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Evaluation of the positions of impacted third molars according to the classifications of Winter and Pell & Gregory in panoramic radiographs

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Summary

Third molars, popularly known as wisdom teeth, are the most frequently impacted teeth in the oral cavity, and their eruption may be partially or totally impeded by anatomical, genetic, and functional factors. This condition is relevant in dentistry because it is associated with complications such as pain, infection, caries, and root resorption. The Winter and Pell & Gregory classifications are widely used to describe the positioning and degree of impaction of these teeth, aiding in diagnosis and surgical planning. This study aims to analyze, through an integrative literature review, the application of panoramic radiography in the evaluation of impacted mandibular third molars, considering the Winter and Pell & Gregory classifications, and to discuss its relevance for diagnosis, surgical planning, and prevention of complications. The research was conducted between May 2024 and August 2025, in the PubMed, SciELO, Scopus, and ScienceDirect databases, including articles published between 2016 and 2024 in Portuguese and English. The results indicated a high prevalence of impacted third molars, mainly in the lower jaw, with a predominance of mesioangular inclinations according to Winter and classes B and 2 according to Pell & Gregory. Panoramic radiographs proved effective for initial diagnosis, while cone-beam computed tomography was recommended for more complex cases. It is concluded that the Winter and Pell & Gregory classifications remain essential for diagnosis and surgical planning, promoting standardization, safety, and effectiveness in the clinical management of impacted third molars.

Keywords: Impacted molars, Winter classification, Pell & Gregory classification; panoramic radiography.

Abstract

Third molars, commonly known as wisdom teeth, are the teeth most frequently impacted in the oral cavity, and may be partially or totally erupted due to anatomical, genetic, and functional factors. This condition is relevant in dentistry because it is associated with complications such as pain, infection, caries, and root resorption. The Winter and Pell & Gregory classifications are widely used to describe the position and degree of impact of these teeth, assisting in diagnosis and surgical planning. The

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present study aims To analyze, through an integrative literature review, the use of panoramic radiography in the evaluation of impacted mandibular third molars, considering the Winter and Pell & Gregory classifications, and to discuss its relevance for diagnosis, surgical planning, and complication prevention. The results indicated a high prevalence of impacted third molars, mainly lower ones, with a predominance of mesioangular inclinations according to Winter and classes B and 2 according to Pell & Gregory. Panoramic radiographs proved to be effective for initial diagnosis, while cone beam computed tomography was recommended for more complex cases. The Winter and Pell & Gregory classifications remain essential in dental practice, offering diagnostic standardization that contributes to communication between professionals and safe surgical planning.

The integration of radiographic examination and clinical judgment is indispensable for decision-making, preventing complications, and promoting oral health. Future studies are needed to correlate radiographic position with long-term clinical outcomes.
Keywords: Impacted molars, Winter classification, Pell & Gregory classification; panoramic radiography.

INTRODUCTION

Evolutionarily, the teeth most frequently impacted in the oral cavity are the third teeth.
molars, whose eruption may be partially or totally prevented by various factors. The prevalence
and the pattern of impaction of these teeth varies according to the population and region studied. The literature
This demonstrates that third molars can achieve normal occlusion or remain in place.
impacted, both in the upper and upper arches (Gümrükçü, Zeynep *et* al., 2020).

One of the main factors hindering proper eruption is the lack of space in the arch.
maxillary or mandibular. This limitation, especially in the mandible, contributes to impaction.
of the lower third molars, preventing their normal development. As a consequence,
Changes in eruption, mechanical stress, and occlusal stress on adjacent teeth may occur.
Dental displacement and, in the long term, structural and functional impairments. The deficiency of
Space is also associated with malocclusion, making it difficult to correct the positioning of third parties.
molars (Gonca, M *et* al., 2021).

Several theories explain dental impaction, relating it to local factors and
Systemic. Among them, the following stand out: opposition of neighboring teeth, occlusion alterations, presence of
cysts, tumors, tissue hyperplasia, local infections, trauma, nutritional deficiencies, disorders
Hormonal disorders and specific syndromes. Anatomical aspects such as shape, size, and orientation of the...
Teeth, in addition to bone and tissue conditions, also exert influence. Thus, impaction
Dental health results from the complex interaction between biomechanical, anatomical, occlusal, and systemic factors.
(Santos *et* al., 2020).

