

Open biopsy of parotid neoplasms is rarely indicated. In fact, open biopsy without facial nerve dissection of the routinely encountered parotid mass is contraindicated because it places the facial nerve at risk and may predispose to dissemination of pleomorphic adenoma in the skin and adjacent soft tissue, thereby increasing the risk of recurrence.

We advocate open biopsy of parotid neoplasms in a highly select population of patients in whom clinical indicators strongly suggest malignancy and the diagnosis is not adequately confirmed on FNAB. This includes patients who present with facial nerve paralysis or fixation of tumor to the skin and adjacent soft tissue, thereby increasing the risk of recurrence. Biopsy without identification of the facial nerve is something of a calculated risk undertaken to obtain a diagnosis so that patients can be appropriately counseled before the definitive surgery. In most cases, no real risk is encountered because of preexistent paralysis. The surgeon can avoid being forced to rely on frozen section diagnosis intraoperatively when making difficult decisions relative to preservation of the integrity of the facial nerve. The author's group acknowledges that most experienced pathologists are highly successful in making frozen section diagnoses of parotid neoplasms; however, the relative rarity of these malignancies makes the use of frozen section diagnosis in community hospitals imprecise at best.

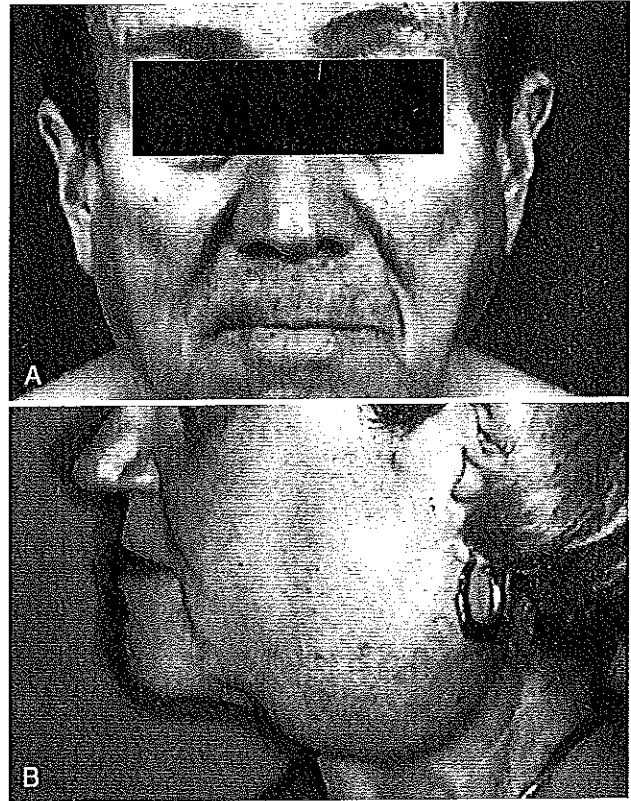
Similarly, open biopsy may be necessary to substantiate the diagnosis of some infiltrative diseases. Sarcoidosis, for instance, can produce either unilateral or bilateral parotid enlargement. Typically, the gland is diffusely enlarged. This is an important clinical finding that should be distinguished from a discrete nodule within the gland. Imaging may demonstrate calcification reflecting the granulomatous changes. Sarcoid may be associated with uveitis and facial paralysis (Heerfordt's syndrome). Biopsy is appropriate and treatment with steroids is effective. Parotidectomy is not appropriate for sarcoidosis.

The benign lymphoepithelial lesions associated with the collagen vascular disease (systemic lupus, Sjögren's syndrome) also produce diffuse glandular enlargement (Fig. 62-3). Biopsy of the minor salivary glands in the lip is the procedure of choice in this circumstance. Patients who display the longstanding lymphoepithelial lesions of Sjögren's syndrome are at risk to develop non-Hodgkin's lymphoma. This most commonly manifests as gland asymmetry due to a solitary solid nodule. Biopsy is needed to make this diagnosis.

