Original Article

Scar Appearance and Patient Satisfaction after the Tear Trough Incision for External Dacryocystorhinostomy

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Background: Postoperative scar is the major disadvantage of external dacryocystorhinostomy (DCR). Modified incision should be performed to reduce postoperative scarring.

Objective: To evaluate scar appearance and patient satisfaction after the tear trough incision for external DCR.

Materials and Methods: The present study was a descriptive study with information collected by telephone survey and retrospective chart review. Patients that underwent external DCR over a period of eight years were enrolled and completed the validated Patient Scar Assessment Questionnaire (PSAQ). Scar appearance, consciousness, symptom, and satisfaction were determined. Patient demographics, surgical information, and postoperative scar evaluation using the Scar Cosmesis Assessment and Rating (SCAR) scale were obtained from the medical records.

Results: Fifty-eight patients responded to the telephone interview with 71 DCR surgeries performed. The most common scar characteristic and symptom reported by patients was color mismatch in 11.3% of scars and itching in 15.5%. Scar evaluated by patients was invisible in 57.7% of scars, minimally visible in 40.8%, and moderately visible in 1.4%. Among all patients with noticeable scars, 92% of these made no attempt to conceal the scars. The average patient scar grade was 0.44 (scale 0 to 3). The majority (93.1%) of patients were very satisfied with the scar outcome. Of the 64 scars evaluated by physician using the SCAR scale, common scar characteristics were scar spread (40.6%), hypopigmentation (15.6%), and hypertrophic scar (12.5%). The scar evaluated by physician was invisible in 59.4% of scars, minimally visible in 34.4%, and moderately visible in 6.3%, with an average scar grade of 0.47 (scale 0 to 3).

Conclusion: The tear trough incision for external DCR results in minimal postoperative scarring, providing a very high satisfaction rate in most patients.

Keywords: External dacryocystorhinostomy, DCR, Scar, Tear trough incision, Patient satisfaction

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External dacryocystorhinostomy (DCR) has been the gold standard for the treatment of acquired nasolacrimal duct obstruction (NLDO). The major disadvantage of this procedure is the postoperative scar. In recent years, attention has turned to an endonasal approach to overcome this problem. However, endonasal DCR requires additional instruments with high cost, special training, and high learning curves[1]. Moreover, despite published studies reporting similar success rates between these two procedures, many surgeons still prefer the external approach over endonasal approach due to the success rate and more long-term data on outcome[2]. Therefore, an alternative incision technique for external DCR should be used to reduce postoperative scar formation.

In conventional DCR, the incision is placed vertically at nasal sidewall. This can result in obvious scarring due to misalignment with relaxed skin tension lines. In 1989, Harris et al described a horizontal incision placed along the relaxed skin tension line in the lower lid area to minimize scar visibility[3]. Subsequently, modified skin incisions have been further studied including the lower eyelid, subciliary, and tear trough incision[4-7]. Other approaches such as W, V, and non-cutaneous incision were also

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developed to improve the cosmetic outcome[8,9]. In the authors practice, the incision was placed within the most prominent wrinkle or relaxed skin tension line in the tear trough area as described by Davies et al and Kim et al[4,6]. The postoperative scar is unremarkable in most cases. However, the impact of scars should be evaluated from the patients' point of view, which is not only the scar appearance, but also the scar-perception and satisfaction. Several studies regarding patient-report scar visibility and satisfaction has been reported, but scar consciousness or concerns have not been determined[10-12]. Moreover, physician scar measurements were mostly assessed by simple grading scales based on visibility of the scar. However, this neglects other important parameters to quantify scar appearance and severity[9]. Therefore, the primary aim of the present study was to determine the patient's satisfaction and scar appearance after a tear trough incision for external DCR using a validated questionnaire. The secondary aim was to report postoperative scar characteristics and severity evaluated by the physician using a validated tool for scar measurement.

