# Delayed Epistaxis in External Dacryocystorhinostomy

## *Rate and Risk Factors*

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**Objective:** To report the incidence and risk factors associated with delayed epistaxis (2-8 days after the procedure) after external dacryocystorhinostomy (DCR).

**Design:** We identified and analyzed all cases of patients who underwent external DCR procedures at 2 institutions from January 1999 through December 2005. Cases of delayed epistaxis and their final surgical outcome were compared with those without it.

**Setting:** All patients who underwent surgery and were examined at 2 public hospitals in Melbourne, Australia.

**Patients:** A total of 374 patients who underwent 437 DCRs.

**Interventions:** Medical treatment, hospitalization, and endonasal examination with cautery.

**Main Outcome Measures:** Rate of delayed epistaxis and current and past use of antiplatelet medications.

**Results:** Of the 374 patients (mean [SD] age, 62 [18] years; 280 [75%] were women) who underwent 437 external DCRs, 15 (3.4%) had an episode of delayed epistaxis. They were generally older and more likely to have a history of active dacryocystitis compared with those who did not develop delayed epistaxis. Preoperative use of aspirin, nonsteroidal anti-inflammatory drugs, or warfarin sodium was not associated with delayed epistaxis or poorer surgical outcome if these anticoagulants were discontinued preoperatively as instructed. None of the 15 patients with delayed epistaxis had continued ingesting anticoagulants before undergoing DCR. Patients who developed epistaxis (80%) had a significantly lower rate of satisfactory surgical outcome than those who did not (90%) (*P* = .02).

**Conclusion:** The risk of delayed epistaxis should be similar for patients taking or not taking anticoagulant agents if their use is stopped within a defined period of time before DCR.

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**D**ACRYOCYSTORHINOS-tomy (DCR) is a relatively successful surgery for nasolacrimal duct obstruction.[1,2] The basic principle of creating a large bypass above the obstruction by connecting the lacrimal sac through a bone ostium to the nasal cavity has remained the same since it was described over a century ago.[3,4] In recent years, endoscopic endonasal DCR has gained popularity, although it is considered more technically challenging and has a prolonged learning curve and a possibly lower rate of success than external DCR.[1,2,5-7]

Early postoperative complications of external DCR include hemorrhage within the first 24 hours that normally subsides spontaneously. Delayed epistaxis may occur 2 to 8 days after surgery, possibly as a result of the dissolution of a blood clot at the surgical site.[8] Several investigators consider postoperative infection to be a causative factor in delayed epistaxis and therefore advocate oral or intravenous antibiotic treatment for their patients. The most important late complication is surgical failure from scar formation around the osteotomy site. There are other complications, but they are uncommon.

Several years ago, Tsirbas and McNab[8] described a 3.8% rate of delayed epistaxis after 293 DCR procedures. The potentially reversible factor that we identified in that series was the use of aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs) during a certain time frame before surgery. We have since established strict guidelines for stopping the use of aspirin 2 weeks before DCR and the use of NSAIDs 1 week before DCR. Our protocol then and currently is that patients who develop delayed epistaxis undergo nasal endoscopy to identify any potential active bleeding. Patients whose bleeding

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stops following the administration of vasoconstrictor nasal spray, without packing, are given oral antibiotics and allowed to go home, with instructions to return if bleeding recurs. If vasoconstrictor nasal spray does not suffice, the patient is admitted to hospital, the nose is packed for 24 hours, and intravenous antibiotics are administered.

We evaluated whether following the instructions of scheduled cessation of the use of aspirin and NSAIDs prior to undergoing DCR favorably influences the rate of delayed epistaxis.

## METHODS

A retrospective medical chart review of all consecutive patients who underwent external DCR at the Royal Victorian Eye and Ear Hospital (RVEEH) and Mercy Hospital from January 1999 through December 2005 was performed. All the procedures had been performed by one of the authors (A.A.M.).

Data on tearing status, medical history, NSAIDs, aspirin, and warfarin sodium use (duration and dose), cessation of these anticoagulants before surgery, surgical outcome, and secondary bleeding were collected and analyzed. Delayed epistaxis was defined as hemorrhage that occurred 2 to 8 days postoperatively. The study was approved by the local institutional review board.

