

The evaluation of the effects of lateral osteotomies on the lacrimal drainage system after rhinoplasty using active transport dacryocystography*

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SUMMARY

The lacrimal drainage system (LDS) is vulnerable to surgical trauma during rhinoplasty. We aimed to investigate the possible effects of the low lateral osteotomies on the LDS during rhinoplasty using active transport dacryocystography (ATD) at the late postoperative stage. Twenty patients who underwent open rhinoplasty were evaluated by ATD between the sixth and seventh postoperative months. Presence of the LDS dehiscence and the absence of the passage of the contrast material into the inferior meatus were noted as signs of injury to the LDS in ATD. The proximity of the osteotomy site to the LDS was measured using three different measurements in ATD. The distance from the lacrimal fossa to the lateral osteotomy site, the distance from the inferior meatus to the lateral osteotomy site and the distance from the middle point of the lacrimal fossa and inferior meatus to the lateral osteotomy site were measured. The anatomic integrity of the bone structure around the LDS was preserved in all patients and free drainage of contrast media from the fossa lacrimalis to inferior meatus was observed in ATD evaluation of all patients. The average distance from the LDS to the lateral osteotomy site was found to be between 7-8.8 mm. In conclusion, the low lateral osteotomy is a safe method in order to avoid trauma to the LDS, and ATD seems an appropriate diagnostic technique in evaluation of the LDS after rhinoplasty.

Key words: rhinoplasty, epiphora, lateral osteotomy, active transport dacryocystography, lacrimal drainage system.

INTRODUCTION

The lacrimal drainage system (LDS) is one of the vulnerable structures to surgical trauma during rhinoplasty due to its anatomic localization. Epiphora, which has been reported just following rhinoplasty, is secondary to edema rather than an actual surgical disruption of the LDS and is normally self limiting (Thomas and Griner, 1986). However, LDS injury does not necessarily result in epiphora (Unlu et al., 2001). The development of late nasolacrimal obstruction due to surgical trauma is also possible (Cies and Baylis, 1976).

Sachs (1989) reported 10 patients (2%) complaining of epiphora after rhinoplasty. Flowers and Anderson (1968) reported evidence of injury to the LDS after lateral osteotomy in 9 of 37 fresh autopsy specimens. However, they reviewed 1000 consecutive rhinoplasty cases and they found no evidence of clinical LDS damage.

ATD is an imaging method for evaluation of the LDS after rhinoplasty. ATD can demonstrate the anatomic patency and the physiological pump function of the LDS concomitantly. Unlü et al. (1996) evaluated the effects of lateral osteotomies on the LDS using active transport dacryocystography (ATD) in 16 patients and they did not record any pathological alteration such as mucosal edema or discontinuity of the LDS.

We aimed to investigate the possible effects of the low lateral osteotomies on the LDS during rhinoplasty and to measure the distances from the lateral osteotomy site to the LDS in 3 different points using ATD.

MATERIALS AND METHODS

In order to evaluate the relationship of the low lateral osteotomies to the LDS, patients who underwent open rhinoplasty were evaluated with ATD between the postoperative sixth and seventh months. Patients with preoperative complaints of epiphora and history of dacryocystorhinostomy procedures in the past were excluded from the study. Informed consent was obtained from all the patients. All the cases were operated by two authors (O.Y., U.C.). In all cases, the short mucosal incision was made just in front of the head of the inferior turbinate for lateral osteotomy. From this incision, a narrow subperiosteal tunnel was carried out by progression of the elevator which ascended, staying in contact with the bone and moved towards the anterior lacrimal crest, guided by the index finger of the left hand of the surgeon so that it stayed in front of the lacrimal crest. The lateral osteotomy was started approximately 5 mm above the lowest point of the pyriform aperture. At first, a 4 mm slightly curved chisel with a guarding notch was engaged firmly into the bone and the osteotomy was directed downward and outward. After the angle between the nose and facial plane was reached, the osteotomy progressed straight toward the point just above the insertion of the medial canthal ligament. The lateral osteotomy ended at the junction of the maxilla and the frontal bone.

After the surgery between the sixth and the seventh postoperative months, all patients were imaged by ATD. We used the technique of ATD which was described by Unlu et al. (1996, 2001). Thirty minutes and 10 minutes before the computerized tomography (CT) imaging, five drops of non-ionic contrast media (Iopamidol, Iohexol) were applied to both eyes of the patients. Patients were imaged in supine position. This was followed by scanning in the axial planes and using zoom, and thus optimum demonstration was achieved. The sections started from the infra-orbitomeatal line with 5 consecutive axial slices every 4 mm. Low mAs, bone detail reconstruction algorithm and wide windows were used. The CT scans were carried out with a General Electric Hi Speed DX/i scanner in all patients. Imaging parameters were as follows: slice thickness: 4 mm, KV: 120, mAs: 150, matrix: 512 x 512, filter: e.