Materials and Methods

The present study was a descriptive study based on information gathered through telephone questionnaires and retrospective chart review. After ethical approval (SWUEC/X-111/2561), all patients who underwent external DCR at HRH Maha Chakri Sirindhorn Medical Center between March 2010 and April 2018 were identified using the computerized hospital database. The cut-off date of April 2018 was chosen to ensure a minimum of six months after surgery at the time the questionnaire was administered.

To evaluate cosmetic results, each patient was contacted by telephone and asked to complete the Patients Scar Assessment Questionnaire (PSAQ), a standard scoring system developed for linear scar in plastic and reconstructive surgery[13]. The PSAQ consisted of five subscales, but only three of them (appearance, symptoms, and consciousness) were used in the present study to save time and increase the response rate[14]. The appearance subscale (Q1 to Q9) is a self-report scar assessment about color, length, width, thickness, shininess, surface, and texture. The symptoms subscale (Q11 to Q15) inquires about itchiness, pain, discomfort, numbness, and pulling sensation. The scar consciousness subscale (Q18 to Q23) was determined by how noticeable the scar is to oneself and to others, the frequency of thinking about or looking at the scar, and the attempt to conceal the scar. Each question had 4-point categorical responses, ranging from 1 (not at all) to 4 (very or always). The sum of all scores within each subscale were expressed as mean ± standard deviation. Overall satisfaction with the scar appearance was assessed on the scale of 1 to 5 (very satisfied to very dissatisfied). A lower score in each category indicates a more favorable cosmetic outcome.

Following the telephone interview, medical records of the patients who completed the questionnaire were retrospective reviewed to obtain demographic data, operative details, and post-operative scar measurement. All external DCR surgeries were performed under general or local anesthesia by a single surgeon (Chanlalit W). The incision was placed within the most prominent wrinkle or along relaxed skin tension line, in the tear trough area as previously described[3,4]. The incision started just below the medial canthal tendon and extended inferiorly and laterally for a length of 10 to 15 mm, falling slightly anterior to the anterior lacrimal crest. If more exposure was needed, the incision was extended superiorly over the medial canthal tendon. The remainder of the procedure was performed in a standard manner, including placement of a silicone tube. At the end of the surgery, the orbicularis muscle was closed with 6-0 polyglactin sutures and the skin was closed with interrupted 6-0 nylon sutures. Skin sutures were removed five to seven days after surgery. The silicone tube was removed two to three months after surgery.

Postoperative scar measurements, done by the physician using the validated Scar Cosmesis Assessment and Rating (SCAR) scale at the last clinic visit, were obtained from the medical records[15]. Only clinician items including scar spread (score 0 to 4), erythema (score 0 to 3), pigmentation (score 0 to 1), hypertrophy (score 0 to 3), and suture marks (0 to 1) were used in the present study. Patient items (itching and pain) were assessed as a part of the PSAQ telephone interview. The sum of all scores within each item were expressed as mean and percent. Additional overall scar visibility was assessed on 4-point scale (invisible to very visible). Data were analyzed using IBM SPSS Statistics, version 19.0 (IBM Corp., Armonk, NY, USA).

Results

Of the 67 patients included in the present study, 58 (86.6%) responded to the telephone interview. Reasons for unsuccessful interviews were inability to contact (n=6) and patient's death (n=3). Most of

the patients were female (52 out of 58, 89.7%). The mean age at the time of surgery was 60.6 years (range 19 to 90). Thirteen patients (22.4%) presented with acute dacryocystitis. Simultaneous bilateral surgery was performed in 11 (19%) patients and sequential bilateral surgery in two (3.4%) patients with a duration of 12 and 44 months between each operation, yielding a study sample of 71 DCR procedures in 58 patients. Anatomical success rate was found in 90.1% (64/71) of the operations. Eight patients had intermittent epiphora despite anatomical patency, resulting in an overall functional success rate of 78.9% (56/71). Additionally, seven out of 71 cases (9.9%) failed DCR, four cases had a repeat external DCR placing the incision on the previous scar, and functional success was achieved in three cases, of which, two cases were scheduled for a revise operation and one case underwent an endoscopic revision elsewhere. Other than recurrent obstructions, complications were stent prolapse in three out of 71 (4.2%), stent loss in two (2.8%), and massive mucosal bleeding in one case (1.4%).

