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Nasolacrimal polyurethane stent placement: preliminary results

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PURPOSE. *To present our initial results in the treatment of nasolacrimal obstruction by placing a polyurethane stent.*
METHODS. *74 nasolacrimal stents were implanted under fluoroscopic guidance in obstructed nasolacrimal systems of 64 patients. Dacryocystography and CT were used to verify the position and patency of the stents. Mean follow-up was 15 months. Clinical examinations were done at the first week, first month, third month and sixth month after stent placement.*
RESULTS. *Polyurethane stents were successfully inserted and permeable in 59 patients (92.1%), but could not be inserted in 5 patients (7.8%). Epiphora was solved and permeable in 53 cases (82.8%), it was not permeable but asymptomatic in 2 cases (3.1%), and was not permeable but symptomatic in 4 (6.2%). In 5 cases (7.8%) stents remained permeable although patients complained of epiphora.*
CONCLUSIONS. *Polyurethane stent placement is a non-invasive technique that can replace dacryocystorhinostomy, giving better results and tolerance. (Eur J Ophthalmol 2001; 11: 25-30)*

KEY WORDS. *Nasolacrimal stent, Lacrimal gland and duct, Interventional procedure, Stents and prostheses*

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INTRODUCTION

Nasolacrimal obstruction results clinically in constant tearing or in secondary acute or chronic dacryocystitis. Several procedures such as punctoplasty, nasolacrimal probing, dacryointubation, dacryocystorhinostomy (DCR) or even conjunctival-dacryocystorhinostomy have been used, all effective in high percentages of cases, depending on the location of the obstructed area, its onset, the patient's age and its clinical progression.

Non-surgical techniques have become an important new measure in this pathology, particularly dacryocystoplasty with a catheter balloon (1,2) the placement of a metallic nasolacrimal stent (3), a nylon stent (4), and recently, a polyurethane stent (5-8). In most cases these techniques avoid a surgical procedure – DCR – which has been employed for years (9-12), and has become an elective procedure in low nasolacrimal obstructions.

The purpose of this study was to evaluate our results after the nasolacrimal placement of a polyurethane stent for obstruction of the lacrimal sac or nasolacrimal duct, according to Song's technique described in 1994 (5).

METHODS

From December 1997 until February 1999, was placed 74 nasolacrimal polyurethane stents in nasolacrimal ducts of 64 patients, aged between 15 and 88 years old; 19 were male and 45 female. There were 30 right nasolacrimal obstructions and 44 left, all with obstruction of the lacrimal sac or nasolacrimal duct. Clinically, epiphora and chronic dacryocystitis was present in

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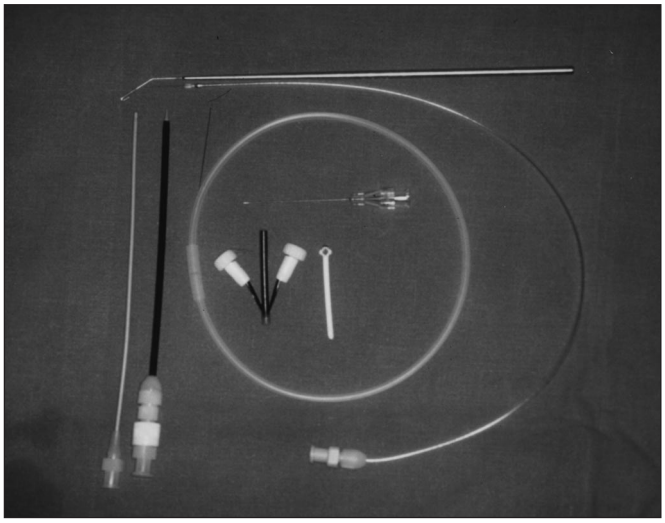