In clinical practice, impacted lower third molars are frequently...
associated with pain, edema, tooth decay, and root resorption, with surgical extraction being one of the

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Most common procedures in oral and maxillofacial surgery. Over time, different theories have emerged. Several proposals have been made to explain impaction and guide clinical practice. Angle's theory is one of them. more accepted approaches address the formation of more occlusions and the need for extraction of third teeth. Morales. Tweed's theory complements this reasoning by emphasizing the most common causes of occlusal changes. Orban's theory, on the other hand, focuses on the position of the third molars and their relationship. with occlusion, while Winter's theory highlights the importance of removal for prevention of complications. Pell and Gregori's theory, in turn, has become established as a reference in planning. and treatment of impacted third molars, especially with regard to aesthetic aspects. and functional (Dias-Ribeiro *et* al., 2013).

Published in 1933 by dentists Warold, H.Pell and John Gregori, the Pell & Gregori theory also known as the theory of occlusal relations, it proposed a comprehensive approach that It considers not only the position of the teeth, but also their relationship with adjacent structures. such as bones, muscles, joints, and ligaments. This perspective broadened the understanding of dental impaction contributed to safer and more effective clinical planning.

This work aims to analyze the information available in the scientific literature. Regarding the positions of impacted third molars in panoramic radiography, according to the Winter's and Pell & Gregori's classifications. The relevance of this analysis lies in consolidating the current knowledge about these classifications, which are widely used in practice Dental tools for diagnosis, surgical planning, and prevention of complications. Considering the high prevalence of impacted and partially impacted third molars, understanding these Classifications are fundamental for promoting oral health and guiding clinical practices based on them. evidence.

2. THEORETICAL FRAMEWORK

2.1 Anatomical Factors and Radiographic Indications in the Evaluation of Impacted third molars

The lack of knowledge about the thickness of the alveolar bone in different regions of A tooth can result in the adoption of an inappropriate extraction protocol, which, in turn, increases The risk of intraoperative and postoperative complications, including those of a prolonged nature. (Choi E, *et* al., 2022).

Analyzing the angulation of the third molar (M3) is a fundamental step in Surgical planning for its extraction, as it allows for an estimation of the degree of difficulty.

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In order to perform the procedure, determine the appropriate instruments and estimate the time required. for the intervention (Yunus B, *et al.,* 2020).

Impacted third molars are a common condition in the world population, varying in size. depending on geographic region, ethnicity, and study methodology. The literature points to these teeth as those most frequently impacted in the oral cavity (Gümrükçü, Zeynep *et* al., 2020).

This high prevalence is related to factors such as lack of space in the dental arch, Late development and genetic and environmental influence (Gonca, M *et* al., 2021). Research Recent epidemiological data reinforce the need for early diagnosis and appropriate management for to prevent complications.

Choosing the most appropriate radiographic technique is fundamental, as it allows one to obtain Accurate and relevant information that assists in both diagnosis and planning. therapeutic. (Fragiskos, Fragiskos D, 2007)

Panoramic radiography (PR), cone beam computed tomography (CBCT) provides a more detailed three-dimensional (3D) assessment of the anatomical relationships between the third molar and adjacent structures. However, despite its diagnostic advantages, the use of CBCT is still limited in clinical practice due to its high cost. (Brazil *et* al., 2019)

Furthermore, it becomes essential to use imaging modalities that enable an accurate diagnosis, while minimizing the patient's exposure to radiation. (Bushberg JT, 2015)

2.2 WINTER CLASSIFICATIONS: SLOPE PATTERNS

Developed by George B. Winter in 1926, the Winter classification is widely used. Used to describe the position of impacted third molars, especially the lower ones. It is based on the angulation of the long axis of the third molars in relation to the adjacent second molar.

The tilting patterns of third molars, as described by Winter, refer to The position of the tooth in relation to the second molar. Vertical inclination occurs when the tooth is... Parallel to the second molar. The mesioangular, which is the most frequent and generally the simplest of Removing it is characterized by a forward tilt, towards the second molar. As for... A distoangular tooth presents a backward inclination, moving away from the second molar, which makes its More complex removal due to limited access and proximity to anatomical structures. important. Finally, horizontal inclination refers to a positioning perpendicular to The second molar presents one of the greatest surgical challenges for extraction. (Dias-Ribeiro *et al.,* 2013),

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Knowledge of these patterns is essential for surgical planning, as each Angulation presents varying degrees of complexity and risk. Panoramic radiography is the main... diagnostic tool in this context (Gümrükçü, Zeynep *et* al., 2020).