All patients were instructed to stop the ingestion of aspirin 2 weeks before undergoing DCR and NSAIDs 1 week before undergoing DCR; otherwise, surgery was cancelled. Patients with purulent material in the lacrimal sac were treated with a bolus of intravenous cephalexin, 1 g, at the commencement of surgery. Warfarin was stopped 5 days prior to surgery, and an international normalized ratio (INR) test was obtained: surgery was cancelled if the INR value was higher than 1.5.

In the current study, delayed epistaxis was defined as epistaxis occurring not earlier than 2 days after surgery. All patients with delayed epistaxis were assessed in the emergency department of the RVEEH. The nose was sprayed with nasal decongestant, and nasal endoscopy was performed, after which any identified source of bleeding was cauterized. Patients requiring nasal packing were admitted to hospital and also received intravenous antibiotics. The nose pack was removed 24 hours later, and the patient was discharged 1 hour after a meal if bleeding did not recur. Patients who did not require hospital admission were treated with oral antibiotics and instructed to return if bleeding recurred.

### SURGICAL TECHNIQUE

The external DCR was performed in a standardized fashion as described in detail elsewhere.[2] Briefly, a skin flap was elevated over the medial canthal tendon, which was identified and incised. A periosteal incision was performed at the level of the incised tendon 2 mm above the medial canthal tendon superiorly and 2 mm toward the inferior orbital rim inferiorly. Large osteotomies were performed using bone punches for removing lacrimal bone, the frontal process of the maxilla, and the medial wall of the upper nasolacrimal duct. Anterior ethmoid air cells (agger nasi) were often exposed intra-operatively. Posterior flaps were always fashioned, and both anterior and posterior flaps were sutured. Silicone tubes were inserted almost routinely. The silicone tube was sutured with two 6-0 silk sutures to form a closed loop and removed 6 weeks postoperatively.

Our method of minimizing intraoperative bleeding during DCR includes meticulous infiltration of topical anesthesia combined with adrenaline at the surgical site, nose spraying with lidocaine hydrochloride and weak phenylephrine hydrochloride, and packing with cocaine hydrochloride–soaked ribbon gauze at least 10 minutes prior to surgery.[9] A skin flap is raised, and the orbicularis muscle is separated from the flap and bluntly dissected to expose the medial canthal tendon that is then severed. The angular vessels are thus left undisturbed on the medial side of the dissection. Blunt dissection is continued to the periosteum, and meticulous bipolar cautery is used to control bleeding from soft tissue. Bone wax can be used on bleeding bone, and cellulose sponge is placed on bleeding mucosal sites if needed. In the earlier report of this method,[8] we recorded a mean blood loss of 4.5 mL, with a maximal blood loss of 14 mL.[10] This minimal blood loss technique was used in the current study.

### STATISTICAL ANALYSIS

Independent samples $t$ test and $\chi^2$ nonparametric analysis were used to compare numerical variables and proportions, respectively, between aspirin or NSAIDs users with nonusers, patients with delayed epistaxis and patients with uneventful postoperative course, and successful and failed cases. The Fisher exact test was used to examine the probability of delayed epistaxis after DCR surgery. Kaplan-Meier survival analysis was used to calculate cumulative survival in patients undergoing DCR; an event was defined as delayed epistaxis. Statistical analysis was performed using Microsoft Excel 2003 (Microsoft Corp, Redmond, Washington) and SPSS (version 13.0; SPSS Inc, Chicago, Illinois) computer programs.

## RESULTS

A total of 374 patients (280 [75%] were women; mean [SD] age, 62 [18] years) underwent 437 DCR procedures (63 patients underwent bilateral surgery). The procedures were equally distributed between the right and left sides. Nasolacrimal duct obstruction was diagnosed based on a history of tearing with failure to irrigate the lacrimal drainage system, and 9% of patients had signs of dacryocystitis as defined by the presence of purulent material in the lacrimal sac at surgery. The demographics of the study population are summarized in the **Table**.

Local anesthesia was used in 323 cases (74%), and general anesthesia in the remaining 114 (26%). Silicone tubes were placed in all but 22 cases (5%) (usually because the patient was an infant or a young child with nasolacrimal duct obstruction, or when removal of the tubing would have required a second anesthetic). Medical history disclosed hypertension in 138 patients (37%), and diabetes mellitus and ischemic heart disease in 26 each (7%).

