

to replace or keep the Jones tube draining. When it is functioning properly, patients do not experience tearing. A CDCR with Jones tube placement may be the only solution for those patients with severely damaged tear ducts.

Nasolacrimal Duct Obstruction of Infancy

Tear duct obstruction can be encountered in otherwise normal infants. Blocked tear ducts will open spontaneously during the first six to twelve months of life in many children who have only a mild blockage. During this time simple downward massage of the duct several times a day and brief courses of topical antibiotics for episodic conjunctivitis may be adequate treatment due to the high rate of spontaneous resolution.

If tear duct obstruction persists beyond age one, the statistical chance of spontaneous improvement in tear duct function drops significantly and further treatment is usually recommended. In most cases, the initial treatment is probing and irrigation of the tear duct. This procedure is customarily performed under general anesthesia on an outpatient basis. The procedure consists of passing a thin metal wire probe through the tear duct system to open any scar tissue or membrane, which may be blocking the opening of the tear duct into the nose. Following passage of the probe, fluid is irrigated through the tear duct system into the nasal cavity to confirm that the tear duct system has been opened. When performed at or before one year of age, probing and irrigation is effective in relieving or improving symptoms of tear duct obstruction in the majority of children with congenital obstruction.

A silicone stent can be placed within the tear drainage system after probing in situations where previous probing and irrigation has been unsuccessful or in children older than 18 months of age who have not yet undergone probing. On occasion, silicone intubation may also be performed on young children at the time of initial probing and irrigation if an unusual degree of tear duct obstruction is noted during the probing procedure. The purpose of tube placement is to block the reformation of scar tissue or membrane that caused the original blockage. This tubing is placed on a temporary basis, and is generally removed six weeks to several months following placement. Occasionally a DCR is required when probing or silicone stent placement is not sufficient to relieve tearing.

POSTOPERATIVE RECOVERY AND CARE

In most cases, pain is not significant and usually controlled with ice compresses and Tylenol, although a prescription for a narcotic pain medication is provided. You will be instructed

to keep your head slightly elevated and to apply cold compresses (quart sized Ziploc bags filled with frozen peas/corn or crushed ice) to the area for several days following surgery. By keeping swelling in check, postoperative pain is also reduced. Thus, ice compresses are a very important part of postoperative care. Oral steroid medication and/or a steroid nasal spray is often prescribed to further reduce postoperative swelling and scarring. You should refrain from nose-blowing, straining, stooping, or lifting heavy objects. Over-the-counter saline nose drops or sprays, such as Ocean® Saline Nasal Spray, can be used three to four times per day to clear mucous and discharge from the airway on the operated side.

If a silicone stent is placed at the time of surgery it is usually removed four to eight weeks after surgery, although it may be left in place longer in some cases. When the stent is removed the new tear drainage system may be irrigated to insure free passage of tears into the nose. This also clears mucous and debris from the new tear duct.

It is normal to experience a slight bloody tinge to the nasal discharge, and some tearing may occur in the early postoperative period. This is minor in most cases and will stop shortly after the silicone stent is removed. Nose bleeds are extremely rare with this surgery, but can occur. Nose bleeds can be controlled in most instances by application of ice packs and firm pressure to the outside of the nose. If bleeding is not controlled by external pressure, you should call our office as it may be necessary to place a temporary nasal pack.

CONCLUSION

In most instances we recommend tear drainage surgery by dacryocystorhinostomy (DCR) when lacrimal obstruction is discovered. DCR is successful in the vast majority of cases. The effect is usually permanent and there is good relief of tearing. Occasionally revisions or adjustments may be necessary to get the best result. When a DCR cannot be performed because of scarring or severe injury to the upper tear drainage system, a conjunctivodacryocystorhinostomy (CDCR) with Jones tube placement may be required. At times, it is necessary to convert from a DCR to a Jones tube either at the time of initial surgery or secondarily if the original operation fails. This brochure is intended as an introduction to tear duct surgery. It may not cover every aspect of your condition or address all questions you may have. For more information visit our website at www.toceyeandface.com or call to schedule an appointment with one of our TOC surgeons.

