

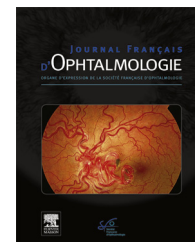


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ORIGINAL ARTICLE

Intralacrimonal migration of Masterka[®] stents



Migrations intralacrinales des sondes Masterka[®]

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Monocanalicular;
Intubation;
Pushed intubation;
Masterka[®]

Summary

Background. – Tearing and conjunctivitis in children are commonly due to lacrimal drainage system obstruction. Congenital nasolacrimal obstruction is a common pathology treated by probing with or without silicone stent insertion, depending upon the age of the child. The silicone stent is self-retaining and placed for at least one month. Masterka[®] is a recent version of Monoka[®], which may lead to the same surgical complications, such as intralacrimal migration.

Subjects and methods. – The medical records of two patients surgically treated with the Masterka[®] probe for nasolacrimal duct obstruction, who developed intralacrimal migration of the stent, were retrospectively reviewed and analyzed. A 41-month-old child and an 18-month-old child presented with disappearance of the silicone tube after 7 days and 2 years respectively. In the first case, the tube migrated completely within the lacrimal system and became externalized through the nose at 2 years, while in the second case, the Masterka[®] was retrieved through a canalicular approach. In both cases, infants had no further tearing.

Discussion. – The frequency self-retaining stent disappearance is estimated at 15%. Among these cases, intralacrimal migration is only reported in 0.5% of cases. To prevent intralacrimal migration, the surgical technique must follow a certain number of rules. Management, based on residual epiphora, is discussed.

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Conclusion. – Prevention of intralacrimal migration of self-retaining stents involves a rigorous analysis of the relationship between the meatus and the fixation head at the time of placement. After lacrimal intubation, scheduled monitoring is necessary to screen for stent disappearance. Management is based on clinical findings, anterior rhinoscopy and even exploratory canaliculotomy.

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MOTS CLÉS

Voies lacrymales ;
Larmolement ;
Imperforation
lacrymonasale ;
Obstruction
lacrymo-nasale
congénitale ;
Mono-canaliculaire ;
Intubation ;
Intubation poussée ;
Masterka[®]

Résumé

Introduction. – L'obstruction congénitale des voies lacrymales de l'enfant est une pathologie fréquente, traitée classiquement par sondage ou intubation en fonction de l'âge de l'enfant. Les sondes à fixation méatique autostable doivent rester en place un mois environ. La Masterka[®] est une variété récente de Monoka[®]. Elle donne lieu aux mêmes complications comme la migration intralacrurale.

Matériel et méthodes. – Deux cas cliniques d'enfants présentant une imperforation lacrymonasale rebelle traitée par Masterka[®] sont rapportés et analyses rétrospectivement. Chez ces deux enfants, âgés respectivement de 41 et 18 mois, la disparition de leur sonde a été constatée après respectivement 7 jours et 2 ans d'intubation. Dans le premier cas la sonde a complètement migré à l'intérieur de la voie lacrymale jusqu'à son extériorisation nasale après deux années, tandis que dans le deuxième cas, la Masterka[®] a été retirée après un abord canaliculaire.

Discussion. – La fréquence de disparition des sondes à fixation méatique autostable est d'environ 15 %. Parmi elles, les migrations intralacrurales ne représentent que seulement 0.5 % des cas. Pour prévenir la migration intralacrurale, la technique chirurgicale doit suivre un certain nombre de règles. La conduite à tenir, fonction de l'épiphora résiduel, est discutée.

Conclusion. – La prévention des migrations intralacrurales des sondes autostables passe par une analyse rigoureuse des rapports méat-tête de fixation au moment de la pose. Après intubation lacrymale, une surveillance planifiée est nécessaire pour dépister une disparition de sonde. La conduite à tenir est basée sur : clinique, rhinoscopie antérieure, voire canaliculotomie exploratrice.

