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# Multiple Trichoepitheliomas Successfully Treated with a High- Energy, Pulsed Carbon Dioxide Laser

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**BACKGROUND.** Multiple trichoepitheliomas are transmitted in an autosomal dominant fashion and can be clinically disfiguring. As with other dermal tumors, destructive techniques such as cryotherapy, electrodesiccation, and radiation therapy can improve the cosmetic appearance, but each of these treatments carries a significant risk of side effects and recurrence.

**OBJECTIVE.** We describe a patient with a severe case of recurrent multiple trichoepitheliomas following excision, cryotherapy, and electrodesiccation.

**RESULTS.** Treatment with a high-energy, pulsed carbon dioxide laser produced an excellent clinical response with no recurrence noted in the treated area for 12 months.

**CONCLUSION.** Laser vaporization of trichoepitheliomas using a pulsed carbon dioxide delivery system may provide superior clinical results without scarring and evidence of regrowth.  
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In 1892, Brooke used the term epithelioma adenoides cysticum to report the entity that is now known as multiple trichoepitheliomas, or Brooke's tumor.<sup>1</sup> Trichoepitheliomas can be solitary or multiple, the latter being an autosomal dominant condition with typical onset at puberty. Trichoepitheliomas are smooth, rounded nodules with a translucent appearance, often distributed on the cheeks, eyelids, and nasolabial folds. Histopathologic features include the presence of aggregates of basophilic cells situated in the dermis, a relatively symmetrical superstructure that is well circumscribed, and a highly fibrocytic stroma that simulates the perifollicular connective tissue sheaths.<sup>2</sup>

We describe a patient with a severe case of recalcitrant and recurrent multiple trichoepitheliomas that had been previously treated with excisions, cryotherapy, and electrodesiccation. A single treatment with a high-energy, pulsed carbon dioxide (CO<sub>2</sub>) laser, however, produced an excellent and persistent clinical response without lesional recurrence.

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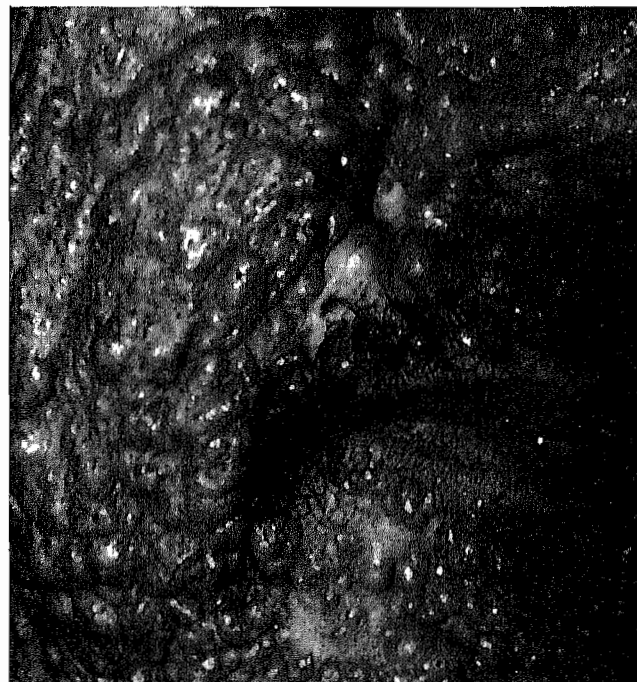
## Case Report

A 52-year-old African-American man presented with a severe case of multiple firm translucent nodules on the face (Figure 1). Since their first appearance at the age of 14 years, the lesions gradually increased in number and size. The patient's 18-year-old daughter displayed identical, but fewer, facial lesions.

Tissue biopsies revealed histopathologic features characteristic of trichoepitheliomas. Numerous treatments, including shave excisions, electrodesiccation, and cryotherapy were attempted, but recurrences inevitably occurred within two months.

A 3 × 3-cm region of the patient's right cheek was treated on a single occasion using a high-energy, pulsed CO<sub>2</sub> laser (Ultrapulse; Coherent Laser Corporation, Palo Alto, CA). Prior to the procedure, a V<sub>2</sub> block on the ipsilateral side of treatment was administered using 1% lidocaine without epinephrine. Two passes with an 8-mm-diameter computer pattern generator (CPG)

Figure 1. Multiple firm translucent nodules on the face and histologically consistent with trichoepitheliomas.



