

# RADIATION INDUCED HYPOPHARYNGEAL STENOSIS MASQUERADING AS THE LARYNX: A CASE REPORT

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## Summary

Radiation to the head and neck is commonly used in the treatment of cancers. A side effect in some patients is the development of pharyngeal and or esophageal strictures. Hypopharyngeal strictures can resemble edematous larynges. If mistakenly so identified, tracheal tubes placed through these structures are unlikely to result in tracheal intubation and more likely to cause obstruction, esophageal intubation or mediastinal damage. This report points out the development of hypopharyngeal stenosis following radiation. The location and appearance of hypopharyngeal stenosis during laryngoscopy are illustrated. The report points out the deficiencies of newer supraglottic laryngoscopes in this situation and underscores the benefits of flexible fiberoptic devices.

## Introduction

Radiation to the neck has been used for decades, to treat numerous problems. It is associated with early and late complications. Early problems include mucosal inflammation, loss of taste, xerostomia, and skin reactions. Late complications are neoplasia, hypothyroidism, muscle fibrosis, and tissue necrosis. Soft tissue damage can result in hypopharyngeal edema, fibrosis, and stenosis<sup>1,2,3,4</sup>. Hypopharyngeal stenosis is an unusual complication of radiation therapy to the neck and is caused by fibrosis of the lamina propria and submucosa. It may be exacerbated by edema, inflammation, and spasm<sup>1</sup>. It is frequently managed with awake dilation, but some cases require laser resection under general anesthesia.

Hypopharyngeal stenosis has the potential to complicate airway management. Associated problems are of low incidence and high consequence. Failed airway management is lethal. Consequently, considerable importance is placed on this issue. Predicting intubation problems before commencing anesthesia allows for selection of alternate airway management techniques<sup>5</sup>. Unfortunately, recognized prediction criteria are unreliable. Anticipating potential airway management issues is one of the most important aspects of preanesthetic assessment and predicting laryngoscopy difficulties is an integral part of that process. As early as 1992, Rocke evaluated several predictors of difficult intubation and showed that none were dependable<sup>6</sup>. More recently, assessment of the current literature and analysis of expert opinion agreed that recognized predictors of difficult intubation, lack sufficient sensitivity and specificity<sup>5,7</sup>.

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Traditional predictors of intubation problems rely on inspection of surface anatomy. Unanticipated intubation issues arise when surface anatomy appears normal, but fails to account for other factors, some of which are hidden from physical examination. Recognized examples include lingual tonsil hypertrophy<sup>8</sup>, epiglottic cysts<sup>9</sup>, laryngoceles<sup>10</sup>, vallecular cysts<sup>11</sup>, neurofibromata<sup>12</sup>, and lingual thyroids<sup>13</sup>.

This is the first report of hypopharyngeal stenosis that resembled an edematous larynx and posed substantial risk of airway mismanagement.

### Case Report

A 66 year old man presented for direct suspension laryngoscopy and laser excision of diagnosed hypopharyngeal stenosis. He complained of mild difficulty in swallowing and dysphonia. His past medical history was significant for diabetes mellitus, carcinoid tumor, rheumatoid arthritis, and squamous cell carcinoma of the tonsil. He had undergone both chemotherapy and cervical radiation. The airway examination included assessment of interincisor distance, Mallampati score, protruding maxillary incisors, thyromental distance, temporomandibular joint translation, and cervical range of motion. All were within normal limits.

After preoxygenation, and induction with propofol, the ability to perform bag-mask ventilation was confirmed. Muscle relaxation was achieved with vecuronium and laryngoscopy was performed using a Macintosh 3 blade. The view obtained was that of pink tissue in the center of the airway, an aperture within the pink tissue, and an anterosuperior tissue flap. Visualized structures gave the appearance of an edematous larynx and an epiglottis. However, because of concerns regarding the anatomic appearance, a tracheal tube was not passed. Bag-mask ventilation was re-initiated followed by flexible fiberoptic laryngoscopy. The previously seen aperture was easily identified and the fiberscope was passed through it. Immediately thereafter, a well-defined larynx was visualized. The fiberscope was introduced through the glottis and into the trachea, where tracheal rings and carina were seen. The tracheal tube was then advanced over the fiberscope, into the trachea. Placement was

confirmed by capnography. Dexamethasone, 10mg was given intravenously. Surgery proceeded as planned and lasted for 35 minutes. Muscle relaxant effect was reversed and the patient allowed to awaken completely. At that time, the tracheal tube was removed and highly humidified oxygen was administered. He made an uneventful recovery.

