DOI: 10.37990/medr.1561673 Med Records 2025;7(1):81-4

MEDICAL RECORDS-International Medical Journal

Research Article

Evaluation of Third Molars According to the Operative Difficulty Score

Gorkem Tekin, Gizem Caliskan, Nesrin Saruhan Kose

Eskişehir Osmangazi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery, Eskişehir, Türkiye

Abstract

Aim: Third molars (M3) are the most common type of impacted tooth, and the prevalence of impaction varies between 27% and 68.8%. The aim of this study was to evaluate M3 according to their operative difficulty score and angulation.

Material and Method: A total of 1000 patients who returned to our clinic for M3 extraction were included in the study. Preoperative clinical and radiological operative difficulty scores (ODS) and angulations were evaluated from 0 to 6. Descriptive statistics were performed.

Results: When M3 were evaluated according to ODS, 343 (34.3%) were ODS 1, 106 (10.6%) were ODS 3, 327 (32.7%) were ODS 4, 188 (18.8%) were ODS 5 and 36 (3.6%) were ODS 6. When evaluated according to their angulations, 621 (62.1%) M3 were found in the vertical position, 184 (18.4%) in the mesioangular position, 70 (7%) in the horizontal position, 104 (10.4%) in the distoangular position, and 21 (2.1%) in the buccolingual-palatal position.

Conclusion: This study will allow the evaluation of the level of difficulty before the operation in the surgery of the M3 and the creation of a better treatment plan. Thus, perioperative and postoperative complications can be minimized.

Keywords: Classification, oral surgery, third molar

INTRODUCTION

Among the molar teeth located on the maxilla and mandible, the Third molars (M3) are the teeth that are the most diverse in terms of morphology and location (1). For this reason, M3 tooth extraction is important in routine oral surgery procedures performed by oral surgeons (2). Molar teeth may also remain impacted for local and systemic reasons, such as inadequate growth, inadequate mandibular distance for tooth eruption, adverse growth direction, early completion of physical maturation, hormonal activity disorders, various syndromes and sometimes high bone density (3). M3, which can be found in the mouth as erupted or impacted, can cause conditions such as infection, decay, and periodontal damage to neighboring teeth and can also pose an obstacle to prosthetic and orthodontic procedures (4). According to the literature, the most commonly impacted teeth, impacted M3, can also cause pericoronitis, osteomyelitis, cysts and atypical pain (5). The most common postoperative complications after M3 extraction are alveolar osteitis and local infection, but severe pain, swelling, trismus, secondary bleeding, and paresthesia of the inferior alveolaris n. may also occur. To prevent possible complications or to treat complications with minimal damage, the level of difficulty of extraction must be carefully evaluated in each patient (6).

The principal radiographic tools are periapical and panoramic radiographs, and the small size of periapical radiographic images can make it difficult for the practitioner to visualize M3 that are deeply positioned in the jaws. This can cause discomfort to the patient or result in incomplete visualization of the anatomy of the tooth during exposure (7). Radiographic variables such as the size and shape of the crown of the tooth; the number, size and curvature of the roots; the position and condition of the impacted tooth; and the presence or absence of the periodontal ligament and its relationships with adjacent structures can be analyzed with an Ortopantomography (OPG) (8). In all cases, preoperative determination of the level of surgical difficulty is important for proper treatment planning.

CITATION

Tekin G, Caliskan G, Saruhan Kose N. Evaluation of Third Molars According to the Operative Difficulty Score. Med Records. 2025;7(1):81-4. DOI:1037990/medr.1561673

Received: 05.10.2024 **Accepted:** 03.11.2024 **Published:** 13.01.2025

Corresponding Author: Gorkem Tekin, Eskişehir Osmangazi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery, Eskişehir, Türkiye

E-mail: dt.gorkemtekin@gmail.com

This will enable the preparation of the correct materials, determination of the surgical access point, selection of the appropriate technique and type of anesthesia, and determination of whether the operator's experience and abilities are compatible with the extraction to be performed (6). This study aims to evaluate the angulation of the M3, the operative difficulty scores (ODS), and the jaw where the patient is located, using demographic data such as age and sex, along with panoramic radiography data that are easily used in clinical practice.

