ORIGINAL ARTICLE

Comparative Study of Primary Intention Lacrimal Probing With and Without Nasal Endoscopy

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KEYWORDS
Congenital nasolacrimal duct obstruction; Probing; Endoscopy

Abstract
Objective: Our objective was to compare the results of probing with and without endoscopy in cases of congenital nasolacrimal duct obstruction without prior probing.

Methods: This was a retrospective analysis on 2 non-randomized cohorts, 36 simple soundings (group 1) and 36 soundings with endoscope (group 2), between January 2011 and January 2013. Both groups were similar in age and had no previous surgery. The age of the patients studied ranged between 8 and 27 months in the first group and between 7 and 30 months in the second group.

Results: The procedure was successful in 50% of the conventional probing group and in 97.22% in the endoscopy probing group. In this group 16.67% of the patients with tight inferior turbinate and 11.11% of those where the probe passed into the submucosal space were diagnosed and corrected intraoperatively. Some anomaly was observed in 30.56% of the patients undergoing endoscopy.

Conclusion: Although nasal endoscopy is classically reserved for unsuccessful probing, its use in primary intention increases the success rate of the procedure. In our study, 97.22% of the eyes had complete resolution of symptoms, avoiding a second surgery and the use of more expensive materials and techniques. Nasal endoscopy helps intraoperative visualization, understanding and management of congenital nasolacrimal duct obstruction and is the only method that confirms the correct anatomic position of the catheterisation in real time.

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PALABRAS CLAVE
Obstrucción nasolagrimal congénita; Sondaje; Endoscopia

Estudio comparativo entre sondajes lacrimales de primera intención con y sin control endoscópico

Resumen
Objetivo: Comparar los resultados de dos series de sondajes de primera intención, sin y con endoscopía nasal, acompañados en este segundo caso de luxación de cornete inferior y corrección de enfermedad del meato inferior si la hubiera, en casos de obstrucción nasolagrimal congénita.

Métodos: Se practica un estudio de cohortes retrospectivos con 36 sondajes simples (grupo 1) frente a 36 sondajes con endoscopía (grupo 2), entre enero de 2011 y enero de 2013, en 2 grupos de población parecidos sin intervenciones previas. El rango de edad fue entre 8 y 27 meses en el grupo 1 y entre 7 y 30 meses en el grupo 2.

Resultados: El 50% de cirugías lagrimales fueron realizadas con éxito en el grupo de los sondajes sin endoscopía, frente al 97,22% en el grupo guiado por endoscopia. En el grupo 2 se diagnosticó y corrigió intraoperatoriamente un 16,67% de vías lagrimales con aposición del cornete inferior en su porción distal y un 11,11% de falsas vías o trayectos submucosos.

En un 30,56% de los sondajes practicados con endoscopía se observó más de una anomalía nasolagrimal, tanto a nivel del canal como en el meato inferior, que influyó negativamente en su funcionamiento.

Conclusión: Aunque clásicamente se ha reservado la endoscopia para fracasos quirúrgicos en reintervenciones, su utilización de primera intención mejora significativamente los éxitos. En nuestra serie un 97,22% tuvieron resolución completa de los síntomas, evitando un segundo paso por quirófano y la utilización de materiales y técnicas más costosas. Nos ayuda a la visualización y compresión de esta enfermedad y es el único método para confirmar directamente un correcto sondaje en tiempo real.

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Introduction
Symptomatic congenital nasolachrymal obstruction is a common clinical problem, estimated to occur in 6% of the newborns. The most frequent aetiology is found at the level of Hasner’s valve, between the lachrymonasal duct and the inferior meatus.

Between 85% and 95% resolve spontaneously in under a year.

Success rates of probing in the first year vary between 50% and 90%. This decreases if it has to be repeated to between 25% and 64%. Probing is a blind procedure and the surgeon’s only guide is tactile sensation.

Recent and ongoing advances in the image provided by endoscopy of the nasolachrymal system with direct visualization of the area to be treated enable diagnosis of anomalies in this area such as cysts, elastic membranes and tight inferior turbinate; they have meant avoiding complications such as passing into the submucosal space, false passages, punctiform orifices, haemorrhage and trauma to the nasal cavity, and contribute towards successful surgical outcomes.

Our objective in this article is to compare the results of cases of congenital nasolachrymal obstruction.

Material and Method
A retrospective cohort study was undertaken.

Diagnosis was based on a clinical history of epiphora and purulent secretion starting shortly after birth and the fluorescein disappearance test (Table 1), which is to assess the amount of stain retained in the lachrymal meniscus 5 min after inserting a drop of 2% fluorescein at the base of the conjunctival sac.

