The Laryngoscope

How I Do It

Office-Based Removal of Vocal Fold Polyp During the COVID-19 Pandemic

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INTRODUCTION

Since its initial occurrence in December 2019 in Wuhan, China, the coronavirus disease 19 (COVID-19), caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), rapidly spread worldwide and was officially declared a pandemic by the World Health Organization on March 11, 2020. The surging number of patients who require hospitalization resulted in the temporary transformation of whole hospitals to dedicated COVID-19 centers and massive redeployment of medical personnel to meet the ongoing burden of the pandemic.[1] To combat the pandemic more effectively and to free up hospital resources, cancellation or postponement of all elective operations has been recommended, until the epidemiologic situation is more favorable.[2] This deferral of elective surgery and invasive diagnostic procedures will have a profound impact on the patient's life quality, as some will present with more advanced disease, subsequently leading to more complex surgeries and worse surgical outcomes.[3] Therefore, diagnostic and surgical procedures had to be modified to maintain the minimum of care for nonurgent and nononcologic patients, principally by introducing personal protective equipment (PPE) and various physical barriers to minimize the exposure to the potentially viral-containing droplets and aerosol particles in the operative theater.[4,5] We describe a new technique for the removal of vocal fold polyp in the office setting, while simultaneously taking into consideration the safety measures proposed for the ambulatory examination of the larynx.

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METHODS

In June 2020, a 74-year-old male patient was seen at our outpatient service for a year-long history of persistent hoarseness. He was a nonsmoker and apart from hypertension, his other relevant medical history was unremarkable. Mirror laryngoscopy revealed a well-defined and pedunculated polypoid lesion measuring 4 mm in diameter, originating on the mid-membranous right vocal fold. The mobility of the vocal folds was normal, and the rest of the clinical examination was unremarkable. The preoperative voice acoustic analysis (PRAAT version 6.1.08. Phonetic Sciences, University of Amsterdam, The Netherlands) demonstrated jitter, shimmer, and harmonics-to-noise ratio (HNR) values of 0.611%, 7.563%, and 0.0716, respectively. Given the benign clinical characteristics of the lesion and the complete halt of inpatient surgical procedures at our otolaryngology department at the moment of his visit, the possibility of indefinite delay in treatment has been presented to the patient. As an alternative, the patient was offered to have vocal fold polyp removed in the office setting in local anesthesia with a negative SARS-CoV-2 reverse transcription-polymerase chain reaction (RT-PCR) screening swab test performed no more than 72 hours before the procedure. On the following visit, the 10% lidocaine solution was applied topically by spraying the oropharynx, epiglottis with laryngeal inlet, and the vocal folds. Following anesthetization, the patient was instructed to hold his tongue with a piece of gauze, as for mirror laryngoscopy examination. Under the visual guidance by the rigid 70° 6-mm telelaryngoscope held in the surgeon's left hand and attached to the wireless camera (Firefly DE1250, Firefly Global, Belmont, MA) and the cold light source, the Brunnings cup forceps attached to the instrument for indirect laryngeal operations (Karl Storz 777910, 775100, and 775600, Tuttlingen, Germany) held in the right hand was introduced in the patient's oropharynx (Fig. 1). While observing the endolarynx on the monitor, the vocal fold polyp was grasped by the forceps, and subsequently removed in a single anterior to posterior motion, respecting the layered histological structure of the vocal fold (Fig. 2A-C, Supporting Video S1) The patient was discharged immediately after the operation, with nothing-by-mouth advice for another hour following surgery to avoid aspiration. The complete voice rest was recommended for the next 48 hours, instructing the patient to have alternative means of communication at hand (pen and piece of paper, text messaging over the cellphone). No medications were prescribed postoperatively.

The use of this surgical procedure has been approved by the Institutional Ethics Board of the Clinical Hospital Center Zemun from March 19, 2020, under reference number 109/1.