MATERIAL AND METHOD

Data Collection

Our study used retrospective data of M3 molars obtained from 1000 patients who presented at our clinic with complaints of M3 between September 2017 and July 2024. Before the study, approval was obtained from the Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee (Decision Date: 23.07.2024/ Decision Number: 30), and the study was conducted in accordance with the Helsinki Declaration of Human Rights. While male and female patients with M3 were included in the study, patients without M3 due to genetic, syndromic or congenital reasons were excluded from the study.Before M3 surgery, panoramic radiographs were taken from all patients, and the M3 were divided into different groups according to their angularities: vertical, mesioangular, distoangular, horizontal, buccolingual or buccopalatinal. M3s were also classified according to the ODS in the study by Lang et al. (9) This classification was performed by a single surgeon after both clinical and radiological examinations before surgery, and an ODS value from 0 to 6 was determined for each M3. The ODS scores were as follows: 0: no extraction needed, 1: nonsurgical erupted, 2: surgical erupted, 3: impact on soft tissue, 4: partial impact on the bone, 5: complete impact on the bone, and 6: complete impact on the bone but in a difficult position to reach (complicated or difficult). The ODS value for each M3 was determined from 1 (erupted without surgery) to 6 (completely impacted in bone and difficult to extract). The ODS scoring was prepared based on Saruhan's study (10).

Statistical Analysis

The data were recorded in a spreadsheet (Excel 2010; Microsoft, USA) and then analyzed via SPSS version 22.0. The jaw location of M3, sex, angulation and ODS were correlated and are shown as frequencies and percentages. Quantitative variables are shown as the minimum, maximum and mean.

RESULTS

The patients who underwent tooth extraction were between 16 and 79 years old, and the average age was 28.58±9.87 years. Among the 1000 patients who underwent tooth extraction, 608 were female (60.8%), and 392 were male (39.2%). The age range of the female patients was between 16 and 70 years, and the average age was 26.9±8.97 years. The age range of the male patients was between 18 and 79 years, and the average age was 31.18±10.62 years. When the extracted teeth were evaluated according to their jaw location, 459 (45.9%) lower M3 were extracted, whereas 541 (54.1%) upper M3 were extracted. When the M3 were evaluated according to their angulation, 621 (62.1%) M3s were found in the vertical position, 184 (18.4%) in the mesioangular position, 70 (7%) in the horizontal position, 104 (10.4%) in the distoangular position, and 21 (2.1%) in the buccolingual-palatinal position. According to the ODS, 343 (34.3%) of the M3s included in the study were ODS 1, 106 (10.6%) were ODS 3, 327 (32.7%) were ODS 4, 188 (18.8%) were ODS 5, and 36 (3.6%) were ODS 6.

The angulations of the teeth according to sex are shown in Table 1. In male and female patients, most teeth were in the vertical position, whereas the fewest teeth were in the buccolingual position. The ODS scores by sex are also shown in Table 2. For both genders, most tooth extractions were performed on teeth with ODS 1. The ODS scores by jaw localization are shown in Table 3. According to the table, the most extracted tooth in the maxilla was ODS 1, whereas in the mandible, ODS 4 was found.

Table 1. Descriptive statistics of tooth position by gender

		Frequency (N)	Percent (%)
Female	Vertical	381	62.7
	Mesioangular	115	18.9
	Horizontal	27	4.4
	Distoangular	73	12
	Buccolingual-palatinal	12	2
	Total	608	100
Male	Vertical	240	61.2
	Mesioangular	69	17.6
	Horizontal	43	11
	Distoangular	31	7.9
	Buccolingual-palatinal	9	2.3
	Total	392	100

Table 2. Descriptive statistics of ODS by gender

		Frequency (N)	Percent (%)
Female	ODS 1	198	32.6
	ODS 2	-	-
	ODS 3	64	10.5
	ODS 4	197	32.4
	ODS 5	126	20.7
	ODS 6	23	3.8
	Total	608	100
Male	ODS 1	145	37
	ODS 2	-	-
	ODS 3	42	10.7
	ODS 4	130	33.2
	ODS 5	62	15.8
	ODS 6	13	3.3
	Total	392	100

Table 3. Descriptive statistics of ODS according to jaw location			
		Frequency (N)	Percent (%)
Maxilla	ODS 1	257	56
	ODS 2	-	-
	ODS 3	47	10.2
	ODS 4	62	13.5
	ODS 5	62	13.5
	ODS 6	31	6.8
	Total	459	100
Mandible	ODS 1	86	15.9
	ODS 2	-	-
	ODS 3	59	10.9
	ODS 4	265	49
	ODS 5	126	23.3
	ODS 6	5	0.9
	Total	541	100

