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ORIGINAL ARTICLE

Degree of difficulty in lower third molar surgery

Grado de dificultad en cirugía de terceros molares inferiores

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ABSTRACT

Introduction: Third molar formation often occurs in a very limited space, there are several difficulty scales to determine the complexity in the surgery of retained molars that are key for planning and prediction.
Objective: to evaluate the difficulties and complications in lower third molar surgeries.
Methods: retrospective, observational and descriptive, with a sample of 100 extractions of retained lower third molars in two different populations, the following variables were evaluated: spatial relationship, depth, relationship with the ramus or available space, integrity of the bone and mucosa, roots, follicle size, the data were recorded in a spreadsheet and the difficulty scale was obtained.
Results: the study evaluated 100 molars from patients of the CME oral surgery clinic in Mexico and Ecuador. In group 1 (CME), a relationship between sex and surgical difficulty was observed, with 18 % of women facing "difficult" difficulty and 6 % of men with "very difficult" difficulty. In group 2 (Ecuador), 18 % of men had a "difficult" difficulty and both sexes had a "very difficult" difficulty equally.
Conclusions: there are significant differences in surgical time according to age, complications according to the location of the third molar, and follicle size. Hence, the scale to be used may be crucial in planning extractions of retained third molars, as it allows for a reduction in surgical times and prevention of complications.

Keywords: Surgery, Oral; Complications; Operative Time.

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RESUMEN

Introducción: la formación del tercer molar con frecuencia se da en un espacio muy limitado, existen varias escalas de dificultad para determinar la complejidad en la cirugía de molares retenidos que son clave para la planificación y predicción.
Objetivo: evaluar las dificultades y complicaciones en las cirugías de terceros molares inferiores.
Métodos: retrospectivo, observacional y descriptivo, con una muestra de 100 extracciones de terceros molares inferiores retenidos en dos poblaciones distintas, se evaluaron las siguientes variables: relación espacial, la profundidad, la relación con la rama o espacio disponible, la integridad del hueso y la mucosa, las raíces, el tamaño del folículo, los datos se registraron en una hoja de cálculo y se obtuvo la escala de dificultad.
Resultados: el estudio evaluó 100 molares de pacientes de la clínica de cirugía bucal CME en México y de Ecuador. En el grupo 1 (CME), se observó una relación entre sexo y dificultad quirúrgica, con un 18 % de mujeres enfrentando dificultad "difícil" y un 6 % de hombres con dificultad "muy difícil". En el grupo 2 (Ecuador), el 18 % de hombres tuvo dificultad "difícil" y ambos sexos presentaron dificultad "muy difícil" de manera equitativa.
Conclusiones: existen diferencias significativas en el tiempo quirúrgico según la edad, complicaciones según la ubicación del tercer molar, tamaño del folículo. De ahí que la escala a emplear puede ser crucial en la planificación de extracciones de terceros molares retenidos, pues permite reducción de tiempos quirúrgicos y prevención de complicaciones.

Palabras clave: Cirugía Bucal; Complicaciones; Tiempo Quirúrgico.

INTRODUCTION

Third molar surgery is one of the most routine clinical actions in the dental office. Understanding the anatomy of the stomatognathic system is essential to avoid risks and consequences of poor practice, which are important for each of the procedures. Insufficient planning of surgical acts, whether due to ignorance or negligence, is one of the main reasons for difficulties during clinical practice. A correct analysis of complementary examinations with the help of a scale to measure the degree of difficulty of surgical procedures allows the operator to understand possible complications that may arise during the intervention. There are scales that help measure the degree of difficulty in lower third molar surgery, which can be simple or complex, and it is important to be prepared both practically and theoretically.

The third molar is one of the most variable teeth in terms of formation and eruption. Its appearance has always been of undoubted concern to the dentist, since this tooth does not usually erupt completely when there is insufficient space in the oral cavity, causing innumerable complications.[1] It erupts at 17 years of age and is commonly found with a distorted shape, with an inconsistency in its position being more noticeable. In approximately 60 % of cases it does not form an occlusion, and more than half of the time it does not erupt outside the gum, often becoming trapped or retained in bone.[2]

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The germ of the third lower molar is born at the end of the dental lamina, this region of the mandibular angle will be modified during the formation of the molar, dragging with it parts of the tooth that have not yet calcified.[3] The mineralization of teeth evolves in an invariable sequence from the tips of the cusps, continuing through the crowns with enamel and dentin, to the formation of the cementoenamel junction. Once the crown is formed, the development of the root advances, ending with the closure of the apex.[4]

