Laryngeal papillomatosis with human papillomavirus DNA contracted by a laser surgeon

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Summary. A 44-year-old laser surgeon presented with laryngeal papillomatosis. In situ DNA hybridization of tissue from these tumors revealed human papillomavirus DNA types 6 and 11. Past history revealed that the surgeon had given laser therapy to patients with anogenital condylomas, which are known to harbor the same viral types. These findings suggest that the papillomas in our patient may have been caused by inhaled virus particles present in the laser plume.

Key words: Laser vapor – Human papillovirus DNA contamination – Laser surgeon

Introduction

The possibility that laser surgeons might inhale virus particles from laser vapor during the removal of certain lesions has been pointed out by several authors [3, 9, 18]. The risk, however, is regarded as being low, provided adequate precautions are taken. Safety procedures related to eye protection, smoke evacuator systems, etc. have been established [12, 19, 20].

Human papillomavirus (HPV) is considered to be the most important potential agent for transmission from patient to surgeon through smoke plume from lasers. To our knowledge though, no case has been reported describing contamination of members of laser teams. Here we present a case of laryngeal papillomatosis where this mode of infection seems likely.

Case report

In May 1990 a 44-year-old male laser surgeon consulted the Department of Otorhinolaryngology because of hoarseness of 6 months’ duration. He had no respiratory distress and was otherwise healthy. He did not smoke and used no medicine. His wife had no history of anogenital condylomas.

From November 1987 until the present date, he had performed several therapeutic procedures with the Nd: YAG laser, the lesions primarily involving 55 cancers in the distal colon and rectum, but also 5 patients with anogenital condyloma acuminata. The hospital possessed no laser smoke evacuator system except for the built-in suction in the endoscope used for treatment of intraluminal cancers. During treatment of the condylomas, an ordinary smoke evacuator was used, in addition to conventional masks, gloves and eye protection. The Nd: YAG laser had a maximum power of 100 W.

Laryngoscopy of the patient revealed large, confluent papillomatous masses in the anterior laryngeal commiss-
Fig. 2. In situ hybridization with biotinylated DNA probe against human papillomavirus (HPV) type 6. HPV type 6 viral particles are present within several nuclei of the tumor. HPV type 11 revealed similar results (not shown).

sure and along most of the right vocal cord (Fig. 1). Four smaller, discrete, smooth papillomas were situated along the cranial and medial surfaces of the left cord. Flexible bronchoscopy revealed no further papillomas in the respiratory tract. Additional clinical examination as well as routine blood tests were normal.

Biopsies of the laryngeal lesions showed squamous papillomas with moderate focal dysplasia. In situ DNA hybridization with DNA probes of HPV types 6, 11, 16, 18, 31, 33, and 35 was carried out [22] using "Vira Type" (Life Technologies, Gaithersburg, Md., USA) and "Pathogene" (Enzo Diagnostics, New York, N.Y., USA). DNA from HPV types 6 and 11 was identified in groups of the tumor cells (Fig. 2), while the other probes were negative.

Management of the laryngeal papillomas required one removal from each vocal cord with a CO₂ laser. Postoperatively no papillomas have been seen, and his previous voice quality has been restored.

Discussion

Respiratory papillomas are usually divided into juvenile-onset and adult-onset forms. In children the multiple type is by far the most frequent, whereas in adults the majority of papillomata are solitary [2, 11, 14]. However, differentiation by type can seldom be made on histological grounds alone [13, 21]. In general, lesions are most often seen on the vocal cords, although the rest of the respiratory tract as well as the pharynx and oral cavity may be affected. In children growth of papillomas is often extensive, with multiple recurrences following repeated removals, while in adults the disease is usually less aggressive [11, 25]. Adults also often lack respiratory distress in their presenting symptomatology [2].

The cause of respiratory papillomatosis remains unknown, although strong evidence supports a viral theory. HPV DNA types 6 and 11 have been demonstrated both in laryngeal papillomas [7, 24, 26] and in anogenital con-
noticeable increase in medical consultations due to ano-
genital lesions caused by HPV in recent years [4]. Equip-
ment which provides optimal protection against inadvert-
ent contamination should therefore be obligatory for
every laser team.

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