Thirty-seven of the study patients (10%) reported the use of NSAIDs, and 79 (21%) used aspirin at a mean (SD) dose of 111 (21) mg/d. Aspirin was stopped 2 weeks before DCR and NSAIDs 1 week before DCR, and surgery was deferred if patients failed to do so. Only seven patients used warfarin (2%), and this was always stopped 5 days before surgery. Thus, all 437 procedures were conducted according to the stringent guidelines of cessation of anticoagulants before surgery.

There were 15 cases in which there was an episode of hemorrhage 2 to 8 days after surgery (3.4%). The mean (SD) age of these patients was 70 (12) years compared with the mean age of 62 (18) years for patients without delayed epistaxis ($P=.02$; independent samples $t$ test).

| Characteristic | Value |
| --- | --- |
| Age, mean (SD), y | 62 (18) |
| Sex, patients | |
| Male | 94 (25) |
| Female | 280 (76) |
| History of dacryocystitis | 34 (9) |
| Anesthesia, % | |
| Local | 74 |
| General | 26 |
| Silicone intubation | |
| Yes | 352 (94) |
| No | 22 (6) |
| Outcome, % | |
| Complete success | 90 |
| Failure | 7 |
| Reoperation rate | 3 |
| Duration of follow-up, mean, mo | 6 |

[a]Data are given as number (percentage) except where noted.



**Figure 1.** Comparison of a history of hypertension, aspirin use, external dacryocystitis, and surgery outcome between 15 patients with and 422 patients without delayed epistaxis following dacryocystorhinostomy.



**Figure 2.** Cumulative survival plot (Kaplan-Meier) of surgical success in 437 consecutive patients who had undergone external dacryocystorhinostomy. Fifteen patients with delayed epistaxis after surgery (dashed line) are compared with 422 cases without delayed postoperative hemorrhage (solid line).

They were also more likely to have experienced lacrimal sac infection preoperatively (13% vs 9%; $P$=.01, Fisher exact test). There was no difference in sex, history of trauma, side of surgery, diabetes mellitus, or cardiovascular disease between the group with delayed epistaxis after DCR and the others. Interestingly, hypertension was not associated with an increased risk for delayed epistaxis, and it was actually more prevalent in the group without it (2 of 15 cases in the delayed epistaxis group and 158 of 352 in the nondelayed epistaxis group). The patients who were taking anticoagulants and stopped using them within the defined time prior to their surgery had the same risk of delayed epistaxis as the patients who had not been prescribed anticoagulant agents (**Figure 1**).

Local anesthesia was used in 5 of 15 patients with delayed epistaxis (60%) and in 313 of 422 patients without delayed hemorrhage (74%) ($P$=.22; $\chi^2$ analysis). As for surgical outcome, the 15 patients who had an episode of delayed epistaxis had a significantly lower success rate (defined as the resolution of epiphora), that is, 80% vs 90% ($P$=.02; $\chi^2$). The Kaplan Meyer curve displaying these results is shown in **Figure 2**.

## COMMENT

Tsirbas and McNab[8] reported a rate of delayed epistaxis similar to the rate found in the present study. In the current study, neither aspirin nor NSAIDs use was associated with increased risk of bleeding when they were meticulously stopped according to a fixed schedule prior to surgery. However, older age and a history of dacryocystitis were found to be risk factors for delayed epistaxis. Older age had also been associated with a higher rate of delayed epistaxis in the previous report,[8] and we speculate that this may be related to poor wound healing among elderly patients. Systemic cardiov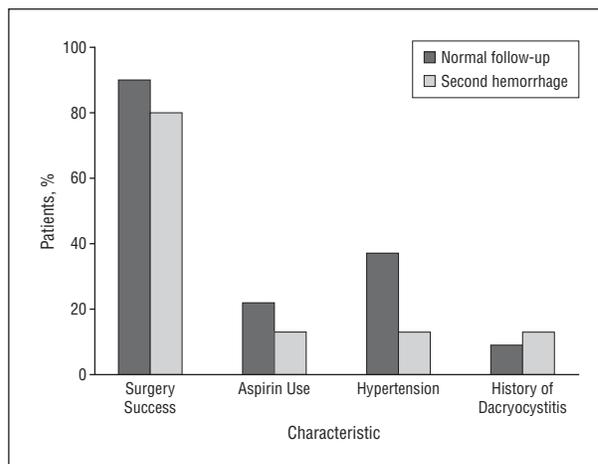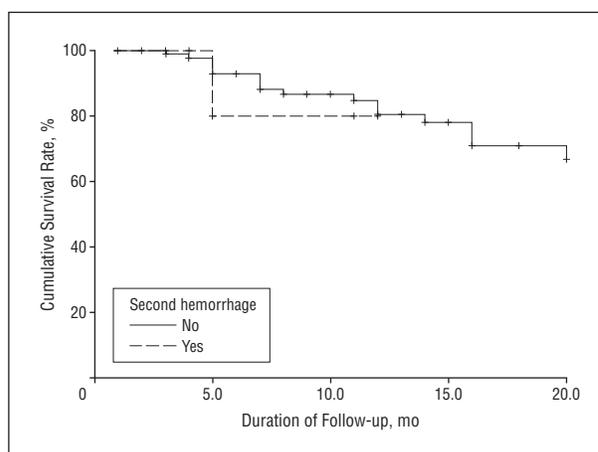ascular diseases, such as hypertension and diabetes mellitus, however, were not associated with a higher rate of delayed epistaxis.

