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Comparación posquirúrgica entre un colgajo lineal y un colgajo triangular en la cirugía de terceros molares inferiores. Revisión de literatura

Postsurgical comparison between a linear flap and a triangular flap in lower third molar surgery. literature review

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Palabras claves:
Colgajo lineal, Colgajo triangular, Cirugía, Terceros molares

Resumen

Introducción. La extracción de terceros molares inferiores es una intervención frecuente en la práctica de la cirugía oral y maxilofacial. Un aspecto crucial para el éxito del procedimiento es el diseño adecuado del colgajo mucoperióstico, el cual determina la exposición y acceso quirúrgico óptimos, así como la recuperación posoperatoria con mínimas complicaciones. Entre las técnicas más utilizadas se encuentran los colgajos lineales y triangulares, generando un debate sobre cuál ofrece mejores resultados. **Objetivo.** El propósito de este estudio es comparar exhaustivamente estas dos técnicas para la cirugía de terceros molares inferiores. **Metodología.** Utilizando la metodología PRISMA, se revisaron 17 estudios que evaluaron el uso de ambos tipos de colgajo desde diversas bases de datos. **Resultados.** Los resultados de la revisión mostraron una variedad de hallazgos: algunos estudios no encontraron diferencias significativas entre los dos tipos de colgajo, mientras que otros destacaron ventajas específicas para cada uno. Según los hallazgos, el colgajo triangular mucoperióstico parece asociarse con una reducción en el dolor postoperatorio, menos incidencia de trismo y menor riesgo de dehiscencia de la herida quirúrgica. Por otro lado, el colgajo lineal podría contribuir a una disminución de la inflamación y la equimosis después de la cirugía. **Conclusión.** En conclusión, tanto el colgajo lineal como el triangular son opciones viables y efectivas para la extracción de terceros molares inferiores. La elección entre ambos dependerá de la evaluación individualizada del paciente, la complejidad del caso y la experiencia del cirujano, buscando optimizar los resultados y minimizar las complicaciones posoperatorias. **Área de estudio general:** Odontología. **Área de estudio específica:** Cirugía. **Tipo de estudio:** Revisión de literatura

Keywords:
Linear flap, Triangular flap, Surgery, Third molars

Abstract

Introduction. The extraction of lower third molars is a frequent intervention in the practice of oral and maxillofacial surgery. A crucial aspect of the procedure's success is the proper design of the mucoperiosteal flap, which determines optimal exposure, surgical access, and postoperative recovery with minimal

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Vol. 7 No. 3.2, pp. 73 – 101, September 2024

complications. Among the most used techniques are linear and triangular flaps, generating a debate about which offers better results. objective. The purpose of this study is to rigorously compare these two techniques for lower third molar surgery. Methodology. Using the PRISMA methodology, 17 studies that evaluated the use of both types of flaps were reviewed from several databases. Results. The review results showed various findings: some studies found no significant differences between the two flap types, while others highlighted specific advantages for each. Based on the findings, the triangular mucoperiosteal flap is associated with reduced postoperative pain, less incidence of lockjaw, and lower risk of surgical wound dehiscence. On the other hand, the linear flap could contribute to a decrease in inflammation and ecchymosis after surgery. Conclusion. In conclusion, linear and triangular flaps are viable and practical options for extracting lower third molars. The choice between both will depend on the individualized evaluation of the patient, the complexity of the case, and the surgeon's experience, seeking to optimize results and minimize postoperative complications.

Introduction

Tooth extraction is a dental technique that consists of the extraction of a damaged tooth or one that presents problems for the patient's oral health. This process involves a surgical intervention based on the extraction of a tooth from the oral cavity.(1). Surgery on lower third molars, commonly known as wisdom teeth, is a common oral intervention in dental practice. This procedure involves the extraction of third molars located in the mandibular retromolar area.(2).

These molars can often cause complications due to their large size, incorrect location, or lack of sufficient space in the jaw.(3). Normally, surgery is usually carried out in cases where the third molars are impacted, that is, when they fail to emerge completely due to interference from other teeth or soft tissues.(4)In some cases, surgery may be required to prevent the development of pain, inflammation, spread of infection, and other potential problems related to impacted third molars.(2).

