Commentary

TEP in the ER: After Hours Tracheoesophageal Prosthesis Management for the Otolaryngologist

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Abstract

Background: Tracheoesophageal voice puncture and prosthesis (TEP) is a common method of voice restoration following total laryngectomy. A variety of complications, both minor and major, can be associated with the TEP and require timely intervention/management. Some of those complications include premature leakage, periprosthetic leakage, granulation tissue growth, TEP dislodgement, or embedding of the TEP. Patients may present with problems and/or complications with the voice prosthesis in an emergency setting or after clinic hours when a trained speech pathologist is not present or readily available for evaluation and management. This manuscript aims to provide guidance for management of acute TEP complications to otolaryngology responders, especially those who may be less familiar with TEP troubleshooting.

Methods: Experiential and literature review was undertaken by a group of head and neck specialized Speech Language Professionals in high volume Head & Neck Oncology practices, to develop consensus guidelines for emergency TEP management.

Results: TEP emergencies were categorized as (1) leakage through, (2) leakage around, (3) sudden loss of voicing, (4) loss of prosthesis, still in tract, (5) loss of prosthesis, not in tract. Management strategies for each form of emergency were developed to achieve patient safety and stability until definitive measures could be performed by the patient's Speech Language Professional.

Conclusions: The goals of emergency management of TEP problems focused on minimizing risk of aspiration pneumonia, risk of foreign body aspiration, risk of wound complications at the puncture site. A simple management algorithm was developed for emergency or on-call otolaryngology responders.

Keywords

laryngectomy, tracheoesophageal puncture, speech pathology, complications, aphonia

Background

Recent estimates suggest that approximately 12 650 people will develop laryngeal cancer in 2024 with total laryngectomy as the recommended treatment for many advanced laryngeal cancers.[1] Total laryngectomy leaves the patient aphonic and in need of communication rehabilitation. While there are different options for voice restoration following total laryngectomy, tracheoesophageal (TE) puncture with voice prosthesis (TEP) is often considered the gold standard for voice restoration as it can be associated with better quality of speech intelligibility, shorter training period, and improvements in quality of life (Figure 1).[2-4] However, a variety of complications can be associated with the TEP and has a reported incidence ranging between 22% and 83% of patients.[3,5,6] Complications can vary from very minor events that can be remedied by replacing the prosthesis or removing granulation tissue, while more major complications may require surgical intervention.[5] Commonly reported complications include premature leakage through the prosthesis (central leakage), periprosthetic leakage, granulation tissue,

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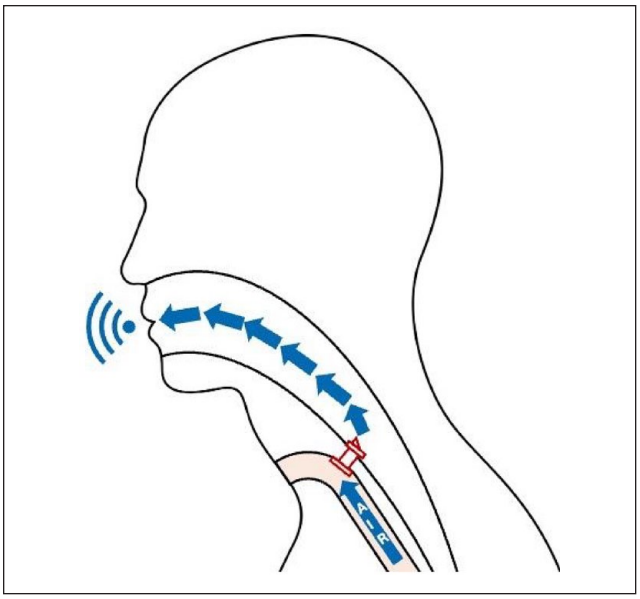

Figure 1. Diagram of TEP.