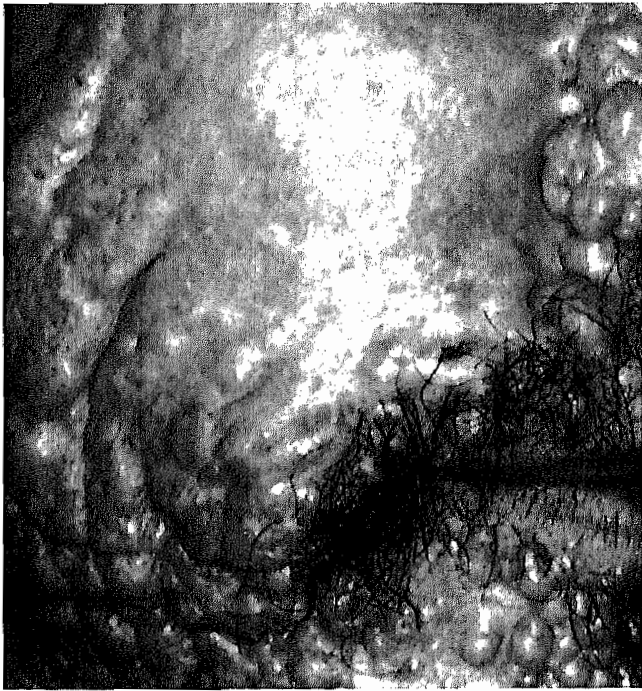


Figure 2. One month post-CO<sub>2</sub> laser treatment (similar clinical appearance at 1 year).

handpiece was utilized at 300 mJ energy, 60 W power, and a density of six to deepithelialize the area and vaporize the exposed collagen. The 3-mm collimated handpiece was then used at 500 mJ energy and 7 W power to further flatten the lesions in 5–10 passes. The laser-irradiated skin was wiped with saline-soaked gauze between each pass with the laser. Topical antibiotic ointment was applied postsurgically and twice daily for the next 10 days. Dramatic clinical improvement was achieved in the laser-treated region (Figure 2). Sustained improvement has been observed for 12 months without evidence of lesional recurrence.

## Discussion

Multiple trichoepitheliomas can be associated with cylindromas,<sup>3</sup> basal cell carcinomas,<sup>4</sup> and epidermal cysts.<sup>5</sup> The problem is chiefly a cosmetic concern, except when associated with basal cell carcinoma. Destructive techniques such as cryotherapy,<sup>6</sup> electrodesiccation,<sup>7</sup> and radiation therapy<sup>8</sup> have been used with varying success; however, recurrences are typical.<sup>9</sup> Although cryotherapy and radiation therapy can occasionally produce long-term remission,<sup>6,8</sup> these treatments carry inherent risks including dyspigmentation, scarring, and, in the case of radiation, eventual cutaneous carcinoma development.

High-energy CO<sub>2</sub> lasers emit light at 10,600 nm. These lasers conform to the principles of selective photothermolysis,<sup>10</sup> in that a short duration, high-energy

laser pulse can vaporize water-containing lesional tissue with minimal heat conduction to adjacent normal tissue. Minimizing light-induced thermal coagulation in this manner reduces the risk of scarring or pigmentary change.

High-energy, pulsed CO<sub>2</sub> laser systems are most often utilized for resurfacing facial rhytides and atrophic scars.<sup>11–14</sup> Other common dermatologic lesions responding to this laser include angiofibromas, actinic keratoses, seborrheic keratoses, sebaceous hyperplasia, xanthelasma, and verrucae.<sup>15,16</sup> Multiple laser passes are necessary when treating trichoepitheliomas, because of the high tissue density, making ablation more difficult.

The dramatic response demonstrated using a high-energy, pulsed CO<sub>2</sub> laser to remove recalcitrant trichoepitheliomas without lesional recurrence noted 1 year after laser treatment is indeed encouraging. Perhaps this char-free and bloodless procedure, which permitted improved tissue visualization during surgery, increased the possibility of complete lesional eradication.