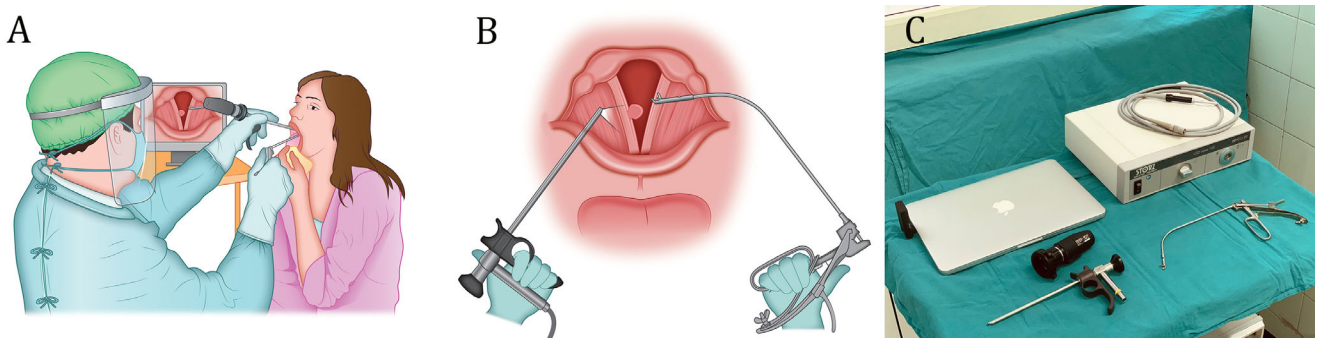

Fig. 1. (A) Operative setting for the procedure. The surgeon, wearing personal protective equipment, is observing the procedure on the monitor, maintaining adequate distance from the patient. The patient is seated as for routine otolaryngologic examination and is holding the tongue in a gauze. (B) Schematics of the procedure. Curved microforceps for indirect laryngeal operations held in the surgeon's right hand is aiming for the lesion of the right vocal fold, under the visual guidance by the rigid telelaryngoscope held in the surgeon's left hand. (C) Instrumentation for the procedure, consisting of a personal laptop, wireless camera, rigid 70° 6-mm telelaryngoscope, cold light source, the Brunnings rotatable cup microforceps with the instrument for indirect laryngeal operations.

RESULTS

The voice improvement is observed immediately during the surgery, after removal of vocal fold mass which interfered with glottal closure during the phonation. The appearance of the patient's right vocal fold at 4 months after the polyp removal is shown in Figure 2D, and the postoperative