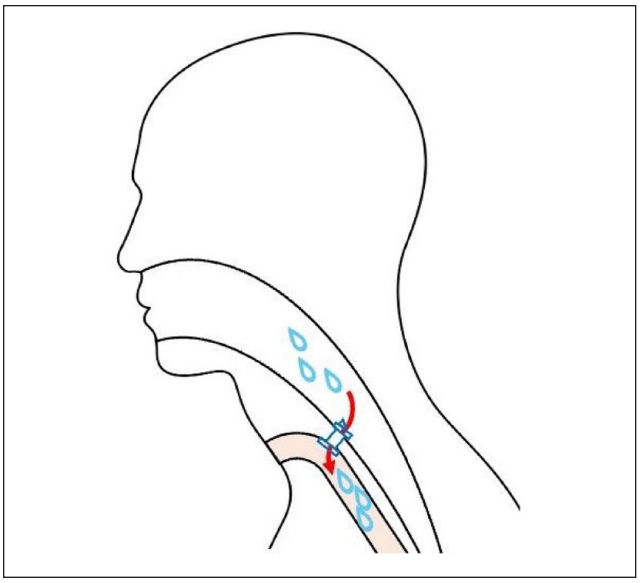

Figure 2. Central leakage.

dislodgement or embedding of the TEP, and aspiration of either oral liquids or the prosthesis itself.[3] In a number of studies, central leakage is reported as one of the most common TEP related complications managed by the Speech-Language Pathologist (SLP).[6-8] While SLPs manage many TEP related complications as part of standard outpatient clinic-related procedures, unfortunately patients may present with TEP problems or complications after clinic hours or in an emergency department setting. The goals of emergency TEP management focus on minimizing risks of aspiration pneumonia, foreign body aspiration, and wound complications at the puncture site. Due to lack of guidance in the literature, we developed an algorithm to help with TEP related complications and emergencies for Otolaryngology and Emergency Medicine providers who are less familiar with TEP management techniques.

Methods

Experiential queries and literature review were undertaken by a group of Head and Neck specialized SLPs in high volume Head and Neck Oncology practices to describe recommended practices for emergency TEP management. TEP emergencies were categorized as (1) central leakage, (2) periprosthetic leakage, (3) sudden loss of voicing, (4) loss of prosthesis, still in tract, and (5) loss of prosthesis, not in tract. Management strategies for each form of emergency were developed with the goal of achieving patient safety and stability until definitive measures can be performed by the patients' SLP. Algorithms was developed to provide guidance regarding management of acute TEP problems for otolaryngology responders, especially those who may be less familiar with TEP troubleshooting.

Central Leakage

Central leakage has been reported to be the most frequent TEP related complication and the main reason for TEP replacement (Figure 2).[5,7,8] Central leakage has been reported to occur in anywhere from 32.2% to 73.2% of patients, however the timeline to leakage has not been clearly defined as to what constitutes premature leakage, and each type of TEP may have variable device life.[5,6] Central leakage can result from valve deterioration, biofilm deposits on the valve, food lodged in the valve, poor fit, or negative esophageal pressure with swallowing or breathing.[9] While the cause of central leakage should be investigated to promote longer device life, central leakage should be resolved in a timely manner to reduce risk of aspiration until the precise remedy can be identified by the SLP. Patients are typically trained on managing central leakage, however they may seek out medical assistance or have limited access to an SLP that is appropriately trained in the management of TEPs.

Upon identifying central leakage, the prosthesis should first be cleaned using a cleaning brush or flush device and if not resolved, a plug insert can be placed (Figure 3). If this is unsuccessful or the patient does not have a plug insert, additional management may be indicated. Trialing thickened liquids or placement of a laryngectomy tube with eating or drinking can temporarily resolve central leakage. If the central leakage persists despite these

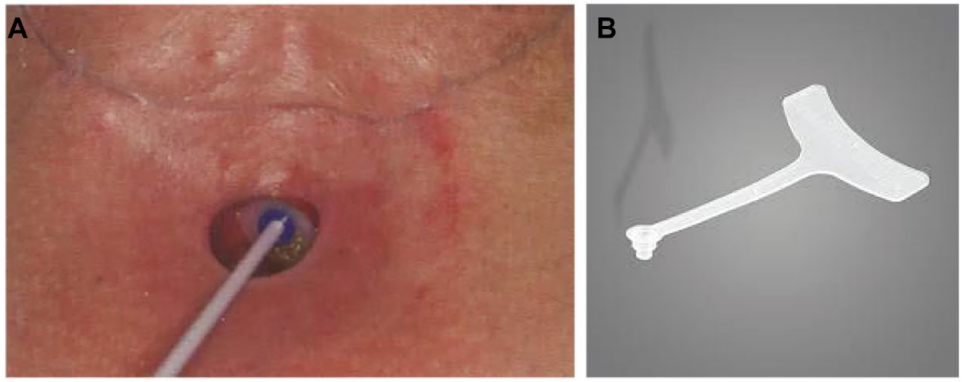

Figure 3. (a) Cleaning brush and (b) plug insert.

