

## Evaluation of the Cosmetic and Functional Outcomes of the Subciliary Incision for External Dacryocystorhinostomy

Hossameldeen Elsayed Elbarbary\*

Department of Ophthalmology, Alexandria University Faculty of Medicine, Egypt

\*Corresponding author: Hossameldeen Elsayed Elbarbary, Department of Ophthalmology, Alexandria University Faculty of Medicine, Egypt, E-mail: hossameldin.elbarbary@alexmed.edu.eg; elbarbary\_h@yahoo.com

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### Abstract

This study was a prospective interventional case series evaluating the subciliary incision for external dacryocystorhinostomy. It has a high functional success outcome and an excellent satisfying scar outcome to the surgeon and the patient.

**Purpose:** To evaluate the cosmetic and functional outcomes of subciliary incision for external dacryocystorhinostomy (DCR).

**Methods:** This study was a prospective interventional case series. Forty eyes of external DCR for primary acquired nasolacrimal duct obstruction were done through the subciliary skin approach. Successful functional outcome was defined as relief from epiphora, and normal Fluorescein Disappearance Test (FDT). The cosmetic outcome of the scar was evaluated objectively by the surgeon and subjectively by the patients using the scar grading scale of the postoperative photographs: 0: invisible incision; 1: minimally visible incision; 2: moderately visible incision; and 3: very visible incision. The follow up visits were done over a period of 6 months after surgery.

**Results:** The study included Forty eyes of 36 patients. Primary external DCR through subciliary approach was done for all cases over a period of 42 months starting from July 2013 to December 2016. The functional success was 95% as epiphora was resolved in 38 out of 40 eyes with normal Fluorescein Disappearance Test at 3 months after surgery. Objective grading of the scars was 100% invisible (grade 0) and Subjective scar grading by the patients was 100% invisible (grade 0) at the end of the postoperative follow up visits..

**Conclusions:** The subciliary incision for external DCR has a high functional success outcome and an excellent satisfying scar outcome to the surgeon and the patient. The subciliary approach was simply an attempt to combine the best of 2 worlds, namely subciliary incision and external DCR.

**Keywords:** Dacryocystorhinostomy; Subciliary incision; Nasolacrimal duct obstruction

### Introduction

Nasolacrimal duct obstruction (NLDO) is mostly treated with dacryocystorhinostomy (DCR) procedure, which is performed either through external incision (Ext-DCR) or endonasal approach [1]. External DCR, as originally described in 1904 by Toti [2], consisted of resecting the lacrimal sac mucosa, bone, and nasal mucosa through an external skin incision. This technique was modified by Dupuy-Dutemps and Bourguet [3], who introduced the concept of nasal and lacrimal mucosal flaps to create an epithelium-lined fistula. This procedure has largely been unchanged and remains the gold standard in the treatment of acquired nasolacrimal duct obstruction due to its high success rate which is reported to be above 90% in most published series [1,4]. Despite a high success rate, its main disadvantage is a relatively large (almost 15 mm) skin incision. The classic original incision is a vertical nasal side, which results in a better exposure and less visible skin scar [5-7]. The problems which have been reported after Ext-DCR procedure include medial canthal web formation [5,7], orbicularis oculi dysfunction [5,8], and scar formation [5,7]. In the

recent years, the disadvantage of cutaneous scar with Ex-DCR has led to the evolution of endonasal DCR techniques [1]. The success rates with endonasal DCR have been reported to range from 59% to 100% in various published series. There has been a considerable increase in the popularity of endonasal dacryocystorhinostomy (DCR) compared with conventional external DCR as a result of advances in techniques and instrumentation, especially in the field of nasal endoscopes and video monitors [9,10]. The main advantage of endonasal DCR is the absence of a surgical scar. Other advantages include less disruption of medial canthal anatomy or lacrimal pump function, decreased operative time, early postoperative rehabilitation and ability to simultaneously treat nasal pathologies [9,10]. The disadvantages of the technique include the need for specialized instruments, increased cost, Familiarity with nasal anatomy, difficulty in the treatment of canalicular pathologies, need for an expert assistant and a steep learning curve [9,10].