Fig. 1 - *Song's nasolacrimal polyurethane stent set.*

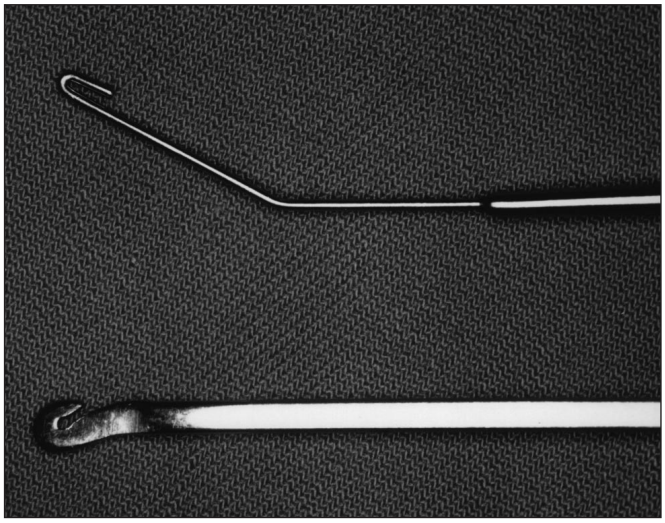

Fig. 2 - *Crawford's and Song's set hooks.*

TABLE I - LOCAL AND REGIONAL ANESTHESIA

1. Topical proparacaine and oxibuprocaine (0.4%) in eye.

2. 2% Lidocaine spray in nasal mucosa. Nasal compresses soaked in tetracaine HCL + epinephrine 1/100.000.

3. Trigeminal blockade (supraorbital, infraorbital and infratrochlear) with 2% mepivacaine.

TABLE II - SONG'S NASOLACRIMAL POLYURETHANE STENT SET COMPONENTS

1. 6-F Polyurethane stent: 35 mm long with a 0.5 mm radiopaque proximal tip

2. 6-F Introducer set

3. Dilator

4. Sheath

5. Stent loader

6. Pusher catheter

7. A ball-tipped guide wire: 100 cm long and 0.6/0.8 mm diameter

8. Dacryocystography needle

9. Hook set

53 patients, acute dacryocystitis in 10, and one case was asymptomatic (preoperative cataract finding).

There were 71 idiopathic obstruction causes and 3 trauma cases. In cases with acute dacryocystitis, the stent was placed when the acute phase was over.

The procedure was always done by an ophthalmologist, working with an interventional radiologist. Informed consent was obtained from each patient.

Local and regional anesthesia was administered in 63 patients, general anesthesia was used in a 15-year-old girl with Down's syndrome. Ocular protectors were placed in order to avoid corneal and conjunctival trauma.

Song's nasolacrimal polyurethane stent set (Fig. 1, Tab. II) was used in all patients (Cook, Queensland, Australia). In certain situations Crawford hook was used instead of Song's hook set (Fig. 2). The superior and inferior puncta were dilated. Preoperatively a dacryocystography was done to view the canaliculus, lacrimal sac and the site of obstruction. One of the wire tips was introduced into the superior or inferior punctum and into the canaliculus (across the most favourable), until bone was found. Then it was slightly withdrawn and rotated 90° in the vertical plane to point the ball tip caudally. Under lateral fluoroscopic guidance, the guide wire was advanced gently across the obstruction into the inferior meatus of the nasal cavity. If resistence was high at the site of the obstruction, it could be advanced with the help of a pusher catheter. A hook was placed in the nasal cavity and aimed laterally toward the inferior meatus to grasp