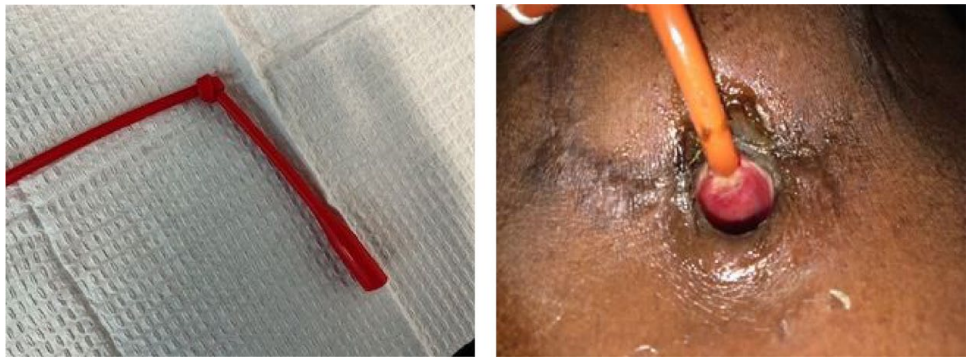

Figure 4. Red rubber catheter.

interventions, the otolaryngologist can place a temporary nasogastric feeding tube and recommend the patient avoid oral intake (NPO) until the prosthesis can be changed by the treating SLP. If the patient refuses a feeding tube, the prosthesis can be removed with a hemostat and a red rubber catheter should be placed in the TE tract to stent and occlude the tract to allow the patient to continue eating and drinking by mouth (Figure 4). A knot should be tied on the end to prevent backflow of liquids out through the catheter. Once the red rubber catheter is secured in place, typically by tying with umbilical tape around the neck or suture to adjacent skin (less ideal), the clinician should observe the patient swallowing to ensure there is no leakage around the catheter into the trachea. See Figure 5 for management algorithm of central leakage.

Periprosthetic Leakage

Periprosthetic leakage has been reported as the second most common occurring TEP related complications behind central leakage with incidence reported ranging from 18.5%-25.9% of patients (Figure 6).[6,8] The systematic review by Mayo-Yanez, et al (2024) suggests that periprosthetic leakage is "related to an advanced nodal stage, post-operative pharyngeal stenosis, the presence of pharyngoesophageal reflux, post-operative radiation therapy or locoregional recurrence or metastatic cancer after laryngectomy."[10] Other factors that can lead to periprosthetic include inaccurate TEP length, reduced health of the surrounding tissue, insufficient parti-wall thickness or irradiated tissue causing an expanding tract, or the presence of granulation tissue that can displace the prosthesis.[9]

Managing periprosthetic leakage can be more complex than managing central leakage, and at times may require more aggressive intervention. In the emergency setting, trialing thickened liquids or partial occlusion of the puncture site with a laryngectomy tube are often the most straightforward troubleshooting methods that can be attempted to reduce or eliminate aspiration. However, these are only temporary solutions as continued periprosthetic leakage can lead to deteriorating tissue health or an aspiration