2.3 PELL & GREGORY'S CLASSIFICATIONS: DEPTH AND RELATIONSHIP MANDIBULAR.

Analysis of the position of the lower third molar is commonly performed by means of Panoramic radiographs. In these examinations, certain radiographic signs may indicate a risk. elevated exposure or injury to the inferior alveolar nerve (IAN) during third molar extraction. such as deviation or narrowing of the mandibular canal, root deflection or narrowing, discontinuity of the white line and the presence of radiolucent areas in the periapical region (Rood *et al.,* 1990; Sedaghatfar *et* al., 2005)

The Pell and Gregory classification is used to assess the positioning of third parties. lower molars, considering their location in relation to the alveolar bone, the space between the second molar and the ascending ramus of the mandible (classes I, II and III), as well as the depth of Tooth impaction (positions A, B, and C). (Pell GJ, *et* al., 1993)

The Pell & Gregory classification, proposed in 1933, complements Winter's classification. Consider two fundamental aspects for the diagnosis and surgical planning of third parties. molars: the depth of impaction in relation to the second molar and the position of the tooth in relation to to the mandibular ramus. (Santos *et al.,* 2020)

Depth is assessed according to the occlusal level, being classified as Class A. when the crown is at or above the occlusal surface of the second molar; Class B, when it is between the occlusal and cervical lines; and Class C, when it is below the cervical line (Lisboa *et* al., 2012).

Regarding the relationship with the mandibular ramus, the classification considers it Class 1 when there is... Sufficient space to accommodate the entire mesiodistal diameter of the crown; Class 2 when the space is Insufficient; and Class 3 when all or most of the tooth is included in the mandibular ramus. (Santos *et* al., 2020)

The combination of these classes allows for a precise description of the tooth's position, being a A useful tool in predicting surgical complexity, in prognosis, and in communication between professionals (Lisbon *et al.,* 2012).

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2.4 Associated Clinical Complications

The presence of impacted third molars is frequently associated with several Clinical complications justify their removal in many cases. One of the most common problems It is tooth decay, especially in the adjacent second molar, caused by difficulty in cleaning the teeth. The posterior region of the dental arch favors the accumulation of biofilm and the development of lesions. caries (Santos *et* al., 2020).

Furthermore, pericoronitis (painful inflammation of the gum covering the teeth) Partially erupted lesions are a recurring complication and can progress to more serious infections. if not treated properly (Gümrükçü *et* al., 2020).

Another important consequence is root resorption, in which the pressure exerted by An impacted tooth on the root of the second molar compromises its structure and vitality (Santos *et* al., 2020).

Periodontal complications are also relevant, such as the formation of deep pockets of difficult access for hygiene, increasing the risk of bone loss and affecting neighboring teeth (Santos) *et* al., 2020).

Although less frequent, the development of dentigerous cysts and other tumors Odontogenic lesions originating from the follicle of the impacted tooth may occur, requiring radiographic evaluation. periodic (Gonca *et* al., 2021).

In addition to pathological manifestations, symptoms such as pain and edema are common. especially in inflammatory or infectious processes. These complications reinforce the importance of clinical and radiographic monitoring of third molars, even when asymptomatic (Gonca *et* al., 2021).

3. MATERIALS AND METHODS

This research is an integrative literature review, an approach... A methodological approach that allows for the gathering, analysis, and synthesis of relevant studies on a specific topic. with the aim of understanding the current state of scientific knowledge, identifying gaps and offering subsidies for evidence-based clinical practice. According to Whittemore and Knafl (2005), the review Integrative research is a rigorous method that allows for the inclusion of studies with different designs. methodological, promoting a comprehensive view of a particular phenomenon of interest in the field. health. This approach is particularly relevant to the topic of "evaluating the positions of impacted third molars according to the Winter and Pell & Gregory classifications in

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panoramic radiographs", given their relevance for diagnosis, surgical planning and treatment.
Clinics in dentistry.

