Are Extracted in a Public University in Mexico

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ABSTRACT

Purpose: The aim of this study was to determine the reasons for which erupted third molars (3M) are extracted in a sample of Mexican patients.

Subjects and Methods: A retrospective cross-sectional study was performed on a sample of 83 patients attending exodontia (minor oral surgery) clinics of a public university in Mexico (Autonomous University of Hidalgo State). The outcome variable was the reason for extractions using Kay and Blinkhorn's classification. The independent variables were age, gender, arch and tooth number according to the World Health Organization (WHO). For statistical analysis, we used the Chi-squared test in Stata 9.0.

Results: Eighty-three patients underwent 150 3M extractions. Mean age was 38.67 ± 13.96 years, and 71.1% were female. The four reasons for 3M extraction were prosthetic (44.0%), followed by orthodontic (24.7%), dental caries (20.0%) and periodontal disease (11.3%). Differences were observed in the reasons for 3M extractions across age groups ($p < 0.05$). No significant differences existed between men and women ($p > 0.05$), or the WHO tooth number ($p > 0.05$).

Conclusion: Women and patients 18 to 34 years of age had erupted 3M extracted more frequently, primarily for prosthetic reasons. The age profile indicated a trend in demand for services that differ from those of overall tooth extractions, but not for the trend across gender.

Keywords: Adults, Mexico, third molar, tooth extraction

Razones por las Cuales los Terceros Molares Erupcionados se Extraen en una Universidad Pública en México

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RESUMEN

Objetivo: Determinar los motivos por los cuales se extraen los terceros molares (3M) erupcionados en una muestra de pacientes mexicanos.

Sujetos y Métodos: Se realizó un estudio transversal en 83 pacientes que acudieron a las clínicas de exodoncia de una universidad pública de México. El período de estudio fue de un año (enero-diciembre de 2009). La variable dependiente fue el motivo de extracción del 3M utilizando la clasificación de Kay y Blinkhorn. Las variables independientes fueron edad, sexo, arcada y número de diente de acuerdo a la OMS. Para el análisis estadístico se utilizó la prueba de Chi cuadrada en Stata 9.0.

Resultados: En los 83 pacientes se realizaron 150 extracciones de 3M. El promedio de edad fue de 38.67 ± 13.96 años, y 71.1% fueron mujeres. Los motivos por los cuales se extrajeron los 3M fueron sólo cuatro: motivos protésicos con el 44.0%, seguido de motivos ortodónticos (24.7%), caries dental (20.0%) y enfermedad periodontal (11.3%). Se observó diferencia de los motivos por los cuales se extrajeron los 3M por los grupos de edad. No se observaron diferencias significativas entre hombres y mujeres ($p > 0.05$), ni por el número de diente ($p > 0.05$). Comparando la arcada superior e inferior mostró una leve tendencia ($p < 0.10$).

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Conclusiones: *Las mujeres y los de 18 a 34 años se presentaron con más frecuencia para extracción de 3M erupcionados. El principal motivo por el que se extrajeron los 3M erupcionados en la población estudiada fue por motivos protésicos. Se observaron diferencias de los motivos de extracción de los 3M entre los grupos de edad.*

INTRODUCTION

Despite scientific and technological advances in the dental field, the major oral health problems in the world are still dental caries and periodontal diseases. They represent a major burden of disease for health systems (1−3). These infections can have complications beyond their anatomic locations. Treating these diseases constitutes a large percentage of daily work for dentists both in public and private practice. One of the ultimate consequences of those diseases is tooth extraction, which remains frequent. Studies conducted in Mexico and around the world have shown that the main reasons why people lose their teeth are dental caries, periodontal disease, prosthetic and orthodontic reasons (including eruption problems and occlusal problems), trauma and other local or general medical reasons (4−16). Third molars (3M) have special features (location and impaction, position within the arch, anatomical variations, among other reasons) that lead to special considerations, in particular in terms of surgical treatment (17−20). Because of the frequency and importance of third molar surgery, the literature has focussed mainly on extraction criteria and extraction complications when they are impacted, retained or partially erupted, adjunct therapies for the postoperative course, and postoperative complications. Additionally, a number of studies have examined risk factors for complicated 3M extraction, using measurable outcomes such as extraction time and surgeon assessment of difficulty (20−24), but very few papers have referred to the reasons for extraction when they are completely erupted. The aim of the present study was to determine the reasons for extractions of erupted 3M in a sample of Mexican patients.

