



Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report

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Abstract (J Korean Assoc Oral Maxillofac Surg 2025;51:404-409)

This study presents a modified upper eyelid approach incorporating a lateral canthotomy to improve surgical access in complex fronto-orbital fractures. A 69-year-old male patient with no comorbidities was admitted to the regional hospital of Rancagua with a left fronto-orbital-zygomatic fracture. Surgery was performed under general anesthesia using an upper eyelid incision combined with a lateral canthotomy to enhance exposure of the fracture site. Reduction and osteosynthesis of the lateral orbital wall and part of the frontal bone were successfully achieved without complications. The modified approach provided wide and direct access to the affected areas, particularly beneficial in cases with comminuted fractures requiring the placement of multiple osteosynthesis elements. The lateral canthotomy significantly expanded the surgical field, facilitating accurate reconstruction. Additionally, the eyelid incision, placed along the natural palpebral crease, offered excellent aesthetic results with a nearly imperceptible scar. This technique proves to be a valuable option for the management of complex fronto-orbital injuries, combining effective exposure with favorable cosmetic outcomes. It is especially useful in extended fractures where optimal visualization is critical for successful repair. The upper eyelid approach with lateral canthotomy thus stands out as a reliable and aesthetically conscious alternative for orbital fracture surgery.

Key words: Orbital fractures, Canthotomy, Facial bones, Eyelids

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I. Introduction

The zygomatic bone forms the lateral portion of the mid-face and upper third of the face. It articulates with several bones of the craniofacial skeleton and constitutes a significant part of both the inferior and lateral orbital walls^{1,2}. Zygomatic bone fractures account for approximately 23% to 43% of all facial fractures¹, whereas frontal bone fractures represent 5% to 15% of traumatic facial injuries. Both types of fractures can result in significant aesthetic and functional morbidity,

and their management must be tailored to the individual patient¹. Multiple surgical approaches have been described for these injuries. Among them, the coronal approach is considered the standard method for managing fractures of the upper facial third and complex or extended fractures³.

For orbito-malar fractures, minimally invasive techniques, such as closed reduction with or without fixation, are available; however, open reduction with rigid internal fixation remains the most effective and widely accepted treatment. Nonetheless, complications such as visible scarring, eyelid malposition, and canthal deformities can occur following surgery⁴.

The upper eyelid approach is regarded as the most aesthetic technique in this region, providing access to the superolateral orbit through a natural skin crease incision^{5,6}. This versatile method has been described in various neurosurgical and craniofacial procedures, including tumor resection, optic nerve decompression, cerebrospinal fluid leak repair, fracture man-

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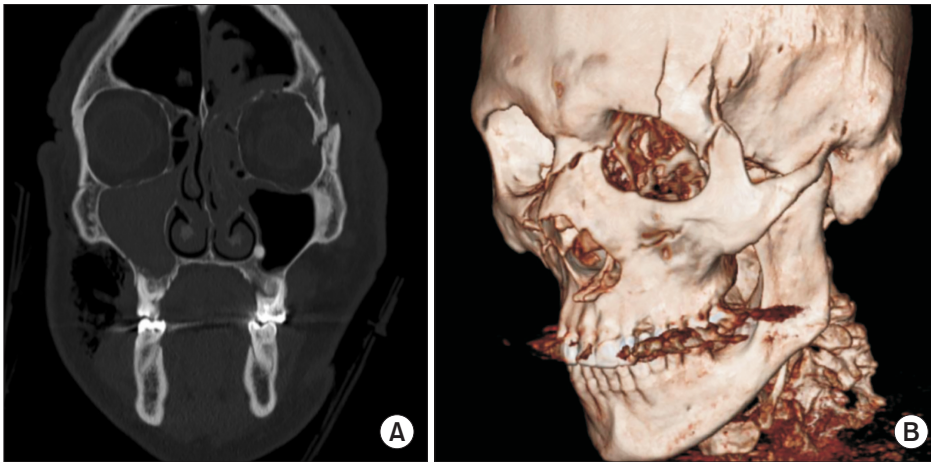


Fig. 1. Preoperative (A) computed tomography scan and (B) three-dimensional reconstruction showing left fronto-orbito-zygomatic fracture with intermediate segment.