Mean age of the scars was 34.7 months (range 6 to 104). The most common scar characteristic and symptoms were color mismatch in 11.3% (8/71) and itching in 15.5% (11/71). Scars evaluated by patients were mostly invisible and none was rated as very noticeable. Among the 25 patients with 30 noticeable scars, 92% (23/25) reported that they had no attempt to hide their scars. Only two out of 25 (8%) patients sometime (score 2) concealed their scars with makeup and one out of 25 (4%) patients sometime (score 2) thought about the scar. On the 4-point visibility scale, self-assessment scar grading was 0.44 (scale 0 to 3) and 1.44 (scale 1 to 4). Overall satisfaction with the final cosmetic appearance showed that 93.1% (54/58) of patients were very satisfied and 6.9% (4/58) patients were satisfied. No patients were dissatisfied with the cosmetic result. The overall satisfaction rating was 1.1. Mean scores of each subscale assessed by the PSAQ are listed in Table 1.

Of the surveyed patients about their scars, 90.1% (64/71) had been evaluated by the physician-rating SCAR scales. Common scar characteristics were scar spread, abnormal pigmentation with hypopigmentation being mostly found (10/64, 15.6%) and hypertrophic scar. Most (93.8%) of the scars were graded as invisible or minimal visible, only 6.3% was graded as moderately visible (Figure 1). No scar was graded as very visible. The average visibility score by physician was 0.47 (scale 0 to 3) and 1.47 (scale 1 to 4). The average score in each item are presented in Table 2. Overall scar visibility score assessed by patients and physician are presented in Table 3.

Table 1. Patient Scar Assessment Questionnaire (PSAQ) scores

Subscales (range)	Mean±SD (range)
Appearance (9 to 36)	9.4±1.3 (9 to 19)
Consciousness (6 to 24)	6.4±0.7 (6 to 9)
Symptoms (5 to 20)	5.2±0.5 (5 to 7)
Overall satisfaction (1 to 5)	1.1±0.3 (1 to 2)

SD=standard deviation

Table 2. Scar Cosmesis Assessment and Rating (SCAR) scale

Clinician items (range)	n=64 n (%)	Mean (range)
Scar spread (0 to 4)	26 (40.6)	0.55 (0 to 3)
Pigmentation (0 to 1)	13 (20.3)	0.22 (0 to 1)
Hypertrophy (0 to 3)	8 (12.5)	0.14 (0 to 2)
Track/suture marks (0 to 1)	3 (4.7)	0.05 (0 to 1)
Erythema (0 to 3)	0 (0.0)	0 (0.0)

Table 3. Summary of scar visibility grading by patients and physician

Overall visibility	Patients (n=71)	Physician (n=64)
Invisible	41 (57.7%)	38 (59.4%)
Minimally visible	29 (40.8%)	22 (34.4%)
Moderately visible	1 (1.4%)	4 (6.3%)
Very visible	0 (0.0%)	0 (0.0%)
Score (0 to 3)	0.44	0.47

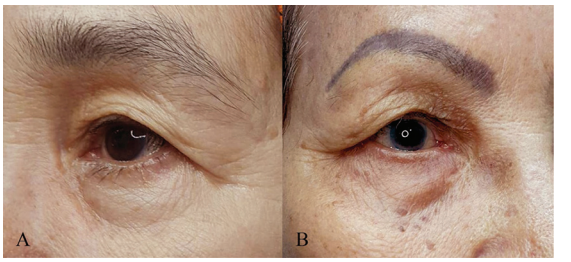

Figure 1. Final scar appearance; (A) minimally visible; (B) moderately visible.

