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Transoral robotic excision of laryngeal papillomas with Flex® Robotic System — A novel surgical approach☆

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ABSTRACT

Introduction: Recurrent respiratory papillomatosis results in hoarseness, stridor and airway obstruction. Management is surgical, with most surgeons using microdebrider or laser. Transoral robotic surgery (TORS) has been successfully utilised for the excision of oropharyngeal malignancies and paediatric airway surgery. This is the first case report of TORS being used for the excision of laryngeal papillomas.

Case report: A 36 year old Chinese female was diagnosed with juvenile onset recurrent respiratory papillomatosis. She had 4 previous laryngeal surgeries. She was pregnant in her 2nd trimester and experienced rapid progression of her disease, leading to impending airway compromise. At her latest surgery (2 years ago), poor laryngeal exposure was encountered during laryngoscopy which made the surgery technically challenging. Thus, a flexible robotic system (Flex® Robotic System, Medrobotics Corporation, Raynham, Massachusetts, USA) was utilised with the aim of providing better surgical exposure. During surgery, laryngeal intubation was not possible and her airway was secured with needle cricothyroidotomy followed by tracheotomy. Transoral robotic excision of laryngeal papillomas was performed successfully. Complete excision of obstructing papillomas was achieved with postoperative restoration of airway and voice.

Discussion: Utilisation of TORS improved visualisation, dexterity and access. Drawbacks include cost, set up time, requirement for special equipment and advanced training. TORS approach can be considered as an alternative to the usual laryngoscopic technique, especially in cases where difficult anatomy and poor laryngeal exposure is anticipated.

1. Introduction

Recurrent respiratory papillomatosis (RRP) is a benign disease. Patients develop multiple papillomas in the larynx, and may also have papillomas in the upper aerodigestive tract as well as the lower tracheobronchial tree. Majority of cases are juvenile onset and a minority are adult onset. Diagnosis typically occurs at ages 2–3. RRP is thought to be caused by Human Papilloma Virus (HPV), acquired from the mother's birth canal. Patients present with hoarseness, stridor and airway obstruction. Physical examination reveals multiple verrucous, polypoid growths overlying the vocal folds and supraglottis. Management is surgical with the aim of debulking the papillomas to restore voice and airway. In severe cases, multiple surgeries as well as tracheostomy may be required Established surgical modalities include—microdebrider and CO2/KTP laser [1,2]. Numerous adjuvant therapies have been described, including interferon, acyclovir, cidofovir, bevacizumab and HPV vaccination [4]. Transoral robotic surgery has been successfully utilised for the excision of oropharyngeal and laryngeal tumours [5–8], as well as for paediatric airway surgery [9]. This is the first case report of this modality being used for the excision of laryngeal papillomas.

2. Case report

A 36-year old Chinese female was diagnosed with juvenile onset recurrent respiratory papillomatosis. She had 4 previous laryngeal surgeries (transoral laser microsurgery using laryngoscope and microscope) during her childhood, following which her disease was quiescent after puberty. She was pregnant in her 2nd trimester and experienced a relapse her disease, leading to airway obstruction (Picture 1). Urgent surgery was arranged. At her latest surgery (2 years ago), poor laryngeal exposure was encountered during laryngoscopy which made the surgery technically challenging. Thus, a flexible robotic system (Flex® Robotic System, Medrobotics Corporation, Raynham, Massachusetts,

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Picture 1. Preoperative image of the patient's larynx showing extensive laryngeal papillomatosis involving supraglottis and glottis. Intubation was not possible and patient required a needle cricothyroidotomy followed by tracheostomy.

Picture 2. Flex® Retractor: a suspension and mouth gag compatible with Flex® Robotic System.

USA) was utilised with the aim of providing better surgical exposure. During induction of general anaesthesia, laryngeal intubation was not possible and her airway was secured with needle cricothyroidotomy followed by tracheotomy (Picture 1). Transoral robotic excision of laryngeal papillomas was performed. A tongue retaining stitch (silk 2/0) was applied, followed by the Flex® Retractor – a suspension and mouth gag compatible with Flex® Robotic System (Picture 2). The robotic system was advanced into the hypopharynx and the larynx visualised (Picture 3). The papillomas were excised using Maryland grasping forceps and monopolar diathermy (Picture 4). Haemostasis was achieved with application of adrenaline soaked patties. Complete excision of obstructing papillomas was achieved with postoperative restoration of airway and voice. Patient was decannulated and discharged on 3rd postoperative day. 1 week postoperatively, the surgical site was healing well, airway was patent and voice was functional (Picture 5). 4 months postoperatively, she remained well with no recurrence of papillomas.