None of the patients had a history of surgery.
All the operations were performed between January 2011 and January 2013.

Thirty-six tear ducts in 10 girls and 15 boys between 8 and 27 months (mean: 14.3 months) were operated using a conventional probe without endoscopy in our hospital (Group 1).

Thirty-six tear ducts in 14 girls and 12 boys between 7 and 30 months (mean: 15.1 months) were operated with endoscopy in our clinic (Group 2).

There were no clinically significant differences in terms of laterality.

Endoscopic surgery was performed by the same team: an ENT surgeon (MAAF) and an ophthalmologist (FJAF).

The guardians accepted informed consent verbally and in writing.

Both types of operations were performed under anaesthetic sedation without airway intubation. Both tear ducts were dilated and a channel created in both canaliculi using a number 0 Bowman probe (0.71 mm in diameter) in the 2 groups.

A cotton swab soaked in 1% tetracaine and epinephrine 1:100.00 for vasoconstriction and appropriate visualization was placed in the nasal cavity 5 min before the endoscopic surgery, and 2 drops of anaesthetic solution 1 mg/ml tetracaine and 4 mg/ml oxybuprocaine (Colirio Anestésico® Doble; Alcon Cusi S.A.; Barcelona, Spain) were instilled in the base of the lower conjunctival sac, 2 min before surgery.
The excretory lachrymal duct was flushed with 0.5% bupi-
vacaine and 0.0005% epinephrine (Svedocain® 0.5% with
adrenalin; Inibsa Laboratories; Madrid, Spain).

A 2.7 mm endoscope was used and 30° optic (Karl Stortz
Tricam® S.L. Endoscope; Tuttingen, Germany) with xenon
light source.

The turbinate was luxated medially using a Freer spatula
to position the endoscope correctly in the inferior meatus.

Our three-stage technique comprises: first, luxation of
the inferior turbinate and flushing the tear duct with physi-
ological serum, the operation is considered complete if the
duct is permeable. If there is reflux of liquid, then in a sec-
ond stage, probing is performed and another flush, if the
accumulation of physiological serum persists on the surface
of the eye, the third stage comprises extending the new
drainage using an otologic micro clamp directing the probe
in a lateral, medial and anteroposterior direction (Fig. 1).

In group 1 it was attempted to pass the Bowman probe
through the common canaliculus, sac and lachrymonasal
duct to the inferior meatus. In group 2 this manoeuvre was
performed only if irrigation after luxation of the turbinate
showed reflux.

In group 2, the correct location of the probe was con-
firmed in all cases and the mucupurulent content (Fig. 2)
and the physiological serum from flushing were suctioned
from the lachrymial duct.

Tobramycin and dexamethasone eye drops were pre-
scribed 4 times daily for 7 days and antibiotic-corticosteroid
nose drops 3 times a day for 5 days. All the patients were
reviewed after a month and after 2 months.

Surgery was considered successful if the epiphora and
secretion had stopped, and when none of the fluorescein
applied in the base of the lower conjuctival sac was
retained.

**Table 1** Fluorescein Disappearance Test.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>With no residual stain after 5 min</td>
</tr>
<tr>
<td>1</td>
<td>Stain after 5 min less or equal to the initial 25%</td>
</tr>
<tr>
<td>2</td>
<td>Stain after 5 min between the initial 25% and 50%</td>
</tr>
<tr>
<td>3</td>
<td>Stain after 5 min between the initial 51% and 75%</td>
</tr>
<tr>
<td>4</td>
<td>Stain after 5 min between the initial 76% and 100%</td>
</tr>
</tbody>
</table>

**Figure 1** Algorithm used in our clinic for the group of children operated with endoscopic control.

**Figure 2** Abundant purulent content in inferior meatus requiring suction.
The statistical method used to evaluate the efficacy of endoscopy-assisted nasolachrymal probing compared to simple probing was the Chi-square Independence test with Yates correction to examine the association between the results obtained and the technique used, at a 95% confidence level.

**Results**

Both groups were similar in terms of gender, age and laterality.

In the first group 18 tear ducts out of the 36 operated functioned (50%).

In the second group, 35 (97.22%) were successful.

The statistical value obtained was $P<.0001$. On examining the results, no significant statistical evidence can be seen to warrant not accepting the existence of this association, and therefore the results achieved depend on the technique used in the operations.

In our study, endoscopy resulted in an added 47.22% success rate (Fig. 3).