During the surgical procedure for the extraction of third molars, the oral or maxillofacial

surgery specialist makes a small incision in the gums in order to reach the tooth to be treated and then performs the extraction in a delicate and precise manner.(3). Surgery may require an odontosection depending on how complicated the case is, so that its extraction is easier.(5). A cleaning process of the affected area is carried out followed by suturing the wound with the aim of promoting the healing process in an appropriate manner.(6)Extraction of third molars is a common procedure within the field of dentistry and is usually carried out on a regular basis in an outpatient setting, either using local or general anesthesia, depending on the patient's specific circumstances and the difficulty of the extraction procedure.(5).

Among the surgical techniques used for the extraction of these molars are the use of linear flaps and triangular flaps.(7)These techniques differ in the way the incision is made and the manipulation of the soft tissues surrounding the tooth to be extracted. The choice between these techniques may depend on several factors, such as the position of the tooth, the patient's anatomy, and the surgeon's preference.(8).

The linear flap involves making a linear incision along the gingival margin, allowing direct access to the tooth and adequate visualization of the surgical area.(9)This specific type of surgical flap offers the advantage of providing direct access to the tooth in question and the surrounding tissue, resulting in better visualization and control of the maneuvers performed during the procedure.(9)The line-shaped incision is carried out with careful precision in order to minimize the impact on the soft tissues, which in turn allows for a faster recovery and a more aesthetically pleasing scar appearance.

After the incision is made, the linear flap is raised so that the entire surgical area is exposed, allowing the surgeon to access the tooth that needs to be extracted or the tissue that needs treatment.(10)This technique is very useful in situations where wide direct access to the specific area of interest is required, which can be essential for the extraction of impacted third molars or for carrying out periodontal surgery interventions.(11). During surgery, the use of the linear flap provides benefits in terms of accuracy and handling, and also contributes to a more comfortable patient recovery after the intervention, since it involves less interference with the surrounding tissues.(10).

On the other hand, the triangular flap is a surgical method commonly used in dental interventions, it stands out for its specific application in the extraction of third molars located in the lower part of the mouth.(12)It is based on making a triangular cut around the tooth to be extracted, which allows for correct visualization of the surgical area and effective manipulation of the surrounding soft tissues.(13)The purpose of this technique is to preserve as much gingival tissue as possible, which can lead to benefits in terms of better healing and improved aesthetic appearance after the intervention.(14).

The triangular flap, due to its versatility and its ability to provide adequate entry to the

intervention area, stands out especially in situations where the lower third molars represent complications, due to their proximity to crucial anatomical structures such as the inferior alveolar nerve.(15). Preserving gum tissue during a surgical procedure can decrease the likelihood of experiencing complications after surgery, such as the appearance of exposed bone or the creation of air pockets. Both techniques have their own advantages and disadvantages, and the choice between them can influence the outcome of the surgery and the patient's postoperative recovery.

In the present review, the efficacy and postoperative results of using linear flaps and triangular flaps in lower third molar surgery will be compared. Surgical parameters such as operating time, incidence of intraoperative and postoperative complications, as well as the degree of postoperative morbidity and patient satisfaction rate during the surgical period will be evaluated.(16). Additionally, the influence of each surgical approach on tissue regeneration will be evaluated, as well as the intensity of postoperative pain and the report of facial edema. Likewise, other relevant clinical parameters such as the degree of trismus and the presence of dry socket will be assessed to determine the efficacy and predictability of the surgical procedure.(17).

Justification

Research in the field of dentistry, focusing on aspects such as surgical methodologies used during interventions such as the extraction of third molars, is considered essential, as it fulfills a series of transcendental functions.(18). Initially, it is important to highlight that dentistry is a field that is constantly progressing, with the permanent introduction of the latest technologies and methods to improve clinical outcomes and achieve a more satisfactory experience for the patient.(19)The scientific study offers relevant and reliable information that can be used as a basis for carefully analyzing both the effectiveness and safety of these innovative medical techniques, as well as allowing their comparison with current conventional care procedures.(20).

