Objective: To determine the proper indications (and thus define good candidates) for the infratemporal fossa approach (ITFA) in the treatment of recurrent nasopharyngeal carcinoma (NPC).

Design: Retrospective analysis of 11 consecutive patients who had recurrent NPC after radiation therapy failure and were treated with curative surgery via the ITFA approach from July 1, 1993, to November 20, 1999. The mean follow-up was 32.5 months (range, 9-56 months).

Setting: Academic tertiary referral center.

Results: Patients who had a recurrent tumor confined to the Rosenmüller fossa (rT1; n=3) or extending to the parapharynx (rT2; n=3) maintained a clear surgical margin and were disease free. However, patients who had rT1 (n=1) or rT2 (n=1) tumors crossing the midline of the posterior nasopharyngeal wall had surgical margin involvement and their tumors recurred, and all patients with rT3 (n=2) or rT4 (n=1) tumors eventually died of the disease.

Conclusions: Resection of recurrent NPC via ITFA is useful for tumors located in the Rosenmüller fossa with or without parapharyngeal extension. However, tumors extending to the contralateral nasopharyngeal mucosa and tumors at an advanced stage are not suitable indications for ITFA.


Nasopharyngeal carcinoma (NPC) is treated primarily by radiation therapy and concomitant chemotherapy. Recently, radiotherapeutic misses have been avoided by using a simulator and advanced imaging methods. However, NPC has a recurrence rate of 19% to 56% within 5 years after primary radiation. Reradiation of recurrent NPC has been performed with disappointing outcomes, as high-dose reradiation can result in morbidity and mortality.

Curative surgery is a well-established alternative treatment for local residual or recurrent NPC when primary radiation has failed. The nasopharynx is reached anteroposteriorly via the transmaxillary approach or inferiorly via the transpalatal or midline mandibulotomy approaches. With these approaches, tumors centrally located in the nasopharynx can be made entirely visible. However, the lateral aspects of the nasopharynx cannot be totally exposed to allow radical resection.

Nasopharyngeal tumors can be removed via the infratemporal fossa approach (ITFA). Fisch treated early-stage recurrent NPC using the ITFA and reported gratifying results. Because the ITFA can be used to control the parapharyngeal region, one of the common extension sites of NPC, it might be the safest oncological procedure in some cases. However, owing to its technical difficulty and the limitation of the working field, this approach has not been widely used and a consensus has not yet been reached regarding the surgical indications for this approach in recurrent NPC.

We analyzed the results of a curative procedure via the ITFA for recurrent NPC. To define good candidates for this approach we compared the patients’ outcomes and surgical margin status with tumor extension.

METHODS

PATIENT CHARACTERISTICS

The 11 patients enrolled in this study, 7 men and 4 women between the ages of 33 and 66 years (mean, 47.5 years), had locally recurrent NPC after radiation and received curative surgery via the ITFA between July 1, 1993, and November 20, 1999. All patients had received primary radiation treatments in our cen-
after the initial diagnosis of NPC, and 3 patients had also received concurrent chemotherapy as part of their primary treatment. The median disease-free interval was 11 months. Table 1 summarizes the patients’ characteristics.

EVALUATION AND STAGING

To assess and define the extent of disease before curative surgery, magnetic resonance imaging (MRI), nasopharyngoscopy, and biopsies were performed on all patients. All patients exhibited histologic evidence of recurrent disease after 1 or 2 courses of radiation therapy. Recurrent tumor (rT) stage was determined according to the American Joint Committee on Cancer criteria.13 There were 4 patients with rT1, 4 with rT2, 2 with rT3, and 1 with rT4 tumors. Patients were considered for surgical resection if they were not eligible for a full course of reradiation because they had previously received high-dose radiation therapy, or if they refused to accept the adverse effects of reradiation therapy. Patients without cranial nerve palsy or intracranial involvement at the time of presentation were recruited. Patients with distant metastatic disease were excluded.

SURGICAL PROCEDURE

The surgical procedure is based on the work of Fisch.11 In brief, extended radical mastoidectomy is initially carried out, followed by the transection of the external auditory canal. The facial nerve is displaced inferiorly and the temporalis muscle is retracted. Bone in the skull base is removed, starting at the glenoid fossa and continuing to the infratemporal fossa, to expose the eustachian tube and the tissue of the parapharyngeal space. The internal carotid artery is exposed from the middle ear to the foramen lacerum and the middle meningeal artery and the mandibular branch of the fifth cranial nerve are separated (Figure 1A). Tumors in the nasopharynx can be removed en bloc with surrounding tissue extending to the contralateral nasopharyngeal wall (Figure 1B). The mobilized temporalis muscle is used to fill the surgical defect, after which middle ear cavity and temporal area are filled with abdominal fat (Figure 1C).

FOLLOW-UP

Follow-up ranged from 9 to 56 months (mean, 32.5 months). Patients were examined every 2 months during the first year.
after surgery and every 4 months thereafter. Physical examinations such as endoscopic examination of the nasopharynx and MRI were performed during follow-up. Nasopharyngoscopy and biopsies were routinely performed in all patients 4 months after surgery. None of the patients received postoperative radiation therapy.