DISCUSSION

It has been reported in the literature that M3 may reach normal occlusion partially or completely or may remain partially or completely impacted in the maxillary or mandibular arch (11). There are several theories about the cause of impaction; insufficient space and mechanical obstacles (cysts, tumors, tissue hyperplasia, local infections, etc.), as well as local and systemic factors such as trauma, vitamin deficiencies, malnutrition, hormonal disorders and some syndromes, may cause this situation (12). M3s are the most frequently impacted teeth in the oral cavity, followed by impacted canine teeth (13). Surgical extraction of M3s is one of the most common surgical procedures performed in oral, dental and maxillofacial surgery clinics (10). In clinical practice, M3s frequently cause problems such as the risk of recurrent pericoronitis, swelling, caries formation in adjacent teeth, root resorption and dysfunction, facial and referred pain of unknown cause, periodontal, prosthetic and orthodontic conditions, and pathological lesions such as cysts and tumors (14,15). Preoperative evaluation of the degree of difficulty of M3 surgery is one of the important factors to consider (16). Many factors affect the difficulty of surgical extraction of M3s. Age, body mass index (BMI), body surface area, race, surgeon experience, extraction method, number of teeth extracted, depth of impaction, ramal relationship, tooth angle, root development, root curvature, relationship to the mandibular canal, root width, patient anxiety, and other factors are thought to affect the difficulty of extraction, but researchers do not agree on the relative effects of these factors (17,18). In their study of 2978 patients, Lang et al. (9) classified the M3s according to the ODS, with 4 M3s in each patient, as upper-lower and right-left, and evaluated the ODS value between 0–6 and determined the ODS value between 0–24, with a score of 4*6 for each patient. They extracted an average of 3.2 teeth from each patient and evaluated the total ODS in the jaw, finding a total score of 12±6.5. They also reported a relationship between gender and ODS. Saruhan (10) reported that 27 (22.5%) of the M3s were ODS 3, 29 (24.2%) were ODS 4, 53 (44.2%) were ODS 5, and 11 (9.1%) were ODS 6 according to the ODS. The author also evaluated the M3s according to their angulation. The author reported that 65 (54.2%) impacted teeth were in the vertical position, 28 (23.3%) were in the mesioangular position, 10 (8.3%) were in the distoangular position, 14 (11.7%) were in the horizontal position, and 3 (2.5%) were in the buccolingual-palatal position. When the ODS was evaluated according to age ranges, the average age was found to be 25,09±8,3. Author reported that the difficulty level of extractions was high in young patients in the population he evaluated by finding the highest score of 5 in the ODS evaluation (10). In his study, Gümrükçü et al. (19) also listed the tooth positions of 684 patients according to the Winter classification. He reported that there were 369 teeth in the vertical position, 249 in the mesioangular position, 45 in the horizontal position, 10 in the distoangular position, and 11 in the buccolingual position. Mahdey et al. (20) evaluated panoramic radiographs of 1249 patients aged between 20 and 44 years. They reported that the operative difficulty score was greater in female patients than in male patients. In our study, the teeth to be surgically extracted were evaluated according to their operative difficulty scores and angulations. In our study, the tooth in the vertical position was the most common tooth, and in the comparison between genders, the tooth in the vertical position was the most common tooth in male and female patients. ODS is different from the literature, whereas ODS 1 is the most common in extracted teeth, when evaluated according to jaw localization, teeth with ODS 4 were extracted in the mandible. Although the average age of the patients in our study is similar to the average age found by Saruhan (10), we can say that more complicated extractions can occur at younger ages by finding ODS 4.In addition, ODS was evaluated not as the total ODS in the patient's jaw but as each ODS in the extracted teeth. In M3 surgery, preoperative radiographic examination is very important to guide the surgical procedure for different types of impacted M3. The type of impacted tooth is routinely evaluated easily and frequently via the OPG. The magnification ratio of the OPG is lower, and the reliability is higher when the correct position of the head is provided. Therefore, the data obtained via OPGs can provide reliable measurement values before M3 surgery. In light of this information, the evaluation of the impacted type of tooth and the measurement via OPGs can be used as standard and reliable methods in oral and maxillofacial surgery/ radiology (19,21). We used the OPG, which is the gold standard, in the evaluations in our study.

CONCLUSION

The degree of difficulty of extracting teeth from the lower jaw was greater than that from the upper jaw, and no significant difference was found between the sexes. Estimating the difficulty index in M3 surgery before surgery will be an important practice in preventing or minimizing postoperative complications by ensuring that the dentist is prepared for complications that may be encountered during surgery.

