

## Coblation resection of paediatric laryngeal papilloma

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### Abstract

**Objective:** To demonstrate the successful treatment of laryngeal papillomatosis in a 32-month-old girl, using coblation (radio-frequency ablation) resection.

**Case report:** A 32-month-old girl was referred to the ENT out-patients clinic due to a hoarse cry and a very croaky voice since birth. Under general anaesthesia, fibre-optic airway endoscopy revealed a large papillomatous lesion involving the anterior glottis, which was reported as a laryngeal papilloma on histological analysis. This was later excised using an Evac 70Xtra wand. The patient made an uneventful post-operative recovery, and there were no signs of recurrence on repeated airway endoscopies at three and 18 months.

**Conclusion:** Coblation (radio-frequency ablation) is a promising surgical technique for the treatment of paediatric laryngeal papillomatosis. The main advantages of this technique include limited damage to underlying tissues and a bloodless field.

**Key words:** Papilloma; Laryngeal Neoplasms; Human Papilloma Virus; Surgical Equipment; Microwaves

### Introduction

Laryngeal papillomatosis is a benign condition of the larynx with potentially significant complications due to a high recurrence rate.

Although rarely diagnosed, it is a common cause of hoarseness, aphonia and airway obstruction in children. The incidence of laryngeal papillomatosis among children in the United States is estimated at 4.3 cases per 100 000 population.<sup>1</sup> These lesions are well known for their recurrence, which is more common in children than in adults. Children frequently require multiple surgical procedures, but their disease often becomes quiescent in adolescence. This spontaneous improvement is presumed to be mediated by the patient's immune system.

The human papilloma virus (HPV) was identified in 1990 as the aetiological agent responsible for papillomatous lesions in the larynx and trachea. Human papilloma virus types six and 11 cause benign papillomata in the airway, and are also responsible for genital warts.

In 1998, Shah *et al.*<sup>2</sup> reported that an abdominally delivered child of a mother with active condylomatous lesions had an approximately 1 in 400 risk of contracting recurrent respiratory papillomatosis. In this study, 50 per cent of mothers of affected children had active or previous condylomata.

The treatment is surgical excision in order to provide the patient with a patent airway and a reasonable voice. To date, various surgical instruments have been used, including micro-laryngeal 'cold steel' dissection, suction diathermy, laser and micro-debrider. Each surgical method has its disadvantages.

In the presented case, we used coblation (radio-frequency ablation) to remove a large laryngeal papilloma occupying the anterior commissure and the anterior thirds of both vocal folds. This is the first report of the use of this technique to treat paediatric laryngeal papillomatosis.

### Case report

A 32-month-old girl was referred to the ENT out-patient clinic by her general practitioner. Her parents were concerned by her hoarse cry and very croaky voice since birth. The patient generally avoided speaking – her brother would talk on her behalf. The patient was one of two non-identical twins born after 40 weeks' gestation via normal vaginal delivery. The other twin had been delivered via caesarean section and had a normal voice. There had been no stridor, cyanosis or feeding difficulties at birth.

The ENT examination did not reveal any abnormal findings except for hypertrophic tonsils.

A fibre-optic airway endoscopy was scheduled on a semi-elective basis. This was performed without an endotracheal tube, under sedation and with spontaneous breathing, using a 0° Hopkins rod. The procedure revealed a large papillomatous lesion involving the anterior glottis (Figure 1). Derkey staging of the lesion gave a score of 12.

