

Efficacy of combined surgical approaches in the management of sinonasal and orbital pathologies: innovations in minimally invasive techniques and their impact on postoperative outcomes

Eficacia de los enfoques quirúrgicos combinados en el tratamiento de patologías sinasales y orbitarias: innovaciones en técnicas mínimamente invasivas y su impacto en los resultados posoperatorios

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ABSTRACT

Sinonasal and orbital pathologies present unique challenges due to their anatomical complexity requiring advanced surgical approaches for optimal management. This systematic study demonstrates the effectiveness of combined surgical interventions based on advancements in minimally invasive approaches. An electronic literature search was performed on articles reporting patient outcomes after combined surgical management in sinonasal and orbital pathologies through the PubMed, Scopus, and Cochrane databases. Under the inclusion criteria, randomized controlled trials, literature reviews, cohort studies, and case reports published in the last decade on reputable journals were taken under consideration. Complications and functional outcomes were improved as compared to the conventional surgery techniques when looked into the previous evidences. Heterogeneities of the study designs and duration of follow-up did not permit a meta-analysis. The endoscopic orbital decompression, and other such sinonasal surgeries were now performed with less intraoperative blood loss, shorter hospital stays, and quicker recovery times. After all research, it can be concluded that combined surgical techniques do improve outcomes, but more high-quality, standardized work needs to be done to establish long-term efficacy. Our research findings support this trend of minimalization of invasive techniques to treat pathologies within the sinonasal and orbital spaces and stress their overall capacity to enhance postoperative results. Future research should focus on standardizing protocols and longer follow up periods to evaluate recurrence and long-term complications better.

Keywords: efficacy, combined surgical approaches, sinonasal pathologies, orbital pathologies, minimally invasive techniques, postoperative outcomes, systematic review.

RESUMEN

Las patologías sinasales y orbitarias presentan desafíos únicos debido a su complejidad anatómica que requiere abordajes quirúrgicos avanzados para un manejo óptimo. Este estudio sistemático demuestra la eficacia de las intervenciones quirúrgicas combinadas basadas en avances en enfoques mínimamente invasivos. Se realizó una búsqueda bibliográfica electrónica de artículos que informaban los resultados de los pacientes después del tratamiento quirúrgico combinado en patologías nasosinuales y orbitarias a través de las bases de datos PubMed, Scopus y Cochrane. Según los criterios de inclusión, se tuvieron en cuenta ensayos controlados aleatorios, revisiones de la literatura, estudios de cohortes e informes de casos publicados en la última década en revistas acreditadas. Las complicaciones y los resultados funcionales mejoraron en comparación con las técnicas quirúrgicas convencionales cuando se analizaron las evidencias anteriores. La heterogeneidad de los diseños de los estudios y la duración del seguimiento no permitieron un metanálisis. La descompresión orbitaria endoscópica y otras cirugías nasosinuales similares ahora se realizaban con menos pérdida de sangre intraoperatoria, estancias hospitalarias más cortas y tiempos de recuperación más rápidos. Después de toda la investigación, se puede concluir que las técnicas quirúrgicas combinadas mejoran los resultados, pero es necesario realizar más trabajo estandarizado y de alta calidad para establecer la eficacia a largo plazo. Los hallazgos de nuestra investigación respaldan esta tendencia de minimizar las técnicas invasivas para tratar patologías dentro de los espacios sinasales y orbitales y enfatizan su capacidad general para mejorar los resultados posoperatorios. Las investigaciones futuras deberían centrarse en estandarizar protocolos y periodos de seguimiento más prolongados para evaluar mejor la recurrencia y las complicaciones a largo plazo.

Palabras clave: eficacia, abordajes quirúrgicos combinados, patologías nasosinuales, patologías orbitarias, técnicas mínimamente invasivas, resultados posoperatorios, revisión sistemática.