The search for studies was conducted between May 2024 and August 2025, in
Electronic databases PubMed, SciELO, Scopus, and ScienceDirect. To ensure more accurate retrieval.
Comprehensive of the literature, the search strategy combined controlled descriptors (DeCS/MeSH) and
Free terms, used in Portuguese and English. The descriptors used were: "molars"
"impacted molars", "Winter classification", "classification of
Pell & Gregory" (Pell & Gregory classification) and "panoramic radiograph",
Combined using the Boolean operators "AND" and "OR". Published articles were included.
between 2016 and 2024, in Portuguese and English, provided they are conducted on humans, focusing on
Analysis of impacted third molars in panoramic radiographs, using the classifications.
de Winter and Pell & Gregory. Original studies, such as clinical trials, were considered eligible.
and observational studies, as well as literature reviews that showed a direct relationship with the
proposed theme. Duplicate publications across databases and studies conducted were excluded.
involving animals, case reports, monographs, unpublished theses, and works without clinical relevance.
direct, as well as those that did not specifically address the position rankings of
third molars or anything outside the scope of the research.

The article selection process was conducted in a systematic way. Initially, it was...
The search for studies was carried out based on the previously defined strategy. Then, two reviewers...
Independent researchers screened the articles based on reading the titles and abstracts, applying
the established inclusion and exclusion criteria. The shortlisted studies were then submitted
The text was read in its entirety to verify its eligibility and relevance to the topic. Finally, the following were included.
only articles that met all the previously established methodological and content criteria were included.
defined for the review, the information extracted from the included studies was organized into a
Comparative table containing the following elements: author and year of publication, objective, results.
from the study and main findings, allowing for a critical and structured analysis of the data.

4. RESULTS AND DISCUSSION

For a visual summary of the main studies discussed in this review, see the following table.
It presents a summary of relevant information, including author/year, sample, objective, and findings.
main ones. This table allows for a quick comparison between the methodologies and results of
different works, highlighting the diversity and richness of research in the area.