EYE AND FACE

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TEARING AND TEAR DUCT OBSTRUCTION



EYE AND FACE

Information Series

OCULOFACIAL PLASTIC SURGERY

Oculofacial Plastic or Ophthalmic Plastic Surgery is a surgical subspecialty of Ophthalmology that seeks to improve physical appearance and function, or minimize disfigurement resulting from accidents, disease, or birth defects. The word plastic comes from the Greek meaning "molding" or "giving form".

TEARING

The medical term for tearing is epiphora. Epiphora implies that there is a blockage of the tear drainage system sufficient to cause tears to well up over the eyelid margin and drain onto the cheek, usually near the inner or outer corner of the eye. Epiphora can be caused by excess tear production, but is not the usual cause for overflow tearing.

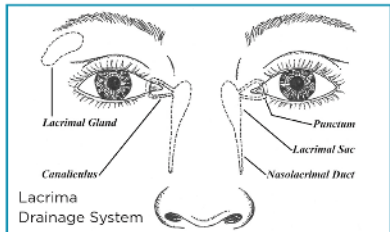
This handout explains the common causes of epiphora due to obstruction of the tear ducts.

ANATOMY

Components of the tears are produced by different glands within the eyelids. The surface of the eye is lubricated and moistened by watery (aqueous) tears formed by two types of tear (lacrimal) glands. The accessory lacrimal glands within the eyelids produce a constant secretion of moistening and lubricating tears. They are known as basic secretors and keep the surface of the eye lubricated from moment to moment. The larger main lacrimal gland that sits behind the upper rim of bone produces tears in response to injury, irritation or emotion. This gland is known as the reflex secretor. Periodic blinking aids in wetting of the cornea by spreading tears over the surface of the eye. As the tears move across the eye, bacteria and debris are flushed from the surface of the eye, and the eye is lubricated and nourished by the tears.

The tears are eliminated by two mechanisms, evaporation and drainage. Evaporation accounts for a significant portion of tear elimination. However, the majority of tears drain through the lacrimal or tear drainage system. There is an active tear pumping mechanism that occurs with blinking which forces tears through the lacrimal drainage system. Paralysis of the face or eyelids interferes with the lacrimal pump and is one cause of tearing. The most common cause of tearing, however, is obstruction of the lacrimal drainage ducts. Tears normally drain through a small opening in each eyelid near the inner corner of the eye called the punctum. Each upper and lower punctum leads to a small channel called a canaliculus. The canaliculus is located directly under the skin of each eyelid. The upper and lower canaliculi join as they drain the tears into the lacrimal sac located behind

a ridge of bone between the eye and the nose. Once the tears reach the sac, they drain through a long channel through the bone called the nasolacrimal duct which drains tears into the nasal cavity down near the nostril. This duct lies within the facial bones and is adjacent to the ethmoid and maxillary sinus cavities. Disease of these sinus cavities and any surgery in this area can cause obstruction of the nasolacrimal duct and lead to tearing and/or infection. One is generally not aware that tears are draining into the nose because the tears rapidly evaporate with breathing. When excess tears are made for emotional reasons or other causes, the nose can run.



TEAR DUCT OBSTRUCTION

There are many causes for tear duct obstruction. In infants and children the most common cause is failure of the nasolacrimal tear duct to develop and completely open properly in utero. Most often it is a small membrane that fails to open where the tear duct exits into the nose. Symptoms of congenital nasolacrimal duct obstruction begins at or shortly after birth to include tearing, redness and irritation of eyelid skin, eye discharge, crusting of the lashes, and recurrent episodes of conjunctivitis. Less commonly, blockage of tear drainage can lead to chronic infection of the lacrimal sac (dacryocystitis).

In adults the most common cause of tear drainage duct obstruction is inflammation of the membrane lining the nasolacrimal duct. The cause of this inflammation is not known, but it is felt that the proximity of the nasal and sinus cavities located beside and behind the tear drainage apparatus plays an important role. Most patients with tearing do not have overt sinus disease, but swelling of the membranes lining the nasal cavity and sinuses may lead to inflammation of the tear duct over time, such as with chronic allergic rhinitis. Eventually obstruction develops and tearing follows.

Primary obstruction of the nasolacrimal duct is more common in middle-aged and elderly women. Menstrual and post-menopausal hormonal changes are thought to cause osteoporotic bone changes and generalized

inflammation and de-epithelialization of the duct's mucosal lining that can lead to narrowing or eventual obstruction of the duct.

