Nasolacrimal duct obstructions (NLDO) have been treated with various methods such as silicone tube intubation, balloon catheter dacryoplasty, and dacryocystorhinostomy (DCR). The most effective treatment method is dacryocystorhinostomy which is done with different surgical modalities. External, endonasal and trans-canalicular ways have been used. Mitomycin-C may be added to the surgery to increase the success rate.

External DCR is the gold standard surgical method in the treatment of NLDO. It is cheap, the learning period is short, the success rate is high and doesn’t require high technology instruments (1).

Endonasal DCR has been most commonly done by otorhinolaryngologists for a long time. In recent years, ophthalmologists also perform endonasal DCR. The advantages of endonasal method include no skin incision and scarring, no touch to orbicularis oculi muscle by this way preserving the lacrimal pump mechanism, and enabling correction of accompanying intranasal pathologies in same session (2,3). In trans-canalicular laser method, nasal endoscope also is used. Short surgical time, less time for learning period and acceptable success rates are the advantages of trans-canalicular laser method.

An inert and easily tolerable silicone material in DCR surgery was first described by Older (4). While some surgeons routinely use silicone tubes, the others prefer it for only complicated cases. It is believed that silicone tubes prevent the blockage of ostium (5,6). Although, it was reported as using silicone tube intubation was one of the most effective way to increase the surgical success rate (7), it has been a controversial issue.

In the literature, while the success rates of DCR with silicone tube intubation are seen, there is a paucity of data regarding comparative studies. Therefore, we studied the DCR surgeries with and without silicone tube intubation to search the effect of silicone rod to the success rate of surgery.

**Material and Methods**

A total 79 patients who had DCR surgery between 2012 and 2014 were retrospectively reviewed in a tertiary referral hospital. All patients had primary nasolacrimal duct obstruction and no previous surgery for nasolacrimal duct obstruction. A complete ophthalmologic examination was performed. The patency of lacrimal drainage system was evaluated with lacrimal syringing. All patients were examined by otorhinolaryngology department and when needed...
assessed with computed tomography. Informed consent was taken from all patients.

Silicone tube intubation was added to surgery in 37 consecutive patients between 2012-2013 and was not used in 42 consecutive patients between 2013-2014. Age, gender, laterality, and lacrimal irrigation in the third month visit were recorded. Surgical success was accepted as the patency of the formed ostium with lacrimal syringing/irrigation. All cases were done by a single surgeon (AG). Exclusion criteria were canalicular stenosis, epiphora due to adnexal, corneal, conjunctival diseases, and age less than 20 years of age.

Descriptive methods and independent t-test were used for statistical analyses and a p value <0.05 was accepted as significant.

Surgical Method

All patients were operated under general anesthesia. Two pads soaked with mixture of epinephrine and lidocaine were placed on the level of middle turbinate. The surgical incision was marked with a skin marker, and the surgical site was infiltrated with epinephrine and lidocaine mixture. The skin was incised starting from 8-10 mm medial to medial canthal ligament and extending in vertical direction as being 10-12 mm. Periosteum was found with blunt dissection and was incised with a scalpel. At this stage, anterior portion of medial canthal ligament was dissected for better dissection of lacrimal sac. The thinnest part of medial wall of the orbit was perforated and a 12x12 mm bony window was opened with a bone punch. A metallic probe was inserted from lower canaliculus after the puncta were dilated. A small incision with the scalpel at the tip of the probe, then H-type incision was made with the scissors on the lacrimal sac. The same H-type incision was also made on the nasal mucosa, then the mucosal flaps were sutured to the flaps of lacrimal sac. In the cases which silicone rods were used, silicone tube intubation was made after the posterior flaps anastomoses. The two ends of the silicone rod were retrieved from the nose and tied then pushed into the nose. Flaps and subcutaneous tissues were sutured with 6/0 absorbable suture and the skin with 5/0 prolene suture. After the skin closure, lacrimal irrigation was made to clean the newly formed passage.

Patients were discharged after recovery from anesthesia and called for third day and first week visit to make lacrimal syringing. Silicone tubes were removed in the third month visit.

Results

The mean age were 58.5 years (range, 29-80) in patients in whom silicone tube was used, and 58.2 years (range, 20-83) in patients that was not used. Female to male ratio were 21/16 and in silicone tube group, and 33/9 in silicone free group. Eighteen out of 37 patients in silicone group was operated from right side, and also 18 out of 42 patients in silicone free group was operated from the right side.