SUBJECTS AND METHODS

This study met the guidelines for the protection of research subjects and ethical guidelines at the Autonomous University of Hidalgo State (UAEH), a public university in Mexico.

We performed a retrospective cross-sectional study in patients who sought treatment at the the minor oral surgery (exodontia) clinics in the Dental Academic Area at UAEH, between January 2009 and December 2009. We included patients 18 years and older who sought care or were referred to the clinic for 3M extractions – exclusively for completely erupted 3M. Clinical records were consulted and a standardized summary of dental charts and the periapical radiographic films routinely taken of all patients was conducted. The extractions were carried out under local anaesthesia.

The independent variables included were age of the patient, which was divided into three groups: 18−34 years, 35−49 years and ≥ 50 years; gender; the tooth number, according to the World Health Organization (WHO) classification; and the arch, coded as upper arch and lower arch. The dependent variable was the reason for extraction. Considering that only completely erupted 3M were extracted and included in the present study (at the minor oral surgery exodontia clinic, surgery for impacted, unerupted third molars is not performed), the classification proposed by Kay and Blinkhorn (25) was used to identify the main reason, based on the conditions shown in Table 1.

Table 1:   Tooth extraction reasons outlined in Kay and Blinkhorn (1986) classification

1. Dental caries and its sequelae	Tooth destroyed by caries in which it was not possible to use conservative dentistry, or root tips; sub-gingival root caries and especially lesions below the bone level, including periapical abscesses and failed root canal therapy.
2. Periodontal disease	Teeth with periodontal disease with unstable levels of mobility, unrecoverable and progressive. Included loss of function, periodontal abscess, and pain.
3. Orthodontic reasons	Orthodontic treatments where there was a large osseo-dental discrepancy without possibility of bone growth. Included reasons aimed at preventing or treating malocclusions.
4. Prosthetic reasons	Teeth that impeded an appropriate design of a prosthesis, as in the need to avoid bridge abutments of highly destroyed teeth and in which there was no possibility of orthodontic correction.
5. Trauma and fractures	Teeth extracted due to acute trauma, with sub-gingival crown fractures, or with vertical cracks or tears.
6. Medical reasons	Prophylactic removal indicated by physicians, teeth posing focal infection risk problems that could not be solved with endodontic treatment, especially in patients with cardiovascular conditions.
7. Other reasons	Supernumerary teeth, ectopic teeth, impacted teeth that were associated with cystic disease, possible root resorptions, imbalance of the arches.

Statistical analysis consisted of a descriptive study of the variables, in which summary measures appropriate to the scale of measurement of the variables were reported, mean and standard deviation for continuous variables, and frequencies and percentages for categorical variables. In the statistical analysis, we used the χ^2 test and a value of $p < 0.05$ was considered statistically significant. Statistical analyses were performed using Stata 9.0.

RESULTS

The study included 83 patients, in whom 150 extractions of erupted 3M were performed. Mean age was 38.67 ± 13.96 years; there were more women (71.1%) than men [28.9%] (Table 2). The reasons for extraction were: prosthetic reasons

Table 2:   Description of the study sample

	Frequency	Percentage
Age (years)		
18−34	34	41.0
35−49	32	38.5
≥ 50	17	20.5
Gender		
Male	24	28.9
Female	59	71.1

(44%), followed by orthodontic reasons (24.7%), dental caries (20.0%) and finally, periodontal disease [11.3%] (Figure).