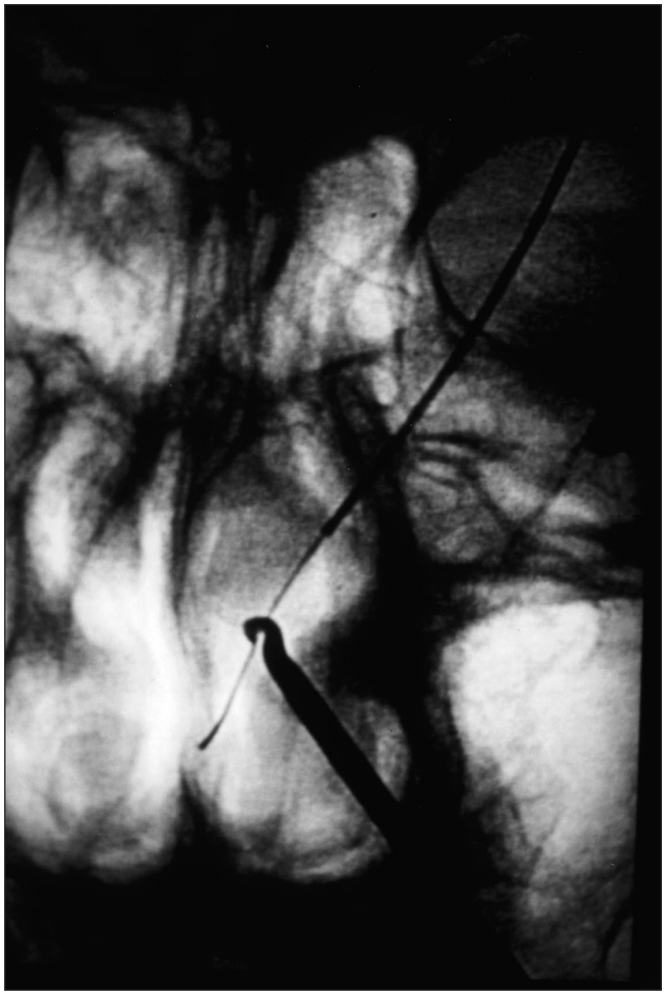

Fig. 3 - *Introducting the guide wire through a Ritleng tube and grasping its fluoroscopic guide with a Crawford's hook.*

the guide wire, until contact was felt with the metal. Then, fluoroscopically, the guide wire was grasped with a hook and pulled out of the external naris (Fig. 3), and cut with wire-cutting scissors.

The 6-F sheath with a dilator was passed retrogradly over the guide wire and advanced across the lesion until the proximal tip of the dilator was in the dilated sac. To place the tip of the sheath accurately in the lacrimal sac, the sheath was advanced approximately 3 mm into the sac while the dilator was withdrawn from the sheath. After the dilator was removed from the sheath, a plastic stent was introduced over the guide wire into the sheath with the stent loader and advanced by means of a pusher catheter until the radiopaque tip of the stent reached the tip of the sheath. The pusher catheter was held in place while the sheath

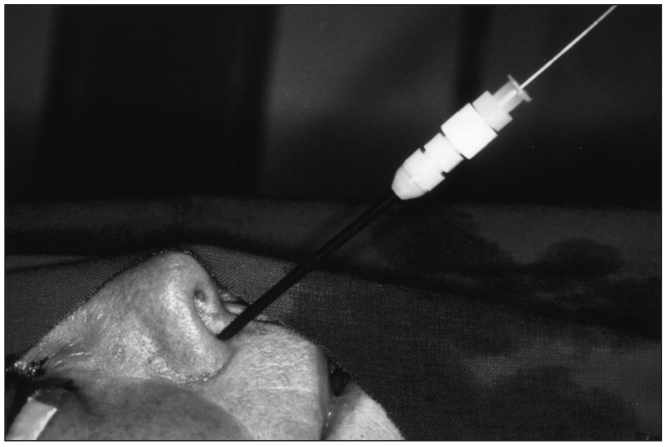

Fig. 4 - *A pusher catheter is held in place before the sheath is withdrawn.*

was withdrawn (Fig. 4). This freed the stent, allowing the mushroom tip to expand and lie within the dilated sac. The sheath containing the pusher catheter was pulled out through the inferior meatus and the guide wire through the superior punctum.

Dacryocystography was performed to verify the position and patency of the stent (Figs. 5 and 6).

In 15 patients, 21 axial computed tomography scans of the nasolacrimal ducts, with coronal reconstruction, were carried out to verify the position, stent trajectory and the presence or absence of false passage.

Topical gentamicin and dexamethasone drops, 4 times daily, were administered as local treatment during the first week.

Clinical examinations were scheduled 1 week, 1, 3, 6 and 12 months after the stent placement. Dacryocystographic follow-up was done at 1, 3, and 6 months.

RESULTS

The guide wire was advanced across the inferior punctum in 56 cases (75.6%) and across the superior punctum in 18 (24.3%). The wire was withdrawn using Crawford's hook in 13 cases (17.5%) and Song's hook in 61 (82.4%). This guide wire was advanced directly in 57 cases (77.0%) and across a cannula introduction in 17 (22.9%).

The stent was successfully placed and permeable in 59 patients (92.1%).

