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# THE ADVANTAGES OF ENDOSCOPIC AND EXTERNAL DACRYOCYSTORHINOSTOMY METHODS IN THE TREATMENT OF DISTAL LACRIMAL OBSTRUCTION AND PRINCIPLES OF INDIVIDUALIZED TREATMENT

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**Abstract**

Endoscopic (END-DCR) and external dacryocystorhinostomy (EXT-DCR) are currently considered the gold standard procedures for non-oncological distal lacrimal obstructions (DALO). However, there remains no consensus on which surgical approach is most suitable for individual patients. This article aims to critically review the literature on DALO management and propose a clear, standardized, and reproducible treatment algorithm to assist clinicians in determining the more appropriate method for each patient—EXT-DCR or END-DCR.

**Keywords:** dacryocystorhinostomy (DCR), superinfection, intranasal surgery, balloon dacryoplasty.

To identify a straightforward and repeatable treatment algorithm for DALO, we reviewed data from the last 30 years. The latest information from PubMed, EMBASE, Scopus, and Cochrane databases was analyzed to examine the role of END-DCR and EXT-DCR in primary and revision surgeries. Gaining more insights into this condition is vital for reaching a final conclusion.

DALO is associated with Rosenmuller distal valve pathology, primarily affecting middle-aged women. Clinically, it manifests as unilateral epiphora and may often be linked to acute or chronic inflammatory superinfections, commonly referred to as dacryocystitis. Excluding malignant lacrimal conditions that require specific management based on histology, external dacryocystorhinostomy (EXT-DCR) has historically been favored. However, numerous studies over the past 40 years indicate that endoscopic endonasal dacryocystorhinostomy (END-DCR) produces comparable results and offers various advantages, such as the absence of external scars and shorter surgical time. Consequently, the endoscopic approach is becoming increasingly popular, even though external methods are still commonly preferred.

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Recent research shows that both EXT-DCR and END-DCR can be effective for primary or secondary (non-oncological) lacrimal obstructions, with success rates of approximately 90-95%, indicating no significant superiority of one method over the other. Notably, among all surgical and non-surgical approaches to DALO, these two methods demonstrate superiority over alternatives such as transcanalicular approaches, balloon dacryoplasty, and lacrimal duct stenting/probing. Therefore, END-DCR and EXT-DCR should be regarded as gold standard techniques for DALO, although there is no specific guideline favoring one surgical approach over the other.

To methodically compare possible therapeutic strategies for DALO, systematic analyses were conducted using data from PubMed, EMBASE, Scopus, and the Cochrane Library. Recent publications from our team compared various surgical techniques and postoperative therapies for DCR. While these studies are crucial for evaluating the effectiveness of each therapeutic strategy, they may not be sufficient to establish one technique as superior in specific cases. Specifically, these meta-analyses indicate that endoscopic and external DCR outperforms other surgical methods, but factors such as anatomical conditions, comorbidities, and patient preferences must be comprehensively considered in choosing between them.

Therefore, to determine the most appropriate approach for each patient in the era of personalized medicine, studies were conducted in PubMed, EMBASE, Scopus, and Cochrane databases. Factors influencing the choice of surgical approach in primary and revision cases of END-DCR and EXT-DCR were evaluated, including systemic/nasal comorbidities, patient age, and anesthesia selection.

The results indicate that a multidisciplinary approach between the ophthalmic surgeon and otorhinolaryngologist is recommended at the outset of treating patients diagnosed with distal lacrimal obstruction (DALO). This approach is necessitated by the need for accurate lacrimal diagnosis and the identification of potential accompanying nasal pathologies. Radiological imaging, such as maxillofacial CT, may be employed if necessary. Some authors recommend this, especially in recurrent cases, while others utilize it to achieve a definitive diagnosis.

In summary, when determining the choice between external or endoscopic approaches, individual patient needs should be considered. The following factors are essential:

1. Primary or secondary etiology (cause of the disease).
2. Primary or revision surgery.

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3. Overall health status, affecting the choice of general or local anesthesia.
4. Presence of accompanying sino-nasal pathologies.
5. Patient age.

This approach allows for personalized treatment based on the individual needs of the patient.