## SUPERFICIAL LOBE PAROTIDECTOMY WITH FACIAL NERVE DISSECTION

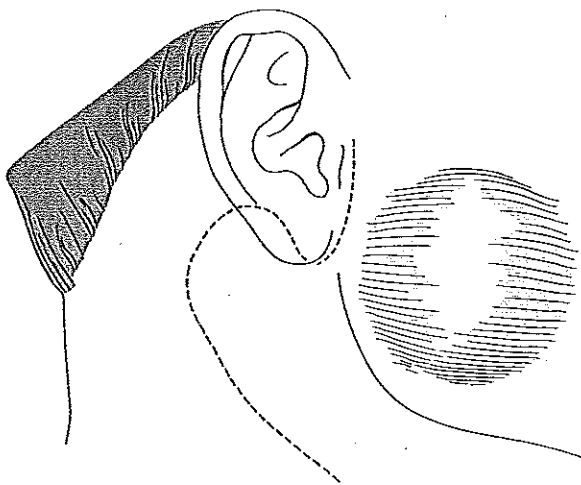
### SURGICAL APPROACHES

Parotid surgery is almost always undertaken with the patient under general anesthesia. It is important to advise the anesthesiologist that muscle paralysis must be avoided to allow observation of facial nerve function during surgery. Electromyographic (EMG) facial nerve

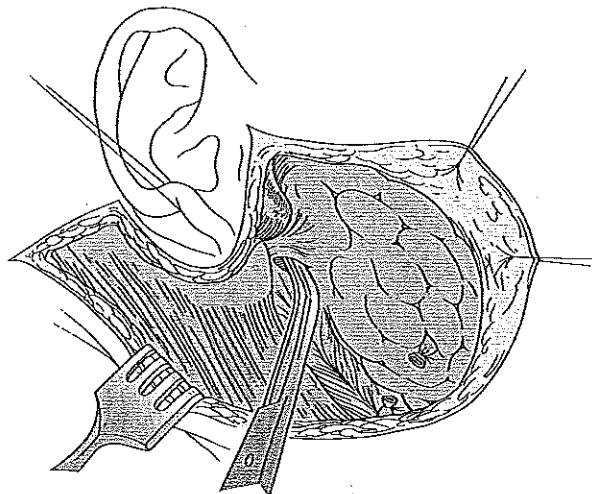


**Figure 62-3.** A, Bilateral diffuse enlargement of the parotid gland is often due to systemic disease. B, This patient demonstrates massive enlargement of the parotid gland due to Sjögren's syndrome. Treatment with steroids resulted in dramatic improvement.

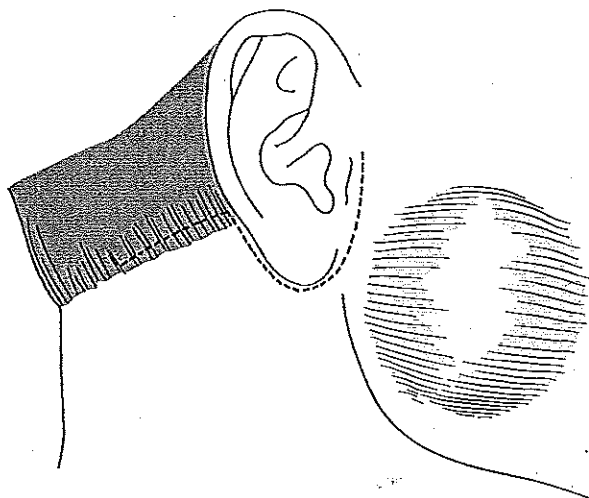
monitoring, which is commonly used in complex otologic surgery, is used infrequently during parotid surgery. We believe that the sensitivity of such monitoring results in excessive alarm tones with dissecting adjacent to the nerve. Nevertheless, the use of monitoring is helpful in revision surgical cases in which the anatomy has been disrupted or in the chronically inflamed gland. The patient should be draped such that the entire side of the face is exposed and facial motion can be observed during the procedure. A modified Blair incision is made beginning anterior and superior to the tragus. It is carried along a skin crease down to the earlobe, then extended around the earlobe to the postauricular area, and then in a curvilinear fashion brought around to a natural skin crease in the submandibular area (Fig. 62-4). An alternative is to extend the incision along the hairline (Fig. 62-5). The skin is elevated in the superficial fascial layer anteriorly to expose the mass to be resected. At this point, the parotid gland is separated from the cartilaginous external auditory canal and the anterior border of the sternocleidomastoid muscle. Hemostasis is carefully secured with electrocautery or suture ligatures. The greater auricular nerve is invariably identified crossing the sternomastoid muscle. Branches that enter the parotid are divided. Efforts to spare postauricular branches are appropriate.