### Discussion

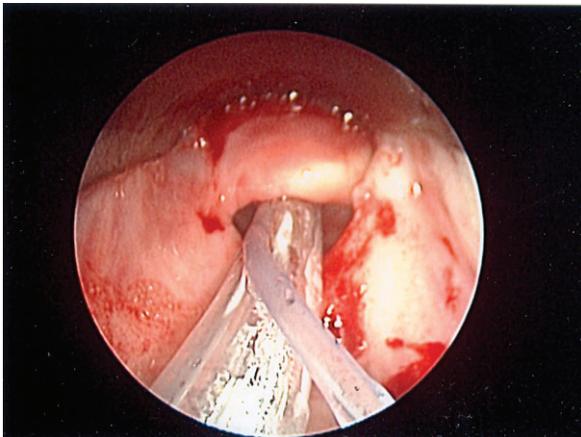
In most patients, laryngoscopy is simple and straightforward. Landmarks such as the epiglottis, vocal cords, and arytenoids are readily visualized. The appearance of some larynges is less well defined. Classic landmarks may be obscured by edema, a situation recognized in association with radiation, pre-eclampsia, epiglottitis, and anasarca. Absent visualization of well-defined glottic structures, practitioners frequently assume that any opening seen in the hypopharynx is the larynx and intubate that aperture. Auscultation and end-tidal carbon dioxide detection are relied upon to confirm or refute successful tube placement. In this case, the aperture found on initial laryngoscopy was neither glottis nor esophagus but rather hypopharyngeal stenosis, located at the approximate expected depth of the larynx. It appeared to be the same cross-sectional diameter as a typical glottis. An anterior tissue fold gave the appearance of an epiglottis (Figure 1). The lateral and inferior tissues did not demonstrate vocal cords or arytenoids, but looked similar to edematous tissues seen in other compromised larynges. The aperture could easily have been mistaken for an edematous larynx, especially because pre-existing disease and radiation were anticipated to have created swelling.

If this stenosis had been mistaken for a larynx, passage of the tracheal tube was unlikely to have resulted in tracheal intubation. Esophageal intubation or tracheal tube obstruction were more probable. Subsequent recognition of either event would, predictably, have lead to multiple instrumentations, swelling, and airway obstruction. In such circumstance, traditional laryngoscopes and supra-glottic laryngoscopes are inadequate. Devices that go beyond the lesion are required. Flexible fiberoptic laryngoscopes are such devices.

This case raises several important issues. First,

Fig. 1

Postradiation hypopharyngeal stenosis masquerading as the larynx. A tracheal tube with its pilot balloon tube traverses the stenosis. A tissue flap above the tracheal tube resembles the epiglottis. Lateral and posterior tissues resemble edematous laryngeal mucosa.



radiation to the head and neck can result in pharyngeal stenosis<sup>14</sup>. Adjuvant chemotherapy seems to increase this risk<sup>1</sup>. Second, as increasingly larger numbers of patients receive radiation therapy, pharyngeal stenosis is expected to develop in more patients presenting for surgery. Third, pharyngeal stenosis can resemble an edematous larynx. Fourth, an aperture located at the hypopharynx is not necessarily the glottis. Fifth, when traditional or newer supra-glottic laryngoscopes do not reveal classic laryngeal landmarks, flexible fiberoptic laryngoscopy is a more reliable method for successful tracheal intubation. Without flexible fiberoptic laryngoscopy to identify tracheal rings and/or carina, location is questionable.

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