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Obstruction of lacrimal drainage system commonly leads to tearing and conjunctivitis. After opening the lacrimal ducts, a silicone stent can be introduced and retained for several weeks or months. The Masterka[®] (Msk) probe is a type of Monoka (Mok) which is inserted by a pushed method rather than pulled into position. In both methods, the plug of the stent is auto-stabilized by placing it in position to be held in place by the sphincter effect of the meatic ring [1]. The introducer guide is placed inside the stent lumen, permitting a pushed method of intubation. Due to its design, it can be inserted just like a venous catheter. The Msk is indicated for the treatment of mucosal lacrimonasal stenosis as an alternative for late and very late probing. Once in place, the literature [1–10] suggests that the safety and complications' rate of these two self-stabilising probes (Msk & Mok) are similar [1–10]. Of the complications mentioned, the loss or disappearance should really be a separate category [11]. The rate of loss varies from 5.7 to 44% for the Mok and 6.8 to 30% for the Msk [1,8–10]. Disappearance is either due the probe being lost externally for some unknown

reason or may be due in intralacrimal migration (canaliculus or duct). Well-documented cases of intralacrimal migration (ILM) of Monoka stents are very rare. This complication has been reported in only 0.5% of cases [8]. The mechanism for ILM is probably due to excessive tension from pulling the stent into the punctum and lower system during insertion. A single case of Msk ILM was reported after insertion during an endonasal DCR [12]. The Msk plug had not been placed using the dilating insertion pin. It was inserted by pulling on the nasal strand until it entered the punctum. We are now reporting two cases of Msk intralacrimal migration in children treated for a nasolacrimal obstruction.

Methods

The medical records of two patients surgically treated with Msk intubation for nasolacrimal duct obstruction and presenting ILM of the stent were retrospectively reviewed and analyzed.

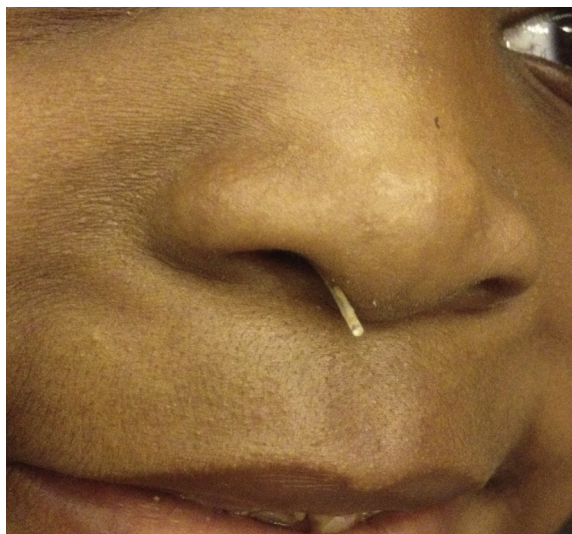


Figure 1. Patient 1: intralacrimal migration of a Masterka[®] placed 8 months earlier.

Case report 1

A 41-month-old infant, at time of surgery, was treated for a unilateral lacrimonasal imperforation that resisted conservative management. A 35 mm Msk was placed via the right upper canaliculus. The child underwent anaesthesia using a face mask, with spontaneous ventilation. No laryngeal protection was necessary. Details of the technique have been reported previously in the literature [1]. Post-operative treatment consisted in instillations of neomycin (4 times a day) and dexamethasone (4 times a day) for 1 week. The child was examined on Day 1 and Day 7. Tearing had disappeared completely. The child did not return for the scheduled appointment on Day 30 for the probe to be removed. Two years later, the child was seen in a hospital Emergency Department because a portion of the silicone stent was now visible emerging from the nostril (Fig. 1). When questioned, the parents said that tearing had ceased for the entire period following intubation of the stent. Pulling on the exposed portion of the stent easily removed the stent. The Msk was found to be completely intact (Fig. 2). When the parents were contacted by telephone 2 months later, they confirmed that there had been no functional relapse.