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### Commentary

The clinical results reported by Rosenbach and Alster regarding the use of a high-energy, pulsed CO<sub>2</sub> laser to vaporize disfiguring facial lesions of multiple trichoepitheliomas are indeed impressive and encouraging in the development of an effective treatment for this and other multiple adnexal tumors or conditions of adnexal hyperplasia. This group of lesions includes syringomas, sebaceous hyperplasia and rhinophyma in addition to trichoepitheliomas. The problem presented in treatment of these dermal lesions is that superficial treatment usually is ineffective and results in rapid recurrence, while deep tissue removal or destruction carries a high risk of scarring. Because most of these lesions extend into the mid to deep reticular dermis, complete lesion removal is not usually possible. Other lesions presenting the same therapeutic dilemma to some degree are adenoma sebaceum, epidermal nevi, and lymphangioma circumscriptum. The fact that there are so many different therapeutic approaches to treatment of these lesions testifies to the inadequacies of all the attempted treatments. Previous treatments include electrocoagulation, electrodesiccation, and curetage, dermabrasion, excision, liquid nitrogen cryosurgery, split-thickness grafting, x-ray irradiation, argon laser photocoagulation, continuous CO<sub>2</sub> laser ablation, topical vitamin A, topical 5-fluorouracil, and oral 13-cis-retinoic acid.

Though Leon Goldman initiated the use of the CO<sub>2</sub> laser in treatment of these lesions with a report of treatment of rhinophyma in 1983, Wheeland and Bailin with other collaborators published a more detailed series of articles from 1985 through 1990 describing use of the continuous CO<sub>2</sub> laser for treatment of rhinophyma, trichoepithelioma, syringoma, adenoma sebaceum, and lymphangioma circumscriptum. Although their results were impressive, there is mention of both hypertrophic scarring and atrophic scarring among their reported patients. This is not surprising, as the CO<sub>2</sub> laser would be expected to leave a zone of residual thermal necrosis of around 500 μm when used with a continuous beam in this vaporization technique. Though this is superior to that of electrocoagulation or a Shaw scalpel, it can be significantly improved by using a pulsed delivery system as reported by Rosenbach and Alster.

To vaporize away the amount of tissue necessary to result in clinical improvement in these lesions requires the use of a "pulse-stacking" technique rather than single pulse vaporization, as is done with facial resurfacing for photodamage. Recent studies have demonstrated that single-pulse vaporization results in a decreasing amount of tissue ablation per pass, plateauing at about 250 μm after three or four passes. In order to vaporize more deeply, multiple CO<sub>2</sub> laser pulses impacting the same tissue site are necessary—or "pulse-stacking." Using this treatment technique allows greater depth of tissue ablation, but carries with it an increased depth of residual thermal necrosis, approaching 200-300 μm. It is important when using this technique to continue treating in passes, not in a free-hand "airbrush" manner, and to wipe away tissue debris between passes. Single-pulse vaporization should be used for the first three or four passes, as the more superficial nodules will be ablated with this safer technique. It is critical to continually observe the laser-tissue interaction, watching for signs of thermal necrosis—ie, a yellow-brown discoloration that does not wipe away. This treatment technique is dependent upon visual assessment that is attained only through clinical experience.

Wheeland and Bailin's patients with trichoepitheliomas showed no evidence of regrowth after 12 months at the time of their clinical report, just as Rosenbach and Alster observed in their patient. In fact, Dr. Bailin confirms that these patients continue to remain stable years later, as is true of CO<sub>2</sub> laser-treated patients with other adnexal growths. There is no known explanation for the apparent improved efficacy of CO<sub>2</sub> laser treatment in these patients. However, the improved visualization during surgery as well as the enhanced control over residual thermal damage may allow removal of adequate adnexal tumor so that the resultant fibrosis or new collagen formation during healing entraps any remaining tumor, essentially preventing its regrowth. When properly performed, resurfacing these difficult patients with a high-energy pulsed CO<sub>2</sub> laser appears to offer superior results.

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