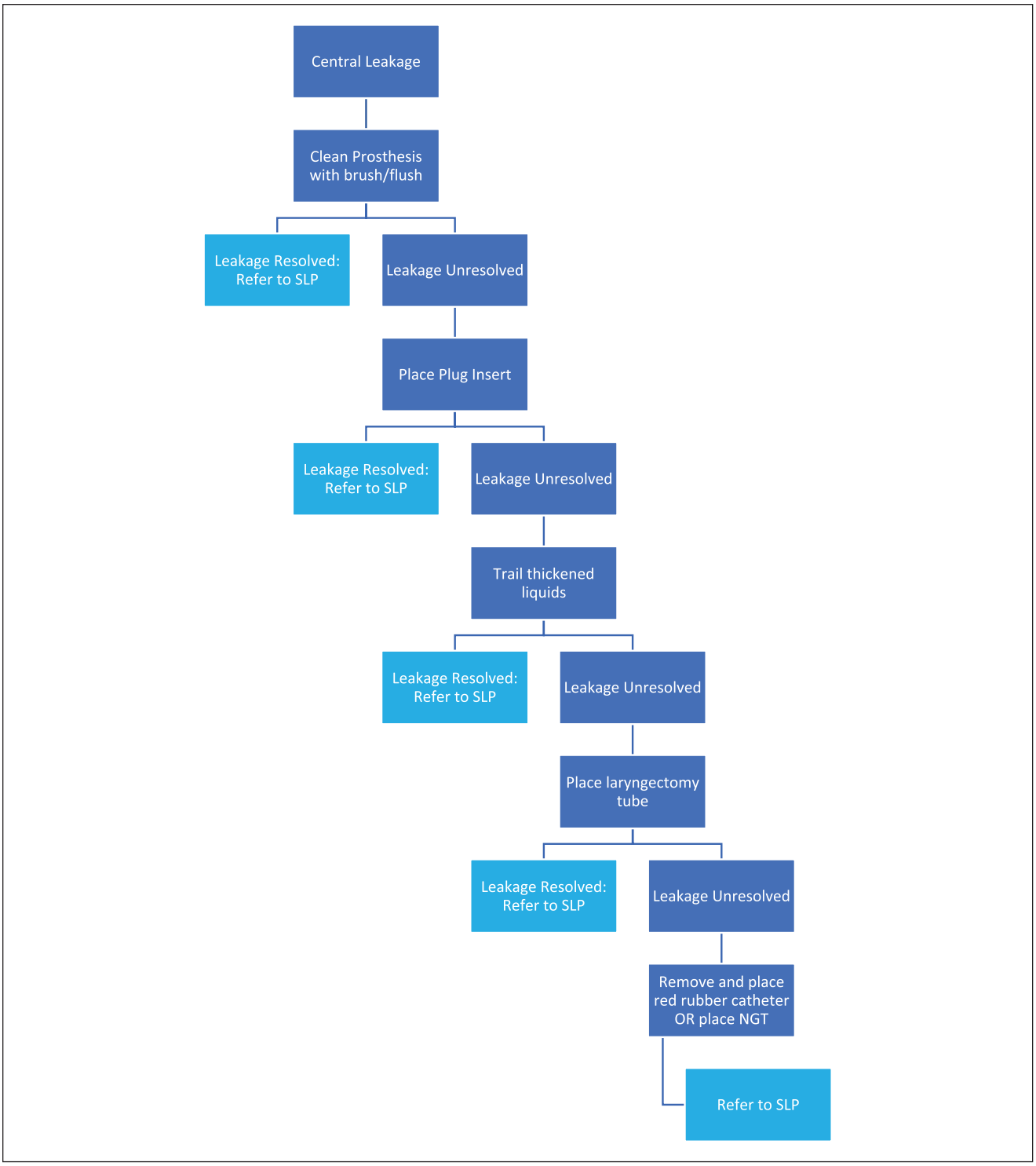

Figure 5. Central leakage algorithm.

related infection. If periprosthetic leakage persists despite attempts at thickening liquids and/or placing a laryngectomy tube, the patient should be made NPO and a nasogastric feeding tube should be placed temporarily until they can return for evaluation and management by their SLP for resizing and/or placement of a specialty prosthesis as indicated. See Figure 7 for management algorithm of periprosthetic leakage.

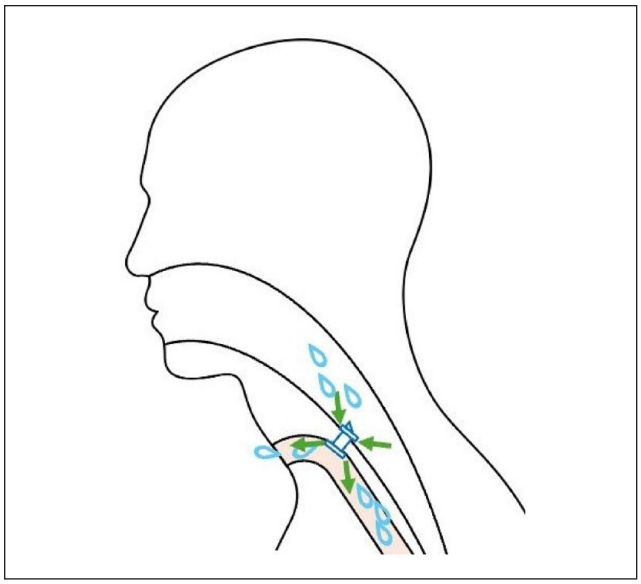

Figure 6. Periprosthetic leakage.