Subsequently, the patient was intubated with a size 3.0 neonatal endotracheal tube under fibre-optic guidance. A biopsy was taken and sent for histopathological examination. The rest of the papillomatous lesion was excised using an Evac 70Xtra wand (Arthrocare, Arthrocare, USA). Suction

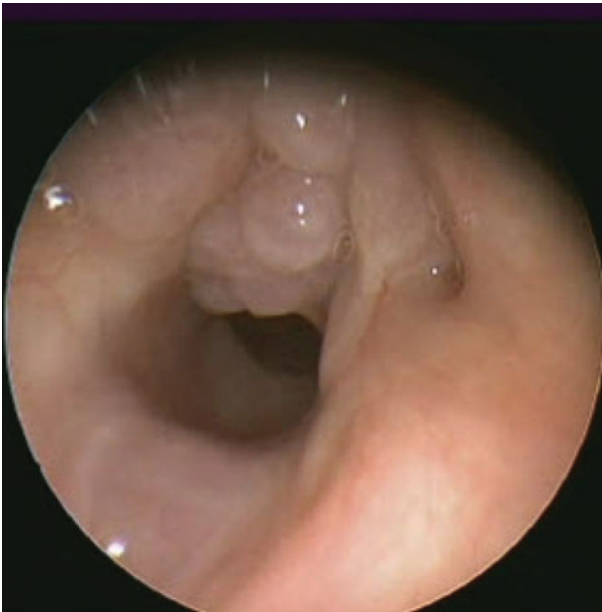


FIG. 1

Airway endoscopic view showing pre-operative appearance.

at the tip pulled the lesion away from the surrounding tissue, preventing collateral damage. The wand tip was always kept under direct vision. Saline-soaked neuropatties were used in the subglottis to prevent distal airway seeding of papilloma lesions.

The senior author AR would have preferred to have used an EIC 7070 laryngeal wand, but unfortunately this was not in stock on the day of the operation. This wand is slimmer (4 mm in diameter), longer (25 cm in length) and has a 30° bend at its distal tip. The malleable tip design provides easier access to the anterior commissure, together with optimal visibility for the surgeon.

The lesion was ablated at a setting of seven and a coagulation setting of three (Figure 2). Simultaneous saline irrigation and suction (features incorporated in the coblation wand) were used throughout the operation; the saline was



FIG. 2

Airway endoscopic view showing coblation resection of the papilloma.



FIG. 3

Airway endoscopic view three months post-operatively.

carefully aspirated from the glottis and trachea as the procedure progressed.

No disease was observed in the subglottis.

There was minimal bleeding during the procedure. Extreme care was taken to avoid physical contact pressure on the underlying tissues, to avoid collateral damage.

The patient had an uneventful post-operative recovery, and was discharged on the same day following eight hours of observation.

She underwent repeated airway endoscopies three and 18 months later, with no sign of recurrence (Figures 3 and 4).

Post-operatively, the patient's voice improved dramatically, with additional assistance from speech therapy sessions.

## Discussion

Coblation is now used for the treatment of a variety of otolaryngological conditions, including: antisocial snoring and obstructive sleep apnoea;<sup>3</sup> tonsil removal, reduction and resurfacing;<sup>4</sup> and turbinate reduction.<sup>5</sup> It is also used to treat benign tumours of the head and neck.<sup>6</sup>

Coblation has been previously described for the treatment of adult laryngeal papillomatosis, with excellent results.<sup>7,8</sup> The radio-frequency energy used in this system has been reported to penetrate surrounding tissues to a depth of only 100 µm.<sup>9</sup> The tissue temperature does not exceed 60°C in coblation mode, and bipolar coagulation is achieved at low temperatures as there is constant cooling due to simultaneous irrigation. For these reasons, there is significantly less local electro-thermal damage to the surrounding tissues than that encountered with suction diathermy or laser treatment.

Cold steel methods, including the micro-debrider, produce bleeding and often require meticulous haemostasis. The facility, within the one tool, to ablate, coagulate, apply suction and irrigate makes coblation a better technique for achieving haemostasis and a clear surgical field.

- **Coblation (radio-frequency ablation) is a promising surgical technique for the treatment of paediatric laryngeal papillomatosis**
- **Advantages of this technique include limited damage to underlying tissues and a bloodless field (which is operator-dependent)**

Laser excision often produces post-operative laryngeal scarring.<sup>10</sup> A study has reported delayed laryngeal complications (i.e. glottic webbing, interarytenoid scarring and arytenoid fixation) in 36 per cent of paediatric patients following CO<sub>2</sub> laser excision of laryngeal papillomata.<sup>11</sup> The benefits of coblation, as compared to CO<sub>2</sub> laser, include easier use, lower surface temperature, no risk of laser fires, more accurate tissue ablation and less collateral tissue damage (as the papillomata are sucked onto the wand tip for ablation).