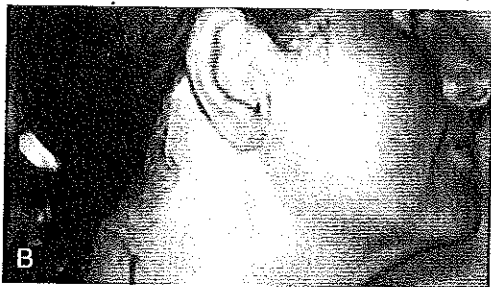
**Figure 62-4.** An incision commonly employed to expose the parotid and facial nerve begins in the preauricular skin crease. It is extended posteriorly in the retroauricular crease and then again inferiorly in a naturally occurring horizontal crease in the neck.



**Figure 62-6.** Before identification of the facial nerve, the basic landmarks are identified, including the posterior belly of the digastric (under the retractor) and the external auditory canal.



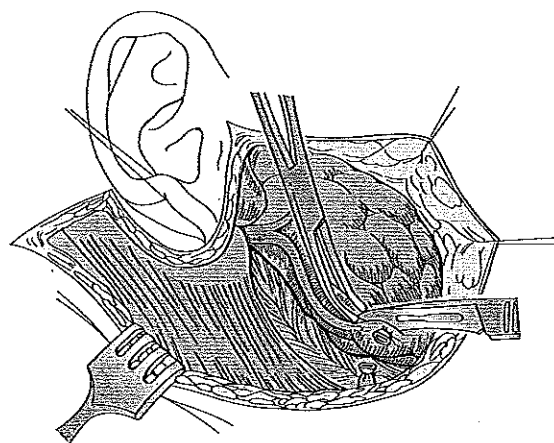
A



B

**Figure 62-5.** A, An alternative parotid incision brings the posterior aspect along the hairline. This gives adequate exposure for most benign parotid neoplasms. B, This photo shows how this incision is hidden in the hairline.

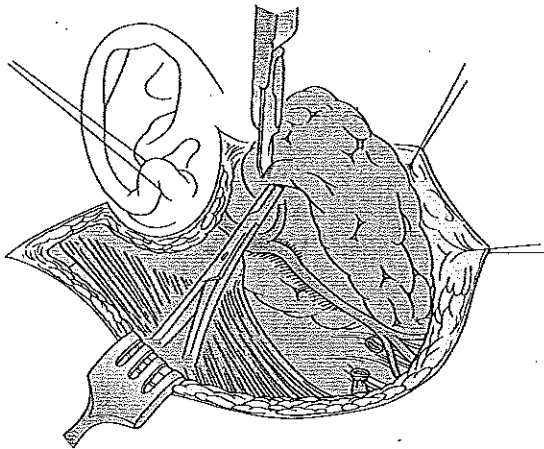
The stylomastoid foramen is located medial to the insertion of the digastric muscle on the mastoid tip. Accordingly, the digastric muscle should next be identified (Fig. 62-6). Great care should be employed in identifying the main trunk of the facial nerve. A hand-held



**Figure 62-7.** Dissection is carried out along the branches of the facial nerve. Vascular structures are ligated.

facial nerve stimulator may be used to confirm the location of the nerve. The nerve is encountered just inferior to the "pointer" or vaginal process of the external auditory canal between the mastoid tip and the bony external auditory meatus. Structures that resemble the nerve should be electrically stimulated before cutting; however, the electrical stimulator should be used sparingly once the nerve is identified because these devices cause temporary weakness to the facial nerve if they are used excessively. Bipolar cautery and magnification are often helpful at this stage of the procedure.