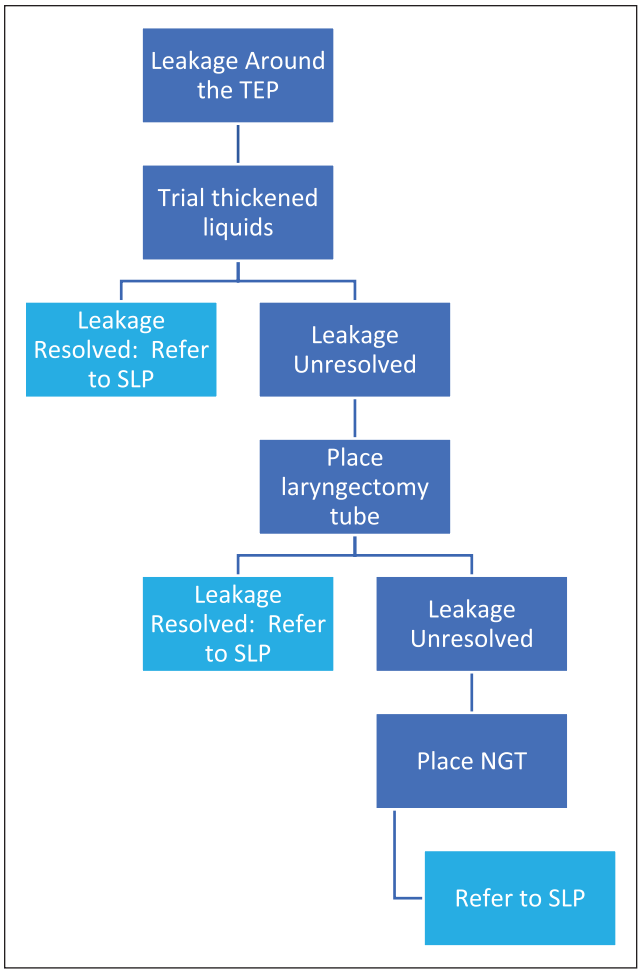

Figure 7. Periprosthetic leakage algorithm.

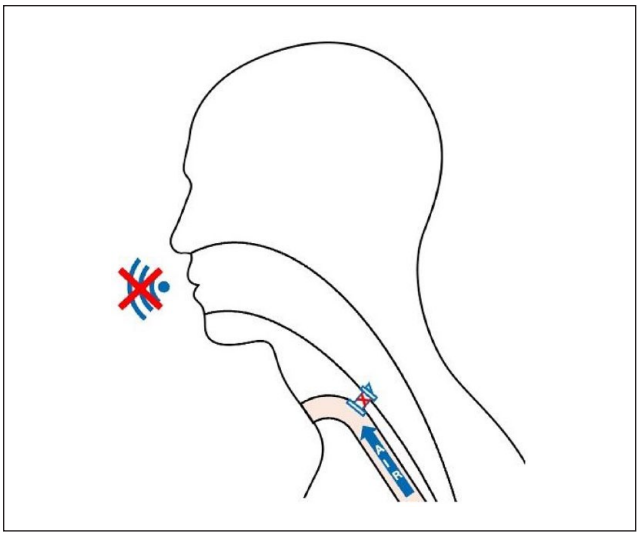

Figure 8. Loss of voice.