In the endoscopic control group there were 11.11% cases where the probe passed into the submucosal space, which were corrected in the same operation (Fig. 4). 13.89% punctiform orifices with reflux in subsequent flushing which were also widened until total permeability was achieved. 2.78% were cysts, instead of membranes at the level of Hasner’s valve, which were resolved intraoperatively. 5.56% were elastic membranes which were excised, as the tissue accompanies the probe and hinders its perforation (Fig. 5.) and, should they open, they would act like a cloth and occlude the new drainage. 16.67% had tight inferior turbinate with a permeable passage, these patients only required this to be luxated (this was performed on all the children in the group with endoscopic control), and no other operations were required.

30.56% of our patients had more than one nasolachrymal anomaly confirmed by endoscopy (Fig. 6).

**Discussion**

All surgical procedures should be as simple as possible, minimally invasive and have a high success rate.

Probing is a blind procedure which in some cases causes additional trauma to the nasal and lachrymal structures.\(^5\)

The low success rate compared to other series achieved in the group of simple probings without endoscopy could be explained because cases aged over 24 months were included (the age from which the success of probing diminishes

![Figure 3](http://example.com/figure3.png)  
**Figure 3** Difference in surgical successes and failures between the 2 groups.

![Figure 4](http://example.com/figure4.png)  
**Figure 4** Bowman probe passing into the submucosal space, indicated by the arrow.

![Figure 5](http://example.com/figure5.png)  
**Figure 5** Cyst in the distal portion of the lacrimal duct.

![Figure 6](http://example.com/figure6.png)  
**Figure 6** Nasolachrymal disease identified in our patients under endoscopic control.
compared to other techniques). Although there were also children over 24 months in the endoscopy group, they were satisfactorily resolved with rates which were similar to author authors.

Direct endoscopic visualization of the area serves as a guide to achieve a correct surgical technique; it provides information on the nature of the obstruction; it prevents the formation of false passages where the tactile sensation of the surgeon in simple probing could give rise to error; it provides an understanding of the diseases causing the nasolachrymal obstruction and it minimizes the number of operations in just one surgical procedure.

There are anatomical variations where opening a small orifice might not be sufficient, in the case of mucoceles and chronic dacryocystitis with distension of the lachrymal passage, for example. More drainage is necessary for these patients due to alterations in fluid dynamics and secondary stasis producing mucopurulent secretion. In these cases, endoscopy allows greater opening of Hasner’s valve as it enables us to widen the opening in an anterior, posterior, medial and temporal direction in a controlled way (Fig. 7); this effect would be very similar to that of dacryocystoplastic surgery. It also provides us with a diagnosis and treats cases where this opening is not made but when a membrane is pushed to the inferior meatus (Fig. 5) and a surgical membranectomy is required, or in cases where the probe passes into the submucosal space, clearly diagnosed using endoscopy (Fig. 4).

In the case of a physiological blockage, endoscopic control helps in diagnosis and treatment by luxation of the inferior turbinate. Kouri states that endoscopy contributes towards an increased success rate in 17.31% of their cases. In our series it was very much above this. Korkmaz study states that 18.18% are resolved by luxation of the inferior turbinate, without further operations, and confirms this success with irrigation of the lachrymal passage. Gardiner uses this surgical technique in 66.66% re-operations, finding no statistically significant differences between bicanalicular intubation and probing with luxation of the inferior turbinate.

We were surprised by the abundant pathology displayed at this level, since, until endoscopy was used, it was taken for granted that the great majority of cases were due to a membrane at Hasner’s valve level, when the reality was very different. Similar findings are described by Gardiner, who found 84.85% anomalies.

Widening drainage moving the probe in a medial, lateral and anteroposterior direction assisted with a micro clamp of the ear, is a very worthwhile operation and can explain our great surprise on observing that cases of mono-canicular intubation, prior to this study, when the tube was lost early and we had performed this dilatation beforehand, continued to function, perhaps because an ample opening is sufficient on its own 5-7 (Fig. 7).

All cases were operated by the same ENT and ophthalmological team.

This technique requires few surgical instruments: Bowman probe, Freer spatula, ear clamps and endoscopy tower. This implies a major saving compared to more expensive materials such as silicone tubes and catheter balloons, and techniques with greater surgery times and morbidity such dacryocystorhinostomy (DCR).

Finally, lachrymal intubation, dacryocystoplasty and DCR remain as options for very few recurrent cases.

Conflict of Interests

The authors have no conflict of interest to compare.

References