Furthermore, it is important to highlight that research in the field of dentistry plays a fundamental role by contributing significantly to improving the quality of clinical care provided and to the more efficient use of available resources.(21)Identifying which techniques are both highly effective and highly efficient can result in a reduction in expenses related to dental treatments, while achieving an increase in the excellence of the care offered.(22).

Conducting research can also be useful in detecting and solving potential problems or hazards related to certain medical techniques, resulting in improved care, making it safer and more effective for patients.(23)Understanding the differences between the linear flap and the triangular flap in lower third molar surgery is crucial for maxillofacial surgeons and dentists who perform these types of interventions. This review develops a comparison

of a comprehensive view of both techniques.(24), with the aim of guiding clinical decision-making and improving surgical outcomes and patient experience.

Methodology

For the development of the current research, a qualitative methodology was used that involves the collection and analysis of non-quantitative data to understand concepts, opinions, as well as data on lived experiences and the meanings that people attribute to them.(25)The purpose of this study is to comprehensively compare these two techniques for lower third molar surgery. Therefore, the results are expressed in words; based on a phenomenological epistemological current. The research also focuses on the analysis of the type of study used, in addition to the key characteristics of each of the documents taken into consideration.

The PRISMA methodology was applied for the development, which allowed the characterization and analysis of the studies that were included in the systematic review, as well as the ease of transparently documenting the reason for the review, what the authors did and what results they found, and how these contribute to the research development. The PRISMA methodology allowed the compilation of previously published results and their comparison with each other; highlighting that the validation of information and its verification must be objective and reliable to answer the research questions.

For this purpose, keywords will be used to search for articles related to the research problem, such as “flaps”, “third molars”, “third molar surgery”, “linear flap”, “triangular flap”, “benefits of third molar surgery”. These words will be key to search for information in both English and Spanish. The search was performed using a combination of the keywords combined with the Boolean operators AND, OR and NOT. For this, the following inclusion and exclusion criteria have been established:

Inclusion criteria

- Documents that belong to scientific databases such as Scopus, Mendeley, SciELO, Dialnet and ProQuest.
- Articles in Spanish and English.
- Studies that address the topic.
- Studies that have been published between 2017 and 2024.

Exclusion criteria

- Studies corresponding to undergraduate or graduate theses.
- Studies that do not address the topic objectively.
- Extra-temporary published documents.

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Vol. 7 No. 3.2, pp. 73 – 101, September 2024

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- Restricted access documents.

The establishment of these criteria allowed for an adequate screening of the information collected. Figure 1 presents the flow chart of the information search and selection process.

