IZADI Laryngeal Inserter: A New Instrument in Endoscopic Management of Laryngotracheal Stenosis

Abstract

Laryngotracheal stenosis is mainly caused by intrinsic airway injuries such as long term intubations. Both congenital and acquired stenoses are managed with open or closed (endoscopic) surgery. Either of approaches has its own characteristics and indications. In the endoscopic approach, after the removal of stenosis by microsurgery, laser or dilatation, a stent is placed in the operated site to provide a patent airway and avoid granulation tissue formation.

We report a new technique with the presentation of a new instrument, IZADI Laryngeal Inserter (ILI), to overcome commonly encountered difficulties in endoscopic procedures for laryngotracheal stenosis removal (fig-1); it will make it possible for hollow stents of any size to be placed in the operated stenosed region and being fixed with nylon sutures transcervically.

Introduction

Patients: Those patients with a stenosis of grade I-II, with less than 1 cm length, placed at least 2 cm above carina, with appropriate stenosis for endoscopic removal, are to be candidates for this purpose. Moreover, those patients who did not respond to other surgical techniques could be included, given that they met at least three out of four criteria and filled the letter of consent.

Therefore, only four patients were treated with endoscopic procedure using ILL in ENT and Head and Neck Surgery Research Center, Tehran, Iran during August 2002-September 2003:

1. An eight-year-old girl with a history of 14 days of orotracheal intubation who had a grade II circumferential fibrosis stenosis of 5 millimeters length in subglotic region
2. A twenty one-year-old female with a history of 14 days of orotracheal intubation and 1 centimeter length grade II stenosis of subglotic region
3. A 5 year-old boy with a history of 10 days of orotracheal intubation and a 50 millimeter grade III subglotic stenosis.
4. The fourth patient was a 32-year-old female with a history of 12-day orotracheal intubation, who had a history of unsuccessful endoscopic and laryngofissure procedures for stenosis removal. She had a complete structure of 1 centimeter length at the origin of trachea.
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**Instrument:** The device is made of stainless steel and is consisted of one main part and an accessory part or head piece that is screwed on. The main part looks like a cup forceps or alligators. The head piece is consisted of two hemi cylindrical halves which can unfold. The stent is placed as to cover the head piece.

When the head piece is screwed on the main part, the clapper at the distal end will force the two halves of head piece to unfold, so that the head piece attaches to the internal surface of the stent.

The surgeon is able to insert the instrument and reach the stenotic region. When the scissors like handle is pressed, the clapper is drawn back and the stent is released. Then, the inserter is pulled out while the stent has been properly placed.

The main part weighs 200 grams and is 30 cm long. We have designed the head piece in five different sizes to match stents with different sizes. The head piece weighs 20-30 gram and is 5.5 to 7.5 cm long. To make the stent, a T-tube is cut at the joint of vertical and horizontal arms to make a simple straight hollow tube.

**Procedure**

At the time of the procedure when patients are under general anesthesia, the stenosis is removed through either microsurgery, laser or dilatation method. Then, a hollow silastic stent is inserted using IUI (fig-2).

To fix the stent transcervically, a straight needle with 2/0 nylon is used to make two sutures on the skin at either sides of the stent. Fixation leads to less movements and sutures on the skin at either sides of the stent, and also it leads to less movement and less reaction to the artificial object (stent). The nylon material is also used to create the least reaction.

**Post-operative care and follow up:**

Patients should take-reflux treatment for 14 days, and post operative antibiotics (kelfin) for 7 days. The first laryngoscopy is done two weeks after surgery to evaluate the operated site and remove any granulation tissue. The stents are removed 1-1.5 months after the operation.

**The Outcome**

All the patients showed normal respiration and speech in the follow-up evaluation conducted after 1-3 months. At the time that this article started to be written, the patients had been followed for an average of 20 months and no complications had been reported.

**Discussion**

Considering the two main approaches of laryngotracheal stenosis removal, there is definitely a role for endoscopic procedures in selected patients who meet the criteria due to less morbidity attached to endoscopy. Should the endoscopic intervention be selected to treat laryngotracheal stenosis, the surgeon must place an appropriate stent in an
appropriate region, which is difficult or
sometimes impossible without a specific
instrument. To our knowledge, the laryngeal inserter is the first instrument used for
such purposes and no similar prototype has
been documented in the literature.
Using the ILI in a closed surgery, the surgeon
can save the external support of laryngotracheal
airway and impose minor damages on
cartilaginous and soft tissues. The procedure is
performed more rapidly and easily, compared to
tracheostomy and T-tube fixation.
Using the ILI, it is even possible to remove the
stenosis and place the stent without
tracheostomy.

The inserter is rigid enough to pass the stenotic
regions, a T-tube is not able to pass because of
its flexibility.

The granulation tissue formed in this procedure
is minimal, because the fibrocartilaginous tissue
is not manipulated, and there is no reaction of
suture materials. Moreover, antibiotics and
corticosteroids may prevent progression of the
granulation tissue to the internal space of the lumen
and soft tissue adhesion. The chance for open
surgery is also preserved due to manipulation of
tissues.

**Conclusion**
The authors do not intend to nullify the role of
open surgery techniques in removing
laryngotracheal stenosis, they have just
presented a new technique which allows easy
placement of stents during endoscopic procedures.

**Competing interests**
This study was conducted with research grant
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