Pedro Tapia et al: Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report. J Korean Assoc Oral Maxillofac Surg 2025

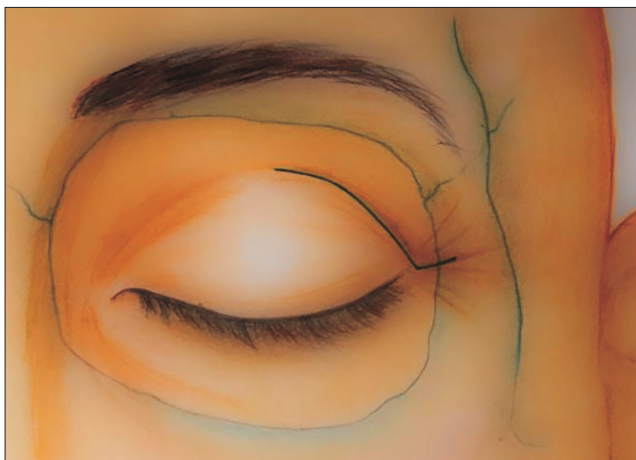


Fig. 2. Schematic representation of the incision for the upper eyelid approach with lateral canthotomy.

Pedro Tapia et al: Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report. J Korean Assoc Oral Maxillofac Surg 2025

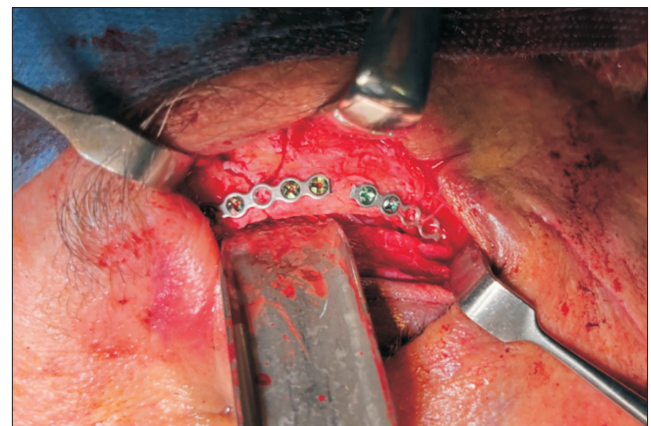


Fig. 3. Intraoperative reduction and osteosynthesis of fronto-orbito-zygomatic fracture using an upper eyelid approach with lateral canthotomy of the left orbit.

Pedro Tapia et al: Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report. J Korean Assoc Oral Maxillofac Surg 2025

agement, and drainage of hematomas or abscesses⁴.

Lateral canthotomy is a complementary procedure that involves an incision along the lateral palpebral fissure, transecting the skin, orbicularis oculi muscle, orbital septum, lateral canthal tendon, and conjunctiva. This technique aims to release the lateral attachment of the eyelid to the orbital rim, thereby increasing surgical exposure⁶.

This article proposes the upper eyelid approach combined with lateral canthotomy as an effective and aesthetically favorable alternative for the management of fronto-orbito-zygomatic fractures, supported by a review of the current literature on surgical access techniques for this region.

II. Case Report

A 69 year-old male patient without comorbidities was ad-

mitted to the regional hospital of Rancagua with a diagnosis of a left fronto-orbito-zygomatic fracture.(Fig. 1) Due to the complexity of the fracture, conservative treatment was not feasible, and the patient underwent surgical intervention under general anesthesia. The chosen approach was an upper eyelid incision combined with a lateral canthotomy (Fig. 2), followed by reduction and osteosynthesis of the lateral orbital wall and part of the frontal bone.

Authorization was obtained for the use of clinical photographs, complementary imaging, and the patient's informed consent for research purposes.

For the surgical procedure, 1 cc of 2% lidocaine with 1:100,000 epinephrine was infiltrated under the eyelid skin and orbicularis oculi muscle, and an additional 0.5 cc was injected into the lateral canthal region. The cornea was protected with a plastic shield following the application of ophthal-

mic ointment. A skin incision was made along the supratarsal crease, extending 5 mm toward the lateral canthus. Dissection was performed through the orbicularis oculi muscle to expose the fracture site, which was then reduced and stabilized with osteosynthesis.(Fig. 3) Wound closure was carried out in three layers—periosteum, muscle, and skin—with meticulous alignment of the lateral canthal structures. The procedure was completed without intraoperative complications.

