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ARTICLE ORIGINAL

Cerebrospinal fluid leakage after endonasal dacryocystorhinostomy

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Rhinorrhée cérébro-spinale après dacryocystorhinostomie endonasale

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Une dacryocystorhinostomie (DCR) par voie endonasale a été compliquée d'une rhinorrhée cérébro-spinale avec pneumencéphalie chez une patiente âgée de 80 ans. Elle présentait quatre éléments osseux prédisposant à une brèche ostéo-méningée : une déviation septale majeure, une insertion du septum sur la lame criblée de l'ethmoïde, une procidence méningée et une ostéoporose de la base du crâne. L'utilisation d'un spéculum nasal pour élargir la fosse nasale a été le facteur causal déclenchant le plus plausible. La brèche méningée a été colmatée par mise en place d'un greffe associant cartilage septal, greffe de graisse abdominale, Surgicel®, et cornet inférieur. Les suites ont été simples avec un recul de 34 mois. Les fosses nasales très étroites représentent une difficulté chirurgicale supplémentaire pour la DCR endonasale. L'utilisation d'un spéculum à valves n'est pas sans danger, en particulier chez les sujets âgés. On peut dans ce cas opter pour une DCR externe ou élargir la fosse nasale par une septoplastie endoscopique. La réparation de la brèche méningée par voie endonasale permet d'éviter un abord neurochirurgical classique.

Mots-clés : Appareil lacrymal, dacryocystorhinostomie, rhinorrhée cérébro-spinale, septoplastie, endoscopie.

Cerebrospinal fluid leakage after endonasal dacryocystorhinostomy

An endonasal dacryocystorhinostomy (DCR) was followed by cerebrospinal fluid leakage and pneumoencephalocele in an 80-year-old female patient presenting four independent risk factors for an ethmoidal breach: severe septal deviation requiring forced reclining, a cranial insertion of the perpendicular plate of the ethmoid directly onto the cribriform plate, meningeal prolapse, and extensive osteoporosis of the skull base. The use of a Killian valve speculum to recline the nasal septum was probably the main cause of the anterior skull base fracture. The defect was repaired by a composite patch of septal cartilage, abdominal fat grafts, Surgicel®, and inferior turbinate mucosa. Thirty-four months after surgery, there was no residual symptom. A narrow nasal fossa makes endoscopic DCR more difficult to perform. The use of a Killian valve speculum to enlarge the nasal fossa may carry a risk for structural damage to the skull base. A narrow nasal fossa may require an external DCR or a prior endoscopic septoplasty to facilitate an endonasal approach. Closing an ethmoidal defect causing cerebrospinal fluid leakage can be successfully achieved by an endonasal approach rather than by a more conventional neurosurgical method.

Key-words: Lacrimal apparatus, dacryocystorhinostomy, cerebrospinal fluid leakage, septoplasty, endoscopy.

INTRODUCTION

Cerebrospinal fluid (CSF) leakage, or rhinorrhea, is a very rare complication of dacryocystorhinostomy (DCR) [1-6] and functional endoscopic sinus surgery (FESS) [7-9]. CSF leakage has not been previously documented following endonasal DCR, although one clinically suspected case was reported by Dolman [1]. It can have serious consequences, including bacterial meningitis [2, 4]. The occurrence of CSF leakage after DCR may be explained by either direct or indirect injury to the base of the skull. Direct damage may occur when inadvertent extension of the osteotomy to the anterior part of the base of the skull occurs.

Anatomical studies measuring the distance between the upper limit of a DCR osteotomy and the skull base indicated that the usual safety margin could be reduced in case of prior trauma or congenital malformation, such as the underdevelopment of the frontal sinus [10-12]. This is in accordance with published CSF cases following DCR. Dryden reported a case with prior posttraumatic orbito-naso-ethmoidal disjunction [3]. Bagheri *et al*. [6] described another case with a meningoencephalocele. In both cases, the frontal part of the brain was in direct contact with the nasal bone (major meningeal prolapse).

Indirect damage during external DCR was first suggested by Neuhaus

and Bayliss [5]. A twisting movement of the bone rongeur applied to the maxillary bone during the osteotomy may cause a spiroid fracture that can further spread to the base of the skull. However, this hypothesis has not been confirmed by any imagery technique to date.

However, indirect damage is more widely established in CSF leakage occurring after endoscopic sinus surgery (FESS) [7]. In this technique, the defect originates from an excessive displacement of either the middle turbinate or the perpendicular plate of the ethmoid. These two structures, which are inserted onto the cribriform plate of the ethmoid, may also be adjacent to the lacrimal fossa [13].

We report a documented case of CSF leakage induced by the forced reclining of the nasal septum during endonasal DCR. We further describe an endonasal endoscopic repair method for this rare complication.