Maxillary third molars may have a close anatomical relationship with the maxillary sinus floor, increasing the risk of developing odontogenic sinusitis or oroantral fistula after extraction. Mandibular third molars are in relation to the inferior alveolar nerve canal, this close relationship poses a risk of nerve injury during dental procedures. Partially impacted ones are exposed to develop several pathologies such as pericoronitis, carious lesions, periodontal bone loss, external root resorption, on the contrary, third molars that are completely unerupted are more likely to be associated with the development of cysts and tumors.[5]

Other soft tissue complications: Pericoronitis, periodontal disease and odontogenic dentigerous cysts or tumors are almost rare.[6] Normal eruption may be hindered by adjacent teeth or bones, some of the obstacles are:

a) physical, such as gingival,
b) dental, dentomaxillary discrepancies, gigantism of temporary teeth and supernumerary germs, tooth position, retained deciduous teeth, tooth germ trauma, odontomas, cysts and tumors,
c) bone,
d) systemic, genetic alterations, deficiency states and endocrine disorders.[7]

Retained teeth are those that once the eruption period has arrived, have not managed to do so and remain inside the jaw, classified as intraosseous and subgingival, the local causes can be: lack of space, density of the covering bone, very dense mucous membrane, improper retention of temporary teeth, premature loss of temporary dentition and infection in bone or mucosa, which cause retention.[2,8]

The Pell and Gregory Classification for third molars is based on two criteria. The first evaluates the position in relation to the ascending mandibular ramus, classifying them as Class I (sufficient space), Class II (diameter greater than the available space), and Class III (no space, covered by the ascending ramus). The second criterion analyzes the relative depth, dividing them into Position A (at the same level or above the occlusal line of the 2M), Position B (below the occlusal line but above the cervical line of the 2M) and Position C (at the same level or below the cervical line of the 2M). [9]

Winter classificationassesses the position of the third molar in relation to the longitudinal axis of the second molar: mesioangular, horizontal, vertical, distoangular, inverted.[10] Indications for surgery on third molars include pathological conditions,[11] prevention of mandibular angle fracture, orthodontic considerations, pericoronitis, prevention of odontogenic tumors and cysts, management of facial pain, preparation for orthognathic surgery, prevention of caries, root resorption, under dental prosthesis, dental crowding, systemic health considerations, periodontal disease.[12,13]

ISSN: 1561-3194 **RNPS:** 1877
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Contraindications can be divided into general general health status of the patient and relative to the poor cooperation of the patient.[14] Less commonly described complications of complexity may depend on: obesity, dense bone, large tongue, dilacerated roots, strong gag reflex, position of the lower dental canal, advanced age, rebellious patient, cortical bone root, uneven anesthetic, atrophic mandible, limited surgical access and the postoperative complications that may occur are: bleeding, persistent pain, alveolitis, infection, trismus, dehydration, mandibular fracture, oro-antral communication.[12] Incomplete tooth extraction, damage to the second molar, displacement to other anatomical regions, bone fractures or neurological injuries may also occur. [15]

The radiographic diagnosis considered first level is the intraoral radiography and the orthopantomography, particularly the panoramic radiography is indicated as the first option in the analysis of the position of third molars and adjacent structures, considering its low cost and accessibility, resulting in a tool that projects the maxilla, mandible, nasal cavities, complete dentition and temporomandibular joints, in a single plane, providing an overview of the state of oral health and state of dental structures.[16,17,18]

This study addresses the importance of performing pre-surgical studies of tooth extraction, focusing on factors that predict difficulty, using the Romero Ruiz clinical-radiographic scale. Unlike other scales, this tool integrates clinical-radiographic variables, allowing for more precise surgical planning. Its application by various authors and its demonstrated capacity are highlighted. The scale evaluates the position of third molars, incorporating Pell, Gregory and Winter classifications to measure the depth and relationship with the ramus, as well as the position in relation to the longitudinal axis of the second molar.

Proper planning is crucial, lack of adequate analysis can result in complications. The Romero Ruiz scale, by assigning scores to specific variables and calculating a total score, is presented as a valuable tool to predict and mitigate complications in lower third molar surgeries.

In a cross-sectional study at the "Dr. Antonio Iraola" Provincial General Teaching Hospital[1]104 patients diagnosed with lower third molars were analyzed, evaluating various variables. The results, analyzed with frequencies, revealed linear dependence and proportionality between extraction time and difficulty factors. It was concluded that the proposed scale is valuable in preoperative evaluation to predict complications and difficulties in extraction procedures.

In Ecuador,[19] a descriptive observational study of 100 extractions of lower third molars in patients aged 16 to 40 years was carried out. 71 % of the cases were classified as "difficult". Significant differences were identified in surgical time related to age, complications according to the location of the third molar, follicle size, and difficulty according to sex and age. It concludes that the scale used can be crucial in the planning of extractions of retained third molars, allowing a reduction in surgical times and prevention of complications.