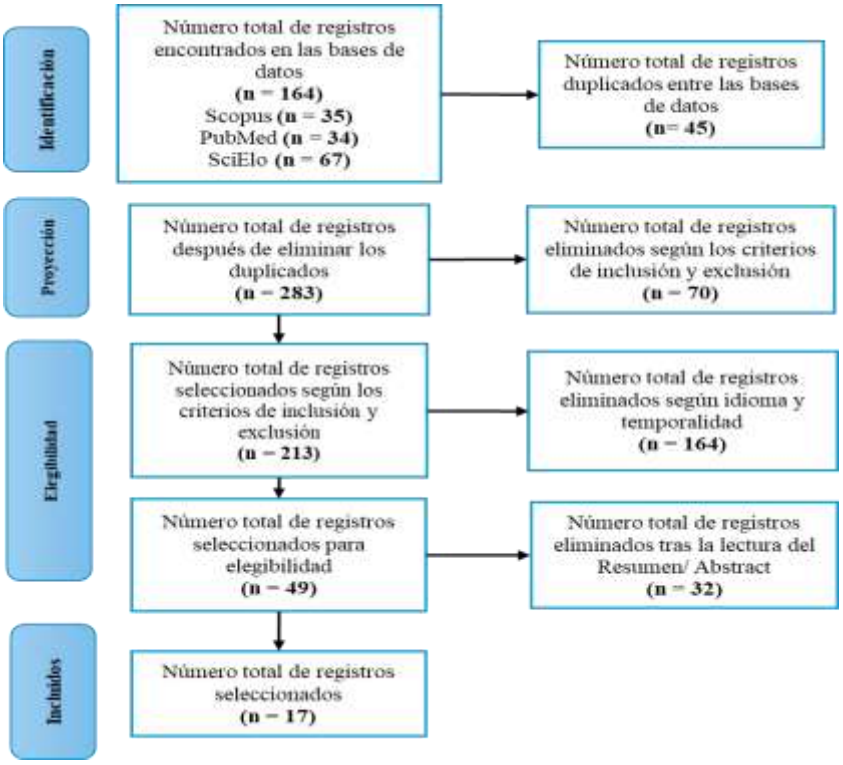

Figure 1.*PRISMA diagram of the research*

Note: Information adapted from the bibliographic review carried out for the selection of relevant articles.

Anatomía Digital
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Vol. 7 No. 3.2, pp. 73 – 101, September 2024
www.anatomiadigital.org

Results

Of the 164 articles that were initially selected, after a detailed review and verification that they met the inclusion criteria, 70 were excluded due to lack of the required set of characteristics. Finally, 49 articles were found, which were subjected to detailed review and data extraction. With the final 17 articles, the construction of the results matrix was completed and a descriptive analysis of the findings and results was performed.

Table 1.*Results of the bibliographic review*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
1	Laissle et al. (18)	2019	Comparison of the postoperative period of two flaps in lower third molar surgery.	To evaluate the postoperative course of impacted mandibular third molar surgery, using a linear flap on one side and a triangular flap on the other side of the same patient.	1 participant	Linear Flap and Triangular Flap	The postoperative period for impacted mandibular third molar surgery is similar when using a linear flap or a triangular flap. The surgeon may choose one or the other interchangeably, depending on his or her preference.
2	Channels (26)	2020	Pocket-type incision and triangular incision and their postoperative effect on extractions of retained third molars in patients treated at the dental clinic of the private university Norbert Wiener, Lima 2016 - 2017	To compare the postoperative effect (edema, trismus) in the extraction of retained lower third molars between the pocket-type incision and the triangular incision, also to determine the postoperative edema and trismus on the seventh day after the extraction.	30 patients	Triangular flap	There are no statistically significant differences in edema and trismus between the pocket incision and the triangular incision. Thus, it is concluded that there are no differences in the postoperative effect in extractions of retained lower third molars between the pocket incision and the triangular incision.

Anatomía Digital
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Vol. 7 No. 3.2, pp. 73 – 101, September 2024
www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
3	Şimşek et al. (27)	2019	The influence of flap design on sequelae and quality of life after surgical removal of impacted mandibular third molars: a randomized split-mouth clinical trial	To compare two different flap designs in terms of sequelae and quality of life after surgical removal of impacted third molars	10 Participants	Triangular flap	According to the findings of the study, the modified triangular flap may be superior to the wrapped flap in terms of pain, trismus, and wound dehiscence in the first 3 days after impacted third molar surgery and may have a better impact on quality of life during this process.
4	Lopes et al. (28)	2020	Overlay or triangular flap for surgical removal of third molars? A systematic review and meta-analysis.	To compare triangular and envelope flaps in mandibular third molar surgery with respect to pain, edema, and trismus.	20 studies	Triangular flap	The triangular flap was associated with a higher occurrence of postoperative ecchymosis and a lower periodontal probing depth on postoperative day 7 compared with the wrapped flap in third-party surgeries. mandibular molars.
5	Passarelli et al. (29)	2022	Effects of flap design on periodontal health of lower second molars after impacted third molar extraction	To compare the wraparound flap and the triangular flap for the extraction of the impacted lower third molar (M3) and their effects on periodontal health. adjacent second molars (M2)	60 Participants	Triangular flap	No significant differences were found between the two groups (A and B) based on the pain index and the postoperative process, which confirms that the design of the mucoperiosteal flap does not influence the periodontal healing process of the second molars.