Discussion

Postoperative scar is considered the major disadvantage of the external DCR. The authors performed a modified horizontal incision in the tear

trough area to minimize scarring. The present study aimed to report scar characteristics and severity evaluated by both physician and patients, including patient's perceptions and satisfaction after a tear trough incision for external DCR.

From the previous studies of DCR scars, the scar appearance is frequently measured on a 4-point scale from invisible to very visible, but with a different numerical rating of 0 to 3 or 1 to 4. Regarding conventional nasal sidewall incision, a wide range of patients (23% to 81%) graded their scars as invisible[8,10-12,16,17]. Based on the scale of 0 to 3, objective scar grading by patients was 0.65 to 0.74 and by physicians was 0.70 to 0.94[16,17]. Cosmetically significant scar was associated with young age (younger than 50 years), female gender, dark skin, types of suture used, and discomfort during suture removal[11,12,18].

To improve the cosmetic result of external DCR scar, in 1989, Harris et al suggested placing the incision horizontally along the relaxed skin tension lines[3]. Subsequently, it was further studied and reported with slight variations by several surgeons. Kim et al studied and customized the incision in each Asian patient[6]. The incision was placed in the most prominent wrinkle in elderly patients or subciliary area in young patients who had no definite relaxed skin tension line. While they reported these approaches to be cosmetically superior, the objective scar grading was not officially documented. Akaishi et al performed a subciliary incision for external DCR[7]. Mean scar visibility was 1.44 (scale 1 to 4) reported by physicians but without assessment by patients. Later, Dave et al studied the same approach and included scar assessment by patients[5]. Patients reported all scar to be invisible or minimally visible with the average scar score of 0.17 (scale 0 to 3). Physician reported only 11.7% of scars was graded as moderately visible with the average scar score of 0.61 (scale 0 to 3).

Since 2010, the authors performed a modified lower eyelid incision within the most prominent wrinkle as described by Kim et al[6]. The incision started just below the medial canthal tendon and extended inferiorly and laterally. The incision was more inferior and more downward slope compared to the subciliary incision, so it was closer to the anterior lacrimal crest. The same approach was reported by Davies et al in 2015, named a tear trough incision[4]. They found that 83.3% of the patients reported the scar to be invisible. Only 4.2% of the patients rated the scar as moderately visible, but none of these patients were unhappy with the scar. The scars evaluated by three independent surgeons were invisible in 25.5% and very visible in 3.7%. The average scar grading (scale 0 to 3) was 0.21 assessed by patients and 0.99 assessed by surgeons. Beside minimize scarring, this approach has many advantages as 1) avoiding angular artery, 2) easy access and good exposure of the lacrimal sac fossa, and 3) not crossing the epicanthal fold, which is a prominent feature in Asians and can result in skin webbing. Similar to many previous studies of DCR scars, only scar visibility was evaluated without describing other scar characteristics.

Other modified incisions had also been described to minimize scarring. The W incision is a non-linear shape incision and decreases tensile force at the incisional site, therefore, results in less scar visibility[8]. The disadvantages of the W incision are the longer length of incision and the surgical instruments can injure the angle of the wound. Non-cutaneous incision such as transconjunctival incision may need conversion to external incision when orbital fat prolapse obstructing the visualization[19].

There are several reliable and valid scar scales in a wide range of scar types for both patients and physicians evaluation. For patients' self-assessment, the visual analog scale (VAS) has been used as a measuring tool for patient satisfaction in two studies of DCR scars[9,20]. The present study utilized the PSAQ, a reliable and valid multi-scale questionnaire developed for patient self-assessment of surgical scarring. The PSAQ incorporates subjective data of scar appearance, symptoms, and particularly scar consciousness that are not included in most scales[15]. The present study found that 57.7% of scars were invisible to the patients. The result was less favorable compared to the report of Davies et al, in which 83.3% of patients graded the incision as invisible[4]. This is probably due to Asians have a tendency toward hypopigmentation and hypertrophic scar. Therefore, more noticeable scarring to both patients and physicians were reported. However, the majority (98.6%) of scars was graded as not more than minimally visible. Moreover, the score in each subscale (appearance, symptoms, and consciousness) was very low, indicating that surgical scar after the tear trough incision was cosmetically acceptable to most patients. Only a small number of patients were concerned or attempted to hide their scars, but none of these patients were dissatisfied with the scar appearance. The results showed that the majority (93.1%) of patients were very satisfied with the scar appearance. Consistent with previous studies, it was