An ideal DCR technique would be one that allows a large bony ostium and good mucosal anastomosis without an external scar [11]. Because many surgeons still prefer the external approach, techniques to minimize scar formation abound in the literature. There are three categories of new techniques [12]. The first category aimed at modifying the original incision and includes doing the original incision with lacrimal diaphragm closure [8] and minimum incision 5

mm with no skin suture [5]. The second category aimed at placing the incision in other site and includes relaxed skin tension line lid crease incision [13], tear trough incision [12] and subciliary incision [11]. The third category includes conjunctival [14] and caruncular incision [15]. Perioperative antibiotics, careful surgical technique, layered closure, and local anesthetics with epinephrine to maintain a bloodless field have all been cited as important measures to prevent scar formation [6,12,13].

While the anatomic success of Ext-DCR has been well validated [4], fewer studies have evaluated the cosmetic outcomes from its incisions [12]. The eyelid subciliary incision is an established approach for several orbital and eyelid procedures, and is known to provide excellent cosmesis [11,16]. The aim of this study was to evaluate the cosmetic and functional outcomes of the subciliary incision for external dacryocystorhinostomy (Ext-DCR). To the best of the author's knowledge, this is the second report on the subciliary skin incision Ext-DCR.

## Methods

This study was a prospective interventional case series which was conducted at the Ophthalmology Department of Alexandria University Faculty of medicine, Egypt. Ethical Committee Board approval and institutional review approval were obtained for the study. A signed consent by all patients was obtained. Forty eyes of Ext-DCR for 36 adult patients with primary acquired nasolacrimal duct obstruction were done through the subciliary skin incision over a period of 42 months (July 2013 to December 2016). The diagnosis was made after complete ocular and nasal examination as well as fluorescein disappearance test (FDT) and lacrimal irrigation. Exclusion Criteria include previous attacks of acute dacryocystitis, secondary nasolacrimal duct obstruction, co-existing canalicular pathology and previous eyelid or lacrimal surgery.

## Surgical Procedure

All surgeries were performed by single surgeon (The Author). Surgeries were done under general anesthesia for all patients. The incision site was first marked with a pen. All patients were given local anesthetic infiltration mixture along the wound site (2% lignocaine admixed with 1:100.000 adrenaline). The incision was placed 2 to 4 mm below the lash line from punctum medially, to midpupillary line laterally for a length of 10 to 15 mm (Figure 1). Subcutaneous dissection was made inferomedially till anterior lacrimal crest where the orbicularis fibers were separated to expose the underlying periosteum. The remainder of procedure was done in a standard manner including creation of large ostium, anterior mucosal flaps and placement of binocular silicon tube. After the flaps anastomosis, orbicularis and skin closure was done with interrupted absorbable sutures. The routine postoperative wound care and medications were prescribed.

The patients were examined on day 1, 1 week, 1 month, 3 months, and thereafter every 3 to 6 months. At each postoperative visit, functional outcome was evaluated. Functional success was defined as complete resolution of epiphora, and normal Fluorescein Disappearance Test (FDT). At 3 months after surgery, the cosmetic outcome of the scar was evaluated objectively by the surgeon and subjectively by the patient using the scar grading scale of the postoperative wound site: 0: invisible incision; 1: minimally visible incision; 2: moderately visible incision; 3: very visible incision [17].



**Figure 1:** Surgical steps of subciliary incision for Ext-DCR. Marking of the skin incision (a) The subciliary incision (b) Subcutaneous dissection (c) Making the bony ostium and flaps (d) Insertion of silicone tube (e) Skin closure (f) First day postoperative (g) Three months postoperative (h) Three months postoperative (i)

## Results

The study included forty eyes of 36 adult patients with primary nasolacrimal duct obstruction during the study period. Twenty-one (58.3%) out of 36 patients were females. The mean age of the study cases was 44.97 years (range from 25 to 65 years). Primary external DCR through subciliary approach was done for all cases. Four patients (11%) were operated bilaterally. Twenty-four procedures were done on the right side and sixteen procedures were performed on left side. The functional success was 95% as epiphora was markedly improved and resolved in 38 out of 40 eyes with normal Fluorescein Disappearance Test at 3 months after surgery.

Two patients had recurrence of epiphora with prolonged FDT. Lacrimal irrigation done for both cases and showed hard stop with regurgitation. DCR revision was done for both cases at 6 months postoperatively through the same incision to enlarge the ostium with lacrimal intubation. Epiphora was completely resolved in both cases at 3 months after revision DCR.

Three months postoperatively, the objective grading of the scars by the surgeon was 100% invisible (grade 0) and Subjective scar grading by the patients was 100% invisible (grade 0). All patients were satisfied with the scar appearance

## Discussion

The classic approach to Ext-DCR involves a nasal sidewall incision 10 mm to 20 mm in length [5-7]. While the anatomic success of Ext-DCR has been well validated [4], fewer studies have evaluated the cosmetic outcomes from this incision [12]. The main disadvantage of the Ext-DCR incision is the scar formation [5,7].