ISSN: 2697-3391
Vol. 7 No. 3.2, pp. 73 – 101, September 2024

www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
6	Zhao et al. (30)	2023	Effects of modified triangular flap for third molar extraction on distal periodontal health of the second molar: a randomized controlled study	To evaluate the effect of the flap design for the extraction of impacted mandibular third molar on the distal periodontal tissue of its neighbors from a clinical, immunological and microbiological point of view.	100 Participants	Triangular flap	Compared with the triangular flap, the modified triangular flap was better for the distal periodontal health of the adjacent second molars, which provides certain directions for clinical treatment.
7	Mohajerani et al. (31)	2018	Comparison of wrap and modified triangular flaps on the incidence of dry socket after surgical removal of impacted mandibular third molars: a double-blind split-mouth study	To investigate the impact of modified triangular flap (MTF) compared with wraparound flap (EF) on the incidence of dry socket and degree of healing after minor impaction third molar surgery.	31 Participants	Triangular flap	The present study indicated that the application of the triangular flap may lead to a reduction in the incidence of dry socket and an increase in healing after 7 days from lower impact third molar surgeries.

Anatomía Digital
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Vol. 7 No. 3.2, pp. 73 – 101, September 2024
www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
8	Maple (32)	2017	Clinical inflammatory effect between the triangular flap technique and the linear flap technique after extraction of retained lower third molars in young patients attending the oral maxillofacial surgery service of the central military hospital 2017.	Determine the effect or degree of inflammation after surgery or extraction of retained lower third molars using triangular flap and linear flap techniques, both techniques most commonly used by maxillofacial surgeons to have an optimal view of the surgical bed.	50 Participants	Linear Flap and Triangular Flap	The postoperative period between both techniques used a decrease in the degree was observed inflammation, however, the The notable decrease in inflammation during this time was seen in the use of the linear flap technique with 38% in mild and severe cases with 0% compared to the triangular flap technique.
9	Rabi et al. (33)	2017	Comparative evaluation of two different flap designs and postoperative outcome in surgical removal of impacted mandibular third molar	To compare triangular and wraparound flap designs and postoperative outcome in surgical removal of impacted mandibular third molar.	50 Participants	Triangular flap	The present study indicated that participants operated with triangular flap had better mouth opening postoperatively compared with participants with wrapped flap, while there were no significant differences in patient satisfaction and pain scores at the end of the seventh day after third molar surgery.

ISSN: 2697-3391
Vol. 7 No. 3.2, pp. 73 – 101, September 2024

www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
10	Hassan et al. (34)	2020	Effect of lingual flap design on postoperative pain of impacted mandibular third molar surgery: a split-mouth randomized clinical trial	To compare the lingually based four-corner flap with the conventional triangular flap and evaluate its effect on postoperative pain after surgical extraction of impacted mandibular third molars.	17 Participants	Triangular flap	The lingually based four-corner flap design was superior to the conventional triangular flap in terms of postoperative discomfort and pain.
11	Mudjono et al. (35)	2020	The effect of triangular and inverted triangular flap designs on complications of post-third molar odontectomy (a pilot study)	To introduce an alternative flap design in the surgical removal of impacted mandibular third molars (inverted triangular flap) and to compare this flap design with the triangular flap in case of dehiscence, reactionary bleeding and clinical attachment loss.	15 Participants	Triangular flap	There were no statistically significant differences according to the Mann Whitney-U test between the flap designs for clinical attachment loss in the distal part of the second molar at day 14 (p = 0.512) and day 30 (p = 0.902) after surgery.