An observational and descriptive study was carried out analyzing 172 orthopantomographies with 688 third molars in patients aged 15 to 50 years, using the Winter, Pell and Gregory classifications. 48,1 % were located vertically, being the most common position, followed by mesioangular with 31,2 %. In the mandible, mesioangular, class II and level B predominated, while in the maxilla, vertical position, class I and level C were more frequent. This analysis provides valuable data on the distribution of third molars according to their position and classification.[20]

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Rev Ciencias Médicas. 2024; 28(S2): e6585

In 2020, a descriptive, prospective, cross-sectional study was conducted with 82 third molars, evaluating the Romero Ruiz difficulty index. 29,3 % were vertical, 50% had depth level B, and 39 % grade III according to Pell and Gregory. 30,6 % were completely covered by mucosa, 50 % had roots with more than 2/3 fused, and 75,6 % had a follicular size of 0-1 mm. 64,6 % of the procedures were considered difficult, highlighting the complexity in retained lower third molars.[21]

The index of surgical difficulty of Dr. Romero Ruiz has a collection of specific data, which cover the most important factors to perform a correct analysis of the degree of difficulty in extracting third molars. Among the reference parameters are: the spatial relationship is measured taking into account as a reference the angle of the third molar, in consideration of the longitudinal axis of the second molar, determining its location in relation to the adjacent structures, which can be mesioangular, horizontal, transverse, vertical, distoangular.[22,23]

The depth as a reference to the degree of inclusion of lower third molars and the depth in relation to the occlusal plane of the lower second molar, is classified in position A, position B and position C by Pell and Gregory. The Pell and Gregory classification evaluates the relationship with the ascending ramus (Class I, II, III) and the integrity of bone and mucosa. The root anatomy in shape, length, number of roots and degree of development, are particular structures of the third molar that due to their conformation can increase dental retention within the alveolar bone. The size of the follicular sac is seen in the x-rays as a radiolucent image, when the tooth erupts the follicle disintegrates, but when the eruption is incomplete the follicular sac remains attached to the tooth, which increases the probability of a cystic or tumoral pathology forming.[24,25]

METHODS

This study is part of a retrospective, observational and descriptive design, with the purpose of radiographically analyzing lower third molars in patients from two clinics, one located in Mexico (CME, Puebla campus) and the other in Ecuador (Guayaquil). The research will be carried out at the facilities of the CME postgraduate course in oral surgery in Mexico and at a clinic in Guayaquil, Ecuador.

A total of 100 lower third molars were analyzed radiographically, divided equally between 50 patients treated in the specialty of oral surgery at the CME Puebla campus and 50 patients in Ecuador. A non-probabilistic convenience sampling was used. The sample consisted of 100 lower third molars, selected according to inclusion and exclusion criteria. Inclusion criteria: patients with complete dentition, ages between 15 and 45 years, either sex, and who gave their permission for the study; exclusion criteria: patients with bone lesions, bone fractures, children under 15 years of age, those who did not wish to participate, upper third molars, and patients older than 46 years.

The comparative study procedure was divided into two groups: Group 1 with 50 molars from Mexican patients from the CME and Group 2 with 50 molars from Ecuadorian patients. Panoramic radiographs were used for the diagnostic scale, followed by data collection and analysis, operator assessment, informed consent, various measurements, and radiographic analysis to evaluate bone and mucosa integrity, root morphology, and follicular sac size. The difficulty scale was determined by adding and dividing by two the recorded values, assigning specific difficulty ranges. This methodological approach will allow obtaining valuable information on the position and characteristics of lower third molars in Mexican and Ecuadorian patients, thus contributing to knowledge in the field of oral surgery.

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Rev Ciencias Médicas. 2024; 28(S2): e6585

RESULTS

Group 1 of patients from the CME oral surgery clinic consisted of 56 % female participants and 44 % male participants. Group 2 of patients treated in Ecuador consisted of 52 % male participants and 48 % female participants. (Figure 1)

Fountain: Author, 2023.

Fig. 1 Percentage of male and female participants in group 1 and 2

According to this study, a certain relationship was found between sex and the difficulty of the surgical procedure. In Mexico, 18 % (50 % of women) had a "difficult" degree of difficulty, which was higher than that of the opposite sex, while 6 % (50 % of men) had a "very difficult" degree of difficulty. (Figure 2)

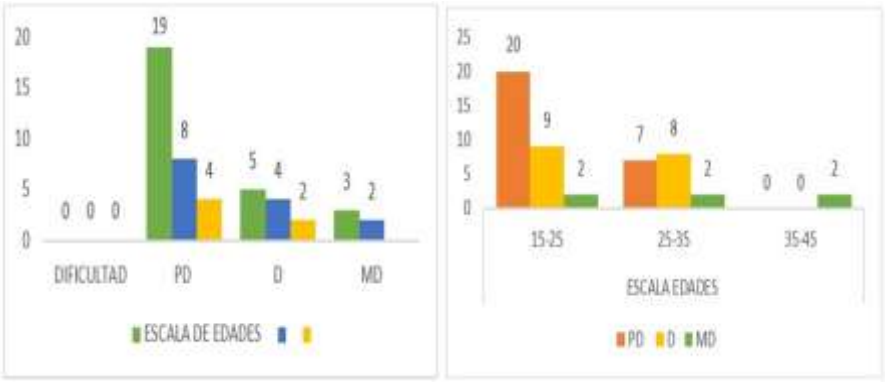
Fountain: Author, 2023.