When the facial nerve has been identified, dissection is carried out along each of the various branches of the facial nerve, dividing the parenchyma of the parotid gland in such a way as to allow the lateral lobe to be removed intact (Fig. 62-7). Soft tissue should be carefully spread parallel to the direction of the facial nerve. Dissection within the facial tunnel surrounding



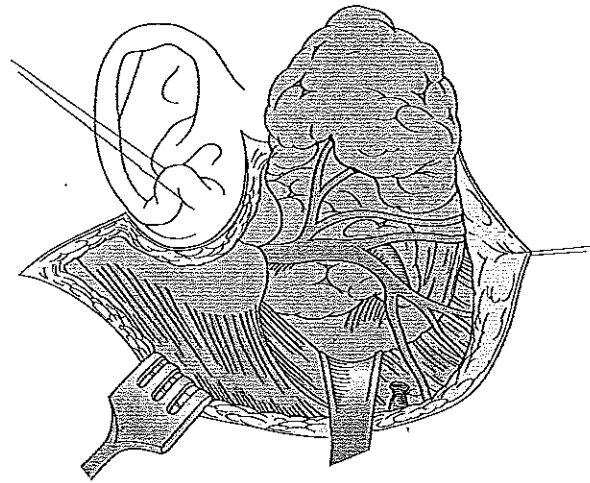
**Figure 62-8.** Parotid tissue lateral to the facial nerve is filleted in the plane of the nerve, with care being taken to ensure that the branches are always under direct vision before cutting soft tissue.

the nerve enables the surgeon to continuously visualize the nerve, assuming knowledge of its position. This requires that the glandular tissue be cut along the plane of the facial nerve (Fig. 62-8). The face should be observed for motion during this dissection, and excessive pressure or traction on the nerve branches must be avoided.

When the dissection has been carried anterior to the neoplasm, the tumor is removed (Fig. 62-9). Complete removal of all parotid glandular tissue is not necessary (and probably not possible without sacrifice of the facial nerve). The single most important principle is to never cut through the tissue of the gland without knowing the precise location of the branches of the facial nerve.

When tumor is adherent or in close proximity to the facial nerve, every effort should be made to dissect the nerve off the tumor and preserve the integrity of the nerve even in cases of known or suspected malignancy. The sole exception to this principle is in patients with malignant disease in whom preoperative paresis or paralysis of the facial nerve was present. These patients rarely (or never) recover function postoperatively, and elective removal of the nerve is justified. Elective removal of the facial nerve for benign parotid neoplasms is not indicated. Experience has demonstrated that benign pleomorphic adenoma can be removed with no margin at the facial nerve with a 0% recurrence rate.<sup>5</sup> An exception to this rule may be patients with recurrent pleomorphic adenoma. In highly selected cases, excision of all or part of the nerve with nerve grafting may be necessary.

When the superficial parotidectomy has been completed, hemostasis should be secured with ligatures, with care being maintained to avoid injury to the facial nerve. The wound should be irrigated. The anatomic integrity of the facial nerve should be confirmed by inspection and the functional integrity confirmed by



**Figure 62-9.** When the dissection has been carried anterior to all palpable tumor, the portion of the parotid gland lateral to the facial nerve can be amputated with the tumor in it.

electrical stimulation. A negative-pressure suction drain is inserted and brought out through a separate stab wound inferior to the incision and the incision is closed in layers. The skin is closed with fast-absorbing sutures and Steri-Strips. A bulky compressive dressing is applied.