The bivariate analysis is shown in Table 3. The reasons for extraction showed differences in their distribution across groups by age, showing the highest percentage in the patients 18 to 34 years old for orthodontic reasons. Prosthetic reasons were more common among patients between 35 and 49 years old, and among those over 50 years old ($p < 0.05$). No significant differences between men and women ($p > 0.05$),
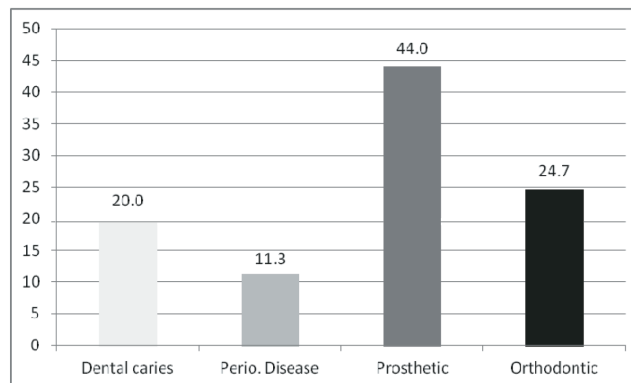

Figure: Reasons for the 150 third molars to be extracted.

or the number of teeth ($p > 0.05$) were observed. Although not significant, a slight trend was hinted for more frequent 3M extractions in the lower arch than in the upper ($p < 0.10$).

DISCUSSION

Due to the fact that there are few similar studies and most of them focussed on the extraction of impacted or unerupted third molars, or on the complications during or after their extraction (17, 19−24), the comparison of our results with other publications is limited. For patients and clinicians, there are many reasons to make a tooth extraction decision. Although teeth are primarily extracted due to disease [such as dental caries and periodontal disease] (4−16) that can cause infection and pain, sometimes healthy teeth have to be sacrificed to improve chewing or for correction of malocclusions. Although dental caries and periodontal disease are still the major oral diseases in Mexico (26−28), in the present study they were not the main reasons for 3M extractions. The main reason was for prosthetic, followed by orthodontic problems. Unlike our results, Lee *et al* (11) in their study in Taiwanese

Table 3:   Bivariate analyses for reasons for third molar extraction (n = 150)

	Caries	Periodontal disease	Prosthetic	Orthodontic	*p*-values
Age (years)					
18−34	6 (11.8)	3 (5.9)	10 (19.6)	32 (62.7)	
35−49	16 (25.4)	7 (11.1)	37 (58.7)	3 (4.8)	$\chi^2 = 62.22$
≥ 50	8 (22.2)	7 (19.4)	19 (52.8)	2 (5.6)	$p = 0.000$
Gender					
Male	10 (20.4)	7 (14.3)	16 (32.6)	16 (32.6)	$\chi^2 = 4.57$
Female	20 (19.8)	10 (9.9)	50 (59.5)	21 (20.8)	$p = 0.206$
Arches					
Upper	18 (19.0)	9 (9.5)	38 (40.0)	30 (31.6)	$\chi^2 = 6.89$
Lower	12 (21.8)	8 (14.6)	28 (50.9)	7 (12.7)	$p = 0.075$
Tooth number					
18	8 (18.2)	4 (9.1)	15 (34.1)	17 (38.6)	
28	10 (19.6)	5 (9.8)	23 (45.1)	13 (25.5)	
38	7 (25 .0)	6 (21.4)	11 (39.3)	4 (14.3)	$\chi^2 = 13.71$
48	5 (18.5)	2 (7.4)	17 (63.0)	3 (11.1)	$p = 0.133$

patients observed that upper and lower 3M were extracted mainly because of caries or complications linked to their unerupted status, respectively. Meanwhile, Aida *et al* (6) in Japan and Anand *et al* (8) in India reported similar results; dental caries was the main reason for extraction of 3M. It should be noted that they also included impacted 3M or not fully erupted ones and the procedures were performed in dental offices. We included only fully erupted 3M, and extractions performed at a teaching clinic. Differences observed between these studies and ours may be due to the different methodologies used.

