

The use of high frequency jet ventilator in a patient with tracheal papillomatosis

Sennur UZUN*, [MD]
Aysun ANKAY YILBAS, [MD]

Hacettepe University Faculty of Medicine,
Department of Anesthesiology and Reanimation,
Ankara, Turkey

* Corresponding Author: Sennur Uzun, MD,
Hacettepe University Faculty of Medicine,
Department of Anesthesiology and Reanimation,
Sihhiye, 06100, Ankara, Turkey
e-mail: sennuruzun1@gmail

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ABSTRACT

Juvenile laryngeal papillomatosis is an acquired disease caused by human papilloma virus of early childhood with the clinic of respiratory distress. In the treatment, mechanical procedures like CO₂ laser, electrocautery, cryotherapy, cold knife excision and curettage can be used. The commonly used chemical methods are salicylic acid, lactic acid, bichloroacetic acid and trichloroacetic acid.

High frequency jet ventilator (HFJV), especially when used during laryngo-tracheal surgery, enables sufficient ventilation, oxygenation and excellent surgical vision. As the ventilation is provided over a possible stenosis, barotrauma risk is minimalised. In this case report, we present the management of a case of a 36 years old with tracheal papillomatosis which started in early childhood as laryngeal papillomatosis, by the use of a rigid bronchoscope and HFJV.

Key words: High frequency jet ventilator, human papilloma virus

INTRODUCTION

Juvenile laryngeal papillomatosis, which is an acquired disease caused by human papilloma virus, can present with the clinic of respiratory distress early childhood. It is also called recurrent respiratory papillomatosis (RRP) due to the tendency to recurrence after excision.

High frequency jet ventilation (HFJV) uses fresh gas jet pulsations, generally with 100-400 breaths/min, via a small catheter placed into the airway directly or passing through an endotracheal tube [1]. HFJV enables adequate ventilation, oxygenation and an excellent surgical view.

In this case report, we present the management of a case of a 36 year-old with tracheal papillomatosis which started during early childhood as laryngeal papillomatosis, by the use of rigid bronchoscope and HFJV.

Case Presentation

A 36 year old male patient, suffering from laryngeal papillomatosis for approximately 35 years was admitted to the ear nose and throat (ENT) clinic with respiratory distress. Papillomatous lesions extending to the trachea were detected. The ENT specialist decided to examine and treat the papillomatous

lesions at trachea and bronchi with a rigid bronchoscopy under general anesthesia.

History of the patient revealed that he was admitted to the hospital with hoarseness for the first time at the age of 1 and he was diagnosed with juvenile papillomatosis after direct laryngoscopy which was verified by the pathological examination of the specimen. In the physical examination; lengthened inspirium time, dyspnea, suprasternal and subcostal retractions were detected at that visit. After 2 months, tracheostomy was performed under emergency conditions due to worsening dyspnea and the patient lived with a tracheostomy cannula for 15 years. He underwent periodic operations under general anesthesia for the excision of papillomatous lesions via the stoma since that time. At his last visit, interferon treatment was also given and his stoma was closed. Routine periodic controls were conducted.

In the operating room, following standard monitoring with electrocardiogram, pulse oximetry and non invasive blood pressure, anesthesia induction was maintained with propofol and succinylcholine. Jet ventilator catheter was inserted via the vocal cords by using a laryngoscope. Bilateral thorax

movements were observed and the auscultation sounds were equal in both lungs. Papillomatous lesions, obstructing nearly the whole passage between the 4th cm of subglottic area and the carina were observed during rigid bronchoscopy. The lesions were excised with electrocautery and the procedure was completed without any complications. There was no malign transformation according to the pathological examination. During the maintenance of anesthesia, airway pressures were 7-12 mmHg, peak pressures were 16-17 mmHg and oxygen saturation (SpO₂) was stable throughout the procedure and no complications related to anesthesia occurred. Postoperatively, he was admitted to the postanesthesia care unit for observation of the possible airway distress but no problem was encountered.

Discussion

Although the disease had been described as 'warts in the larynx' by Marcellus Donalus in the 17th century, the term 'papillomatosis' was first used in 1871 by Sir Morell Mackenzie [2].

Juvenile laryngeal papillomatosis, is an acquired disease caused by human papilloma virus and the first symptom is usually respiratory distress in the early childhood. It is usually seen as a multiple located, exophytic, vegetative, white-pink colored, soft and fragile tumor on the laryngeal mucosa. The disease is a chronic viral infection of the airway mucosa and the incidence has been increased in recent years. It is mostly seen in the larynx of children. The virus leads to a tissue response presented as exophytic warts that can be located anywhere from the epiglottis till the subglottic area. Viral particles can be detected in both the diseased and the normal mucosal areas [3]. Rarely papillomas can be seen in the tracheobronchial tree as in our patient. The recurrent respiratory papillomatosis in small children is usually thought to have spreaded from the birth canal of the mother. This hypothesis is based on having genital HPV history in most of the mothers of these children and the similar HPV types in both respiratory papillomatosis and anogenital warts [4].

The aim of the treatment is achieving a sufficient airway rather than aggressive eradication of the virus. Physical methods like carbondioxide laser,

electrocautery, cryotherapy, excision with cold knife and curettage can be used for treatment. The commonly used agents for the chemical treatment are salicylic acid, lactic acid, bichloroacetic acid, trichloroacetic acid, antimetabolites, antimitotics like podophyllin and retinoids [4].

The role of human papilloma virus in head and neck cancers was first suggested by the progressing of recurrent juvenile papillomatosis to invasive epidermoid carcinoma. HPV is thought to have a major role in primary larynx carcinoma, especially in verrucous carcinoma and at least a part of epidermoid carcinomas.

Jet ventilation was first used by Sanders in 1967, but Heijman was the first person who used high frequency jet ventilation in 1972 [5]. High frequency jet ventilation (HFJV) uses fresh gas jet pulsations, generally with 100-400 breaths/min, via a small catheter placed into the airway directly or passing through the central airway passage [1]. HFJV enables giving gas volume compressed with high speed to the central airway passage. The major advantage is empowerment of elective gas transport without causing high airway pressures or depression of hemodynamic functions [6].

Major limitations of HFJV usage are the descent in the airway pressures of trachea, bronchi and alveoli, the increasing end-expiratory and mean airway pressures, complex and bulky mechanical system, unwanted positive end expiratory pressure due to gas traps, problems with expiratory flow, not having a conventional ventilatory mode on HFJV device and non-standard ventilatory circuits [7].

HFJV provides sufficient ventilation, oxygenation and an excellent surgical view especially during the laryngotracheal surgery. Barotrauma risk is minimized by ventilating the patient above a possible stenotic area [8,9].

Conclusion

Sufficient pulmonary gas exchange can be provided with HFJV by monitoring airway pressures. In addition, especially during laryngotracheal surgery, surgical manipulations can be performed more easily with excellent anatomical view. HFJV is a safe, comfortable and easy ventilation technique allowing sufficient pulmonary gas exchange and oxygenation.

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