Case report 2

An 18-month-old infant was treated for a bilateral congenital nasolacrimal obstruction that was resistant to conservative medical management. A 35 mm Msk was inserted on each side using the same surgical technique. When examined on Day 7, only the right Msk was present. The other had disappeared. They returned on Day 30 for the probe to be removed. Upon examination, a discrete area of inflammation was noted involving the left upper canaliculus. It was decided to explore the canaliculus with the child under general anaesthesia. The eyelid was everted and a small incision was made over the canaliculus on conjunctival side, mid-way between the medial canthal angle and the



Figure 2. Same patient, after pulling on the nasal end of the stent, which makes the probe migrate.

punctum. The Msk was removed with visual monitoring under magnification. It was completely intact. Another stent was not inserted because the child was no longer suffering from any symptoms on either side and both sides irrigated freely. There were no sequellae noted during a follow-up visit one month later.

Discussion

The disappearance of these auto-stabilized stents was due either to their being lost externally for an unknown reason or due to secondary intralacrimal migration (ILM). Imaging is not of much use in diagnosis as the probes are radio-transparent. A high-frequency ultrasound scan likewise is of little value. The frequency rate of stent loss or disappearance for these stents is around 15% [8]. There does not appear to be any significant difference between Mok and Msk stents in regard to this problem (Table 1) [8]. Three main concepts can be considered for reducing the risk of Mok ILM:

- increasing the length of the collar from the plug [13];
- choosing another method of intubation if the patient has a congenital or iatrogenic stenosis;
- preventing probe tension between the nasolacrimal stenosis and the lacrimal punctum.

During surgery, pulling gently on the introducer (introducer-wire) should move the plug until it just contacts the lacrimal punctum. The plug should just come into contact with the punctum (Fig. 3), but should not be pulled further into the system by the surgeon which is probably the



Figure 3. Surgical technique for the Masterka®: After removing the introducer, the plug should be just about touching. It should not display any signs of becoming buried.

main cause of ILM. Excessive tension gradually widens the meatic ring through the pressure exerted on it by the collar. In this way, the collar may fold and enter through the meatic ring. The ILM migration will not stop until any tension has been released.

All of these comments can also be applied to the Msk. Placing too much pressure on the Msk can also cause ILM if the surgeon pushes too hard on the introducer once the plug has come into contact with the lacrimal punctum. To prevent this, the proper technique for inserting the Msk must be carefully followed:

- the lacrimal meatus must be dilated carefully (preferably for the upper system) using the dilating insertion pin;
- the distance between the lacrimal punctum and the nasal fossa must be measured. The Msk must be longer than this length;
- vertical catheterization must stop once contact is achieved with the roof of the nasal fossa. Since the Msk is longer than this distance, the plug will not be in contact with the lacrimal punctum to start with. It will come into contact with it only after several additional stages: The plug is pressed against the eyelid using one end of the

dilating insertion pin. It is best to avoid using forceps so the silicon is not damaged. The introducer is carefully withdrawn only one or two millimetres out of the Msk. Then the pressure on the dilating insertion pin is released completely. Afterward the entire Msk is pushed into the tear duct, by one or two millimetres, but no more. Once more, the plug is pressed against the eyelid. The introducer is then removed to gain another one or two millimetres, but no more. And so on. In a few stages, the plug will finally reach the lacrimal punctum. The introducer is pulled out two millimetres at a time, while carefully watching the plug at each stage. Once the introducer has been fully removed, the relationship between the plug and the punctum is evaluated. The plug must not show any sign of resistance to insertion. At this point, it would only be possible to engage them by squeezing the probe into the canaliculus like a spring. This is probably one of the reasons for secondary expulsion of the probe (Table 2). When the introducer is removed, if the plug is not perfectly in contact with the punctum, it is preferable to start the process over again using a new Msk with the introducing guide in place. Great care in inserting the device appears to explain why the number of cases of the Msk disappearing has fallen from 15 [8] to 9.2%. We are currently using mainly the 40 mm Msk which will pass completely though the valve of Hasner and slide anteriorly on the floor of the nasal antrum.

The literature gives little information in regard to the disappearance of auto-stabilising probes (Mok or Msk), so by default, we must rely on residual symptoms:

- no functional symptoms.