INTRODUCTION

Sinonasal tumors represent abnormal growths involving the nasal cavity and paranasal sinuses (Cardesa., 2016). Tumors of this region are quite infrequent and represent less than 5% of all head and neck cancers, with an annual rate of 0.5 to 1.0 per 100,000 people (Thawani et al., 2022). Cancers include sinonasal undifferentiated carcinoma, adenocarcinoma, squamous cell carcinoma, and esthesioneuroblastoma. While treatment of most other head and neck cancers has improved, sinonasal malignancies continue to have extremely poor outcomes. In part, this is because they have largely been excluded from most clinical trials. Other malignancies, such as primary mucosal melanoma and extranodal NK/T-cell lymphoma, can also involve the sinonasal tract and complicate diagnosis and treatment options even further (Thawani et al., 2022).

Sinonasal and orbital pathologies is a generic term for all the overall conditions that affect the anatomical structures around the eyes, nose, and paranasal sinuses (Welkoborsky., 2022). This term encompasses chronic rhinosinusitis, sinonasal tumors, and even other orbital diseases, inflammatory disorders, and neoplasms Nassrallah (2021). The conditions are very difficult to treat due to their intricate anatomy and close proximity to other important structures such as the brain and the eyes. Such historical features have characterized general surgery from the very beginning: it has always presupposed an open invasive method. The treatment of such conditions traditionally usually involved rather long recovery and high complication rates and sometimes damage to adjacent tissues. Within recent ten years, minimally invasive technique dramatically changed the approach to the treatment of such a branch as pathologies of sinonasal and orbit territories. An example of this trend is endoscopic sinus surgery, wherein a surgeon can access and treat the disease in the sinonasal cavity without even making an external incision (Chatelet et al., 2021).

Transnasal endoscopic approaches to the orbit have also been a popular alternative for dealing with orbital pathologies while maintaining normal tissue, thus avoiding unnecessary morbidity at the postoperative period. Intraoperative navigation systems added other dimensions of accuracy to the process (Vural et al., 2021). This is a systematic review that focuses on reviewing the efficacy of combined surgical approaches on including minimally invasive techniques in the management of pathologies that involve the sinuses and orbit. All the post-operative outcomes, success rates after surgery, time to recovery, complication rates, and overall quality of life of the patient would be assessed by integrating all the latest evidence. As the interest in achieving better surgical results using less invasive approaches grows, it makes this understanding all the more imperative-guiding principles for future clinical practice and improved patient care. The current review will be a step forward on this pathway towards an evolving field: minimally invasive surgery in sinonasal and orbital pathologies.

METHODOLOGY

A literature search was performed to review relevant studies on concomitant surgical approaches in the field of sinonasal and orbital pathologies. The chosen databases for the search are PubMed, Cochrane Library, Scopus, and Embase. MeSH terms combined with keywords on sinonasal surgery, orbital surgery, and outcomes post-operative from minimally invasive technique contributed to the search. Boolean operators were used to enhance the query refinement of the search in question. Articles were restricted to those that are in the English language, and published between January 2000 and up to October 2024.

Table 1. MeSH Term Table

Primary Keyword	Secondary Keywords (Synonyms)	Boolean Search (MeSH)
Sinonasal Pathologies	Nasal diseases, Paranasal sinus diseases, Sinusitis, Rhinosinusitis, Nasal polyps, Chronic sinusitis, Sinus infections	Sinonasal Pathologies OR Nasal diseases OR Paranasal sinus diseases OR Sinusitis OR Rhinosinusitis...
Orbital Pathologies	Orbital diseases, Eye socket diseases, Orbital cellulitis, Orbital tumors, Orbital infections, Orbital fractures	Orbital Pathologies OR Orbital diseases OR Eye socket diseases OR Orbital cellulitis OR Orbital tumors
Minimally Invasive Techniques	Endoscopic surgery, Laparoscopic surgery, Non-invasive procedures, Keyhole surgery, Image-guided surgery, Robot-assisted surgery	Minimally Invasive Techniques OR Endoscopic surgery OR Laparoscopic surgery OR Keyhole surgery
Postoperative Outcomes	Surgical outcomes, Post-surgical recovery, Postoperative complications, Healing, Recurrence rates, Mortality, Morbidity	Postoperative Outcomes OR Surgical outcomes OR Post-surgical recovery OR Postoperative complications