observed that women and young patients (younger than 50 years) tend to be more self-conscious about their DCR scars.

For physician grading, the Vancouver Scar Scale (VSS) and the Patient and the Observer Scar Assessment Scale (POSAS) are the most frequently used tools[21]. The POSAS also include a patient component of scar assessment, however, without having the criteria described for each numerical grading, it can be difficult for some patients to score from 1 to 10, especially elderly patients. Originally, both scales were developed for burn scar evaluation. While the scales were later tested for applicability in linear scars, these scales had different clinical considerations at the inception[22]. Among all studies of DCR scars, the only validated scale used for physician assessment was the Stony Brook scar evaluation scale (SBSES). It has been used as a measuring tool in a study of periciliary V-incision DCR[9]. The scale was developed for evaluation of linear scars, which included important parameters such as size, color, and suture marks. However, with a binary outcome (yes or no) in each parameter, assessment of scar evolution and degree of severity was limited. In the present study, the authors used the SCAR scale developed for measurement of postoperative linear scars[22]. The SCAR scale shares many features with the SBSES but has more written criteria in each category. It is a simple and fast method to quantify scar appearance. The present study found that common scar characteristics were scar spread, hypopigmentation, and hypertrophic scar, which are commonly found in Asians. Surprisingly, prior history of acute dacryocystitis or repeated incision was not associated with worse scar appearance. Scar rating by physician (score 0.47) reported a slightly more favorable outcome than previous study (score 0.99)[4]. This can be assumed that the incision is well-concealed within wrinkles. However, only one single observer assessed all the scars and may bias the results. A prospective study with multiple observers should be conducted to solve the issue.

Because external DCR has high success rate, acceptable scar, and does not require expensive equipment or high learning curve, therefore, in the author's opinion, external DCR still remains the appropriate choice of surgery for the treatment of NLDO and modified incision should be performed to camouflage surgical scar such as the tear trough incision.

Limitation of the present study was the retrospective non-comparative study design. In addition, the number of patients included in the study was lower than expected. The main problem in recruitment was the fact that computerized hospital database was only recently used. The actual number of patients who underwent DCR prior to the used of computerized database could not be identified. Another limitation was one single observer assessed all the scars and may bias the results. Nonetheless, this is the first study to evaluate scar self-consciousness after external DCR using a validated questionnaire. In addition to long-term outcomes, the strength of the present study also includes the use of validated measuring tool for physician assessment to describe physical characteristics and cosmetic outcome of the scars. Prospective comparative study should be further conducted to solve these limitations.

Conclusion

The tear trough incision for external DCR can be used to conceal scars, providing a superior cosmetic outcome evaluated by both patients and physician with a very high patient satisfaction rate.

What is already known on this topic?

Modified skin incision placed in the tear trough area for external DCR provides a good cosmetic outcome.

What this study adds?

