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# Delayed laryngeal implant infection and laryngocutaneous fistula after medialization laryngoplasty☆,☆☆

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ABSTRACT

*Background:* Medialization laryngoplasty is a common procedure for voice rehabilitation in patients with unilateral vocal fold paralysis. Complications are uncommon and delayed infections involving implants are rare. We report a delayed infectious complication following an animal scratch resulting in a laryngocutaneous fistula.
*Methods:* Case report.
*Results:* A 73-year-old female underwent a successful and uneventful medialization laryngoplasty for idiopathic unilateral vocal fold paralysis using a silastic implant. More than one year after surgery, she presented with an anterior neck infection following an animal scratch with CT neck findings of a left strap muscle abscess. After incision and drainage, cultures grew methicillin-resistant *Staphylococcus aureus*. Despite culture-directed antibiotic therapy, the neck continued to drain persistently. Laryngoscopy with stroboscopy revealed a medialized vocal fold with no obvious granulation tissue and normal mucosal pliability.

The patient underwent neck exploration revealing a laryngocutaneous fistula. Thus, both the fistulous tract and implant were removed. The wound was closed with a strap muscle advancement into the laryngoplasty window. One month after surgery and antibiotics, the patient had no signs of recurrent neck infection, with a well-healing wound and stroboscopic findings of complete glottic closure, symmetric vocal fold oscillation and acceptable phonation with mild supraglottic compression.
*Conclusions:* Delayed complications of medialization laryngoplasty are rarely reported. This case demonstrates a delayed infection of a laryngeal implant after an animal scratch requiring implant removal, local tissue reconstruction, and culture-directed antibiotic therapy.

## 1. Introduction

Medialization laryngoplasty is a common procedure for voice rehabilitation in patients with unilateral vocal fold paralysis. Also known as a type 1 thyroplasty, it was first performed in 1974 by Isshiki et al. on a total of eight patients with either vocal fold paralysis or atrophy [1]. This approach used a rectangular window of cartilage which was depressed inward into the paraglottic space and wedged in place using autologous cartilage from the contralateral side, when needed. Modification to this technique using Silastic was proposed several years later by Koufman [2]. Using a moldable material such as Silastic allowed for intraoperative custom fabrication of laryngeal implants based upon preoperative CT measurements and established equations with favorable results [3]. Other implanted materials used in type 1 thyroplasty have also been described including but not limited to titanium and Gore-Tex (expanded polytetrafluoroethylene) with varying degrees of popularity, efficacy and complication rates [4–6].

No matter which aforementioned approach or implanted material used, overall immediate postoperative complications of medialization laryngoplasty are uncommon, and delayed complications involving implants are even rarer. A 2010 questionnaire returned by 1070 board-certified otolaryngologists who performed laryngeal framework surgery (medialization laryngoplasty or arytenoid adduction), reported an overall complication rate of 15.4% [7]. The most common complications were implant revision (6%), suboptimal voice outcome (4%), airway compromise requiring intervention (2.2%) and implant extrusion (0.8%). Decreased complication rates were seen with increasing experience, although not statistically significant [7]. Although the use

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of Silastic implants had decreased over time while the use of other materials had increased, still the most commonly used material among respondents was Silastic.

Another study of 60 patients using Silastic implantation revealed a total complication rate of 16.7%, of which 10% were considered severe [8]. Of the total complications, 70% occurred within the first week of surgery and consisted of hematoma (86%) and implant extrusion (14%). The remaining 30% of complications occurred > 4 months after surgery and were due to delayed implant extrusion [8].

In this case study, we report a delayed infectious complication following an animal scratch resulting in a laryngocutaneous fistula and ultimate extraction of the Silastic implant. To our knowledge, a delayed infectious process has not been described after medialization laryngoplasty and is further marginalized by the formation of a laryngocutaneous fistula.

## 2. Case report

A 73-year-old female underwent a successful and uneventful medialization laryngoplasty for idiopathic unilateral vocal fold paralysis using a Silastic implant. Nearly two years after surgery, she presented with an anterior neck infection following a dog scratch to her left clavicular chest with CT neck with contrast findings of a left strap muscle abscess (Fig. 1). After bedside incision and drainage, cultures grew methicillin-resistant *Staphylococcus aureus* (MRSA). Culture-directed antibiotic therapy was instituted but given the patient's history of *Clostridium difficile* infection status-post fecal transplantation, aggressive and long-term treatment with antibiotics was guarded. Additionally, she developed nausea and diarrhea on antibiotic therapy. Not surprisingly, the neck continued to drain persistently for the next several months. At this time, laryngoscopy with stroboscopy revealed a medialized vocal fold with no obvious granulation tissue and normal mucosal pliability.

Given the persistent drainage in the setting of a foreign body, the patient ultimately underwent neck exploration revealing a laryngocutaneous fistula communication with the left anterior paraglottic space (Fig. 2). Thus, the fistulous tract was excised and the Silastic implant was removed. The wound was closed with a left strap muscle advancement into the laryngoplasty window. One month after surgery and antibiotic-directed therapy under the guidance of Infectious Disease, the patient had no signs of recurrent neck infection with a well-healing wound and stroboscopic findings of complete glottic closure, symmetric vocal fold oscillation and acceptable phonation with mild supraglottic compression (Fig. 3). She has not requested revision medialization laryngoplasty and has retained acceptable phonation.

