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Editorial

Endoscopy in the field of oculo-facial plastic surgery

We have been constantly coming across a couple of questions from some mentors, peers, and trainees with regard to the use of the endoscope in the field of oculo-facial plastic surgery. The first question is why it is essential to utilize an endoscope when the conventional procedures are working just as well? The second is to what extent can it be beneficial? The answer to the first question is rooted in three concepts of modern medicine: less invasiveness, rapid recovery, and better quality of life. Ophthalmologists experienced the same scenario when phacoemulsification cataract surgery was first introduced against extracapsular cataract extraction procedure, and it is clear how the story went. This editorial highlights an update on the use of the endoscope in the field of oculo-facial plastic surgery to answer the second question.

Endoscopy is a minimally invasive procedure which allows the physician to observe and manipulate the target organ through a keyhole or reach inaccessible targets. The basic instrument, the endoscope, includes a light source, delivery shaft, and a lens. There are various types available which are based on the length of the shaft and the strength and angulation of the lens. The most common ones used in our field are 4 mm and 2.7 mm diameter endoscope with zero, 30, and 45-degree angulation of the lens. These are utilized in the lacrimal drainage system (LDS), orbital, and cosmetic surgery.

Lacrimal drainage system

Primary acquired nasolacrimal duct obstruction (PANDO) is the most common cause of LDS obstruction in adults[1] for which different clinical tests are performed to reach the diagnosis. Diagnostic tests include fluorescein dye disappearance test (FDDT), regurgitation test, and irrigation of the drainage system.[2] FDDT and irrigation of drainage system can be performed more accurately with the use of an endoscope.[3] The opening of the nasolacrimal duct in inferior meatus, the ease of fluid passing through this opening, and the anatomy of LDS and nasal cavity can be easily assessed with an endonasal endoscope.

Dacryocystorhinostomy (DCR) and dacryoplasty are commonly performed for complete and partial nasolacrimal duct obstructions.[4–7] Dacryoplasty is performed for partial obstruction of the drainage system in which following a probing of the canaliculus and nasolacrimal duct, the drainage system is intubated with or without a balloon dilatation of system prior to it.[4,5] It is essential to use an endoscope to control the procedure and avoid false passage into the nasal cavity. DCR, on the other hand, is performed for complete obstruction which is either through a skin incision (external),[6] nasal cavity (endonasal),[7] or inside the lacrimal system (endolacrimal).[8] Endonasal DCR is mostly performed using an endoscope, a method which has gradually gained more popularity since its advent in 1990s. Its success rate is almost the same as external DCR but offers rapid recovery and no skin incision.

Trans canalicular[8] (endolacrimal) utilizes a small diameter endoscope (0.8–1 mm) to visualize canaliculus and nasolacrimal duct and, if necessary, remove the blockage mechanically or by means of a laser. It will surely be the future of lacrimal procedures due to its non-invasive nature of procedure which can be performed under local anaesthesia with no collateral damage to the other tissues (skin, nasal cavity), even though the reported rate of success of dacryoendoscopic DCR is still less than external and endonasal DCR. It has less success and requires meticulous patient selection.

Failure has, on average, been reported in less than 10% of the patients with previous DCR procedure, and further investigation is required in order to find out the reason.[9,10] Endoscopy (nasal endoscopy and or dacryoendoscopy) could be an important tool for such an investigation, similar to preoperative assessment of the LDS. More importantly, it is considered the best option for revision surgery because of direct observation of the ostium and addressing the nasal cavity problems.[11]

Congenital nasolacrimal duct obstruction (CNLDO) is the most common cause of epiphora in early childhood. This consists of a simple membranous obstruction for non-opening of the nasolacrimal duct to the inferior meatus which is more prevalent. It can also be due to a complex nasolacrimal duct obstruction. The simple membranous obstruction can open spontaneously or would require a simple probing of nasolacrimal duct with or without inferior turbinate fracture. The complex obstruction is usually associated with nasal cavity problems such as turbinate hyperplasia, septal deviation, and impacted inferior conchae and turbinate. These can contribute to persistent epiphora after a

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simple probing of the nasolacrimal duct.[12] Endoscopically-controlled probing of nasolacrimal duct identifies false passage and results in a higher rate of success.[13] It is not unusual for children to undergo multiple procedures such as probing, re-probing, followed by probing with inferior turbinate fracture, then intubation, and finally DCR. Considering the resources needed to be used and the increased chance of morbidity, especially general anaesthesia in childhood, this has become an unacceptable practice. Therefore, one-stage, obstruction-based endoscopic CNLDO surgery[12] is becoming more prevalent. In this approach, examination under general anaesthesia of the drainage system and nasal cavity utilizing the endonasal endoscope is performed. The inferior turbinate is medialized or in fractured. In some, turbinectomy and septal deviation correction is performed when the nasolacrimal duct is re-canalized or intubated. Should a complete complex obstruction be noted, then an endonasal DCR can be performed at the same setting. Endoscopes play a pivotal role in such management. 3D endoscopic lacrimal surgery has also recently been employed and introduced to give a 3D image of the LDS during the lacrimal procedures.[14]

