Malignant Esophagorespiratory Fistula: A Challenge…

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Short Communication

Keywords
Tracheoesophageal fistula; Bronchoesophageal fistula; Surgery; Esophagoscopy; Bronchoscopy; Stenting Esophagus; Stenting the airway

Key points
TFE is an incurable condition that reduces life expectancy.
Aspiration and septic pneumonia lead to morbidity and need early control.
Surgery is rarely indicated.
Different esophageal and airway stents are available.
Self-expanding covered stents are easy to insert.
Team effort between the endoscopist and anesthesiologist is necessary for good results.

Introduction
The malignant esophagorespiratory fistula is a communication between the upper digestive tract and the respiratory system, secondary to tumor invasion through the wall of the esophagus and trachea or bronchus. The fistula may happen most often between the trachea and the esophagus and commonly called malignant tracheo esophageal fistula (MTEF). For simplicity MTEF will be used in the text.

MTEF is an uncommon complication of esophageal and lung cancer. Its incidence is from 5% to 10% of esophageal and 1% of lung cancer [1]. Most of malignant TEF happens during or after completion of radiation and or chemotherapy. But it may happen spontaneously in some patients during the evolution of their cancer. Tumor necrosis is thought to be the cause. Malignant tracheoesophageal fistula may also complicate other type of cancer such as lymphoma, carcinoid tumor, and adenocystic carcinoma during the evolution or during chemo or radiotherapy. When this condition happens, it is always a challenge to the patient life. It also appeals to the clinician skills for an adequate palliation with minimal risks.

The malignant TEF is a completely different situation in comparison to the benign type, which is often secondary to a medical problem or trauma. Most acquired TEF result from complications of mechanical ventilation. Although, the symptomatology is similar the therapeutic approach is different and surgery is often the therapy of choice for its resolution [2].

The diagnosis of a MTEF is not always clear. Because it is a relatively rare condition, its recognition always needs some suspicion from the clinician. In the context of a patient with an esophageal carcinoma, deterioration of the general condition associated to pulmonary symptoms should raise the possibility of a malignant TEF. The clinical manifestations are those related to a contamination of the respiratory system by the gastrointestinal content. It gives symptoms of aspiration such as coughing while drinking and or eating. Pulmonary aspiration will lead to repetitive cough, fever, pneumonia, and sometimes chest pain. Dysphagia may also present when there is an associated stenosis. Hemoptysis may occur with inflammatory changes secondary to the airway contamination. The major life-threatening complications from MTEF remain infection and poor nutrition.

When a clinical diagnosis has been raised, one needs to confirm radiologically and endoscopically the fistula, its location and size in order to choose the best palliative approach.

In a patient with symptoms of aspiration the finding of retro tracheal abnormalities may suggest the diagnosis. However, it will be more precise with a thin section chest computed tomography after
When the actual interventional technology was not available, surgery had a role to bypass the fistula or exclude the esophagus in certain specific situation.

Esophageal bypass with stomach or colon was used in patients with a good general condition. Although, it was not to cure the patient, it works to prevent the continuing contamination of the respiratory system and allow for food ingestion [5-7].

The gastric or colon interposition is connected to the proximal esophagus once the upper esophagus is transected and the distal part closed to isolate the fistula.

Another surgical option is the esophageal exclusion. The esophagus is disconnected in the upper mediastinum and brought in the neck. The distal esophagus is closed in order to reduce the contamination of the respiratory system.

An anterior chest wall esophagostomy is performed. A bag is installed on the stoma and the patient is allowed to eat. If the stoma is positioned in the neck instead of the anterior chest wall, it may be difficult to adapt a bag and the situation can be miserable for the patient. Thus, the importance of choosing a good position for the stomaon the anterior chest wall. A feeding jejunostomy become necessary for feeding. The stomach left in place may contaminate the airway by reflux of acid and bile. Those interventions are not performed without a significant morbidity and mortality.

Among the other surgical options, the resection of the TEF, is considered super aggressive and should only be performed in exceptional situation.

Direct closure of the fistula should never be performed because it makes no sense in such a disease.

Today, surgery of resection and reconstruction is rarely a good option, even if one can occasionally find reports in the surgical literature [5].

In patient with a very poor and short term prognosis surgery is justified only in a much selected situation.

### Intervventional Therapy

Insertion of a stent in the esophagus to bridge a TEF is not new. In the past traction technique was used with a high morbidity [8]. Interventionsh therapy with stenting the airway, the esophagus or both has shown since the 90 to be the best palliative option. Technical success is very high and results are immediate [7]. This is the palliative approach with the less risks and the best results. However, complications may happen such as chest pain, migration, bleeding, ulceration, food impaction. Balazs has reported an impressive
experience with more than 200 cases of TEF treated during a period of 20 years [1].

It is not always obvious to decide what the best approach is for a particular patient. There are many possible options to control the fistula. When is it indicated to only stent the esophagus or to stent the airway or to stent both the esophagus and the airway?

There are several esophageal and airway stents and different clinical situation. For example one may have to deal with a very large or very small fistula. Is the approach the same? The location of the fistula has some influence on the choice of a stent as well as the presence or not of a stenosis. Thus the clinician has to make a decision about which organ needs to be stented first, which stent to be used. Mingyagoo has made an excellent review on this topic [9].

**Stent the Esophagus Only**

Attempting closing a fistula by stenting the esophagus first, appears to be very logical. Most of the time, this simple maneuver will be sufficient to relieve the patient from aspiration and allows him eating.