It could not be inserted in 5 patients (7.8%), 3 of them (4.6%) because of intense pain at the site of the

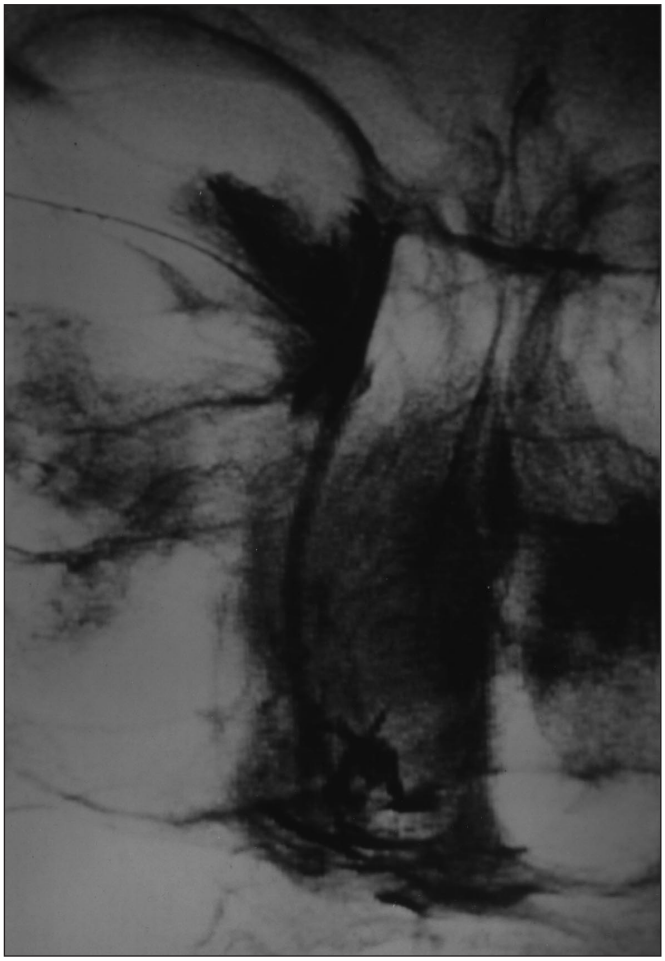

Fig. 5 - *Dacryocystography to verify the postoperative permeability of the stent.*

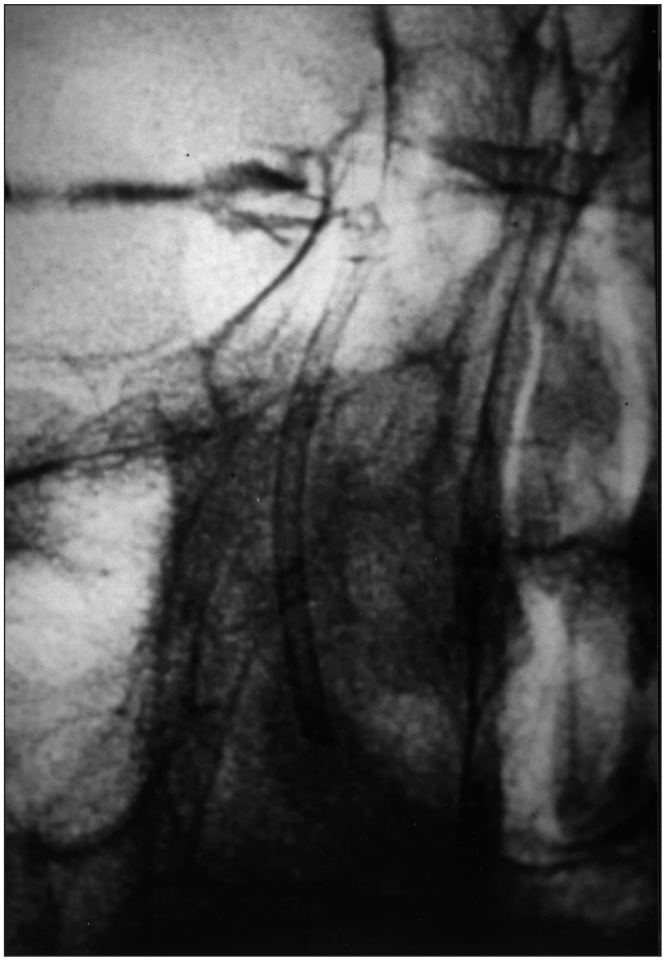

Fig. 6 - *Dacryocystography to verify the postoperative position and patency of the stent.*

nasolacrimal sac or naris, the other 2 (3.1%) because it was impossible to advance the guide across the nasolacrimal duct.

In 2 (3.1%) of the 64 patients, stents migrated after the first week of placement, 1 (1.5%) through the inferior punctum and the other across the naris.