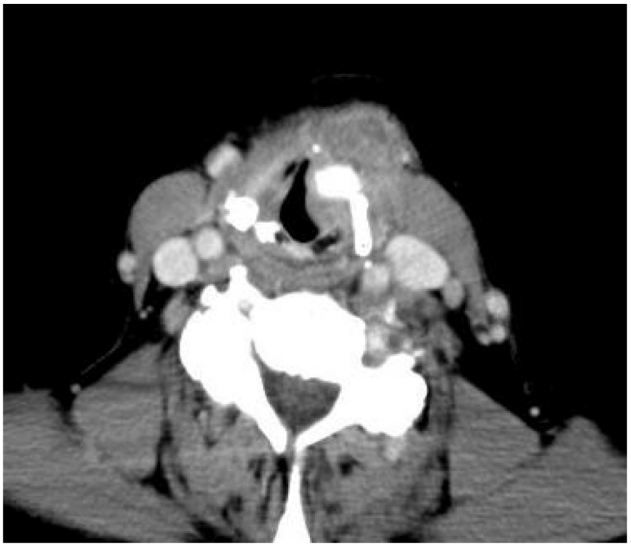

**Fig. 1.** CT neck with IV contrast with left strap muscle abscess superficial to the left laryngeal Silastic implant (axial).

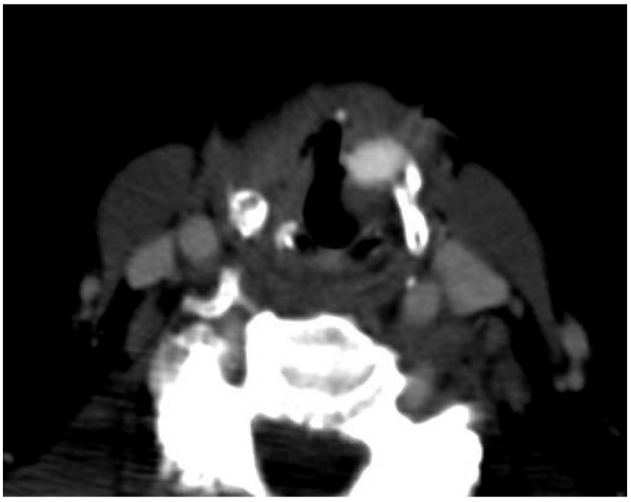

**Fig. 2.** CT neck with IV contrast with left anterior paraglottic laryngocutaneous fistula communicating with left laryngeal Silastic implant (axial).

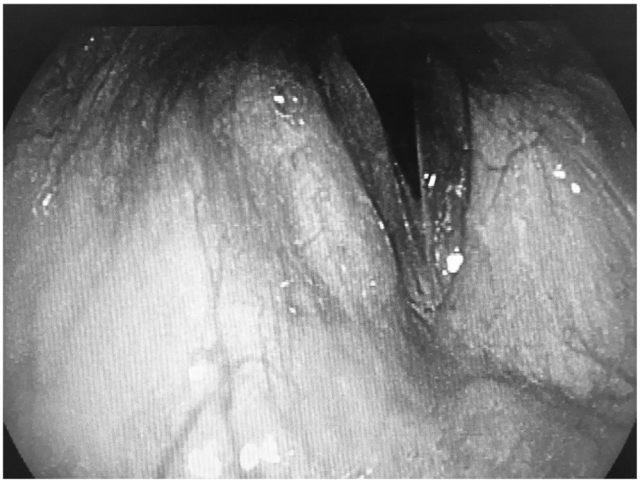

**Fig. 3.** Post-implant extraction flexible laryngoscopy revealing appropriately medialized left true vocal fold. Stroboscopy revealed complete glottic closure, symmetric vocal fold oscillation and mild supraglottic compression.

## 3. Discussion

Infection or fistula formation is considered a rare complication of medialization laryngoplasty. In the previously mentioned study polling over 1000 otolaryngologists who perform laryngeal framework surgery, infection was found in < 1% of cases and fistula formation was the least reported complication (< 0.1%) [7]. In this case report, a rare, delayed infectious process involving a laryngeal Silastic implant was described. Although difficult to confirm, the speculated culprit was a neighboring dog scratch and surrounding soft tissue infection which occurred several days prior to the patient's presentation to the hospital.

Infection involving implants has been a closely studied phenomenon, most especially in the settings of orthopedics or indwelling-catheters (i.e. central line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infections (CAUTI)) with particular emphasis on biofilm formation. Despite the benefits that implants provide, they are susceptible to several complications including lack of integration, inflammatory processes, host rejection and bacterial

infection [9]. Of these complications, implant-related infection is the leading indication for implant extraction. Approximately 80% of implant-related infections are caused by *Staphylococcus aureus*, as was seen in our patient [9].

According to an article in *Oral Science*, "high inoculums (108 CFU $mL^{-1}$, CFU, colony forming units) of *Staphylococcus aureus* in animal soft tissues could not create any abscesses in the absence of foreign body, whereas 102 CFU $mL^{-1}$ of *S. aureus* were sufficient to induce an infection with foreign body in 95% of the cases" [10]. The very presence of a foreign body inhibits phagocytosis and intracellular bactericidal effects of leukocytes and provides an ideal surface for bacterial cell adherence. Additionally, the minimum bactericidal concentration of antibiotics for biofilm bacterial cells was 10–10,000 times higher than planktonic bacterial cells [9]. Thus, removal of the implant is highly recommended in order to assist with pathogen irradiation [9–10]. The presence of methicillin-resistance in this patient's bacterial cultures and history of *Clostridium difficile* infection requiring fecal transplantation, further complicated the treatment paradigm of this case study. Ultimate extraction of the implant was prudent.

## 4. Conclusions

Delayed complications of medialization laryngoplasty are rarely reported. This case demonstrates a delayed infection of a laryngeal implant after an animal scratch requiring implant removal, local tissue reconstruction, and postoperative culture-directed antibiotic therapy.

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