The parameters studied in ATD examination for the evaluation of the LDS injury were the integrity of the bone lacrimal canal and its patency, which were indicated by observation of the non-ionic contrast material in the inferior meatus. The distance from the lateral osteotomy site to the lacrimal fossa (A), the midpoint of the lacrimal fossa and inferior meatus (B), and inferior meatus (C) were measured to assess the proximity of the osteotomy site to the LDS (Figures 1, 2 and 3). ATD findings were analyzed separately on the left and on the right sides in each patient.

RESULTS

The study involves 20 patients (9 males and 11 females), ranging in age from 19 to 32 years. None of the patients reported any signs of epiphora in late postoperative stage. The findings



Figure 1. The distance from lacrimal fossa to the lateral osteotomy site (A).

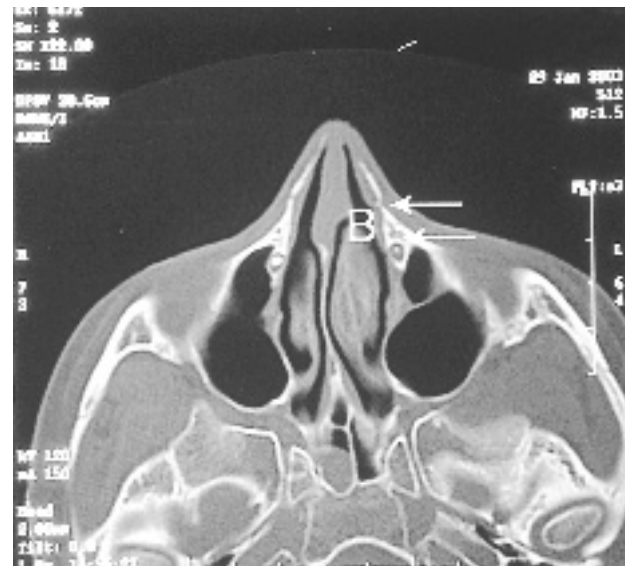


Figure 2. The distance from middle point of the lacrimal fossa and inferior meatus to the lateral osteotomy site (B).



Figure 3. The distance from inferior meatus to the lateral osteotomy site (C).

in ATD evaluation, the anatomic integrity of the bone structure around the LDS were preserved, free drainage of contrast media from the fossa lacrimalis to the inferior meatus was observed in all patients. The average distance from the lateral osteotomy site to the lacrimal fossa, the middle point of the lacrimal fossa and inferior meatus were 8.1 ± 2.3 mm (max. 11 mm, min. 3 mm) on the right and 8.0 ± 2.4 mm (max. 11 mm, min. 3 mm) on the left, 7 ± 3.1 mm (max. 12 mm, min. 3 mm) on the right and 7.4 ± 3.1 mm (max. 12 mm, min. 2 mm) on the left, 8.8 ± 3.2 mm (max. 14 mm, min. 3 mm) on the right and 8.8 ± 3.3 mm (max. 14 mm, min. 2 mm) on the left side, respectively.

DISCUSSION

Rhinoplasty is not a very difficult operation technically but has the potential for rare but yet serious complications. Transient LDS obstruction is a common complication of rhinoplasty. A need for dacryocystorhinostomy to re-establish anatomic drainage is rare. The anatomical variations in the paranasal sinuses and extensive measurements concerning the LDS have been well documented by Lang (1989). Flowers and Anderson (1968) reported that 21 of 27 rhinoplasty patients, who were examined on the second postoperative day, had epiphora on one or both sides. This was usually secondary to nasal packing, creating a functional blockage to the passage of tears. Osguthorpe and Calcaterra (1979) reported 3 patients with surgical injury to the LDS after rhinoplasty, which necessitated dacryocystorhinostomy for correction. They showed that the most vulnerable area to inadvertent surgical injury was the nasolacrimal sac, located just beneath the medial canthal ligament. Flowers and Anderson (1968) carried out 74 dacryocystograms of 37 fresh cadaver specimens after lateral osteotomies and showed evidence of disruption of the LDS in 23%. In the same study, both sides were dissected and disruption of one or both sides was demonstrated in 12 (33%) cadavers and all of these injuries appeared in the lacrimal sac region. They reported that damage produced by the osteotomy was limited to the lacrimal sac, which heals rapidly without stenosis; but if there was injury to the canaliculi, or to the lacrimal duct, we should expect a high incidence of stenosis and associated epiphora. Thomas and Griner (1986) reported that the anterior wall of the sac was unprotected by bone for 10 to 11 mm. In their study, 10 fresh cadaver specimens were studied following bilateral osteotomies. There were no cases of lacrimal apparatus injury in any of the 10 patients. They showed that the average distance from the osteotomy line to the lacrimal crest was 7 mm. In order to avoid trauma to the lacrimal apparatus, they suggested a low, curved osteotomy without precreation of subperiosteal tunnels. Thomas and Griner (1986) also reported that subperiosteal tunneling was deep to the predictive medial canthal ligament which could be disrupted and this predisposes the lacrimal sac to a shearing injury because of its attachment to the undersurface of the ligament. However, for most authors, the elevation of the periosteum is a useful step in pre-