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Author/Year	Objective	Results: The	Key Findings
Nadaes et al., (2016)	He assessed the positioning using panoramic radiographs. the of impacted third molars with and without root dilaceration and to verify a possible association between these two variables.	results indicated that the most frequent position was mesioangular (44.5%), followed by horizontal (24.9%), vertical (17.4%), distoangular (12.5%), inverted (0.4%), and linguoangular (0.3%). Of the lower third molars evaluated, 35% presented root dilaceration. The chi-square test revealed a significant association between tooth position and the presence of root dilaceration (P<0.0001, ÿ2=34.28). The frequency of root dilaceration was statistically higher for the vertical (45.5%) and distoangular (40.9%) positions.	The mesioangular position was the most prevalent location for lower third molars, and the highest frequencies of root dilaceration were observed in the vertical and distoangular positions. Knowledge of the prevalence of root dilaceration and the significant association between the position of third molars and root dilacerations will allow for safer surgical planning for third molar extractions.
Oliveira et al., (2016)	He assessed dental impactions according to Winter's classification using panoramic images from computed tomography scans.	One hundred panoramic images containing at least one impacted tooth were analyzed, of which 54 belonged to males and 37 to females. The most prevalent dental impactions, in descending order, were vertical (42.8%), mesioangular (33.5%), distoangular (22.4%), and horizontal (1.3%). The most predominant position in the maxilla was vertical, and in the mandible, it was mesioangular.	Regarding complementary examinations used for visualization and diagnosis of impacted teeth, panoramic radiography is of fundamental importance in order to observe all the structures of the maxillomandibular complex. In this way, it is possible not only to diagnose these teeth but also to carry out appropriate treatment planning for each type of angulation and position in which they may be found.
Brasil et al., (2019)	The following questions were answered: 1) Is panoramic radiography (PR) equivalent to cone-beam computed tomography (CBCT) of in determining the degree of impaction of the mandibular third molar? 2) For RP, is the external oblique ridge a more reliable reference for determining the degree of impaction of the mandibular third molar?	A total of 173 patients were included (66 men and 107 women). Among these patients, 313 mandibular third molars were evaluated. Regarding the occlusal plane, the concordance rate between PR and CBCT was 82.1% for Pell and Gregory class A, 90.5% for class B, and 65.6% for class C (P = 0.116). The overall concordance rate between classifications regarding the mandibular ramus in PR and CBCT ranged from 66.8% (considering the ascending ramus, P < 0.001) to 76.4% (considering the external oblique ridge, P < 0.001).	PR performs similarly to CBCT in classifying impaction in relation to the occlusal plane. However, PR tends to underestimate the space for third molar accommodation compared to CBCT. Furthermore, the external oblique ridge is not a reliable alternative reference point in PR.
Khojastepour et al., (2019)	The Winter or Pell & Gregory classification system indicates the apical position of impacted mandibular third molars.	The mesioangular position was more prevalent in the current sample. Most teeth were Class I in relation to the ascending ramus and C-level in depth. Generally, impacted mandibular third molars showed a lingual position and were in contact with or intersecting the intercostal space (ICS). A significant association was found between the type of dental impaction using the Winter and Pell and Gregory classifications and the position of the third molar teeth in relation to the cortical plates and ICS.	Both classifications are useful, but they may have limitations in accurately determining the apical position.
Gümrükçü et al., (2020)	Investigated the relationship between the types of impacted third molars and the dimensional/ angular measurements of the posterior mandible.	A statistically significant difference was found between the Pell and Gregory classification types in terms of ramus height/gonial angle (p < 0.001). A significant difference was found in terms of gonial angle in the Winter classifications (p < 0.001). Ramus height was less than 3.8 cm in patients with an angle less than 123.8° (sensitivity of 78%, specificity of 84%).	Significant relationship between impaction types and mandibular morphological characteristics.
Nunes et al., (2021)	The reliability of 7 panoramic radiographic signs for predicting the proximity of the root apices of mandibular third molars to the mandibular canal was analyzed using cone-beam computed tomography, correlating findings with the Pell of and Gregory and and Winter those classification systems.	Binary logistic regression showed that only 4 of the 7 panoramic radiographic signs were able to predict the proximity of the root apices of mandibular third molars to the mandibular canal: root darkening, root deflection, root narrowing, and interruption of the mandibular canal (P < 0.05).	Darkening, deflection, and narrowing of the root, along with interruption of the mandibular canal on panoramic radiographs, indicate that cone-beam computed tomography should be performed in planning the extraction of impacted mandibular third molars. The proximity between the mandibular third molars and the mandibular canal is correlated with the Winter classification.
Santos et al., (2020)	The prevalence the of mandibular third molars was determined according to the Pell & with to the Gregory and Winter classifications.	In total, 1,087 teeth were analyzed, and 1,055 teeth were included in the study. Teeth were most commonly found in the mesioangular position (41.8%). The highest frequency was observed in position IIB (26.4%). The prevalence of impacted teeth was 79.6%. There was a statistically significant association between the Winter classification and the Pell & Gregory classification (p < 0.001).	High prevalence of impaction, with a predominance of certain Winter patterns and Pell & Gregory

