CASE REPORT

Prevention of CSF Leakage by Staged Operation for Clival Metastatic Tumor

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ABSTRACT—The transoral approach is a direct route to the clivus. However, application of this approach is infrequent because of the risk of cerebrospinal fluid (CSF) fistula and subsequent meningitis. We report a case of clival metastatic tumor treated by staged operation without CSF leakage. A 39-year-old man was found to have a tumor in clivus extending to the intradural space. Two-staged resection through the lateral suboccipital and transoral approach was performed and the dural defect was replaced by a fascia in the first operation. CSF leakage was prevented by this procedure. The patient received radiotherapy postoperatively.

KEYWORDS: cerebrospinal fluid leak, clivus, metastasis, transoral approach

Despite the safety of transoral surgery for extradural lesions, there are very few reported cases that deal with transoral intradural tumor resection.¹⁻⁴ Most of the tumors resected via the transoral route were chordomas. This approach, when applied to patients with intradural lesions, has been reported to produce disappointing results: more than half of these cases were complicated by cerebrospinal fluid (CSF) fistula and subsequent meningitis.⁵⁻⁸

Here we report a case of clival metastatic tumor originating from the parotid gland, treated by a staged operation to prevent postoperative CSF leakage.

CASE REPORT

A 39-year-old man was asymptomatic until August 1991, when he noticed swelling of the right parotid gland. On January 14, 1992, the patient underwent a parotidectomy with preservation of the facial nerve. Pathological examination showed a 3 cm node with a well-demarcated margin. A diagnosis of clear cell carcinoma was given based on a microscopic examination. The patient was transferred to our institution for radiotherapy, where he received 64.8 Gy irradiation in frac-

tionated dosages. In December 1994, at a follow-up magnetic resonance imaging (MRI) examination, a tumor mass was found in clivus.

Examination

The general physical examination was unremarkable. Results of the neurological examination were entirely normal and there was no evidence of cranial nerve palsy. A mass with an abnormal intensity was noted on MRI at the lower portion of the clivus with extension to the intracranial pontomedullary region. The mass was heterogeneously enhanced by gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA) (Fig 1). A chest x-ray showed no lung metastasis and bone scintigraphy was negative except for the clival lesion.

Operation

A two-stage resection was planned. On March 15, 1995, the intracranial portion of the tumor was removed by a far lateral suboccipital approach. The tumor had been extended to penetrate the dura. The dural defect

Figure 1. Left: Preoperative T1-weighted plain(upper) and gadolinium(Gd) enhanced (lower) axial MRI. Right: Gd enhanced sagittal MRI, showing a moderately enhanced mass in the lower clivus extending to the intracranial pontomedullary region.

was replaced by rectus fascia, that was secured in position by a 8/0 nylon tacking stitch. Histological examination revealed a clear cell carcinoma. The immunohistochemical analysis showed that the tumor cells were strongly positive for α -smooth muscle actin, anti-human muscle actin (HHF-35), epithelial membrane antigen (EMA), S-100, and vimentin. Based on these findings, a diagnosis of epithelial myoepithelial carcinoma was made (Fig. 2).

During the postoperative period, the patient suffered from dysphagia and hoarseness, from which he made a partial recovery by the end of the 4-month follow-up period. About 6 weeks later, the residual tumor was removed by a transoral approach assisted by a neuronavigation system. The fascia patch placed in the previous operation was easily identified. The tumor bled easily but was well demarcated. Macroscopic total removal was performed. The clival defect was replaced by adipose tissue and covered with rectus fascia and sealed with fibrin glue. A small CSF

leak was identified at the second operation; however, there were no postoperative leak. A lumbar drain was placed for one week following surgery. The patient suffered no additional neurological deficits.

Postoperative Course

The patient subsequently received 22 Gy of linac radiosurgery to the lower clivus. Six months after surgery, a recurrence of the tumor was found in the upper portion of the clivus and in the sphenoid sinus (Fig. 3). The recurrent tumor was removed by employing a transoral-transpalatal approach (Fig. 4). Then focal proton beam irradiation was conducted at a dose of 55 Gy in 25 fractions postoperatively. In a follow-up MRI 18 months later, no definitive recurrence of the tumor was observed. The patient has since returned to full-time employment as a physical therapist.

Figure 2. Left: Photomicrograph of the tumor shows nests of polygonal clear cells separated by thin connective tissue. (Hematoxylin & eosin, original mag $\times 200$.) Right: Immunostain for smooth muscle actin reveals positive cells. (Original mag. $\times 200$.)

Figure 3. T1-weighted MRI (upper) obtained 6 months after first surgery, showing an isointensity mass in the upper clivus and petrous sinus. Postcontrast-enhanced MRI (lower) demonstrates a homogeneous enhancement of the tumor.

Figure 4. Postoperative T1-weighted MRI (upper) obtained one month after second surgery showing a total removal of the tumor and the fat tissue that was packed in the tumor bed. Postcontrast-enhanced MRI (lower) demonstrates no residual tumor.

DISCUSSION

Clear cell neoplasms involving the parotid gland include oncocytoma, acinic cell neoplasm, mucoepidermoid carcinoma, primary clear cell carcinoma, epithelial-myoepithelial carcinoma, and metastatic renal cell carcinoma.⁹ For therapeutic and prognostic purposes, it is important to distinguish these tumors from each other because these lesions encompass a wide morphologic spectrum from benign to malignant.¹⁰ Epithelial-myoepithelial carcinomas are rare bimorphic neoplasms, first described by Donath et al.¹¹ A diagnosis is made based on light and electron microscopic findings. These tumors consist of two cell types: dark cells forming the inner layer of tubules, and clear cells rich in organelles and glycogen forming the outer layer, with myoepithelial differentiation. Recently, immunohistochemical analysis makes it possible to identify two different lines of differentiation, epithelial and myoepithelial. These tumors are capable of local recurrence and regional metastasis, and have as well a potential for distant metastasis.^{10,12} The most common metastatic sites for a salivary gland tumor are the lungs, followed by the bones. It has been reported that nearly all patients with distant metastases die within 24 months following their detection, except in the case of adenocystic carcinoma.⁹ In our experience,¹³ 10 of 30 patients with malignant salivary gland tumors have died. Seven of these 10 fatal cases showed distant metastasis.

The clivus is not a rare site of metastasis.^{1,14-17} However, there are not many reports that describe the treatment for clival metastasis.¹ The transoral surgical approach is a useful direct route to lesions ventral to the lower clivus and brain stem. In most instances, anterior approaches have been used for the management of extradural lesions, but these have been much less frequent because of the narrow working space, limited lateral visibility, and the likelihood of cerebrospinal fluid leakage and infection. Several investigators have reported surgical techniques to eliminate the early CSF leak.^{6,8,18-20} In the present case, a two-stage operation was selected because the lesion was located intra- and extradurally and extended over 10 mm laterally. In the first operation, the intracranial portion of the tumor was removed and the dural defect was replaced by rectus fascia. Only a minor CSF leak was seen at the second operation and none was observed after surgery. We think that this two-stage operation is a useful tactic for the treatment of a clival tumor that extends into the intradural space.

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