Records of 169 external OCR procedures performed over an 8.7 year period were reviewed by Tarbet and Custer in 1995 [4]. Patient satisfaction and long-term success were evaluated by telephone survey. They found that a patent system was established in 95% of procedures, whereas 92% remained asymptomatic. Postoperative complications included hemorrhage (3.9%) and scarring (2.6%). Of the surveyed patients, 87% denied continued or recurrent symptoms; 97% rated their incision "good" to "excellent" in appearance; and all patients stated they would recommend the procedure to others. They also had 3 independent observers to grade the incisions (2 ophthalmologists, 1 technician), who all reported average scar grades between invisible and minimally visible at 6 months.

Ciftci et al. compared cosmetic results of the lateral nasal sidewall incision with and without closure of the lacrimal diaphragm [8]. While 8.3% of patients in the skin only closure group developed hypertrophic scarring, only 1.1% developed similar scarring with closure of the lacrimal diaphragm. Kashkouli and Jamshidian-Tehrani [5] in 2014 evaluated scar formation after using a 5 mm nasal sidewall incision without suture closure. They used bimanual manipulation of the incision to allow wide osteotomy. Anatomical and overall functional success was 98.8% (84/85) and 95.3% (81/85), respectively. Subjects with canalicular stenosis had a lower anatomical (75%) and functional (50%) success rates. Wound elongation (up to 8 mm) was observed in 3 cases, which did not require skin suturing. Mean patient satisfaction score for the appearance of incision was 99.2 on a visual analog scale of 0 to 100.

While these results show that most patients are satisfied with the appearance of the Ext-DCR scar, a small percentage of patients are not satisfied with the cosmetic outcome. Several studies have evaluated the effect of placing the incision elsewhere to improve the satisfaction with the postoperative scar appearance. Several studies have avoided external scar formation altogether by placing the incision through the conjunctiva or the caruncle. Kaynak and Yilmaz [14] evaluated a transconjunctival approach to ex-DCR in 25 eyes. While the incision was well concealed, 34% of cases had to be converted to an external approach due to technical difficulties and access issues. Adenis and Robert [15] published a series of 10 patients (11 procedures) who underwent a retrocaruncular approach to Ext-DCR. They did not report any intraoperative complications, but their success rate of 82% was a little lower than previous published Ext-DCR results.

Harris et al. [13] suggested placing the Ext-DCR in the relaxed skin tension lines of the eyelid to minimize scar visibility. Their incision started 10 mm medial to the medial canthus, and extended inferiorly and laterally in the first lower eyelid crease. Davis et al. [12] evaluated the scar appearance after skin incision placed in the tear trough just under the medial canthal tendon and extended inferolaterally into the tear trough for 10 mm to 15 mm. 96% reported the scars as invisible or minimally visible. Only 3 patients (4.2%) rated the scar as moderately visible, but none of these patients were unhappy with the scar. The average surgeon grade across 3 independent surgeons was 0.99 (falls under the score for minimally visible [1]). The advantage of the tear trough incision includes high cosmetic acceptance, avoidance of the angular vessels, easy access to the lacrimal sac fossa, and ability of patients to wear glasses immediately postoperatively.

Dave et al. [11] studied the subciliary approach in 16 patients (2012). At the final follow up, 88% of patients rated the scar as invisible and 100% rated it as invisible or minimally visible. Objective grading by the physician, who was also one of the authors, showed 47% of scars to be invisible and 88.2% of scars to be invisible or minimally visible.

This study results are consistent with the previously reported studies as regard the cosmetic and functional outcomes. The functional success was 95% as epiphora was markedly improved and resolved in 38 out of 40 eyes with normal Fluorescein Disappearance Test at 3 months after surgery. Three months postoperatively, the objective grading of the scars by the surgeon was 100% invisible (grade 0) and Subjective scar grading by the patients was 100% invisible (grade 0). All patients were completely satisfied and happy with the scar appearance.

This study described an incision approach to Ext-DCR, which has been reported once in literature by Dave et al. [11]. The scar assessment was performed prospectively by the patient and the surgeon. The subciliary approach is likely to give good results if surgeon is familiar with subciliary incision for other eyelid or orbital surgeries [11].

## Conflict of Interest

The authors have no financial or conflicts of interest to disclose.

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