Postoperative clinical and radiographic evaluations revealed no alterations in photomotor reflexes, visual acuity, or extraocular motility. Follow-up assessments were conducted at 7, 14, and 21 days, and at 1, 3, and 6 months postoperatively, all showing satisfactory functional and aesthetic outcomes.(Fig. 4)

In addition, a literature search was conducted in the MEDLINE, Epistemonikos, Scopus, and Web of Science databases using the keywords: “Orbital Fracture,” “Zygomatic Frac-

ture,” “Frontal Fracture,” and “Superior Eyelid Approach,” in order to develop a bibliographic review of the surgical



Fig. 4. Clinical control at six months post-surgery. *Pedro Tapia et al: Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report. J Korean Assoc Oral Maxillofac Surg 2025*

Table 1. Articles included in the bibliographic review

Study	Country	Study objective	Main finding
Palavalli et al. ⁷ (2023)	USA	Contemporary evidence-based review of the major surgical approaches for orbital wall fractures and analyze the literature to compare all major surgical procedures and their complication rates.	Subtarsal and transcaruncular approaches were observed to have the lowest rates of complications.
Melek and Noureldin ⁸ (2023)	Egypt	Compare between the subtarsal approach, conventional transconjunctival approach and the Y-modification of the transconjunctival approach in the management of zygomatico-maxillary complex fractures.	The transconjunctival approach provides adequate exposure with excellent esthetics and minor complications. The Y-modification also delivers an esthetic access with inconspicuous scar to the fronto-zygomatic region.
Zhang et al. ⁹ (2022)	China	Study through a systematic review and meta-analysis of the best surgical timing and approach for orbital fracture.	The optimal surgical management of orbital trauma is generally recommended within 14 days following the injury.
Pitak-Arnop et al. ¹⁰ (2022)	France	The aim of this article is to provide an overview of the supramuscular approach to upper blepharoplasty in orbital roof fractures and/or lower anterior table frontal sinus fractures.	Supramuscular approach to upper blepharoplasty is a minimally invasive approach provide direct visualisation of the fracture, quick operative time, rare complications, and easy learning.
Wang and Dillon ¹¹ (2021)	USA	This article provides an updated overview of the evaluation and treatment of zygomatic-maxillary complex fractures based on the available evidence and clinical experience at our center.	Careful soft tissue management during surgery is essential to optimize functional and aesthetic outcomes.
Lucas et al. ¹² (2020)	USA	To conduct a systematic review evaluating the underlying causes, associated complications, and management of orbital roof fractures including reconstructive options in the general population of children and adults.	Bicoronal approaches were performed most commonly along with reconstruction utilizing titanium miniplates. Conservative management was more common among the pediatric population.
Al-Moraissi et al. ¹³ (2018)	Yemen	Systematically analyze and estimate evidence of lower lid complications associated with the different surgical approaches in the treatment of orbital and periorbital fractures.	Transconjunctival approach has the lowest incidence of the lower lid complications, with a superior cosmetic outcome in the treatment of orbital floor and periorbital fractures.
Bourry et al. ¹⁴ (2019)	France	Description of a technique for reduction and fixation of isolated fractures of the anterior wall by incision of the upper eyelid, which allows good exposure of the inferior portion of the frontal sinus, with limited scarring.	Upper eyelid incision represents an alternative to the coronal approach in isolated displaced fractures of the anterior wall of the frontal sinus.
Kinzinger et al. ³ (2019)	USA	The aim of this study is to quantify the frontal bone exposure that can be achieved with an upper eyelid blepharoplasty incision.	Upper eyelid blepharoplasty incision plus far lateral extension provides direct surgical access to the inferior frontal bone.

Pedro Tapia et al: Advantages of the upper eyelid approach with lateral canthotomy in the resolution of complex fronto-orbito-zygomatic fractures: bibliographic review of conventional approaches and a case report. J Korean Assoc Oral Maxillofac Surg 2025

approaches used for the reduction of fronto-orbito-zygomatic fractures.

A total of 179 articles were initially identified. After the removal of duplicates, title and abstract screening, and full-text review, 8 articles were selected for analysis. These studies, summarized in Table 1^{3,7-14}, include 5 systematic reviews, 1 randomized clinical trial, 1 cadaveric study, 1 descriptive study, and 1 clinical case report.

With regard to the management of fronto-orbito-zygomatic fractures, several authors report that the majority of cases were managed using a coronal approach. A secondary strategy involved combining multiple approaches, such as the lateral eyebrow incision (tail of the eyebrow) with a transconjunctival approach and lateral canthotomy^{3,11,13}. Melek and Noureldin⁸ emphasize that, in their experience, no single limited approach—except for the coronal approach—can adequately address the full extent of fronto-orbito-zygomatic fractures.

In terms of complications, the most frequently reported for both the coronal and tail of the eyebrow approaches include alopecia, visible scarring, paresthesia, and frontal nerve paresis. Specifically for the tail of the eyebrow approach, visible alopecic scarring is cited as the main drawback. However, Jones et al. note that this scarring can be minimized through the use of a cold scalpel.