CASE REPORT

Preoperative data

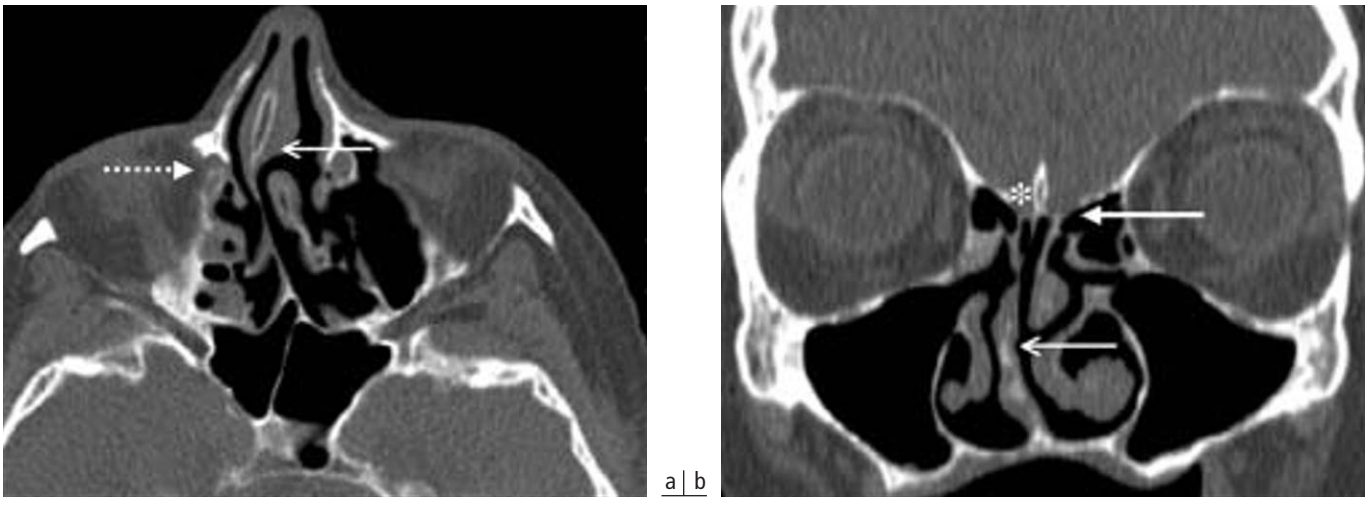
An 80-year-old female patient, in good general health and with no specific history, presented with permanent chronic epiphora with secretions that had been increasing for the previous year.

Examination revealed a mucocele of the right lacrimal sac, with bone contact and negative irrigation. The lacrimal-nasal stenosis was incomplete on the left side. Endoscopic examination of the middle meatus was difficult because of a major deviation of the nasal septum, causing an extreme narrowing of the right nasal fossa. Preoperative CT scan revealed a complex deviation of the nasal septum *(fig. 1a)* involving both the cartilaginous (septum) and bony (perpendicular plate of the ethmoid) sections. A meningeal prolapse and marked osteoporosis of the skull base was also noted *(fig. 1b)*. The right middle turbinate was atrophic and distant from the lacrimal duct.

Endonasal DCR method

A right dacryocystorhinostomy (DCR) was performed from an endonasal approach. A three stage enlargement of the nasal fossa was initially achieved. The anterior nasal fossa was first packed with 5% naphazoline Xylocaine. The septum was then medialized using a Killian speculum. The resulting enlargement allowed inserting a second packing up to the middle meatus. A few minutes later, the nasal mucosa over the frontal process of the maxillary was infiltrated with 1% Xylocaine and adrenalin (1ml).

The endonasal DCR was then performed as previously described [14]. A mucosal-periosteal flap incorporating the anterior part of the uncinate process was resected. This was followed by maxillary osteotomy with a protected microdrill without using any bone rongeur. The lacrimal sac was freed from all bony obstruction. The sac was then cut open and its medial wall was removed. Finally, the two lacrimonasal canaliculi were catheterized with silicone tubing. Mucosal bleeding required permanent irrigation/aspiration. Neither turbinectomy nor anterior ethmoidectomy (other than unciformectomy) was required.



a | b

Figure 1: (a) Preoperative axial CT scan showing a marked deviation of the nasal septum (open arrow), adjacent to the opacified lacrimal sac (dotted arrow). **(b)** Preoperative coronal CT scan. A major meningeal prolapse can be seen below the equator of the orbit (solid arrow), and the marked deviation of the nasal septum (open arrow). The nasal septum is inserted onto the cribriform plate (*) instead of the crista galli. The right middle turbinate is atrophic and distant from the lacrimal duct.

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