Orbit

Surgical approach to the orbit is transcutaneous, transconjunctival, and endoscopic. Many orbital fracture repair, orbital wall decompressions, and tumor removal are carried out through a transconjunctival approach in our practice, which has the advantage of avoiding incision of skin or nasal mucosa. However, the nasal approach into the medial wall of the orbit is also an acceptable practice, even though it is mostly used for naso-orbital lesions.[15,16] Medial orbital wall decompression is the most common procedure where the endonasal endoscopy is utilized. It is also very effective for drainage of orbital abscess and excision or biopsy of medial orbital pathology. It gives good access to the deep medial orbit and optic canal where recently navigation systems are utilized for improving the safety of the surgery.[17] A combined external approach through an extended skin crease incision and simultaneous endonasal endoscopy has been used in interactive fronto-ethmoidal mucocele when the sinus is evacuated, and anastomosis established between the sinus and nasal cavity.[18] Lastly, in selected cases, a transconjunctival endoscopic technique has been utilized to decompress and excise orbital tumors.[19] This is an exciting area, opening new scopes for future treatments.

Cosmetic

The eyebrows are an essential part of any upper face rejuvenation procedure.[20–22] Currently, one of the most popular endoscopic cosmetic procedure is endoscopic upper face and eyebrow lift.[23] It significantly decreases the complications of conventional transcoronal lift, even though under-correction of the lift was one of its drawbacks in the beginning. Some modifications were, however, introduced to address the under-correction.[23] It is now considered the most popular and most effective eyebrow and forehead lift, even though males and subjects with a high hair line or severe forehead droopiness would require modified versions of endoscopic forehead lift. Endoscopic mid-face lift can be performed, although transconjunctival lower eyelid approach[24] offers another less invasive approach in which lateral eyelid tightening can be simultaneously performed with mid-face lift through the same incision. While other cosmetic facial procedures (lower face lift and neck lift) could potentially be performed with endoscopic approach, simultaneous need for excess skin excision has been an obstacle in the way of their popularity and effectiveness.

Harvesting tissue such as fascia lata for brow suspension sling procedure usually requires a long skin incision[25] in which the endoscopy can potentially be used with shorter skin incisions.

Recommendations

General advantages of endoscopic approaches include less pain, no or smaller skin excision, lower risk of infection, less trauma to the tissues, a shorter hospital stay and tissue recovery, and generally a better quality of life. Disadvantages could be a steep learning curve, cost, periodic machine update, and technology dependency.

Based on our experience on the use of endoscopes in the field of oculo-facial plastic surgery, we recommend the following 10 key points in order to make its learning curve smoother in the transition from conventional to endoscopic procedures.

1. Review (books and articles) and revisit (cadaveric dissection) the facial anatomy with regard to endoscopic approaches in different facial units.
2. Use the endoscope to look and see the facial units during and at the end of conventional approaches. For instance, nasal endoscopy during and after external DCR.
3. Take a 3- to 6-month training period for each field of endoscopic procedure (lacrimal, orbital, cosmetic).
4. Start with simple, straightforward cases which are expected to have a better success rate. For example, endoscopic DCR on the left side of a wide nasal cavity and endoscopic eyebrow lift on a low hairline, relatively thin-skinned female.
5. Set up the endoscopic instruments well and familiarize yourself with the use of the endoscope, such as the white balance, and use the right focus and appropriate lighting. Nothing is worse than not being able to clearly see the anatomy during the endoscopic procedures because of low quality lenses or camera.
6. Secure good hemostasis before any endoscopic surgery. Hemostasis is crucial for endoscopic approaches, and without it, not only would the procedure be difficult to execute, but the success would also be lower.
7. Have a well-trained assistant for endoscopic procedures in order to set the endoscope, fix any unexpected problems during the procedure, keep the quality of instruments high, and sometimes comment on how to use different instruments.
8. Before starting the surgery, check that all required instruments are available and sterile. Since endoscopic procedures are very instrument-dependent, availability of all the required instruments should be double checked.

9. Follow the company's guidelines for sterilization, maintenance, and cleaning. Since the cost of repair and renewal are high, the endoscopic set should be handled, cleaned, and sterilized carefully.
10. Obtain the name of the local company representative and their contact number for advice.

In conclusion, a greater number of conventional procedures are now benefitting from the use of suitable endoscopes. This results in a less invasive procedure through a keyhole approach and faster recovery for patients. Ophthalmologists are well-geared to take up this technique with their background familiarity of the use of microscopes, the use of various lenses, and various ophthalmoscopes. Therefore, the learning curve would appear to be less steep. We believe that endoscopic procedures should become part of the basic curriculum in the field of oculo-facial, orbital, and lacrimal surgery. Furthermore, common orbital complications after endoscopic approaches should also be taken into consideration during the training courses in order to reduce their frequency and severity. The reported complications include but are not limited to extraocular muscle injury, optic neuropathy, and herniation of orbital tissues. With recent advances, the reliability and image quality of the endoscopes have improved and are improving further. Adding to this the 3-dimensional imaging and use of navigation systems, the future is very exciting.

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