Fig. 2 Surgical difficulty according to sex group 1 and 2

According to the second group, according to the degree of surgical difficulty, the "Difficult" degree of difficulty was found to be 18 % higher for the male sex than for the opposite sex, and the "Very difficult" degree of difficulty was found to be equal for both sexes.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6585

Group 1 (Mexico) included 26 patients aged 15-25 years; 16 patients aged 25-35 years and 6 patients aged 35-45 years. The difficulty according to age was 39,58 % PD 15-25 years, 16,6 % PD 25-35 years, 8,33 % PD 25-35 years, 10,41 % D 15-25 years, 8,33 % D 25-35 years, 4,16 % D 35-45 years, 6.25% MD 15-25 years, 4.16% MD 25-35 years. Within the exclusion criteria, there were 2 patients aged 61 and 70 years. (Figure 3)



Fountain: Author, 2023.

Fig. 3 Surgical difficulty according to age group 1 and 2.

Group 2 (Ecuador) included 33 patients between the ages of 15 and 25 years; 15 patients between 25 and 35 years; and 1 patient between 35 and 45 years. The results according to age were 40,81 % PD 15-25 years, 14,28 % PD 25-35 years, 18,36 % D 15-25 years, 16,32 % D 25-35 years, 4 % MD 15-25, 25-35, and 35-45 years. Exclusion criteria were a 48-year-old patient. (Figure 3)

In the comparison of the results obtained between the scale and without a scale, different figures were obtained, with respect to coincidences of results. In group 1, 46 % of surgeries were found to coincide with the scale and 54 % were found to have no coincidence. (Figure 4)

Fountain: Author, 2023.

Fig. 4. Results obtained in scale coincidence group 1 and 2

In group 2, 64 % of surgeries were matched on the scale and 36 % were non-matched.

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Rev Ciencias Médicas. 2024; 28(S2): e6585

DISCUSSION

One of the most frequently performed procedures in clinical practice is the extraction of third molars, which requires extensive surgical knowledge to avoid complications that may arise. Several authors,[1,2] present the need to use surgical difficulty indices to predict the degree of difficulty of the extraction before performing it.

In this study, the Romero Ruiz scale was used and variables such as sex, age and location were added. The data were obtained from panoramic radiographs, which are the most commonly used diagnostic method. According to,[2] the economic component is considered a very important factor in the use and prescription of diagnostic methods. Cone beam panoramic radiography is limited, as it does not contain clear anatomical elements such as roots or the mandibular canal. Arias Estrada,[3] agrees that 53,06 % of the female sex is more frequently subjected to extractions of lower third molars. He also determined that sex and surgical difficulty have a relationship. 31 % of men presented difficulty "PD", 29 % of women with "PD", 17 % difficulty "D" in women and 12 % scale of "D" in men, 6% in men difficulty "MD", and 5 % "MD" in women. Quezada Marquez et al,[4] report the prevalence of complications in patients undergoing third molar surgery, a cross-sectional observational study, with women presenting the highest average difficulty.

58 % of the 100 surgeries had a low operative difficulty. According to the age groups, in the 15-25 age group the low operative difficulty predominated with 39 %, in the 25-35 age group the low operative difficulty predominated with 15 %, while in the 35-45 age group the low operative difficulty predominated with 4 %. Coinciding with the result of the research ofLourerioand col,[5] where 52,2 % of all surgeries had a low operative difficulty, in the group of 15 -19 years the low operative difficulty predominated, ages 20 - 25 and 26 - 30 years the medium operative difficulty predominated.

According to the coincidence in the operating clinic and the scale of Dr. Romero Ruiz, the result obtained is that 55 % of the total population agreed with the result of the scale, while 45 % did not agree.

CONCLUSIONS

There are significant differences in surgical time depending on age, complications depending on the location of the third molar, and size of the follicle. Therefore, the scale to be used can be crucial in planning extractions of retained third molars, as it allows for a reduction in surgical times and prevention of complications.

Conflict of Interest Declaration
The authors declare that there is no conflict of interest regarding this study.

Authors' Contribution
DNQC, FASL and JICG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing-original draft, Writing-review and editing.

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