When the fistula is in the lower esophagus, stenting the esophagus only may be sufficient. An endoscopic evaluation of the size and degree of esophageal stenosis is determined. The conventional technique of stent insertion under endoscopic and radiologic guidance is usually easy and allows to cover the distal end of the fistula as well as the proximal one. The presence of the stenosis as well as a limited pre insertion dilatation should avoid the migration of the esophageal stent. After the stent is installed and after a radiologic control with contrast medium (Gastrograffin) the patient should resume eating progressively.

**Stent the Esophagus and the Airway**

If there is an airway stenosis, a stent should first be installed in the airway because of the danger that an esophageal stent increases the size of the fistula or block the airway. It should be followed by esophageal stenting if judged necessary. The esophageal stent should be placed higher than the airway stent margin to avoid migration of the airway stent.

The other indication for a double stenting is when the fistula is too large and would possibly interfere with the tracheal lumen. Then, it becomes imperative to stent first the trachea to secure the airway followed by the esophageal stent (Figure 2).

**Airway Stent Alone**

When it is impossible to place an esophageal stent because of a tight esophageal stenosis an airway stent alone may be the solution to prevent aspiration from the upper esophagus.

Difficulties arise when the fistula is high and the vocal cord are closed to the fistula. If the fistula is very high within 2 cm of the upper esophageal sphincter, it might be impossible to install two stents. There is a danger of compromising the airway. Stenting the airway becomes the best option.

One can find many other clinical situations, which command some reflections before deciding what to do first. Now let’s review briefly the type of stents available.

**Type of Esophageal Stents**

Partially or fully covered self-expanding metal stents are the treatment of choice for malignant tracheoesophageal fistulas. With partially covered stent, there should be less migration. In some occasions, the stent may stay in place for a long period of time and be well tolerated. I personally treat a patient with lymphoma and a post radiation tracheoesophageal fistula. The stent remains incorporated to the esophagus 10 years later (Figure 1).

**Type of Airway Stents**

Although, most of esophageal stents are metal ones the airway stents are divided in two groups based on their material: self-expandable covered metal stent and the silicone stent. The covered metal is easy to install, but are associated with granulation tissue formation.

The silicone stents are more difficult to insert especially at the carina. The rigid bronchoscope is necessary under general anesthesia.

Airway stent should covered 2 cm on each side of the fistula and the diameter should be at least 10% bigger than the airway to be stented.

**The Team Effort and Timing**

In our unit, most of the stents are installed under general anesthesia in the operating room. Every case is discussed with the whole team including the anesthesiology team. The technique is relatively simple when it is only an esophageal stent that is contemplated, but the procedure is more complex when an airway stent is inserted and demanded close cooperation with all the personal in the room. Every procedure is performed with the help of a C arm for fluoroscopy. All the endoscopic equipment for flexible and rigid esophagoscopy as well as rigid and flexible bronchoscopy is prepared for immediate use. Communication between the anesthesiologist and endoscopist is crucial.
Technique of Esophageal Stenting

Under general anesthesia, a flexible bronchoscopy and esophagoscopy are first carried to identify the site of the fistula, the site and length of the fistula, as well as the length of the stenosis if present. Under fluoroscopy, we identify with metallic markers the upper and lower part of the esophageal fistula where the stent will be deployed. A guide wire is installed in the esophagus and stomach, the scope is then pulled out and the stent inserted and deployed under fluoroscopic guiding. Once installed, the endoscope will help to confirm the good position and expansion of the stent. A nasogastric tube is installed and Gastrograffin is used to verify the passage of the contrast and the closure of the fistula. It also allows to identify the presence of endoleakage mainly at the proximal end of the stent. The second step is to re-examine the airway with a flexible bronchoscope to make sure the airway is not compromised. Depending on the findings, the clinician has to make a decision about the necessity of an airway stent.

Technique of Airway Stenting

If an airway stent is needed, a team work with the anesthesiologist is imperative to protect the ventilation and saturation during the procedure. Using a rigid bronchoscope is probably the easiest to proceed. An 11 mm or 14 mm rigid bronchoscope is used inside of which one can slip a small flexible bronchoscope and still ventilate adequately the patient. Under direct vision, the stent applicator can be positioned and stent deployed. Fluoroscopic control can also help during the procedure and is used as a control post insertion.

If the fistula is at the level of the carina a more complex procedure is needed to position a Y-stent which can be most difficult in unexperienced hands.

If the fistula is at the level of a main bronchus a short stent can be inserted under fluoroscopy after proper endoscopic visualization and fluoroscopic marking.

Post Stenting Management

Esophageal stents are relatively easy to manage. Elevated bed head prevent from aspiration and diet need to be soft. A document explaining the type of diet recommended is given to the patient. An outpatient follow-up with nurses is organized to support the patient and prevent complications [3].

Tracheal stents need more care because of the possible hardening and incrustation of the secretion. Humid inhalation is recommended especially during night time.

Complications

Complication with the stents is migration, granulation tissue formation and secretion obstruction. One of the worst is the necrosis of the esophageal and tracheal wall by the pressure of a double stent.

Although, there is no statistic available, the different procedures the different procedure can be performed with a very low immediate mortality. It has to be if done by experienced endoscopist working in a well-equipped environment. An appropriate correction of any septic condition is essential.

Summary

Taking charge of a patient with a malignant tracheoesophageal fistula can be challenging. Today the best way to support those patients with a dismal prognosis is to properly use the new self-expanding technology. Stenting is the ideal method to palliate effectively aspiration and to deal with airway stenosis. One has to document properly the fistula and use the appropriate stents to seal the airway and bypass the stenosis.

References