Delayed epistaxis may occur 2 to 8 days after surgery and may be associated with wound breakdown caused by infection or natural clot lysis. Systemic antibiotics are given to treat presumed infection and enhance wound healing for prevention of scar tissue formation and surgery failure. As expected, the patients in the current study who experienced delayed epistaxis had a significantly lower surgical success rate compared with patients without delayed epistaxis (80% vs 90%, respectively; $P$=.02). This is in contrast with the results of the previous study[8] in which the success rate of surgery in patients with delayed epistaxis was 100%. Our finding that a history of dacryocystitis is associated with an increased risk for delayed epistaxis may support infection at the surgery site as the causative agent for scar tissue formation leading to surgical failure. We tried to reduce this risk by administering intravenous antibiotics at the onset of surgery when the lacrimal sac was observed to contain purulent material,

but we did not routinely continue antibiotic treatment thereafter. A more prolonged administration of appropriate oral antibiotics in these patients may have reduced the rate of delayed epistaxis, as suggested by Walland and Rose.[11] This hypothesis merits further investigation.

Aspirin, a highly potent cyclo-oxygenase inhibitor, inhibits platelet aggregation and increases bleeding time. The half-life of platelets is 5 days; therefore, stopping the use of aspirin as well as other NSAIDs 2 weeks prior to surgery seems adequate to prevent excessive bleeding, both during surgery and the early postoperative period. Neither habitual aspirin nor NSAIDs use was associated with an increased risk of hemorrhage, probably because its clinical effect had subsided by the time of surgery. This is in contrast to the previous report[8] in which 4 of the 10 patients with delayed epistaxis were taking aspirin compared with the 16% of patients who did not have it. It is noteworthy that we had not meticulously checked that the patients in the earlier study followed the presurgical aspirin cessation protocol. In addition, 3 of the 10 previously reported patients with delayed epistaxis had blood dyscrasias compared with none in the current study.

Other investigators reported various rates of delayed epistaxis after dacryocystorhinostomy, ranging from 0.5% to 3.9%, and some pointed to antiplatelet use as a causative agent.[10-14] Surgical site infection was also reported to be associated with delayed bleeding,[11] and this is in line with our finding that a history of dacryocystitis was more common in patients with delayed hemorrhage. Finally, 6 of the 10 patients in the previous study[8] were admitted to hospital, whereas only 2 of the 15 patients with delayed epistaxis in the current study needed to be admitted.

In conclusion, we describe what we believe to be the largest series reported of secondary or delayed hemorrhage after external DCR. One limitation of this report is that it is retrospective. Delayed epistaxis after external DCR is not rare: the rate was 3.4% in the current study, similar to the rate of 3.8% in the previous report.[8] It may be associated with older age and nasolacrimal sac infection. Cessation of the use of aspirin and other NSAIDs 2 weeks before the procedure seems to reduce the risk of delayed bleeding. Diabetes mellitus and hypertension were not risk factors for delayed bleeding. Conclusive evidence for identifying which of the potential risk factors are responsible for delayed epistaxis awaits prospective investigations.

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