A recent study has reported that radio-frequency ablation of adult laryngeal papillomata resulted in longer periods between interventions, compared with CO<sub>2</sub> laser ( $p = 0.03$ ).<sup>8</sup>

More studies are needed to verify the theoretical advantages of radio-frequency ablation, such as denaturation of certain viral proteins (thus preventing distal airway seeding of viral particles).<sup>12</sup>

Adjuvant therapies for advanced respiratory papillomatosis comprise systemic and intralesional antiviral agents,<sup>13,14</sup> interferon-4, indole-3-carbinol,<sup>15</sup> and photodynamic therapy.<sup>16</sup>

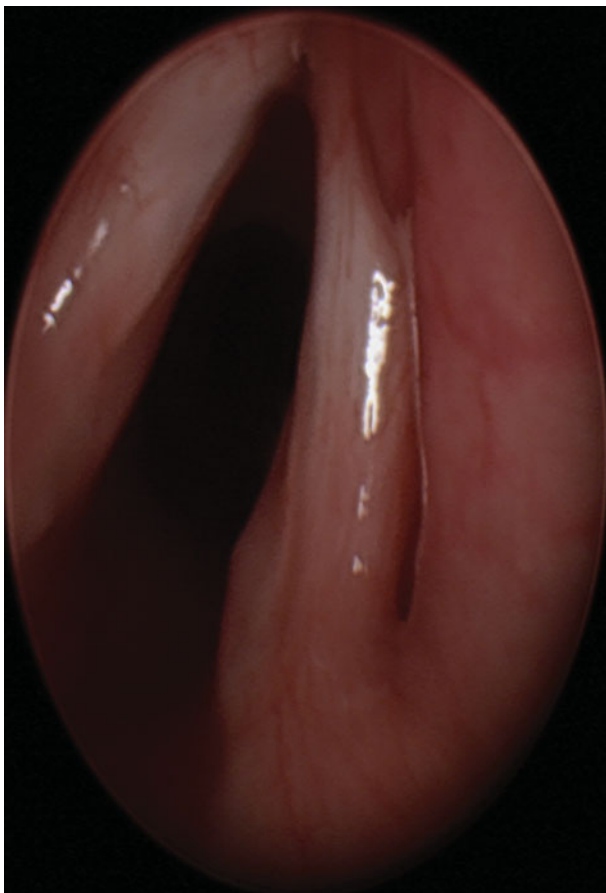


FIG. 4

Airway endoscopic view 18 months post-operatively.

However, the treatment of choice for recurrent papillomatosis remains repeated local ablation.

Repeated surgical procedures, regardless of the method used, are associated with a high risk of fibrosis and scarring. In this context, radio-frequency ablation could be regarded as the surgical technique which offers satisfactory lesion clearance together with less collateral tissue damage, and thereby less scarring and fibrosis.

Respiratory papillomatosis is difficult to stage. One of the more accepted scoring methods is the Derkay system.<sup>17</sup> The surgeon assigns a score of 0 to 3 (0 = absent, 1 = surface lesion, 2 = raised lesion and 3 = bulky lesion) to each site in the aero-digestive tract. A composite score is generated by summing the scores at each involved site. We used this system to stage our patient, in whom a bulky lesion involved the false and true vocal folds anteriorly and on both sides.

### Conclusion

Coblation (radio-frequency ablation) is a promising surgical technique for the treatment of paediatric laryngeal papillomatosis.

The main advantages of this technique include limited damage to underlying tissues and a bloodless field (which is operator-dependent). However, the senior author of this case report believes that the technique needs to be further evaluated in more cases with long-term follow up.

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