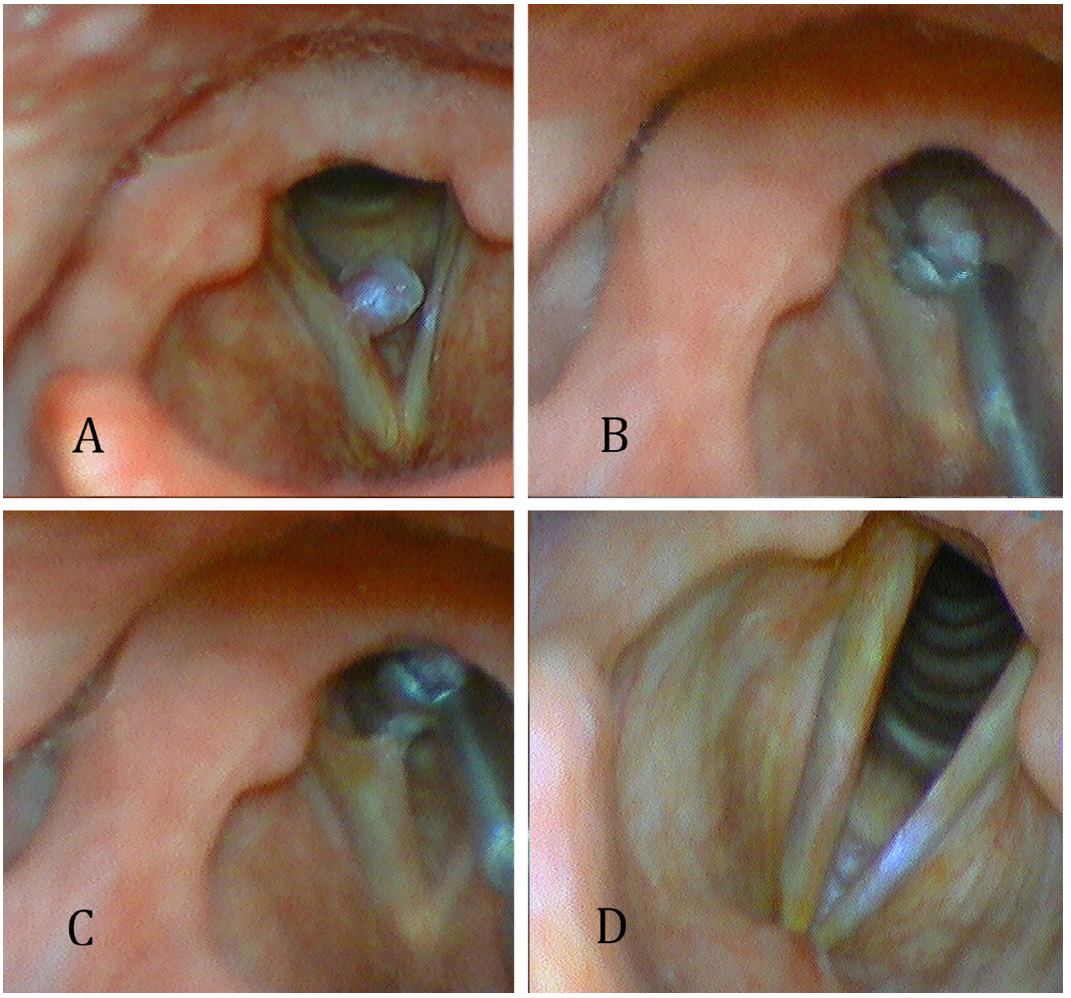

Fig. 2. (A) Telelaryngoscopic view (70°) of the right vocal fold polyp. (B) The Brunnings microforceps grasping the polyp insertion and applying the anterior-to-posterior traction. (C) Division of the polyp insertion from the membranous vocal fold. (D) The postoperative appearance of the vocal folds at 4 months. A straight edge of the right vocal fold without the residual polyp tissue is observed.

acoustic analysis demonstrated the improvement in the measured parameters, with the jitter, shimmer, and HNR values of 0.215%, 5.991%, and 0.0392.

DISCUSSION

Visualization of the larynx using office-based endoscopy is mandatory for assessing and accurately diagnosing dysphonic patients. Although timely laryngeal examination can be challenging in the context of the COVID-19 pandemic, every dysphonia lasting longer than 4 weeks should be evaluated by an otolaryngologist without postponement, especially if underlying malignancy is suspected.[6] Even if malignant pathology is excluded, dysphonia resulting from benign vocal fold lesions can significantly affect the quality of life.[7] Vocal fold polyps are one of the most common benign laryngeal lesions encountered in the otolaryngologic practice and are usually treated surgically by microlaryngoscopy under general anesthesia.[8] As the microlaryngoscopy for vocal fold polyps is currently considered as a nonurgent procedure, simple observation may be offered to the patient, as small to mid-size polyps may spontaneously resolve over several months.[9,10] However, in patients with larger polyps or in patients who wish immediate relief of symptoms, alternative office-based surgical procedures should be considered, as the office laryngoscopy is regarded as a minimal risk procedure for SARS-CoV-2 transmission to the provider.[9,11] Preoperative epidemiologic questionnaires and testing for SARS-CoV-2 should be performed in all patients based on the local health authorities' or institutional recommendations. Although the negative preoperative screening for SARS-CoV-2 mitigates the risk of possible transmission, there is a possibility of false-negative results of RT-PCR testing, and even asymptomatic individuals may harbor significant viral loads in the nasopharynx.[12] Until additional understanding of SARS-CoV-2 transmission is gained, we recommend the use of PPE consisting of N95 mask, face shield, surgical cap, fluid-resistant gown, shoe covers, and gloves in all office-based airway procedures.[11,13]

Office-based management of the benign vocal fold lesions including the use of the potassium–titanyl–phosphate (KTP) laser and steroid injections have been well described, with voice outcomes comparable to those by microlaryngoscopy.[14] However, most of them are performed under flexible fiberendoscopic guidance, which requires an assistant surgeon to operate the endoscope.