Additionally, studies^{11,12} suggest that the choice of surgical approach is largely influenced by factors such as the degree of fracture comminution, displacement, and the presence of associated fractures. An approach through an existing wound is only considered when the wound is located near the fracture site and its use is appropriate given the extent of the injury.

III. Discussion

The surgical management of fronto-orbito-zygomatic fractures presents a significant challenge for specialists, who aim to restore both form and function, with particular emphasis on facial symmetry and projection^{15,16}. The coronal approach is the most commonly described technique for fractures involving the upper third of the face. While it offers excellent visibility of the operative field, it also has important disadvantages, including increased bleeding, alopecia, sensory deficits in the scalp, and a high risk of injury to the temporal and frontal branches of the facial nerve¹⁵⁻¹⁷.

Adequate exposure of the affected area can also be achieved through a combination of approaches, such as the

transconjunctival approach (with or without lateral canthotomy) and the tail of the eyebrow incision, particularly in fronto-zygomatic fractures¹⁶. However, the use of an upper eyelid approach with extension to the lateral canthus is not documented in the current literature. The tail of the eyebrow approach is a quick and simple technique that provides good access to the fronto-zygomatic suture. Nevertheless, it can leave a visible scar, especially in patients with sparse eyebrow hair, or lead to hair loss in the area postoperatively^{3,7,8}.

Although numerous case reports and literature reviews describe the various surgical approaches to the fronto-orbito-zygomatic complex, few studies directly compare the performance of these techniques^{7,12}. In our review, these studies differ in methodology, sample size, and research objectives, limiting their comparability. Among all approaches, the upper eyelid technique is one of the least reported and is rarely evaluated in comparative studies. Specifically, the combination of the upper eyelid approach with lateral canthotomy has not been documented in the existing scientific literature.

Based on our clinical case and its outcomes, we observed that the upper eyelid approach combined with lateral canthotomy provides a fast, aesthetically favorable technique with wide exposure of the frontal region, including the lateral orbital wall. This is especially relevant in cases involving multifragmentary fractures or comminution, where multiple fixation points must be accessed and visualized. The rapid execution of this technique, as with other approaches, depends largely on the surgeon's experience and consistency. Efficient and broad exposure of the fracture site allows for a significant reduction in operative time, which in turn leads to decreased costs in terms of operating room resources and personnel.

Although the findings of this review do not provide robust scientific evidence to conclusively support the superiority of the upper eyelid approach with lateral canthotomy, our clinical experience suggests that it offers meaningful advantages in terms of aesthetics, surgical access, and functional outcomes when compared to more commonly used techniques. Given the current lack of literature evaluating this approach, the authors propose conducting future studies—ideally beginning with retrospective analyses, followed by randomized, double-blind clinical trials—to directly compare this technique with existing methods. Such research would provide a clearer understanding of the potential benefits, limitations, and complications associated with this approach, thereby supporting evidence-based decision-making for the surgical treatment of fronto-orbito-zygomatic fractures.

Fractures of the fronto-orbito-zygomatic complex are frequently managed through surgical intervention. Among the various available techniques, the upper eyelid approach combined with lateral canthotomy offers rapid and effective exposure of the fracture site, making it particularly valuable in cases of complex or comminuted fractures. This technique also provides excellent postoperative aesthetic outcomes, as the incision is placed within the natural palpebral crease, rendering the scar virtually imperceptible. Additionally, it poses a low risk of injury to critical anatomical structures, has a relatively simple learning curve, and can be reliably performed by experienced surgeons. Despite these potential advantages, the use of the upper eyelid approach with lateral canthotomy has not been previously described in the literature, and there are currently no studies supporting its efficacy or outcomes. Therefore, further research is warranted to document and evaluate the benefits of this technique. Well-designed clinical studies would help validate its use and promote its adoption as a safe, effective, and aesthetically favorable alternative for the surgical management of fronto-orbito-zygomatic fractures.

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Authors' Contributions

Formal analysis was performed by P.T., F.D., S.D., F.J., and B.O. Investigation was carried out by P.T., J.Z., and F.D. Methodology was developed by P.T., J.Z., F.D., and B.O. Project administration was handled by P.T., F.D., and B.O. Resources were provided by P.T. and J.Z. Supervision was performed by P.T., and validation by J.Z. Visualization was conducted by P.T. and F.D. The original draft was written by P.T., F.D., and B.O., and all authors (P.T., F.D., S.D., F.K., and B.O.) contributed to the review and editing of the manuscript.