ISSN: 2697-3391
Vol. 7 No. 3.2, pp. 73 – 101, September 2024

www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
12	Altamirano (36)	2023	Involute flap vs. Triangular flap in surgery of retained lower third molars	To identify which of the two flap designs, envelope or triangular, has greater benefits in surgeries of retained lower third molars.	31 articles	Triangular flap	It is concluded that the evidence is not sufficient to specifically suggest a single Flap design, the selection of the same will depend on the needs of the specific case to be treated in order to reduce as much as possible possible effects of postoperative morbidity on the patient.
13	Figliuzzi et al. (37)	2020	New flap drawing proposal for the extraction of semi-included mandibular third molar. Modified and transposed Cogswell triangular flap	To propose a new flap design derived from the modification of a triangular Cogswell flap to treat a semi-included third molar.	12 Participants	Triangular flap	At 7 days and 14 days postoperatively, the results showed a statistically significant difference in the increase in healing by primary intention in the study group, while no statistically significant difference was found between the use of the innovative flap or the Cogswell triangular flap in terms of swelling.

Anatomía Digital
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Vol. 7 No. 3.2, pp. 73 – 101, September 2024
www.anatomiadigital.org

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
14	Qi et al. (38)	2019	Effect of triangular flap design and healing procedure on sequelae after third molar extraction impacted lower parts.	To evaluate the effect of different triangular flap designs and healing procedures on sequelae after extraction of impacted lower third molars.	60 Participants	Triangular flap	The probing depth of the adjacent second molar was assessed 6 months after extraction. No abnormalities were detected. Statistical difference between the triangular flap strategy and the linear flap strategy in both groups.
15	Liu et al. (39)	2021	Distal-triangular flap design for impacted mandibular third molars: a randomized controlled trial	To evaluate whether the distal triangular flap was a practical alternative surgical approach for the extraction of mandibular third molars.	60 Participants	Triangular flap	All 60 participants had successful extraction and a 3-month follow-up observation. No participant suffered from postoperative infections, lower lip disorder, or tongue sensory disorders.
16	Alqahtani et al. (40)	2017	Evaluation of two flap designs on the mandibular second molar after third molar extractions	AssessCompar atively, the clinical results and periodontal status of the adjacent second molar, when two different flap designs were used, namely, the wraparound and triangular flap designs.	60 Participants	Triangular flap	The study found that the modified triangular flap had fewer postoperative problems and dehiscence. The envelope flap was better when analyzed for swelling. Pain scores, although slightly higher for the modified triangular flap group, were not statistically significant.

Table 1.*Results of the bibliographic review (continuation)*

No.	Author	Year	Qualification	Aim	Sample	Type of Flap	Result
17	Dolan & Rae (41)	2021	What are the implications of flap design on post-operative complications when carrying out third molar surgery?	Evaluate the best flap design for third molar extraction	20 items	Triangular flap	The triangular flap had greater postoperative ecchymosis but reduced periodontal probing depth on day 7 compared with the wraparound flap in mandibular third molar surgeries

Note: The information presented in Table 1 refers to the most relevant data from the selected studies.

The postoperative comparison between the linear flap and the triangular flap in lower third molar surgery has been the subject of several studies. In general, several researchers have not found statistically significant differences between both types of flap in terms of pain, edema, trismus and postoperative healing after the extraction of these molars (18, 26). These findings suggest that both techniques may be equally effective in managing common postoperative symptoms.

However, some studies have pointed out certain advantages of the modified triangular flap compared to the linear flap. For example, Şimşek et al. (27) concluded in their study that the modified triangular flap demonstrated significant superiority over the linear flap in terms of reduced postoperative pain intensity, decreased degree of trismus as measured by interincisal opening, and lower incidence of surgical wound dehiscence during the immediate postoperative period after extraction of impacted mandibular third molars. This potential advantage could be attributed to better visualization of the surgical field and more favorable access to the extraction site, allowing for more precise tissue manipulation and reduced surgical trauma.

On the other hand, Lopes et al. (28) found that the triangular flap was complicated by a higher occurrence of postoperative ecchymosis compared to the linear flap. This finding suggests that the triangular flap might cause more tissue trauma and therefore increase the risk of hematomas and bruises after surgery. This aesthetic complication might be a concern for some patients.