Mean follow-up was 42 weeks (range 4-60 weeks). During the follow-up period, epiphora resolved in 53 patients (82.8%), nasolacrimal obstruction in 6 (9.3%) and one (1.5%) had a lacrimal mucocele. In 5 cases (7.8%), stents remained permeable but the patients complained of epiphora. Dacryocystography showed permeability in all but one of these after stent placement.

Five patients underwent other surgical procedures because of the persistence of epiphora. In 3 patients (4.6%) a dacryocystectomy was done, 2 of them (3.1%) secondary to postoperative lacrimal mucocele.

A punctoplasty was carried out in other patient to deal with tearing after stent placement. Another patient required a monocanalicular dacryointubation to pass the occluded stent, since saline solution irrigation or urokinase could not recanalize it. DCR was done in two patients (3.1%), one of them permeable but still symptomatic.

During the stent placement, patients suffered mild pain, but three had such intense pain that placement was not possible. Mild epistaxis was common, except in three (4.6%) who suffered severe epistaxis, which stopped when the stent placement was completed.

The 21 aleatory axial computed tomography scans showed the right position in 19 cases: three posterior, two medial and one anterior trajectory deviations, and two false passages.

DISCUSSION

The search for less traumatic methods to treat nasolacrimal and lacrimal sac obstructions has led to polyurethane stent placement, a non-invasive technique which can replace DCR because of its better results and tolerance. The advantages over invasive procedures are: general anesthesia is not required; the procedure is easy and safe; it has a better cost-effectiveness ratio, no facial scar is produced and there is less bleeding and anatomical alteration. The procedure is easily tolerated by patients. Song's success rate is 98.3%, in comparison to the average rate for invasive DCR of 89-95% (9, 11,12).

After 20 months' follow-up, Allen and Berlin (11) reported 13% of DCR failures considering only those cases of epiphora in which canalicular irrigation was notable, excluding asymptomatic obstructions (11, 12).

Other alternatives to DCR offer lower rates of success. Silicone dacryointubation, described in 1977 by Crawford (13), on which Song's procedure is based, becomes effective in adults with a 78% lacrimal obstruction (15). Munk, with catheter balloon dacryocystoplasty, obtained 37% success in 71 cases. Two years later, Song (6) obtained 31% of success in 39 cases two months after stent placement. Song also used metallic stents in eight lacrimal ducts of patients in whom catheter balloon dacryocystoplasty had failed and 88% remained permeable for 4-20 weeks. Finally, Song used a 5-F Nylon stent in 19 patients before using polyurethane ones, obtaining total resolution of the epiphora in 79% of cases and partial in 21%.

Our results with polyurethane stent placement are comparable to other reports.

We obtained correct stent placement in 59 cases and found it impossible in five, three of them because of intense pain during placement, even though a second dose of regional anesthesia was administered. In two cases it proved impossible to advance the guide wire across the nasolacrimal duct.

A six-month postoperative follow-up showed that stents were permeable in 92.1%, a success rate comparable to DCR. Song in 1995 reported a success rate of 98% in 51 cases and obstruction in one after 1-2 weeks of follow-up, for a total of 96%. Song (6) provides the largest case-lists. In 1996 he had already treated 283 cases, with a success rate after stent placement of about 95%. Song reported improvement of epiphora in 262 cases (93%) after the first week of follow-up, and at a year 181 stents had good drainage (64%). In a series of 82 procedures, Pérez-Alvarez et al (7) reported a 100% success rate at the moment of stent placement and after 130 days 89% of stents were still permeable. Pulido-Duque et al (8) also reported 100% successes after placing 35 stents, with permeability in 33 (94%) at the sixth month of follow-up.

CONCLUSIONS

A distinction must be made between the success rate at the time of implantation and during follow-up. Cases in which the procedure is patent and permeable must also be considered (dacryocystography). The clinical improvement a month later is judged from the reduction in the epiphora and the permeability of the stent, which may or may not coincide with the permeability rate.

Important steps must be considered when employing this technique:

a) The placement of ocular protectors avoids ocular trauma and reduces photophobia;
b) Cases with canalicular obstruction, in which the guide wire cannot be advanced, should be excluded;
c) The wire can be guided up the inferior meatus through a Ritleng lacrimal intubation set (14). In case of difficulty in advancing across the obstruction a Bowman Probe No. 1 could be used beforehand;
d) Instead of Song's set hook a Crawford Hook is less traumatic for removing the guide wire because of its rounded tip;
e) The proximal tip of the stent should be placed at an adequate height, using dacryocystoghraphy.

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