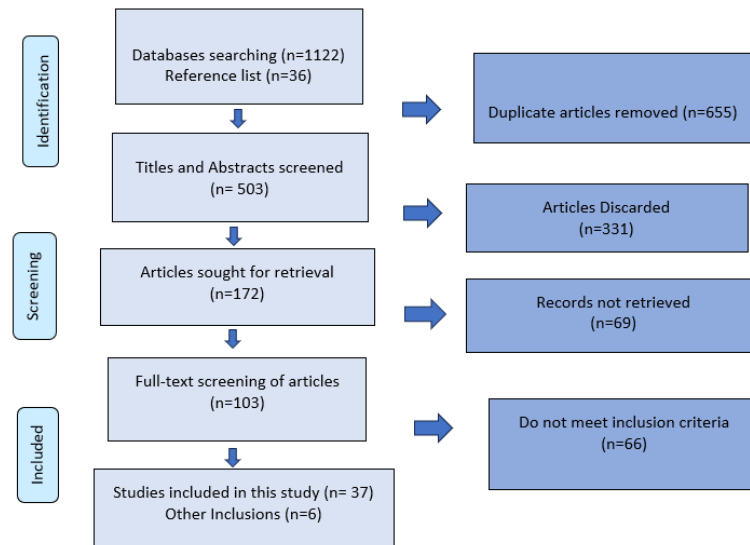
Source: the authors.

Study Selection Process and data extraction

The study selection was based on the PRISMA statement, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Initially, the titles as well as the abstracts were screened for relevance, while relevant full-text articles were retrieved for further evaluation. A secondary screening was conducted by two independent reviewers for accuracy and in an attempt to minimize bias, thus discrepancies resolved by consensus. The data extraction process was

focused on surgical techniques and innovational approaches to minimally invasive options as well as postoperative outcomes. Overall main outcome measures included complication rate, duration of stay in the hospital, and long-term recovery. Secondary outcomes included patient reported outcomes after surgery that reflected improvement in function as well as quality of life.

Figure. 1 PRISMA Flow Diagram of Included Studies



Source: the authors.

RESULTS AND DISCUSSION

Table 2. Management of Sinonasal and Orbital Pathologies with Minimally Invasive Techniques

Technique/Procedure	Description
Endoscopic Sinus Surgery (ESS)	Surgical intervention to restore sinus drainage and function through the nasal cavity, Saydy et al., 2021.
Functional Endoscopic Sinus Surgery (FESS)	A specific type of ESS that focuses on functional restoration of the sinus cavities (Kar., 2024).
Balloon Sinuplasty	Utilizes a balloon catheter to dilate blocked sinus openings without tissue removal (kumar., 2020).
Transnasal Endoscopic Approaches	Accessing sinonasal and orbital structures via the nasal cavity, reducing the need for external incisions (Li., 2023).
Transnasal Orbital Decompression	Decompression of the orbit through a transnasal route to alleviate exophthalmos (Sun., 2024).
Transnasal Dacryocystorhinostomy (DCR)	Minimally invasive procedure to treat nasolacrimal duct obstruction using transnasal access (Olver.,2024).
Laser-Assisted Techniques	Employ lasers to facilitate surgical interventions, often with less bleeding and faster recovery (Zhou., 2024).
Transcanalicular Laser-Assisted DCR (TDL-DCR)	Uses lasers to create an opening between the lacrimal sac and the nasal cavity through the canalculus (Lemaitre et al., 2021).
Laser Turbinoplasty	Reduction of the size of nasal turbinates using laser technology for improved airflow (Furculita., 2023)
Inferomedial Wall Orbital Decompression	Removal or repositioning of the inferomedial wall of the orbit to relieve pressure and improve symptoms (Koerbel., 2023).
Balanced Medial Plus Lateral Wall Orbital Decompression	Combines approaches to both the medial and lateral walls of the orbit for enhanced decompression (Tian., 2024)
Endoscopic Techniques for Tumor Resection	Minimally invasive excision of sinonasal or orbital tumors using endoscopic guidance (Li et al., 2023).
Septoplasty	Correction of a deviated septum through endoscopic or traditional methods for improved airflow (Kumar., 2024).
Sphenoidotomy	Endoscopic access to the sphenoid sinus, often performed in conjunction with other procedures (Kumar., 2024).
Frontal Sinus Surgery	Minimally invasive techniques to treat frontal sinus disease, often via endoscopic methods (Kumar., 2024).
Nasal Polyps	Endoscopic removal of nasal polyps to improve sinus drainage and airflow (Jankowski., 2024)
Surgical Techniques for Chronic Rhinosinusitis	Various endoscopic methods to address persistent inflammation and blockage in the sinuses (Crear., 2024)