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Gonca et al., (2021)	This study evaluated the mandibular morphological and the measurements and trabecular structure among subgroups of impacted lower third molars.	Statistically, a significant difference was found only in terms of the impaction angle between the MM3 groups ($p < 0.05$) [Winter (vertical) and Pell & Gregory Class 1 and groups A, B, C]. There was no difference between groups A, B, and C in mandibular morphology and trabecular structure, but group C presented different characteristics from the other groups only in terms of the impaction angle.	Morphological and structural differences in the mandible influence impaction.
Jacque et al., (2023)	Assessed the depth and angle of third parties. Impacted inferior molars (M3) from panoramic radiographs, according to the classifications proposed by Winter and Pell & Gregory.	The depth of impaction of the M3 crown was level A, representing 54.4% (n = 260) of the PR, while level B constituted 35.7% (n = 171) of the images. Regarding the availability of retromandibular space, Class I constituted 36.8% (n = 176). Class II represented 55.9% (n = 267) of the PR.	It showed that 54.4% of M3s were located at the same level as the occlusal plane of the second molar, while in 56% of PRs the space between the second molar and the mandibular ramus is smaller than the mesiodistal diameter of the third molar. This research showed that 23.1% of M3s presented a level of vertical angulation, a level that allows for less painful luxation of impacted molars. These results seem to indicate a relatively high level of difficulty in mobilizing and extracting M3s in Cameroonian patients.
Mubarak et al., (2024)	Cone-beam if computed tomography (CBCT) and panoramic radiography (PR) have been determined to produce consistent results in determining the degree of impacted lower molar teeth based on existing classification parameters.	One study used the Pell & Gregory classification to assess the differences, finding a significant result ($P < 0.001$). Two studies used the Winter and Pell & Gregory classifications. In these assessments, one study found no significant differences in the Winter classification ($p = 1.000$) or in the Pell & Gregory assessment ($p = 0.500$). However, another study identified significant differences using both the Winter and Pell & Gregory classifications ($P < 0.001$). One study conducted an assessment using only the Winter classification and found no significant differences between PR and CBCT ($P > 0.05$).	There are intermodal differences in agreement regarding the degree of third molar impaction when using CBCT compared to panoramic imaging at various classification levels.
Zirek T et al, (2024)	It detected all impacted teeth and classified them. Impacted third molars were identified using the Winter method and an artificial intelligence model on panoramic radiographs.	For the detection of impacted third molars, according to Winter's classification, the average accuracy, average recall, and average F1 score were 0.972, 0.967, and 0.969, respectively. For the detection of all impacted teeth, the average accuracy, average recall, and average F1 score were 0.991, 0.995, and 0.993, respectively.	According to the results, the YOLOv8 deep learning model based on artificial intelligence successfully detected all impacted teeth and impacted third molars according to the Winter classification system.
Couto et al, (2025)	This study evaluated and compared the anatomical position and surgical indication for lower third molars (LTM) using panoramic radiography and cone-beam computed tomography (CBCT) among three groups of dental specialists.	Oral radiologists detected more root dilacerations and retromolar canals, and identified more likely contact with the CM using panoramic radiographs and CBCT ($P < 0.05$).	The primary outcome variable was the anatomical position of the MLT and radiographic findings associated with the risk of inferior alveolar nerve injury. Anatomical positions were assessed according to the Pell & Gregory and Winter classification. Radiographic findings associated with the risk of inferior alveolar nerve injury were root contact with the mandibular canal (MC), cortical rupture, narrowing and deviation, deflection and dilaceration, and retromolar canal. The secondary outcome was surgical indication.

DISCUSSION

A comparative analysis between the studies by Nadaes et al. (2016), Oliveira et al. (2016) and Nunes et al. (2021) highlight the fundamental role of panoramic radiography in the evaluation of impacted third molars and in the application of the Winter and Pell & Gregory classifications. This This examination is widely used because it allows for a comprehensive visualization of the structures. maxillomandibular structures, which are essential for initial diagnosis and surgical planning.

Nadaes et al. (2016) highlighted panoramic radiography as an effective tool for Identifying the position of the third molars and possible root dilacerations are factors that directly affect the condition. related to the complexity of the extraction. Oliveira et al. (2016) reinforced the usefulness of this examination.

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when applying Winter's classification, demonstrating that the determination of the angle and position of A tooth is indispensable for proper planning. Nunes et al. (2021), in turn, They correlated panoramic radiographic signs with the proximity of the mandibular canal. showing that panoramic radiography, when associated with classifications, can indicate the The need for complementary examinations, such as tomography. Therefore, panoramic radiography. It remains the primary method for initial screening and assessment, allowing it to be applied in a way that... The Winter and Pell & Gregory classifications are reliable. These tools, combined, They provide an accurate diagnosis, guide clinical management, and reduce risks during removal. Surgical treatment of impacted third molars.

The studies by Khojastepour et al. (2019) and Santos et al. (2020) highlight the importance of Panoramic radiography in the analysis of impacted mandibular third molars, allowing for application of the Winter and Pell & Gregory classifications. This examination provides a broad overview and A detailed understanding of anatomical structures is essential for diagnosis and surgical planning.

Khojastepour et al. (2019) emphasize that both classifications are effective in Determining the position of the teeth, although they present limitations in apical evaluation. Santos et al. al. (2020) demonstrate a higher prevalence of mesioangular position and class IIB, in addition to Significant association between the two classification systems.