It is not enough to rule out intralacrimal retention in the absence of tearing, as was seen in case #1. This finding must be recorded in the patient's medical file. The parents must be informed that their child's body may react to the foreign body in the lacrimal and/or nasal tract in years to come;

Table 1 Comparison of the frequency with which the various Monoka® and Masterka® complications occur.

Design	Publication	Year	n	Complications-loss			
				Total	Mechanism Unknown	Migration	Exteriorisation
Monoka®	Kaufman et al.	1998	48	37% (18/48)	0	1% (1/48)	35.4% (17/48)
	Fayet et al.	2006	1028	13.7% (141)	12.50%	0.5% (5/1028)	0, 7% (7/1028)
	Engel et al.	2007	635	18.2% (116)	—	—	—
	Kominek et al.	2011	35	5.7% (2/35)	—	—	—
	Dotan et al.	2015	54	44% (24/54)	—	—	—
Masterka®	Fayet et al.	2012	110	15% (17/110)	11.8% (13–110)	0	3.6% (4–110)
	Andalib et al.	2014	20	30% (6/20)	30% (6–20)	—	—
	Esrhagi et al.	2014	44	6.8% (3/44)	6.8% (3–44)	—	—
	Alanon et al.	2015	40	15% (6/40)	—	—	—
	Fayet et al. (IJO 2016)	2016	71	8.4% (6/71)	4.2% (3/71)	1.4% (1/71)	2.8% (2/71)

* In: Les voies lacrymales. Alain Ducasse, Editor. Masson Paris, 2006. Chapitre 8 - Intubations des Voies lacrymales. B. Fayet & J.M. Ruban. Page 451.

** In: Jfo, Pushed monocanalicular intubation Pitfalls deleterous side effects and complications.

*** In: JAAPOS (2012), Pushed Monocanalicular Intubation. Fayet, Katowitz et al.

Table 2 Mechanism by which the probes disappear.

	Technical error (Masterka [®] or Monoka [®])	Plug/Lacrymal puncta (guidewire withdrawn)	Flexibility	Complication	
Loss	Too far inserted	To bury itself into (landfill trend)	Tension between Hasner and punctum	Elastic	Migration (inward)
	Not far enough inserted	Poorly positioned (too far away)	Compression in the canaliculus	Spring	Extrusion (outward)

- persistent or reoccurring of functional problems (inflammation, purulent discharge and/or epiphora). This could be due either to a reaction to a foreign body or to lacrimonasal stenosis.

In this case, it is preferable to rule out the foreign body reaction hypothesis. The excretory lacrimal ducts are explored while the patient is under a general anaesthetic:

- in the first instance, a surgical microscope or magnifying loupes are used and then the meatus inspected carefully to look for the plug;
- following this, an endoscope examination of the lower nasal meatus is carried out to look for the nasal end of the stent. In order to view the area properly, there must be a good level of vasoconstriction and subluxation (out-fracture) of the inferior turbinate. If the silicone stent is protruding from Hasner's valve, then pulling gently should remove it completely. In case #1, this was possible without causing the plug and the silicone stem to tear apart;
- if this does not work, however, the canaliculus can then be explored by making a small incision on the conjunctival side of the eyelid, mid-way between the punctum and the medial canthal angle. (case #2). We are not in favour of using pass a probe in an attempt to push a buried stent down and out of the nasolacrimal duct. The results are, from our point perspective, unpredictable and likely to give false reassurance;
- an approach via an incision of the lacrimal sac is, in our view, to be used as a last resort. Fortunately, we have not had to resort to this more aggressive surgical intervention;
- once the buried stent has been removed, if there is still evidence of obstruction, appropriate steps should be taken to manage this.

Careful follow-up of lacrimal intubation surgery is essential in order to detect complications such as ILM. Should lacrimal stent migration occur, a specific treatment plan is needed to optimize the chances for a successful treatment plan outcome in children.

Funding

None.

Disclosure of interest

B.F. holds the patent for the Masterka[®].

The authors declare that they have no competing interest.

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