Source: the authors.

Description: Minimally invasive techniques in sinonasal and orbital pathologies such as Endoscopic Sinus Surgery (ESS) and Functional Endoscopic Sinus Surgery (FESS) focus restoring sinus drainage and function by avoiding external incisions (Kar., 2024). Balloon Sinuplasty and Transnasal Endoscopic Approaches access structures through the nasal cavity reducing tissue damage and recovery time and novel and advanced techniques such as Transnasal Orbital Decompression and Transnasal Dacryocystorhinostomy (DCR) helps the surgeons decompress orbit or treat nasolacrimal duct obstructions with minimal disruption to surrounding tissues (Maxfielg., 2022). Laser-assisted techniques, like Laser Turbinoplasty and Transcanalicular Laser-Assisted DCR further reduce postoperative recovery times by minimizing bleeding and inflammation (Lau., 2021). Endoscopic methods, including tumor resections, septoplasty, and nasal polypectomy offer precision and lower the risk of complications while procedures like sphenoidotomy and frontal sinus surgery enable targeted treatment for specific sinus issues. All these techniques are increasingly preferred due to their safety and precision, and reduced patient morbidity in chronic rhinosinusitis management.

Table. 3 Combined Surgical Techniques for Sinonasal and Orbital Pathologies

Surgical Approach	Indications	Advantages	Considerations
Endoscopic Endonasal Approach (EEA)	Benign/malignant sinonasal tumors with limited orbital involvement, orbital decompression	Minimally invasive, avoids external incisions, fast recovery, preserves facial aesthetics	Requires expertise, limited by tumor size and extent
Transorbital Endoscopic Approach (TEA)	Lesions at the orbital apex, medial orbital wall decompression, tumors invading orbital floor	Minimally invasive, access to deep orbital structures without craniotomy	Challenging access to complex regions, potential risk to optic nerve and ocular muscles
Endoscopic-Assisted Transpalpebral Approach	Tumors in the anterior/medial orbit, some sinonasal pathologies with orbital involvement	Direct access to orbit, minimal disruption to sinonasal structures, combined with endoscopic visualization	Risk to eyelid function, limited access to posterior orbital lesions
Combined Endoscopic and Transnasal Surgery	Small sinonasal or orbital lesions with limited extension	Minimally invasive, excellent visualization through both transnasal and orbital routes	Requires expertise in both ENT and ophthalmology surgeries, limited for larger lesions
Endoscopic Orbital Decompression	Graves' ophthalmopathy with orbital involvement, sinonasal tumors compressing the orbit	Minimally invasive, avoids external scarring, faster recovery, improved postoperative outcomes	Risk of postoperative diplopia (double vision), requires precise anatomical knowledge

Source: the authors.