RESULTS

SURGICAL RESULTS

Patient outcomes and mean survival times were shown to be dependent on the stage of the recurrent tumor at the time of curative surgery (Table 2). Three of the 4 patients who had rT1 tumors were free of disease and the fourth patient was living with recurrence of disease; of the 4 patients who had rT2 tumors, 3 were free of disease and 1 died of a recurrence; and the 2 patients who had rT3 tumors and the patient who had an rT4 tumor died of the disease. The mean survival time correlated inversely with the stage of the recurrent tumor.

The surgical complications are shown in Table 3. All patients had conductive hearing loss and facial numbness. Two patients developed malocclusion of teeth due to temporomandibular joint dysfunction. Permanent facial nerve paresis (grade III by the House-Brackman grading system) and unilateral deafness occurred in 1 patient each. There was, however, no occurrence of intraoperative or postoperative carotid blowout.

SURGICAL MARGIN AND PATIENT CONDITION ACCORDING TO RESECTED TUMOR GRADE AND EXTENSION

To determine what indications are suitable for the ITFA, we reviewed the surgical margins and outcome status of patients who had undergone curative surgery via the ITFA for resection of rT1 or rT2 tumors (Table 4). Three patients (patients 1, 2, and 3) whose rT1 tumor had been confined to the Rosenmüller fossa had clear surgical margins and were found to be free of disease. In 1 patient (patient 4), whose rT1 tumor had crossed the midline of the posterior nasopharyngeal wall and who had a positive resection margin, the tumor recurred. Two patients (patients 5 and 8) whose rT2 tumor had extended to the parapharynx were found to have a clear surgical margin and to be free of disease. One patient (patient 6) whose rT2 tumor had invaded the parapharynx and the oropharynx also had a negative surgical margin and was free of disease. In contrast, a patient whose rT2 (patient 7) had crossed the midline of the posterior nasopharyngeal wall had a positive surgical margin and experienced a local recurrence. Figure 2 shows the preoperative MRI image and the excised tumor of patient 5. He had an rT2 extending to the parapharynx after primary radiotherapy. The tumor was removed with a safety margin via the ITFA. The postoperative MRI image and a facial photograph are also shown. This patient was free of disease 49 months after surgery.

COMMENT

Because of limited access to the nasopharynx and the proximity of numerous vital structures, nasopharyngeal tumors are notoriously difficult to expose. Various surgical approaches have been developed for operative treatment of recurrent NPC. Anterior approaches (maxillary swing and maxillectomy) and inferior approaches (transpalatal and mandible swing) have been used in the treatment of tumors occurring in the central region of the nasopharynx. However, these surgical approaches offer...
limited exposure of the lateral aspects of the nasopharynx, including the Rosenmüller fossa, which is one of the most common recurrent sites of NPC. Consequently, surgeons experience difficulty in the radical resection of nasopharyngeal tumors. Furthermore, the presence of the internal carotid artery complicates these approaches.

Nasopharyngeal tumors can be effectively exposed and removed via the ITFA. Fisch,12 used this approach to treat 13 patients with recurrent or persistent NPC after radiotherapy. He reported that patients with early-stage NPC were still alive without recurrence of disease 2 to 5 years after surgery. However, because of its technical difficulty, the ITFA is not routinely used and a consensus has still not been reached regarding indications for this approach in the treatment of recurrent NPC. In our study, rT1 tumors located in the Rosenmüller fossa and rT2 tumors with parapharyngeal extension could be removed en bloc with the surgical margin, resulting in good disease control. However, it is difficult to control the surgical margin when tumors, whether rT1 or rT2, cross the midline of the nasopharynx; thus tumors tend to recur. Because of the inadequate exposure of the nasopharynx, rT3 or more advanced tumors can normally not be completely removed. Thus, early-stage tumors extending to the parapharynx are suitable indications for this approach. In contrast, tumors extending to the contralateral nasopharyngeal mucosa cannot be completely removed via this approach.

Carotid blowout is one of the major complications of curative nasopharyngectomy.14 With the ITFA, the internal carotid artery is exposed from the middle ear to the foramen lacerum. Thus, this approach has the advantage of controlling the internal carotid artery during tumor resection. In none of our cases did carotid blowout occur. The ITFA is also acceptable cosmetically, as it can be performed without a facial scar. Although this approach has inevitable complications, most notably conductive hearing loss and loss of function of the fifth cranial nerve, these complications were acceptable to the patients. Because the surgeon approaches the nasopharyngeal mucosa blindly, the preoperative assessment of tumor mucosal extension is essential when using the ITFA.

In summary, surgical resection of recurrent NPC via the ITFA is a useful treatment modality when the tumor is located in the Rosenmüller fossa, with or without parapharyngeal extension. However, tumors extending to the contralateral nasopharyngeal mucosa and advanced-stage tumors are not suitable indications for the ITFA.

Submitted for publication: January 20, 2004; accepted November 3, 2004.

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