Sudden Loss of Voicing

The most likely causes of sudden loss of voice include blockage of the TEP valve or an improper prosthesis fit (Figure 8). In some instances, loss of voice may be attributed to the puncture tract closing on the esophageal side, likely due to embedding or tissue growth over the prosthesis. Tissue overgrowth can lead to complete loss of the TE tract requiring re-puncture and requires timely intervention. As an initial management strategy, the prosthesis should be cleaned using either the cleaning brush or flush to ensure the valve is not blocked. If the voice does not return to baseline, tissue changes along the esophageal flange may be present. The otolaryngologist may complete a scope exam to confirm appropriate prosthesis placement of the esophageal flange and determine the presence or extent of tissue overgrowth. However, the TEP can be left in the TE tract and timely SLP follow-up should be scheduled to address the causes of voice loss. By leaving the prosthesis in place, the risks of complete closure of the tract on the esophageal side, prosthesis embedding, or total loss of the TE tract are increased if the patient cannot see their SLP quickly. Alternatively, the prosthesis can be removed and replaced with a red rubber catheter to maintain stoma patency and prevent aspiration. If the red rubber catheter is not able to be placed through the TE tract, this may indicate that the tract is nearly closed. A smaller diameter nasogastric tube, that is, 8 or 10 Fr can be placed through the TE tract in attempts to stent and salvage the tract and allow for dilation and TEP replacement at a later time. After this is placed, the patient should be observed drinking sips of liquids to ensure no leakage is noted around the catheter or nasogastric tube. If nothing can be placed through the

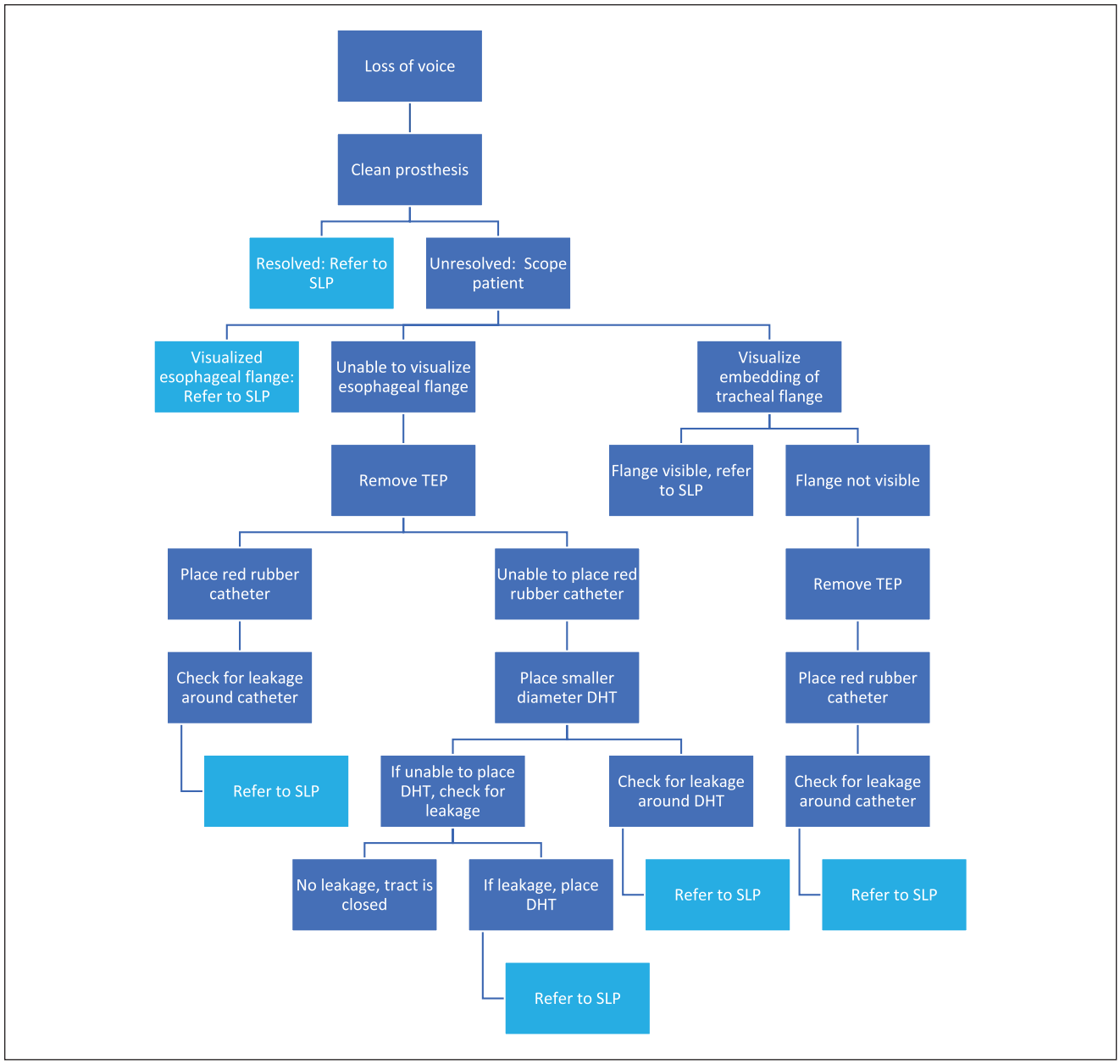

Figure 9. Loss of voice algorithm.