Description: Minimal disruption of surrounding tissues, shortened recovery times, and preservation of aesthetics are the main goals of less invasive surgical approaches for sinonasal and orbital pathologies. The Endoscopic Endonasal Approach (EEA) is frequently used for benign or malignant tumors with limited orbital involvement (Sindwani., 2024). Since it is performed through the deeper nasal passages, there is less chance of external scarring and a quicker recovery. The Transorbital Endoscopic Approach (TEA) is a better option for some orbital pathologies because it allows access to deeper orbital structures like the apex or medial wall without requiring a craniotomy (Corvino., 2024) (Algattas., 2024). The Endoscopic-Assisted Transpalpebral Approach combines endoscopic visualization with a transpalpebral route to remove tumors in the anterior or medial orbit, minimizing sinonasal disruption while offering direct orbital access (Locatelli., 2024). For minor lesions affecting both the sinus and orbit, Combined Endoscopic and Transnasal Surgery offers a minimally invasive alternative with great visualization, while it is less successful for bigger lesions (Azab., 2024). Endoscopic Orbital Decompression, employed in conditions like Graves' ophthalmopathy, enables for decompression while conserving facial aesthetics and minimizing recovery time (Verity., 2024). But there are hazards associated with the treatment, like postoperative diplopia, which need for exact anatomy knowledge (Nassimizadeh., 2024). These methods, which are all customized to the unique anatomy and pathology, are a significant improvement in the treatment of orbital and sinonasal disorders.

Table 4. Latest Technological Advancements in Non-Invasive Sinonasal and Orbital Surgery

Innovation	Description	Benefits	Applications
Image-Guided Navigation Systems (IGS)	Combines real-time imaging with preoperative CT/MRI scans to guide surgical instruments during endoscopic procedures.	Increased precision, especially in complex or high-risk areas, reducing complications.	Used in complex sinonasal and orbital surgeries, particularly near the optic nerve or skull base.
3D Endoscopy	Provides high-definition, three-dimensional imaging during surgery, enhancing depth perception and spatial awareness.	Greater visual clarity, improved tissue dissection, and safer manipulation in confined spaces.	Applied in both sinonasal surgeries and orbital decompression for more accurate dissection and maneuvering.
Robotic-Assisted Surgery	Utilizes robotic platforms like the da Vinci system to enhance surgical precision,	Improved range of motion, reduced surgeon fatigue, and enhanced	Employed in advanced endoscopic surgeries, including tumor resection and

	dexterity, and control in endoscopic procedures.	safety in complex or prolonged surgeries.	orbital decompression.
Balloon Sinus Dilation with Microdebriders	Integrates balloon dilation with microdebriders to remove sinus blockages more effectively while minimizing tissue trauma.	More precise sinus opening, reduced trauma, faster recovery, and improved outcomes for sinus drainage procedures.	Best suited for patients with sinus blockages requiring minimally invasive intervention.
Laser-Assisted Endoscopic Surgery	Uses fiber-guided lasers (e.g., CO2 lasers) for precise tissue dissection with minimal thermal damage during endoscopic procedures.	Reduced bleeding, faster recovery, lower risk of complications, and enhanced surgical precision.	Ideal for surgeries like transcanalicular DCR, turbinoplasty, and tumor resections with minimal surrounding tissue damage.
Intraoperative Optical Coherence Tomography (OCT)	Provides real-time, high-resolution imaging of tissue layers during surgery, particularly for assessing tumor margins and tissue depth.	Enhances surgical precision by confirming complete resection while preserving healthy tissue.	Applied in orbital decompressions, tumor resections, and surgeries requiring detailed tissue analysis.
Augmented Reality (AR) in Surgery	AR overlays anatomical structures onto the surgical field in real-time, offering enhanced visualization of hidden structures or lesions.	Improved accuracy, better visualization of critical structures, and fewer surgical errors.	Used in complex endoscopic procedures, especially in sinonasal tumor resections or surgeries near critical anatomical structures.
Biodegradable Stents and Drug-Eluting Implants	Utilizes stents that release medication, such as steroids, to reduce inflammation and maintain patency post-surgery.	Reduces postoperative inflammation, decreases need for systemic steroids, and improves long-term sinus function.	Primarily used post-sinus surgery to ensure patency and deliver localized anti-inflammatory treatment in chronic rhinosinusitis.