In addition to postoperative symptoms, another important aspect to consider is the periodontal health of the adjacent second molar. Some studies suggest that the modified triangular flap may be better for the distal periodontal health of the second molar compared to the conventional triangular flap (29, 30). This could be due to better visualization and surgical access, which will facilitate a more precise technique and

minimize damage to the surrounding periodontal tissue.

However, different researchers have found different results. The study by Mohajerani et al. (31) concluded that no significant differences were found between the two groups (linear flap and triangular flap) in terms of periodontal probing depth and clinical attachment level on the adjacent second molars. These contradictory findings suggest that the choice of flap may depend on other factors such as the surgeon's experience and the specific characteristics of the case.

It is noteworthy that Arce (32) found that the use of the linear flap technique showed a more notable decrease in the degree of postoperative inflammation compared to the triangular flap. This observation could be related to less tissue manipulation and, therefore, a lower inflammatory response with the linear flap. However, further research is needed to confirm this finding and explore its clinical implications. The results of the analyzed studies are varied and there is no clear consensus on the superiority of one type of flap over the other. Rabi et al. (33) and Hassan et al. (34) suggest that the triangular flap may have certain advantages, such as less pain, trismus and wound dehiscence in the first postoperative days, as well as better distal periodontal health of the adjacent second molar. However, other studies do not find significant differences or even suggest that the linear flap may be better for certain postoperative aspects, such as reduced inflammation and ecchymosis.

Discussion

No statistically significant differences were observed between the use of the linear flap and the triangular flap in terms of pain, edema, trismus and postoperative healing and are supported by similar findings in previous research. For example, Mudjono et al. (35) reported that there were no statistically significant differences according to the Mann Whitney-U test between the flap designs for clinical attachment loss in the distal part of the second molar at day 14 ($p= 0.512$) and day 30 ($p = 0.902$) after surgery.

However, some studies have found significant results suggesting certain advantages of the triangular flap as in the case of Şimşek et al. (27) who concluded that the triangular flap may be superior to the wrapped flap in terms of pain, trismus and wound dehiscence in the first 3 days after impacted third molar surgery and may have a better impact on quality of life during this process. These findings are in agreement with those of Mohajerani et al. (31) who state that their research indicates that the application of the triangular flap may lead to a reduction in the incidence of dry socket and an increase in healing after 7 days from less impacted third molar surgeries.

On the other hand, some studies have found significant results that favor the linear flap. Lopes et al. (28) reported that the triangular flap was compromised with a greater

appearance of postoperative ecchymosis and a lower periodontal probing depth on postoperative day 7 compared to the wrapped flap in mandibular third molar surgeries. These findings are supported by Arce (32), who found that the postoperative period between both techniques used a decrease in the degree of inflammation is detected, however, the notoriety of the inflammatory decrease at this time was given in the use of the linear flap technique with 38% in mild and severe with 0% compared to the triangular flap technique.

In terms of periodontal health, some studies suggest that the modified triangular flap may be beneficial. Zhao et al. (30) concluded that compared with the triangular flap, the modified triangular flap was better for the distal periodontal health of third molars, which provides certain directions for clinical treatment. These results are consistent with those of Passarelli et al. (29) who found that no significant differences were found between the two groups (A and B) based on pain index and postoperative process which confirms that the mucoperiosteal flap design does not influence the periodontal healing process of third molars.

Despite the variability in results, it is important to note that flap choice may depend on case-specific factors, as suggested by Altamirano (36) who concluded that the evidence is not sufficient to specifically indicate a single flap design. The selection of this will depend on the needs of the specific case to be treated in order to reduce as much as possible the effects of postoperative morbidity in the patient. This statement highlights the importance of considering the individual circumstances of each patient and the surgical procedure when making an informed decision about flap design.

Figliuzzi et al. (37) proposed a new modified triangular flap design and observed that at 7 days and 14 days postoperatively, the results showed a statistically significant difference in increased healing by primary intention in the study group, whereas no statistically significant difference was found between the use of the innovative flap or the Cogswell triangular flap in terms of exaggeration. These findings suggest that modifications in the triangular flap design may influence postoperative healing.