Thus, the combination of panoramic radiography with the Winter and Pell & classifications Gregory represents a reliable diagnostic tool, assisting the surgeon in defining the best practices and prevention of complications during third molar extraction.

Gümrükçü et al. (2020) and Gonca et al. (2021) demonstrate that mandibular morphology It directly influences the impaction pattern of third molars, evidenced by differences in measurements such as branch height and gonial angle.

Gümrükçü et al. (2020) observed that distinct types of impaction, classified by Winter and Pell & Gregory show a significant relationship between the height of the mandibular ramus and the gonial angle, suggesting that smaller dimensions are associated with greater complexity of eruption. Gonca et al. (2021), in turn, found significant differences only in the angle of impact between groups, highlighting variations in group C compared to the others, while the The trabecular structure remained similar.

These findings reinforce the idea that, in addition to radiographic classification, anatomical assessment is also important. Mandibular radiography is fundamental. Panoramic radiography remains a practical tool and efficient for this analysis, providing important information for surgical planning and Risk reduction during third molar extraction.

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Panoramic radiography remains a central tool in the evaluation of third parties.
impacted molars, especially when applied with the Winter and Pell &
Gregory. Studies such as Brasil et al. (2019) and Mubarak et al. (2024) indicate that RP presents
Performance similar to CBCT in determining the degree of impaction, although it may underestimate.
The available space may vary depending on the classification used.

Jacque et al. (2023) reinforce the usefulness of RP in depth and angle analysis,
allowing the identification of surgical difficulty levels based on tooth positioning and in
retromandibular space. Zirek T et al. (2024) show that the application of artificial intelligence in
RP, combined with Winter's classification, increases the accuracy and reliability in tooth detection.
impacted, demonstrating potential to aid clinical diagnosis.

In summary, panoramic radiography, combined with the Winter and Pell & Gregory classifications,
It remains the most practical and reliable method for initial evaluation of third molars.
impacted, with the possibility of being complemented by advanced technologies such as AI or exams.
Three-dimensional in cases of greater complexity.

FINAL CONSIDERATIONS

Panoramic **radiography** proves to be an essential tool in the evaluation of third parties.
impacted mandibular molars, allowing for comprehensive and non-invasive identification of their position.
Depth and angulation of the teeth. When combined with the Winter and Pell &
Gregory enables accurate diagnosis and safer surgical planning, assisting in...
Anticipating difficulties and preventing complications during extraction.

Furthermore, the integration of new technologies, such as artificial intelligence models, has
potential to increase the accuracy and reliability of tooth detection and classification
impacted, reinforcing the role of panoramic radiography as an initial screening examination.
indispensable, highlighting its clinical and diagnostic importance.

REFERENCES

RASIL, DM; NASCIMENTO, EH; GAETA-ARAUJO, H.; OLIVEIRA-SANTOS, C.; MARIA DE ALMEIDA, S. *Is panoramic imaging equivalent to cone-beam computed tomography for the classification of impacted lower third molars? Journal of Oral and Maxillofacial Surgery,* 2019.

BUSHBERG, JT. *Warren K. Sinclair's Eleventh Annual Lecture: Science, Radiation Protection, and NCRP: Building on the Past, Looking to the Future. Health Physics,* 2015.

Year V, v.2 2025 | Submission: October 26, 2025 | Accepted: October 28, 2025 | Publication: October 30, 2025

COUTO, DAF et al. *Comparison of Panoramic Radiography and Cone Beam Computed Tomography for Lower Third Molar Assessment Among Different Dental Specialists. Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons,* vol. 83, no. 8, p. 1000–1011, Aug. 2025.

CHOI, E. et al. *Artificial intelligence in tooth-nerve positioning in panoramic radiography. Scientific Reports,* v. 12, n. 1, p. 2456, 2022.

DEMIREL, O.; AKBULUT, A. *Evaluation of the relationship between gonial angle and impacted mandibular third molar teeth. Anatomical Science International,* vol. 95, no. 1, p. 134–142, 2019.

DIAS-RIBEIRO, E. et al. *Evaluation of the positions of impacted third molars in relation to Winter's classification.* v. 37, n. 3, p. 203–209, 2008.