Source: the authors.

Description: Recent technology in the non-invasive sinonasal and orbital surgeries has dramatically altered the outcomes by offering precision during the procedures and also minimizing complications (Morrison., 2022). IGS offers real-time surgical navigation in intricate procedures with delicate nerves like the optic (Isiky., 2024). 3D Endoscopy enhances depth perception hence making the dissection precise whereas, robotic surgery redefines dexterity and control in tight spaces (Wu et al., 2024). Balloon Sinus Dilation with microdebriders offer more precise sinus opening with minimal trauma (Wright., 2024). Laser-assisted endoscopic techniques aided by CO2 lasers decrease post-operative bleed and rapid recovery (Spacca., 2023). Intraoperative Optical Coherence Tomography proves to better measure the tissues, especially during excision of tumors (Zoli et al., 2020). The overlaid anatomical structures aided by Augmented Reality help better visualize critical areas. Biodegradable drug eluting stents locally deliver anti-inflammatory drugs post-operatively thereby reducing recurrence and enhancing sinus drainage. All these innovations together enhance safety, accuracy, and recovery related to surgeries in the sinonasal and orbital areas (Neves., 2020)

External dacryocystorhinostomy (EX-DCR) and transcanalicular laser-assisted DCR (TDL-DCR) are more frequently used for primary nasolacrimal duct obstruction. EX-DCR involves creating a new tear drainage pathway while TDL-DCR uses lasers for a minimally invasive approach. Orbital decompression techniques like inferomedial and balanced medial-lateral decompression and target exophthalmos in Graves’ orbitopathy are also focusing on reducing pressure in orbital tissues. Our reviewed evidences are consistently demonstrating innovations in minimally invasive techniques have improved both functional and oncologic outcomes in sinonasal and orbital surgeries. Combination of high-definition imaging, robotic assistance and advanced intraoperative tools like OCT has allowed for precise resections with minimal morbidity especially in complex cases involving tumor invasion of critical structures. A randomized controlled study by Wang et al. in 2022 showed that patients with maxillary sinus fungus ball with frontal sinusitis did not have the outcomes for both the middle meatal antrostomy alone, or combined with frontal sinusotomy. Lund–Kennedy endoscopic scores and SNOT-22 improved equally for both groups, suggesting that frontal sinusotomy is actually not required for healing of frontal sinusitis associated with MSFB.

Tara et al. (2022) researched a new variation of the canaliculo-dacryocystorhinostomy (DCR) in post-dacryocystectomy patients. Of the 15 patients, functionally patent lacrimal drainage existed in 93.33% of patients with significant symptomatic benefit. Despite the 20 % incidence rate of tube prolapse, the study of the technique thus concluded safe and effective with reliable alternative for the management of traditional Jones tube. Yu et al. (2022) Contrasted immediate versus delayed endoscopic dacryocystorhinostomy in the management of acute dacryocystitis. Immediate En-DCR resulted in quicker resolution of inflammation and a higher 12-month success rate for the reconstruction of lacrimal passage (94.2% vs. 83.8%). Delayed surgery presented with more complication, such as skin fistulization, occurring in 10 cases and orbital cellulitis in 4 cases.

Mutlu et al. (2022) compared EX-DCR and TDL-DCR in the management of PANDO. It was a randomized study on 60 eyes with surgical success rates at 96.7% and 90% for EX-DCR and TDL-DCR, respectively, without statistical difference between the groups, p = 0.612. Conclusion: TDL-DCR is a minimally invasive procedure with less intraoperative bleeding and no scarring; thus, it can be considered an appropriate alternative to EX-DCR for managing PANDO.