TE tract, the tract has likely closed. The patient should be observed with sips of liquids to identify any leakage through the former TE tract. If leakage does not occur and the patient is unable to voice, the TE tract has closed and the patient can resume oral intake. However, if leakage does occur, there is some degree of opening and the TE tract could possibly be salvaged. If nothing can be placed through the TE tract and the patient is still leaking, a nasogastric feeding tube should be placed for feeding until the tract completely closes.

Loss of Prosthesis

Loss of Prosthesis, Still in Tract. When a patient presents with a TEP extruding from the TE tract, it can lead to stoma obstruction and difficulty breathing, especially in patients with small stomas, as well as leakage (Figures 9–11). First, the stoma needs to be assessed and determined to have enough patency for adequate breathing. If not, a laryngectomy tube should be placed to stent the stoma. If the stoma is stable, an oral trial should be completed to ensure the

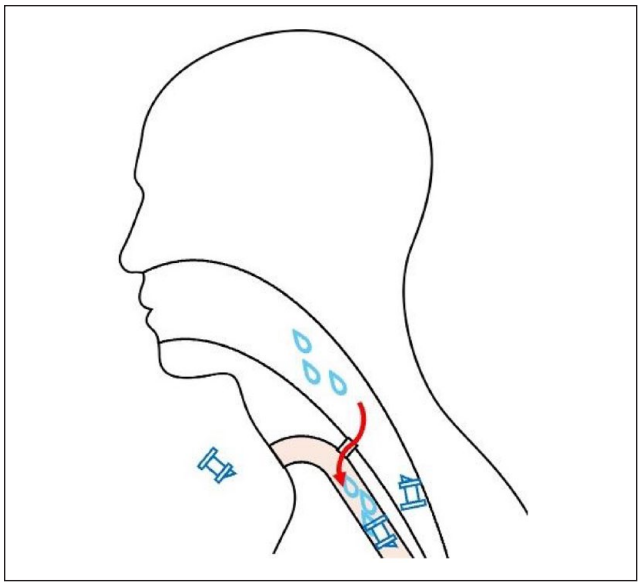

Figure 10. Loss of prosthesis.

Figure 11. Extruded TEP.

patient is not leaking and aspirating. If the TEP is obstructing the airway or is a risk for foreign body aspiration, it should be removed with caution due to bleeding risk, followed by red rubber catheter placement through the tract.

Figure 12. Dislodged TEP.

Loss of Prosthesis, Not in Tract. When a patient presents without a TEP in place, it is possible that the prosthesis has been dislodged, swallowed, or aspirated (Figure 12). Identification of the location of the prosthesis is imperative and the patient's report of events may be most informative. At times, the prosthesis may have dislodged when coughing and the patient was able to locate the TEP. In other scenarios, the TEP may have been swallowed and will likely pass through the GI tract without complication. Lastly, the prosthesis may have been aspirated into the respiratory tract. In this instance, a chest X-ray or CT chest is recommended to rule out foreign body aspiration. TEPs are radio-opaque and can often be seen on imaging. If the prosthesis is identified in the airway or lungs, the patient needs an endoscopic tracheobronchoscopy and prosthesis removal. In the meantime, if the TE tract is open without a prosthesis, it is recommended to place a red rubber catheter to stent the tract and prevent aspiration. If the TE tract has closed and the patient is unable to voice, confirm that no leakage occurs with sips of liquids. Once the tract is secured with either a catheter or determined to be closed, the patient can resume oral intake. See Figure 13 for management algorithm of loss of prosthesis.