Another cause of tearing are fractures of the facial bones surrounding the lacrimal sac and nasolacrimal duct. This may be due to blunt trauma to the face, nose or orbit. Lacerations and penetrating injuries of the tear drainage ducts can also lead to lacrimal obstruction and tearing. Rarely, tumors of the tear sac, duct or sinuses may cause tear blockage. Finally, stones can form in the lacrimal collecting system when tear flow is reduced. These stones develop in the setting of chronic inflammation when bacteria reside within the lacrimal drainage system. If the stones get large enough, they block tear outflow and may cause pain, tearing and infection.

RESULTS OF TEAR DUCT OBSTRUCTION

Patients with obstruction of the lacrimal drainage system will usually experience tearing. The tearing may be intermittent or constant. The symptoms usually increase when the eye is irritated by wind, dust, allergies, or poor blinking.

Infections can occur within the tear drainage system when there is obstruction of the nasolacrimal duct and tears cannot adequately drain out of the lacrimal sac. Tears collecting in the lacrimal sac are mixed with oil, mucus, bacteria and debris from the surface of the eye. Stasis or stagnation can result in overgrowth of bacteria and a serious infection may result. The tear sac swells, becomes very painful, and is associated with redness and tenderness of the eyelids near the inner corner of the eye. This infection, called dacryocystitis, can cause severe problems if not treated promptly. Fortunately, dacryocystitis responds to medical and surgical therapy. Hospitalization for treatment with intravenous antibiotics may be required for more serious infections.

It is important to understand that overflow tearing alone does not "harm" the eye. Infection is a threat to vision however, and always warrants prompt treatment. On the other hand, tearing is very bothersome to most patients and does blur the vision. Fortunately, there is good treatment for patients with tearing due to tear drainage duct obstruction.

TEAR DUCT SURGERY

We perform most tear duct surgery in our on-site ambulatory surgery center, the Center for Aesthetic and Reconstructive Eyelid and Orbital Surgery (CAREOS). This state-of-the-art, certified outpatient surgical facility was designed for the safety, convenience and comfort of our patients. It is run by our

dedicated and professional nursing staff. Board certified anesthesiologists are available for those patients in need of monitoring and intravenous sedation or general anesthesia. The option for hospital based surgery remains for patients requiring more extensive work. The decision of where to perform surgery depends on the patient's medical condition, length and complexity of surgery, and other factors. Our goal is to provide the best possible care in a safe and comfortable environment.

Nasolacrimal Duct Obstruction

The need for surgery to treat tearing becomes necessary when the nasolacrimal duct becomes obstructed. In most cases, the upper tear drainage system (puncta and canaliculi) and the lacrimal sac are not affected. A new tear drainage duct can be created between the lacrimal sac and the inside of the nose allowing tears to bypass the obstructed nasolacrimal duct. This procedure is called dacryocystorhinostomy (DCR) and has been performed for over 75 years with excellent success rates (>90%) in adults without prior sinus disease or surgery. The DCR can be performed through a small skin incision on the side of the nose or medial lower eyelid.

Alternatively the surgery can be performed inside the nose (endoscopic DCR) avoiding a skin incision. The advantages and disadvantages of each approach are discussed at the initial evaluation. In either approach an opening is made through the thin bone between the lacrimal sac and the inside of the nose. The lacrimal sac is opened and attached to the mucosa or lining of the nose. A temporary, thin, silicone stent is placed through the puncta and canaliculi, and then through the opening into the nose in order to keep the new drain open during the initial phases of healing. It is usually removed four to eight weeks after surgery, but may be left in place longer in some cases.

Canalicular Obstruction

Rarely there can be obstruction or severe injury to the upper tear drainage system (canaliculus and/or lacrimal sac) that is beyond repair leaving insufficient tissue to construct a new, more natural drain into the nose. In this situation, an artificial tear drain using a small glass Jones tube is inserted through an incision in the inner corner of the eye. The tube then passes through an opening in the bone created through an incision on the side of the nose similar to a DCR. This procedure is called conjunctivodacryocystorhinostomy (CDCR). The Jones tube is a small, Pyrex® glass tube with a phalange. It allows tears to drain into the nose through the lumen in the center of the tube. From time to time adjustments are necessary