The etiology of lacrimal obstruction is a significant factor to consider during diagnosis. In many cases, distal obstruction is considered idiopathic (primary), while secondary etiologies constitute a small fraction of obstruction causes. Distinguishing them is critical, as specific treatment modalities must be applied to secondary cases. Additionally, several authors emphasize the importance of categorizing secondary cases into oncological and non-oncological etiologies. Non-oncological obstructions primarily affect the nasolacrimal ducts, leaving surgical options (EXT-DCR and END-DCR) largely unchanged from those used in primary etiologies. In contrast, oncological DALO can affect lacrimal pathways at any level and may require a treatment algorithm based on the histology of the malignancy and the degree of spread to surrounding tissues. Thus, this article will not cover all treatment options for lacrimal malignancies, focusing mainly on the treatment algorithm for primary and secondary non-oncological etiologies.

Primary and Revision Surgical Procedures

While END-DCR and EXT-DCR have nearly a 90% success rate, recurrences may occur, necessitating revision surgeries. Key reasons for DCR failure include reduced neorinostomy size, scar tissue, fibrosis, intra-nasal synechiae, and concurrent sino-nasal diseases (e.g., nasal septal deviation or middle concha bullosa) that may have been untreated during the first procedure. Due to these factors, treatment can become complicated when DCR fails, requiring either external or endoscopic approaches. Nonetheless, considering the prevalence of nasal issues associated with DCR failure and the need to avoid further skin incisions, there is a growing acceptance of preferring endoscopic approaches for revision cases: it provides direct visualization of the cause of failure using endonasal optical instruments, enabling selective treatment.

Furthermore, several recently described mini-invasive endoscopic techniques have shown promising results and reduced surgical trauma, allowing for their application in certain patients under local anesthesia. Consequently, due to the lack of comparative data on the revision outcomes of EXT-DCR and END-DCR, employing the endoscopic approach appears

to be the best decision. In primary surgical situations, additional factors should be considered before performing either endoscopic or external DCR procedures.

Selection of General and Local Anesthesia Methods

Once the etiology and type of surgery have been determined, the overall status of the patient with DALO should be assessed, alongside their suitability for general anesthesia. Indeed, while surgical procedures may be easier to perform on anesthetized patients, local anesthesia can be employed in selected cases. Specifically, pharmacological advancements have made general anesthesia the preferred choice due to its benefits, such as optimal surgical conditions, reduced patient anxiety and pain, particularly during periosteal elevation and osteotomy. However, in some instances, the presence of serious systemic illnesses may pose risks to general anesthesia, allowing for local anesthesia instead, which has several advantages including reduced surgical time, decreased incidence of vomiting and illness, minimized blood loss during the procedure, and significantly shorter hospital stays, with minimal impact on outcomes.

On the other hand, local anesthesia, particularly during endoscopic approaches, may lead to several adverse events, such as retro-orbital hemorrhage, damage to the optic nerve, or nasal cavity burning due to diathermy during oxygen supply, which may pose risks in patients who have altered sensory states following sedation. Additionally, there may be risks associated with visualizing the surgical field through endoscopic instruments in non-cooperative patients under local anesthesia, potentially worsening outcomes. Due to all the above reasons, a broader surgical field through external approaches may be beneficial for uncooperative patients, and, without compromising historical experience and final success rates, EXT-DCR should be considered as the chosen surgical approach for DALO under local anesthesia.

Identification of Accompanying Sino-Nasal Pathologies

As mentioned previously, exploring the nasal cavity and sinuses is an important part of preoperative preparation, as sino-nasal anomalies may not always be related to nasal symptoms (e.g., middle turbinate concha bullosa) and can jeopardize the final success rate of DCR. Specifically, preoperative nasal endoscopy, in conjunction with subsequent radiological examinations (such as maxillofacial CT), is essential for ENT preoperative preparation, allowing direct and clear visualization of sino-nasal pathologies. Several studies have emphasized that the presence of nasal diseases adversely affects END-DCR more than EXT-DCR, as the latter approach does not permit direct visualization of nasal anomalies.

Additionally, as previously mentioned, the endoscopic approach enables the simultaneous treatment of nasal pathologies during DCR.

Patient Age

In previous years, patients aged 65 and older were considered the selection criteria for EXT-DCR due to better observed outcomes in this demographic. However, age does not always indicate the presence of severe systemic illnesses, and recent studies have demonstrated the reliability of END-DCR in elderly patients undergoing general anesthesia. Specifically, the success rates of END-DCR in patients aged 65-80 and those over 80 were comparable to those in patients under 65, suggesting that endoscopic procedures are equally effective in these age groups. END-DCR is often described as having advantages over EXT-DCR, such as the absence of external scars, shorter surgical times, quicker recovery, and fewer postoperative complications.

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