venting injury to the lacrimal sac and the medial canthal ligament (Jugo, 1995). In our study, subperiosteal tunnels were performed in all patients with no evidence of lacrimal sac damage and the average distances from the lacrimal fossa to the lateral osteotomy site were found 8 mm (max. 11 mm, min. 3 mm). We also noticed that the average distance from the midpoint of the lacrimal sac and inferior meatus to lateral osteotomy site was shorter than the average distance from the lacrimal sac to the lateral osteotomy site and the average distance from the inferior meatus to the lateral osteotomy site.

Dacryocystography, dacryocintillography and the Jones test were the primary diagnostic tools used in the evaluation of lacrimal system injury following surgical procedures (Flowers and Anderson, 1968; Hunink et al., 1988; Unlu et al., 2001). However, in their conventional methods, superimposition of skeletal structures does not allow exact and correct evaluation of the LDS. Being able to acquire information on the bony detail, the anatomic patency and the function at the same time are the major advantages of the ATD over conventional methods (Unlu et al., 1996). The major disadvantages of the ATD are its cost and radiological load for the patient. ATD was suggested by Unlu et al. for evaluation of the LDS after rhinoplasty or endoscopic sinus surgery (Unlu et al., 1996; Unlu et al., 2001). In ATD, the first section as shown in the scanogram, approximates to the inferior part of fossa lacrimalis. In the second, third and fourth axial sections, the lumen of the duct filled with contrast material, thickness of the ductal mucosa, and the bony canal around the duct can be clearly evaluated. In the fifth section, the free passage of the contrast material to the inferior meatus and the detailed image of the neighboring structures can be identified precisely.

In our study, the anatomic integrity of the bone structure around the LDS was seen to be preserved and free drainage of contrast media from the fossa lacrimalis to the inferior meatus was observed in ATD evaluation of all patients. The main reason for evaluating our patients in the late postoperative stage was to assess the permanent effects of lateral osteotomies on the bony canal of LDS. Thus, the physiological blockage of the lacrimal passage secondary to edema in an early stage was eliminated.

In conclusion, the anatomic integrity of the bone structure around the LDS is preserved by using the low osteotomy technique. In evaluation with ATD, the distances between the LDS and the lateral osteotomy site are 7-8.8 mm on average. ATD seems an appropriate diagnostic technique in evaluation of the LDS after complications in rhinoplasty or accidents with midfacial fractures.

REFERENCES

1. Chavis RM, Welham RA, Maisey MN (1978) Quantitative lacrimal scintillography. Arch Ophthalmol 96: 2066-2068.
2. Cies WA, Baylis HI (1976) Epiphora following rhinoplasty and Caldwell-Luc procedures. Ophthalmic Surg 7: 77-81.
3. Flowers RS, Anderson R (1968) Injury to the lacrimal apparatus during rhinoplasty. Plast Reconstr Surg 42: 577-581.
4. Hunink MG, de Vries-Knoppert WA, Balm AJ, Luth VJ (1988) Dacryocystography after paranasal sinus surgery. Br J Radiol 61: 362-365.
5. Jugo S (1995) Surgical atlas of external rhinoplasty. Decortication approach. Churchill Livingstone, Hong Kong.
6. Lang J (1989) Clinical anatomy of the nose, nasal cavity and paranasal sinuses. Thieme, New York.
7. Osguthorpe DJ, Calcaterra TC (1979) Nasolacrimal obstruction after maxillary sinus and rhinoplastic surgery. Arch Otolaryngol 105: 264-266.
8. Sachs ME (1989) Post-rhinoplastic nasal obstruction. Otolaryngol Clin North Am 22: 319-332.
9. Thomas R, Griner N (1986) The relationship of lateral osteotomies in rhinoplasty to the lacrimal drainage system. Otolaryngol Head Neck Surg 94: 362-367.
10. Unlu HH, Goktan C, Aslan A, Tarhan S (2001) Injury to the lacrimal apparatus after endoscopic sinus surgery: surgical implications from active transport dacryocystography. Otolaryngol Head Neck Surg 124: 308-312.
11. Unlu HH, Caylan R, Kutlu N, Imamoglu M, Unal M, Yuceturk AV (1996) Active transport dacryocystography in evaluating lacrimal drainage system after rhinoplasty. Am J Rhinology 10: 87-91.

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