Laryngeal Chloroma Heralding Relapse of Acute Myeloid Leukemia

Introduction

Granulocytic sarcomas, also referred to as chloromas or myeloid sarcomas, are extramedullary neoplasms that are composed of immature myeloid cells. The term chloroma refers to the green color that is imparted to the tissues as a result of the high concentration of myeloperoxidase found within the tumor cells. These tumors typically occur in association with nonlymphocytic leukemias or myelodysplastic syndromes, and their development may precede or coincide with relapse of systemic disease. Although the exact incidence is unknown, they are relatively uncommon, occurring in less than 10% of cases of acute myeloid leukemia (AML). Despite the facts that granulocytic sarcomas can occur in almost any organ and the head and neck are frequently reported sites, laryngeal involvement has rarely been cited in the medical literature. Here we report the unusual clinical presentation and management of a laryngeal granulocytic sarcoma that heralded relapse of AML.

Case Report

The patient, a 57-year-old white man, had a history of AML that was in remission after he underwent allogeneic stem-cell transplantation from an HLA-identical sister. Three years after the stem-cell
transplantation, he developed a worsening sore throat over several months with associated progressive shortness of breath. He ultimately went into acute respiratory distress one morning after taking a shower and required hospitalization and tracheotomy. Examination under anesthesia revealed a right-sided laryngeal mass that involved the true vocal cord and false vocal fold. Biopsy and routine hematoxylin and eosin staining revealed large atypical cells with a high nuclear to cytoplasmic ratio, fine chromatin with prominent nucleoli, and high mitotic activity (Fig 1A; inset, high power magnification of myeloid blasts). The neoplastic cells were positive for CD117 (Fig 1B) and myeloperoxidase (Fig 1C), which is characteristic of the immunophenotype of myeloid blasts.

The final diagnosis was extramedullary AML (granulocytic sarcoma). A contrast-enhanced computed tomography (CT) scan of the larynx showed a 2.7 × 2.7 × 2.8 cm mass arising from the right true vocal cord and extending to the supraglottis and anterior portion of the left true vocal cord (Figs 2 A, axial, and 2B, coronal CT images of the laryngeal mass; arrows point to mass). Additional work-up with cytogenetic testing, bone marrow biopsy, and in situ hybridization showed normal female donor cells, with no increase in blasts and no trisomy 8. Urinalysis, chest x-ray, and echocardiogram were unremarkable.

Given that his work-up revealed no other sites of disease, the patient was referred for definitive radiation therapy. Radiation simulation was performed in the supine position with a head and shoulder thermoplastic mask for immobilization. A CT scan without contrast was performed in the treatment position. A dose of 24 Gy in 12 fractions was delivered to the larynx using opposed lateral fields and 6 MV photons (Figs 3A, axial, and 3B, coronal views of radiation plan; dose prescribed to the 98% isodose line (red); tumor highlighted in green). A daily cone-beam CT scan was performed to optimize patient positioning before treatment delivery. Repeat endoscopy during treatment at 20 Gy showed complete clinical resolution of the tumor, coincident with an improvement in the quality of the patient’s voice (Figs 4A and 4B). The patient completed treatment with no acute adverse effects. A follow-up CT scan of the
larynx 1 month after completion of therapy showed no residual laryngeal mass (Fig 4C).

The patient presented again 2 months after completion of radiation with worsening respiratory difficulty, a hoarse voice, and bleeding from his tracheotomy site. Examination of the larynx revealed a subglottic mass that was partially occluding the airway. A repeat bone marrow biopsy confirmed relapsed AML. He underwent salvage chemotherapy with high-dose cytarabine, as well as additional palliative radiation therapy to his larynx and trachea at a dose of 24 Gy in 12 fractions. He again responded well to radiation treatments, with improvement in his voice quality and resolution of endotracheal tumor. Unfortunately, he continued to suffer systemic disease progression, was not a candidate for additional systemic therapies, and ultimately passed away a few weeks later.

**Discussion**

We present a 57-year-old man with a history of AML in complete remission after allogeneic peripheral blood stem-cell transplantation, who experienced systemic disease relapse that was heralded by the
Granulocytic sarcomas can be found in a broad range of body sites and tissues. A review of 154 reported cases of extramedullary leukemia revealed that the skin was the most common site of involvement, followed by lymph nodes, spine, small intestine, orbit, bone, breast, cervix, and nasal sinuses. Likewise, data from pediatric patients with AML revealed skin was the most common site of extramedullary AML, followed by the orbit, other head and neck sites, and CNS/spine. Although head and neck involvement is common for granulocytic sarcomas (there have been multiple reports at sites in the nasal cavities, orbits, and oral cavity), reports of laryngeal involvement are exceedingly rare in the medical literature. In fact, a published Medline review of 170 cases of primary laryngeal involvement by a hematologic tumor demonstrated only one granulocytic sarcoma. 

Granulocytic sarcomas are generally regarded as being radiosensitive tumors. Current treatment recommendations include focal radiation therapy to doses up to 30 Gy, although the optimal radiation dose to achieve tumor response while minimizing treatment-related toxicity is not known. A recently published series of 38 patients treated for granulocytic sarcoma at Memorial Sloan-Kettering Cancer Center revealed local control rates of 97% with a median dose of 20 Gy in 2-Gy fractions. Local failure occurred in only one patient, who received a total dose of 6 Gy; and, although several patients went on to develop additional granulocytic sarcomas, none developed in-field recurrences. On the basis of these results, the authors recommended treatment to at least 20 Gy and proposed 24 Gy over 12 fractions as an appropriate treatment course for most patients. In the presented case, we have likewise found a dose of 24 Gy in 12 fractions to be safe and effective for management of a laryngeal granulocytic sarcoma. Although the patient developed an adjacent laryngeal recurrence within a few months of completion of therapy, this occurred outside of his initial treatment field and was managed with additional radiation therapy to result in effective palliation of symptoms.

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REFERENCES

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