The reasons for all tooth extractions vary according to age (4−16); although there are no reports on 3M specifically, we believe that a similar situation could be seen based on our data. With regard to gender, most studies report that women undergo more extractions than men (8), and this trend appears to be replicated in 3M requiring surgery (21). Although other studies have found differences in the reasons why teeth are extracted between men and women, we did not observe significant differences – although women had more teeth extracted for prosthetic reasons and men had more extractions for orthodontic reasons. This lack of observable differences was extended to other variables.

There are some limitations of the present study that should be considered when interpreting the data. For example, the information was obtained from patients who sought care at university clinics, and, therefore possibly, it is not representative of dental offices in Mexico; economic conditions are likely to not be the same. This variable has influence on the reasons for tooth loss (29). Our study included only fully erupted 3M, while most studies have included impacted 3M (and teeth in some stage of the spectrum of eruption). Adding strength to our paper is that specialists, who were teachers helping the students in planning and undertaking prosthetic and surgical treatment, might have led to a measure of criteria standardization, which might not have been the same case outside the university clinics.

In conclusion, women and people aged 18−34 years most frequently underwent erupted 3M extractions. The main reason for extraction was prosthetic. There were differences in the reasons between age groups and although they were different from reasons for non-3M tooth extraction in general, the reasons for erupted 3M extractions tended to have a more balanced distribution, without the marked preponderance that is observed in the stated reasons for removing teeth in general.