FERREIRA JÚNIOR, OS; DAMANTE, JH. *Social contribution of the dental emergency service of the Faculty of Dentistry of Bauru: its participation in the agreement with the Unified Health System.* Available at: https://repositorio.usp.br/item/001036248. Accessed on: September 30, 2025.

FRAGISKOS, FD *Oral Surgery.* Springer Science & Business Media, 2007

GONCA, M. et al. *Evaluation of mandibular morphological measurements and trabecular structure among subgroups of impacted mandibular third molars. Oral Radiology,* vol. 38, no. 1, p. 63–71, 2021.

GÜMRÜKÇÜ, Z.; BALABAN, E.; KARABAÿ, 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 Radiology,* 2020.

JACQUES, E. et al. *Radiographic evaluation of impacted third mandibular molar according to the classification of Winter, Pell and Gregory in a sample of Cameroonian population. Ethiopian Journal of Health Sciences,* vol. 33, no. 5, p. 851–858, 2023.

KHOURI, C. et al. *Evaluation of Third Molar Impaction Distribution and Patterns in a Sample of Lebanese Population. Journal of Maxillofacial and Oral Surgery,* 2020.

KUMAR, VR et al. *Prevalence and Pattern of Mandibular Third Molar Impaction in Eritrean Population: A Retrospective Study. The Journal of Contemporary Dental Practice,* vol. 18, no. 2, p. 100–106, 2017.

LACERDA-SANTOS, JT et al. *Signs of the proximity of third molar roots to the mandibular canal: an observational study in panoramic radiographs. General Dentistry,* vol. 68, no. 2, p. 30–35, 2020.

LISBOA, AH et al. *Prevalence of inclinations and depth of lower third molars, according to the Winter and Pell & Gregory classifications. Brazilian Research in Pediatric Dentistry and Integrated Clinic,* v. 12, n. 4, p. 511–515, 2012.

Year V, v.2 2025 | Submission: October 26, 2025 | Accepted: October 28, 2025 | Publication: October 30, 2025

MUBARAK, H.; TAJRIN, AN; NURWAIDA. *Concordance of panoramic radiography with cone beam computed tomography in the classification of impacted lower third molars: a systematic review. Archives of Craniofacial Surgery,* v. 25, n. 6, p. 263–269, 2024.

NADAES, MR et al. *Evaluation of the position of unerupted mandibular third molars with and without root dilacerations: a study on panoramic radiographs. Minerva Stomatologica,* vol. 65, n. 3, p. 152–157, 2016.

NUNES, WJP et al. *Reliability of panoramic radiography in predicting proximity of third molars to the mandibular canal: a comparison using cone-beam computed tomography. Imaging Science in Dentistry,* v. 51, no. 1, p. 9–9, 2021.

KHOJASTEPOUR, L. et al. *Does the Winter or Pell and Gregory Classification System Indicate the Apical Position of Impacted Mandibular Third Molars?* Available at: https://pubmed.ncbi.nlm.nih.gov/31306615/.

OLIVEIRA, DV de; MARTINS, VB; OLIVEIRA, MV de. *Tomographic evaluation of impacted third molars according to Winter's classification. Revista de Cirurgia e Traumatologia Buco-Maxilo-Facial,* v. 16, n. 2, p. 17–23, 2016.

OLIVERA-BARROS, C. et al. *Pell-Gregory, Winter, and Nolla classifications of third molars in patients at a university dental clinic. Cuban Journal of Military Medicine,* v. 53, no. 2, 2024.

ROOD, JP; SHEHAB, BA. *Radiological prediction of inferior alveolar nerve injury during third molar surgery. British Journal of Oral and Maxillofacial Surgery,* v. 28, p. 20–25, 1990.

SEDAGHATFAR, M.; AUGUST, MA; DODSON, TB. *Panoramic radiographic findings as predictors of inferior alveolar nerve exposure after third molar extraction. Journal of Oral and Maxillofacial Surgery,* [sl], [sd].

SIMONS, RN et al. *Association of indications for mandibular third molar coronectomy and the Pell and Gregory and Winter classification systems. Oral and Maxillofacial Surgery,* v. 28, n. 2, p. 885–892, 2024.

SANTOS, KK et al. *Prevalence of Mandibular Third Molars According to the Pell & Gregory and Winter Classifications. Journal of Maxillofacial and Oral Surgery,* 2020.