During the COVID-19 pandemic, the number of providers in the surgical procedures should be kept to a minimum. Therefore, the reduction of surgical teams to only one, preferably the most experienced surgeon, has been recommended to reduce the operative time and limit the potential viral exposure of the operating theater staff.[15]

With the available resources, we have modified the single-surgeon indirect microlaryngoscopic technique originally described in the 1970s, by replacing the laryngeal mirror and operating microscope with the 70° rigid telelaryngoscope attached to the wireless camera and a laptop for visualization of the larynx.[16]

A similar technique has been described using the stroboscopic light and video-camera attached to the telelaryngoscope, which allowed excellent magnification and observation of the procedure on the TV-monitor.[17] However, these procedures were confined to the subspecialist voice clinics, and to our knowledge, there has been no evidence of whether the stroboscopic light has an advantage over the conventional cold light for performing this type of surgery.

In the context of the current pandemic, the use of a camera and observing the surgery on the monitor is preferred over the endoscope eyepiece, as this further reduces the risk of SARS-CoV-2 transmission by increasing the distance of the endoscopist's face from the patient. Furthermore, the use of a camera allows the surgeon to wear a face shield, which could not be possible when operating with a microscope, either using the indirect microlaryngeal procedure in the office or in a classic microlaryngoscopy setting.

The introduction of inexpensive rechargeable handheld light sources and wireless endoscopy cameras on the market has allowed the otolaryngologist to virtually replace the classic endoscopy towers with personal computers or tablets, thus decreasing their dependence on the clinic or office resources. Additionally, the recent integration of state-of-the-art technology such as high-resolution cameras and powerful central processing units into smartphones, and the introduction of the smartphone endoscopy adaptors have transferred the endoscopic view on the smartphone screen, with image quality comparable to the conventional endoscope system monitors or eyepiece-only examinations.[18,19] Besides diagnostic procedures, smartphone-assisted endoscopy has even found its use in minimally invasive neurosurgical procedures, enabling increased mobility for the surgeon and more intuitive use of the surgical instruments.[20]

However, our system consisting of the wireless camera connected to the rigid endoscope and coupled with the laptop may provide superior magnification over the smaller smartphone screen, and hence allow easier surgical manipulation of the vocal fold pathology.

By replacing the standard tabletop cold light fountain by a portable, battery-operated LED light source, the laryngologist could easily switch practice from office or clinic to any improvised location regardless to the electrical power supply access if necessary, and virtually to perform laryngeal examination, biopsy, or excision on site.

This technique has several limitations. As a single instrument is used for removal of the vocal fold pathology, it is not recommended for bulkier or submucosal lesions, or sessile polyps with a wide base, which require delicate bimanual preparation and dissection under the operating microscope. Also, patients with excessive gagging who cannot tolerate rigid endoscopy may require conventional microlaryngoscopy in general anesthesia.

The procedure is easy to master, and the surgeon can shorten the learning curve significantly by initially performing simple tasks such as base-of-tongue foreign body removal, arytenoid palpation in unilateral vocal fold paralysis, or biopsy of larger tumors in the office. The wireless camera connected to the laptop not only allows live observation of the surgery using digital online platforms but also permits storage and sharing of the recorded procedures, enabling distance-learning for the novice surgeon in the pandemic setting.

CONCLUSION

During the COVID-19 pandemic, both patients with vocal pathology and their physicians may experience limited access to in-hospital resources and anesthesiologic assistance. Therefore a shift to the office-based surgical management of voice disorders may become a necessity rather than a preference. With the gradual reintroduction of the elective surgery, we have proposed a simple and straightforward procedure for the office removal of vocal fold polyps which can be performed by only one surgeon, instead of multiple providers necessary for the microlaryngoscopy or other office-based procedures. Additionally, it requires minimal instrumentation and inexpensive additional equipment, which makes this procedure very efficient in a resource-constrained pandemic setting.

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