Financial disclosures: *The authors declared that this study has received no financial support.*

Conflict of interest: *The authors have no conflicts of interest to declare.*

Ethical approval: *This study received the necessary ethical approval from the Non-Invasive Clinical Research Ethics Committee of Eskişehir Osmangazi University (Protocol No: 2024/30).*

REFERENCES

1. Peñarrocha-Diago M, Camps-Font O, Sánchez-Torres A, et al. Indications of the extraction of symptomatic impacted third molars. A systematic review. J Clin Exp Dent. 2021;13:278-86.
2. Dicus-Brookes C, Partrick M, Blakey GH, et al. Removal of symptomatic third molars may improve periodontal status of remaining dentition. J Oral Maxillofac Surg. 2013;71:1639-46.
3. Jeyashree T, Kumar MPS. Evaluation of difficulty index of impacted mandibular third molar extractions. J Adv Pharm Technol Res. 2022;13:98-101.
4. Kandasamy S, Rinchuse DJ, Rinchuse DJ. The wisdom behind third molar extractions. Aust Dent J. 2009;54:284-92.
5. Hermida-Cabrera P, Lima-Sánchez B, Montoya-Salazar V, et al. Proposal and validation of a new index to assess the difficulty of lower third molar extraction. Dent J. 2024;12:138.
6. Gay-Escoda C, Sánchez-Torres A, Borrás-Ferreres J, Valmaseda-Castellón E. Third molar surgical difficulty scales: systematic review and preoperative assessment form. Med Oral Patol Oral Cir Bucal. 2022;27:e68-76.
7. Al-Dajani M, Abouonq AO, Almohammadi TA, et al. A cohort study of the patterns of third molar impaction in panoramic radiographs in Saudi population. Open Dent J. 2017;11:648-60.
8. Sánchez-Jorge MI, Cortés-Bretón-Brinkmann J, Acevedo-Ocaña R, et al. Perceived surgical difficulty of mandibular third molar extraction. A comparative cross-sectional study of dentists with postgraduate qualification in oral surgery and maxillofacial surgeons in a Spanish subpopulation. Med Oral Patol Oral Cir Bucal. 2024;29:263-72.
9. Lang MS, Gonzalez ML, Dodson TB. Do antibiotics decrease the risk of inflammatory complications after third molar removal in community practices?. J Oral Maxillofac Surg. 2017;75:249-55.
10. Saruhan N. Gömülü 3. molar dişlerin operatif zorluk skoruna ve komplikasyonlara göre değerlendirilmesi. Med J SDU. 2018;25:282-6.
11. Mercier P, Precious D. Risks and benefits of removal of impacted third molars. A critical review of the literature. Int J Oral Maxillofac Surg. 1992;21:17-27.
12. van der Linden W, Cleaton-Jones P, Lownie M. Diseases and lesions associated with third molars. Review of 1001 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1995;79:142-5.
13. Brasileiro BF, de Bragança RM, Van Sickels JE. An evaluation of patients' knowledge about perioperative information for third molar removal. J Oral Maxillofac Surg. 2012;70:12-8.
14. Contar CM, de Oliveira P, Kanegusuku K, et al.Complications in third molar removal: a retrospective study of 588 patients. Med Oral Patol Oral Cir Bucal. 2010;15:e74-8.
15. Chaparro-Avendaño AV, Pérez-García S, Valmaseda-Castellón E, et al.Morbidity of third molar extraction in patients between 12 and 18 years of age. Med Oral Patol Oral Cir Bucal. 2005;10:422-31.
16. Bali A, Bali D, Sharma A, Verma G. Is pederson index a true predictive difficulty index for impacted mandibular third molar surgery? A meta-analysis. J Maxillofac Oral Surg. 2013;12:359-64.
17. Carvalho RW, do Egito Vasconcelos BC. Assessment of factors associated with surgical difficulty during removal of impacted lower third molars. J Oral Maxillofac Surg. 2011;69:2714-21.
18. Park KL. Which factors are associated with difficult surgical extraction of impacted lower third molars?. J Korean Assoc Oral Maxillofac Surg. 2016;42:251-8.
19. Gümrükçü Z, Balaban E, Karabağ M. Is there a relationship between third-molar impaction types and the dimensional/angular measurement values of posterior mandible according to Pell & Gregory/Winter Classification?. Oral Radiol. 2021;37:29-35.
20. Mahdey HM, Arora S, Wei M. Prevalence and difficulty index associated with the 3(rd) mandibular molar impaction among Malaysian Ethnicities: a clinico-radiographic study. J Clin Diagn Res. 2015;9:ZC65-8.
21. Habets LL, Bezuur JN, Naeiji M, Hansson TL. The Orthopantomogram,an aid in diagnosis of temporomandibular joint problems. II. The vertical symmetry. J Oral Rehabil. 1988;15:465-71.