Conclusion

It has been reported that most patients with TEP will experience complications which can vary in severity.[3] Often,

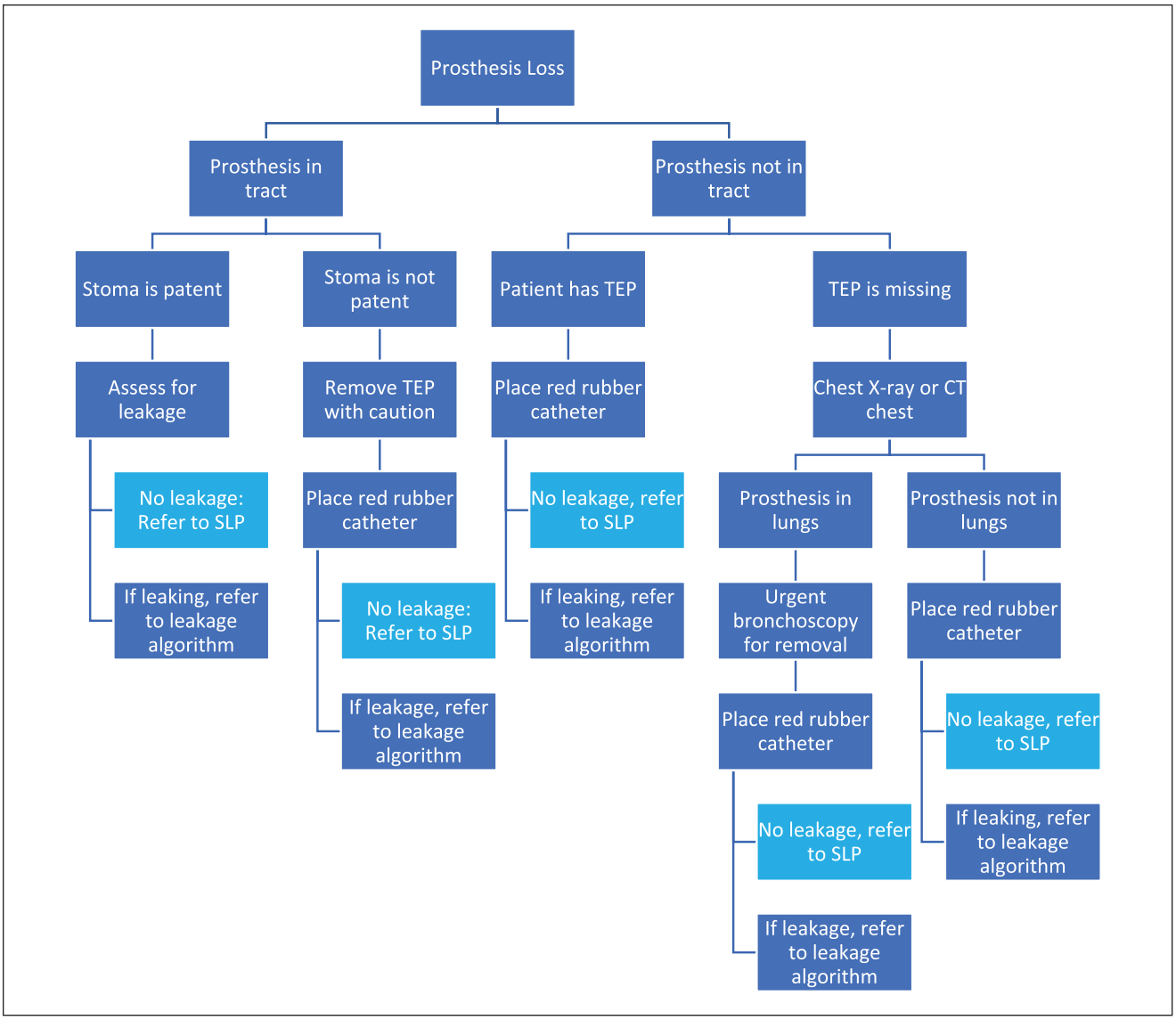

Figure 13. Loss of prosthesis algorithm.

patients can manage TEP complications independently without assistance from emergency responders or otolaryngologists. Our recommendations address the patient who may require immediate interventions after hours until they are able to be seen by their SLP. Lack of prompt management can lead to serious complications for the patient that may result in loss of the TE tract or an aspiration related infection or foreign body.

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Meeting Information

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