A prospective randomized controlled study was conducted by Rizvi et al. in 2022 to compare glued versus conventional suture techniques within the setting of external dacryocystorhinostomy (Ext DCR) for primary acquired nasolacrimal duct obstruction (PANDO). It followed fifty patients who were divided equally between the two groups. In the former group, fibrin glue was applied for the apposition of lacrimal sac flaps along with nasal mucosal flaps. The latter group received the conventional suturing technique. No significant difference in anatomical results was found between the groups, with 92% success rates for both. Success for functional results was equally high in the glued group at 92%, and sutured group at 88% but yet, not for a statistically significant difference. The study concluded that glued technique will be an acceptable substitute for suturing, especially when there is excessive bleeding or very thin, friable flaps.

A comparative, prospective study by Leite et al. (2021) compared two orbital decompression techniques: inferomedial wall orbital decompression (IM-OD) vs. balanced medial plus lateral wall orbital decompression (ML-OD) in inactive patients with GO. Forty-two patients were randomly assigned to the IM-OD or ML-OD group. Both procedures caused a highly significant reduction in exophthalmometry; this was significantly higher, though, in the ML-OD group ($p=0.010$). New-onset esotropia developed in 11.1% of the IM-OD patients, but was significantly more common in 23.5% of the ML-OD patients. Motility difficulties tended to be worse postoperatively in abduction and elevation for the IM-OD patients, but resolved by 6 months' post-op; the ML-OD patients did not develop significant postoperative motility problems. Preoperative enlargement of the medial rectus muscle as visualized on CT scan predicted new-onset strabismus. The authors concluded that IM-OD can be used for patients needing more exophthalmos reduction, and ML-OD is used for more reduction as well with recovery being smoother. Of course, the preoperative medial rectus enlargement increases the risk of esotropia postoperatively. The trend toward minimally invasive techniques aimed at improving patient outcomes is illustrated by the studies examining different surgical approaches, including balanced medial plus lateral wall orbital decompression, inferomedial wall, and transcanalicular laser-assisted dacryocystorhinostomy (TDL-DCR). By reducing problems like bleeding and scarring, these surgical techniques seek to improve functional recovery and patient happiness in addition to addressing anatomical obstacles. Fibrin glue, for example, can make it easier for the lacrimal sac and nasal mucosal flaps to adhere together during a dacryocystorhinostomy, cutting down on both the length of the procedure and the possibility of difficulties thereafter.

Comparing inferomedial wall orbital decompression to balanced medial and lateral wall decompression also demonstrates how well these combined techniques can treat exophthalmos and problems with ocular movement in patients with Graves' orbitopathy. With a focus on minimally invasive procedures, these combined surgical tactics are especially important for enhancing patient outcomes and shortening recovery times. The incorporation of these cutting-edge techniques opens up exciting new options for clinical application and study as the area develops. Through an analysis of their effectiveness, possible side effects, and overall effect on surgical outcomes, a thorough grasp of their function in the treatment of orbital and sinonasal diseases may be established. (Anderson., 2021).

CONCLUSION

Sinonasal and orbital pathologies have evolved in management with the incorporation of minimally invasive surgical techniques and technological innovations. Indeed, techniques like FESS combined with orbital decompression, Balloon Sinuplasty with septoplasty, and so forth, have presented improved outcomes for patients, morbidity is reduced, and recovery time appears significantly decreased. Advanced imaging methods, robotic assistance, and laser technologies are sophisticated means through which all these techniques can be performed with even greater precision and safety. These methods must provide the best solution for complex conditions of the sinonasal and orbit by minimizing postoperative complications and giving faster functional recovery, as evidence supports growing preference for combined surgical interventions.

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