Success rate were 89.2% (33/37) in silicone group, and 88.1% (37/42) in silicone free group. The difference between the groups was not found as statistically significant (p>0.05).

The mean age was 53.2 in four patients (2 men, 2 women) in silicone group. In silicone free group, the mean age was 52.2 in four unsuccessful cases who were 4 women and 1 man.

There were no case with distal or common canalicular obstruction.

In silicone group, no punctal erosion, corneal erosion, and granuloma formation were seen for following 6 months in postoperative period. In only one patient, silicone road extrusion was seen and the patient was managed with the aiding of an intranasal endoscope, and the silicone road was retrieved to previous position.

Discussion

Silicone tube is an inert material and encapsulation around the material is formed. There has been no consensus for using silicone tube in external DCR. Some surgeons have used it as routine (8,9). They have thought that silicone tube protects the passage by preventing granulation tissue formation in the site of osteotomy and anastomoses in the postoperative period. They have also thought that, it prevents common canalicular obstruction. The other surgeons have preferred it for only complicated cases like unsuccessful cases, canalicular stenosis, and in cases of insufficient flap formations (10-12). They claimed that, silicone tube may lead to several complications including punctal erosion, corneal erosion, and pyogenic granuloma formation, beyond the cost of the material.

Silicone tubes have been especially used in cases with canalicular problems. Buttanri et al., used silicone tube in 69 patients with distal/common canalicular obstructions in external DCR surgery and reported the success rate as 76%. They implicated that silicone tube...
should be used in patients with distal or common canalicular obstructions. In their study, although most of the patients relieved after the removal of the tubes, epiphora was started again in 21% of the patients (13). In another study, Bayhan et al., reported that they used silicone tube only in cases of distal/common canalicular stenoses, and small-fibrotic sacs (14).

Choung et al. claimed that, the silicone tube should not be used nearly half of the cases. They operated 166 cases and implanted silicone tube in 74 patients whoose both lacrimal sacs and nasal spaces were large for tear drainage. They reported that, although all pasages were anatomically patent, epiphora was seen in 6.7% (15). Madge and Selva, also reported the same conclusion that silicone tube was not required in uncomplicated cases (16). Ozay et al., reported that indications for silicone tube implantation in their study were small-fibrotic sac in 19 cases, unsuccessful previous DCR in 9, common canalicular stenosis in 9, intraoperative technical problems in 7, and mucocele in 3 patients. They reported the success rate as 84% (12).

Comparative studies in this era are rare. Saiju et al. studied in 100 patients and used silicone tube in 44 patients and not used in 56 patients. After six month follow up, the success rates were 90% in silicone group, and 87% in silicone free group, and the difference between the groups was insignificant. They also reported that silicone rod increased the cost of the surgery as 20% (17). Ozkaya et al., used silicone tube in nearly half of the patients and reported that the success rates were 87.5 % in silicone used group, and 86.3% in silicone free group (18).

An interesting example to search the essentiality of silicone tube in external DCR surgery may be seen in two reports of same surgeon. In 2009, Kaçaniku, performed external DCR with silicone tube implantation in 41 out of 166 patients, and reported that the success rate was higher in the group with intubation (95.1%) compared to in the group without intubation (87.5%), but the difference was statistically insignificant. He proposed further prospective studies to confirm the beneficial effect of silicone intubation (5). In 2014, the same author studied in 106 patients and he used silicone tube only in 11 eleven patients who had common canalicular obstruction (19).

In our study, there was no significant difference between the silicone (89.2%) and silicone free groups (88.1%). The cost of the silicone rod was one fourth of the total cost of the DCR surgery. Beyond the cost, a less pronounced issue is the time span for silicone rod placement. It increases the surgical time and also the duration of general anesthesia. There were no case with distal or common canalicular obstruction. Therefore we couldn’t conclude anything about the use the silicone tube when it was required.

**Conclusion**

External dacryocystorhinostomy is still gold standard surgical treatment in primary nasolacrimal duct obstruction. This study shows that the silicone tube implantation is not necessary in the surgery. Omitting the use of silicone rod reduces both the cost and the time of the surgery. Regarding with the possible complications including pyogenic granuloma formation, punctal erosion, and corneal erosion, it is not essential to use silicone rod routinely in external dacryocystorhinostomy.

**References**


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