A small number of patients were concerned about the scars and made efforts to hide their DCR scars. Common DCR scar characteristics were scar spread, hypopigmentation, and hypertrophic scar.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Hii BW, McNab AA, Friebel JD. A comparison of external and endonasal dacryocystorhinostomy in regard to patient satisfaction and cost. Orbit 2012;31:67-76.
2. Barmettler A, Ehrlich JR, Lelli G Jr. Current preferences and reported success rates in dacryocystorhinostomy amongst ASOPRS members. Orbit 2013;32:20-6.
3. Harris GJ, Sakol PJ, Beatty RL. Relaxed skin tension line incision for dacryocystorhinostomy. Am J Ophthalmol 1989;108:742-3.
4. Davies BW, McCracken MS, Hawes MJ, Hink EM, Durairaj VD, Pelton RW. Tear trough incision for external dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg 2015;31:278-81.
5. Dave TV, Javed Ali M, Sravani P, Naik MN. Subciliary

incision for external dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg 2012;28:341-5.
6. Kim JH, Woo KI, Chang HR. Eyelid incision for dacryocystorhinostomy in Asians. Korean J Ophthalmol 2005;19:243-6.
7. Akaishi PM, Mano JB, Pereira IC, Cruz AA. Functional and cosmetic results of a lower eyelid crease approach for external dacryocystorhinostomy. Arq Bras Oftalmol 2011;74:283-5.
8. Ekinci M, Çağatay HH, Oba ME, Yazar Z, Kaplan A, Gökçe G, et al. The long-term follow-up results of external dacryocystorhinostomy skin incision scar with "W incision". Orbit 2013;32:349-55.
9. Ng DS, Chan E, Yu DK, Ko ST. Aesthetic assessment in periciliary "v-incision" versus conventional external dacryocystorhinostomy in Asians. Graefes Arch Clin Exp Ophthalmol 2015;253:1783-90.
10. Tarbet KJ, Custer PL. External dacryocystorhinostomy. Surgical success, patient satisfaction, and economic cost. Ophthalmology 1995;102:1065-70.
11. Sharma V, Martin PA, Benger R, Kourt G, Danks JJ, Deckel Y, et al. Evaluation of the cosmetic significance of external dacryocystorhinostomy scars. Am J Ophthalmol 2005;140:359-62.
12. Caesar RH, Fernando G, Scott K, McNab AA. Scarring in external dacryocystorhinostomy: fact or fiction? Orbit 2005;24:83-6.
13. Durani P, McGrouther DA, Ferguson MW. The Patient Scar Assessment Questionnaire: a reliable and valid patient-reported outcomes measure for linear scars. Plast Reconstr Surg 2009;123:1481-9.
14. Lee YJ, Cho YJ, Lee SY, Yoon JS. Comparison of satisfaction after direct browplasty in Asian patients with and without brow tattoo. Can J Ophthalmol 2014;49:174-9.
15. Kantor J. The SCAR (Scar Cosmesis Assessment and Rating) scale: development and validation of a new outcome measure for postoperative scar assessment. Br J Dermatol 2016;175:1394-6.
16. Rizvi SA, Saquib M, Maheshwari R, Gupta Y, Iqbal Z, Maheshwari P. Cosmetic evaluation of surgical scars after external dacryocystorhinostomy. Int J Ophthalmol 2016;9:1745-50.
17. Devoto MH, Zaffaroni MC, Bernardini FP, de Conciliis C. Postoperative evaluation of skin incision in external dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg 2004;20:358-61.
18. Waly MA, Shalaby OE, Elbakary MA, Hashish AA. The cosmetic outcome of external dacryocystorhinostomy scar and factors affecting it. Indian J Ophthalmol 2016;64:261-5.
19. Kaynak P, Ozturker C, Karabulut G, Celik B, Yilmaz OF, Demirok A. Transconjunctival dacryocystorhinostomy: Long term results. Saudi J Ophthalmol 2014;28:61-5.
20. Kashkouli MB, Jamshidian-Tehrani M. Minimum incision no skin suture external dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg 2014;30:405-9.
21. Zhang J, Miller CJ, O'Malley V, Bowman EB, Etzkorn JR, Shin TM, et al. Patient and physician assessment of surgical scars: A systematic review. JAMA Facial Plast Surg 2018;20:314-23.
22. Roh MR. The SCAR (Scar Cosmesis Assessment and Rating) scale: new evaluation method for postoperative scars. Br J Dermatol 2016;175:1151-2.