REFERENCES

1. Petersen PE, Kandelman D, Arpin S, Ogawa H. Global oral health of older people–call for public health action. Community Dent Health 2010; **27** (**Suppl 2**): 257−67.
2. Petersen PE, Ogawa H. The global burden of periodontal disease: towards integration with chronic disease prevention and control. Periodontol 2000 2012; **60**: 15−39.
3. Marcenes W, Kassebaum NJ, Bernabé E, Flaxman A, Naghavi M, Lopez A et al. Global burden of oral conditions in 1990-2010: a systematic analysis. J Dent Res 2013; **92**: 592−7.
4. McCaul LK, Jenkins WM, Kay EJ. The reasons for the extraction of various tooth types in Scotland: a 15-year follow up. J Dent 2001; **29**: 401−7.
5. Da'ameh D. Reasons for permanent tooth extraction in the North of Afghanistan. J Dent 2006; **34**: 48−51.
6. Aida J, Ando Y, Akhter R, Aoyama H, Masui M, Morita M. Reasons for permanent tooth extractions in Japan. J Epidemiol 2006; **16**: 214−19.
7. Rubiños-López E, Rodríguez-Vázquez LM, Varela-Centelles A, Varela-Centelles P. Causas de exodoncia registradas en el Servicio Gallego de Salud. Aten Primaria 2008; **40**: 157−8.
8. Anand PS, Kamath KP, Nair B. Trends in extraction of permanent teeth in private dental practices in Kerala State, India. J Contemp Dent Pract 2010; **11**: 41−8.
9. Chrysanthakopoulos NA. Reasons for extraction of permanent teeth in Greece: a five-year follow-up study. Int Dent J 2011; **61**: 19−24.
10. Montandon A, Zuza E, Toledo BE. Prevalence and reasons for tooth loss in a sample from a dental clinic in Brazil. Int J Dent 2012; **2012**: 719750. doi: 10.1155/2012/719750.
11. Lee CY, Chang YY, Shieh TY, Chang CS. Reasons for permanent tooth extractions in Taiwan. Asia Pac J Public Health 2012. doi: 10.1177/1010539512448814. Epub ahead of print 2012 Jun 28.
12. Haseeb M, Ali K, Munir MF. Causes of tooth extraction at a tertiary care centre in Pakistan. J Pak Med Assoc 2012; **62**: 812−5.
13. Saheeb BD, Sede MA. Reasons and pattern of tooth mortality in a Nigerian urban teaching hospital. Ann Afr Med 2013; **12**: 110−4.
14. Alomari QD, Khalaf ME, Al-Shawaf NM. Relative contribution of restorative treatment to tooth extraction in a teaching institution. J Oral Rehabil 2013; **40**: 464−71.
15. Jafarian M, Etebarian A. Reasons for extraction of permanent teeth in general dental practices in Tehran, Iran. Med Princ Pract 2013; **22**: 239−44.
16. Medina-Solís CE, Pontigo-Loyola AP, Pérez-Campos E, Hernández-Cruz P, de la Rosa-Santillana R, Navarrete-Hernández JJ et al. Principales razones de extracción de dientes permanentes en una muestra de adultos Mexicanos. Rev Invest Clin 2013; **65**: 141−9.
17. de Santana-Santos T, de Souza-Santos JA, Martins-Filho PR, da Silva LC, de Oliveira E Silva ED, Gomes AC. Prediction of postoperative facial swelling, pain and trismus following third molar surgery based on preoperative variables. Med Oral Patol Oral Cir Bucal 2013; **18**: e65−70.
18. Al Kuwari HM, Talakey AA, Al-Sahli RM, Albadr AH. Influence of orthodontic treatment with first premolar extraction on the angulation of the mandibular third molar. Saudi Med J 2013; **34**: 639−43.
19. Rodríguez-Pérez M, Bravo-Pérez M, Sánchez-López JD, Muñoz-Soto E, Romero-Olid MN, Baca-García P. Effectiveness of 1% versus 0.2% chlorhexidine gels in reducing alveolar osteitis from mandibular third molar surgery: a randomized, double-blind clinical trial. Med Oral Patol Oral Cir Bucal 2013; **18**: e693−700.
20. Morales-Trejo B, Rocha-Navarro ML, Acosta-Veloz AL, Juárez-Hernández A. Class, type and position of 9148 surgically removed third molars in 3206 patients: a retrospective study. Med Oral Patol Oral Cir Bucal 2012; **17**: e447−51.
21. Susarla SM, Dodson TB. Predicting third molar surgery operative time: a validated model. J Oral Maxillofac Surg 2013; **71**: 5−13.
22. Sancho-Puchades M, Valmaseda-Castellón E, Berini-Aytés L, Gay-Escoda C. Quality of life following third molar removal under conscious sedation. Med Oral Patol Oral Cir Bucal 2012; **17**: e994−9.
23. Kim JW, Cha IH, Kim SJ, Kim MR. Which risk factors are associated with neurosensory deficits of inferior alveolar nerve after mandibular third molar extraction? J Oral Maxillofac Surg 2012; **70**: 2508−14.
24. Marciani RD. Complications of third molar surgery and their management. Atlas Oral Maxillofac Surg Clin North Am 2012; **20**: 233−51.
25. Kay EJ, Blinkhorn AS. The reasons underlying the extraction of teeth in Scotland. Br Dent J 1986; **160**: 287−90.
26. Minaya-Sánchez M, Medina-Solís CE, Vallejos-Sánchez AA, Marquez-Corona ML, Pontigo-Loyola AP, Islas-Granillo H et al. Gingival recession and associated factors in a homogeneous Mexican adult male population: a cross-sectional clinical investigation. Med Oral Patol Oral Cir Bucal 2012; **17**: 807−13.

27. Islas-Granillo H, Borges-Yañez SA, Medina-Solís CE, Casanova-Rosado AJ, Minaya-Sánchez M, Villalobos-Rodelo JJ et al. Socio-economic, sociodemographic and clinical variables associated to root caries in a group of Mexican elders aged 60+. Geriatr Gerontol Int 2012; **12:** 271−6.

28. Villalobos-Rodelo JJ, Medina-Solís CE, Verdugo-Barraza L, Islas-Granillo H, Garcia-Jau RA, Escoffié-Ramírez M et al. Experiencia de lesiones cariosas reversibles y no-reversibles en escolares mexicanos de 11 y 12 años de edad: un análisis de regresión binomial negativa. Biomédica 2013; **33:** 88−98.

29. Cimões R, Caldas-Júnior AF, Souza EH, Gusmão ES. [Influence of social class on clinical reasons for tooth loss]. Cien Saude Colet 2007; **12:** 1691−6.