Furthermore, some studies have reported significant results favoring the use of the triangular flap in terms of postoperative complications. Qi et al. (38) evaluated the effect of the triangular flap design and healing procedure on the sequelae after extraction of impacted lower third molars and found that the probing depth of the adjacent second molar was assessed 6 months after extraction. No statistical difference was detected between the use of the triangular flap and the linear flap in both groups. These results suggest that the triangular flap did not have a negative impact on the periodontal health of the adjacent second molar.

On the other hand, Liu et al. (39) conducted a randomized controlled trial in which they

found that the participants had a successful extraction and no participant suffered from postoperative infections, lower lip disorder or sensory disorders of the tongue. These findings support the safety and efficacy of the triangular flap in the extraction of impacted mandibular third molars.

However, it is important to note that the choice of flap may depend on the complexity of the case. Laissle et al.(18) They compared the postoperative course of two flaps in lower third molar surgery and concluded that surgery for impacted mandibular third molars is similar when using a linear flap or a triangular flap. The surgeon may choose one or the other interchangeably, depending on his or her preference. This suggests that in less complex cases, both types of flap may be equally effective.

The results of studies vary considerably, with some finding no significant differences between linear and triangular flaps, while others report specific advantages or disadvantages for each flap type. This variability may be due to factors such as case complexity, surgeon experience, modifications in flap design, and outcome variables evaluated. Therefore, it is essential to consider the results of multiple studies and the individual circumstances of each patient when selecting the most appropriate surgical approach.

Conclusions

- In conclusion, there is no clear consensus on the superiority of one type of flap over the other for lower third molar surgery. Both the linear flap and the triangular flap have been shown to be viable and effective techniques, with specific advantages and disadvantages in different postoperative aspects. Evidence suggests that the choice of flap may depend on several factors, such as the complexity of the case, the experience of the surgeon, the conditions of the third molar and the most viable option for its extraction.
- As noted, some studies have found that the triangular flap may offer certain advantages, such as less pain, trismus, and wound dehiscence in the first few days after surgery, as well as better distal periodontal health of the adjacent molars. However, other studies have found no significant differences between the two flap types or have even suggested that the linear flap may be superior in terms of reducing inflammation and postoperative ecchymosis.
- It is important to note that most studies have evaluated different outcome variables, such as pain, edema, trismus, wound healing, and periodontal health. Therefore, it is possible that one type of flap may be more beneficial for certain postoperative aspects, while the other type of flap may be more suitable for other aspects. This variability in outcomes highlights the importance of considering the specific goals and priorities of each patient when selecting the surgical approach.

- Considering that both the linear flap and the triangular flap are valid and effective options for the extraction of mandibular third molars, their choice being dependent on various clinical factors. The depth of the third molar inclusion, according to the classification of Pell and Gregory, plays a crucial role in the selection of the surgical approach. For shallow inclusions (Class A), the linear flap is usually sufficient, while for deeper inclusions (Class B and C), the triangular flap offers better visualization and access to the surgical field.
- The linear flap generally requires fewer stitches and allows for easier closure, which may result in faster healing in uncomplicated cases. The triangular flap, although requiring more stitches, facilitates better flap repositioning, especially useful in cases where an extensive osteotomy has been performed. The final choice of flap type will depend on a careful evaluation of the patient's individual circumstances, the complexity of the case according to the Pell and Gregory classification, and the experience of the surgeon.

- Finally, it is recommended that dental professionals review the most recent literature, considering studies that compare the postoperative results of both types of flap in different inclusion classifications. This, together with their clinical judgment and experience, will allow them to make informed and personalized decisions for each patient, thus optimizing surgical and postoperative results in mandibular third molar extraction.

Conflict of Interest

No conflict of interest detected.

Authors' contribution

Author Jorge Luis Hurtado Carrión contributed with an exhaustive search for information, facilitating the optimal execution of the research. For his part, author Felipe Calle Jara contributed his experience in the area of surgery, collaborating in the organization and correction of the project information, and supervising the research with precision to avoid possible conflicts.

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