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Consent for Publishing Photographs

Written informed consent was obtained from the patient for publication of this article and accompanying images.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

References

- Bergeron JM, Hohman MH, Raggio BS. Zygomatic arch fracture. In: Abdelsattar M, Abernethy LT, Ackley WB, Adolphe TS, Aeby TC, Agadi S, et al., eds. StatPearls. StatPearls Publishing; 2025.
- Cohn JE, Othman S, Bosco S, Shokri T, Evarts M, Papajohn P, et al. Management of isolated zygomatic arch fractures and a review of external fixation techniques. *Craniofacial Trauma Reconstr* 2020;13:38-44. <https://doi.org/10.1177/1943387520905164>
- Kinzing M, Steele TO, Chin O, Strong EB. Degree of frontal bone exposure via upper blepharoplasty incision: considerations for frontal sinus fracture. *Otolaryngol Head Neck Surg* 2019;160:468-71. <https://doi.org/10.1177/0194599818825456>
- Baylan JM, Jupiter D, Parker WL, Czerwinski M. Management of zygomatic fractures: a national survey. *J Craniofac Surg* 2016;27:1571-5. <https://doi.org/10.1097/scs.0000000000002880>
- Bhattacharjee K, Misra DK, Deori N. Updates on upper eyelid blepharoplasty. *Indian J Ophthalmol* 2017;65:551-8. https://doi.org/10.4103/ijo.ijo_540_17
- Ellis E 3rd, Zide MF. Periorbital incisions. In: Ellis E 3rd, Zide MF, eds. *Surgical approaches to the facial skeleton*. 3rd ed. Lippincott Williams & Wilkins; 2018:7-54.
- Palavalli MH, Huayllani MT, Gokun Y, Lu Y, Janis JE. Surgical approaches to orbital fractures: a practical and systematic review. *Plast Reconstr Surg Glob Open* 2023;11:e4967. <https://doi.org/10.1097/gox.0000000000004967>
- Melek LN, Noureldin MG. Zygomaticomaxillary complex fractures: finding the least complicated surgical approach (a randomized clinical trial). *BMC Oral Health* 2023;23:539. <https://doi.org/10.1186/s12903-023-03249-8>
- Zhang J, He X, Qi Y, Zhou P. The better surgical timing and approach for orbital fracture: a systematic review and meta-analysis. *Ann Transl Med* 2022;10:564. <https://doi.org/10.21037/atm-22-1465>
- Pitak-Arnop P, Meningaud JP, Neff A. Supramuscular upper blepharoplasty approach to orbital roof and/or lower anterior table frontal sinus fractures: a meta-narrative review. *J Stomatol Oral Maxillofac Surg* 2022;123:645-54. <https://doi.org/10.1016/j.jormas.2022.05.020>
- Wang HD, Dillon J. Contemporary management of zygomaticomaxillary complex fractures. *Semin Plast Surg* 2021;35:256-62. <https://doi.org/10.1055/s-0041-1735812>
- Lucas JP, Allen M, Nguyen BK, Svider PF, Folbe AJ, Carron M. Orbital roof fractures: an evidence-based approach. *Facial Plast Surg Aesthet Med* 2020;22:471-80. <https://doi.org/10.1089/fpsam.2020.0029>
- Al-Moraissi E, Elsharkawy A, Al-Tairi N, Farhan A, Abotaleb B, Alsharaee Y, et al. What surgical approach has the lowest risk of the lower lid complications in the treatment of orbital floor and periorbital fractures? A frequentist network meta-analysis. *J Craniofacial Surg* 2018;46:2164-75. <https://doi.org/10.1016/j.jcms.2018.09.001>

14. Bourry M, Oliver C, Maalouf J, Corre P, Bertin H. Surgical approach of isolated fracture of the anterior wall of the frontal sinus: the upper eyelid incision. *J Stomatol Oral Maxillofac Surg* 2019;120:240-3. <https://doi.org/10.1016/j.jormas.2018.11.010>
15. Morales Cadena M, Sánchez Bejar F. [Direct approach to the open reduction and internal rigid fixation of fractures of the zygomatic arc]. *An Otorrinolaringol Mex* 2001;46:163-7. Spanish.
16. Marinho RO, Freire-Maia B. Management of fractures of the zygomaticomaxillary complex. *Oral Maxillofac Surg Clin North Am* 2013;25:617-36. <https://doi.org/10.1016/j.coms.2013.07.011>
17. Hollier LH, Thornton J, Pazmino P, Stal S. The management of orbitozygomatic fractures. *Plast Reconstr Surg* 2003;111:2386-92, quiz 2393. <https://doi.org/10.1097/01.prs.0000061010.42215.23>

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