## POSTOPERATIVE MANAGEMENT

The patient is observed as soon as possible in the recovery room for evidence of facial function. A full recovery can be expected, even if some element of paresis is encountered, as long as the nerve is anatomically intact. Reexploration for facial nerve paralysis is indicated only if the surgeon has failed to identify any branches of the facial nerve during the procedure.

The suction drain should be maintained on wall suction. Drains are removed when the total amount of drainage is less than 15 mL per 24 hours. Most patients require a drain for 18 to 30 hours. When drainage is less than 5 mL per 8-hour shift, the author's group allows removal of the drain in midday to facilitate early discharge. The compressive dressing is not removed until the drain is removed.

Discharge instructions should include keeping the wound clean and dry for at least 24 hours, following which the patient may be allowed to shower, wetting the Steri-Strips and then carefully patting them dry. Patients should avoid strenuous exercise and lifting for at least 21 days. The patient is asked to return to the office 7 to 10 days postoperatively for wound care, removal of Steri-Strips, and discussion of the pathology report.

All patients have anesthesia of the periauricular skin. This is attributable to intentional transection of the greater auricular nerve. Recovery requires months and is rarely complete.

The most commonly encountered postoperative complication is wound hematoma. This is most frequently recognized in the recovery room as swelling of the flap with associated bright-red blood in the drainage tube. Patients should be returned to the operating room to reexplore the wound, evacuate the hematoma, and reestablish hemostasis. Failure to adequately drain a hematoma may result in an increased risk of infection, prolonged resolution of edema, and potential compromise of the skin flap. Hematoma following parotidectomy has occurred in patients taking aspirin or nonsteroidal anti-inflammatory drugs. The author's group always counsels patients against the use of these medications for 7 to 10 days preoperatively.

Inadvertent injury to the facial nerve occurs in 3% to 5% of cases. This assumes that the facial nerve has been adequately identified and preserved during the course of the surgery. When branches of the nerve are electively divided because of malignancy, the postoperative findings are predictable. On occasion, seemingly innocuous trauma to the facial nerve may be associated with neuropraxia and temporary paresis. More commonly, this paresis is due to excessive stimulation of the nerve intraoperatively or stretching the nerve with retraction. The observation of postoperative movement, however slight, should be considered an indication of good prognosis and full recovery can be predicted. Steroid administration to reduce the incidence of neuropraxia associated with parotidectomy failed to demonstrate efficacy in a randomized trial.<sup>15</sup> If weakness is due to neuropraxia, recovery is expected in 3 or 4 weeks postoperatively. If the injury results in axon death, recovery may require 6 months and may result in permanent weakness and synkinesis. If the nerve was transected and not repaired, it will never recover.

Postoperative wound infection rarely occurs following parotidectomy. In a series of 175 parotidectomies performed without perioperative antibiotics, infection occurred in less than 5% of patients.<sup>6</sup> Routine administration of antibiotic prophylaxis is not indicated unless infection exists preoperatively (which should be deemed treatment rather than prophylaxis under these circumstances). If infection is encountered, the wound should be drained and antibiotics administered based on findings of Gram stain and culture and sensitivity data.

Development of a postoperative sialocele or persistent drainage through an incisional sinus is occasionally encountered. Traditional therapy includes needle aspiration and compressive dressings. Some authors have reported more rapid resolution with botulinum toxin therapy.<sup>16</sup>

Necrosis of skin flaps is rarely encountered. Flap necrosis occur following hematoma or occurs due to poor design of the excessively long and narrow postauricular extension. Similarly, when the skin is elevated in a very superficial plane, compromise of the blood supply may ensue. The best management of skin necrosis is prevention. This includes proper planning of the skin incision, elevation of the flap in the correct plane, and evacuation of hematoma if encountered.

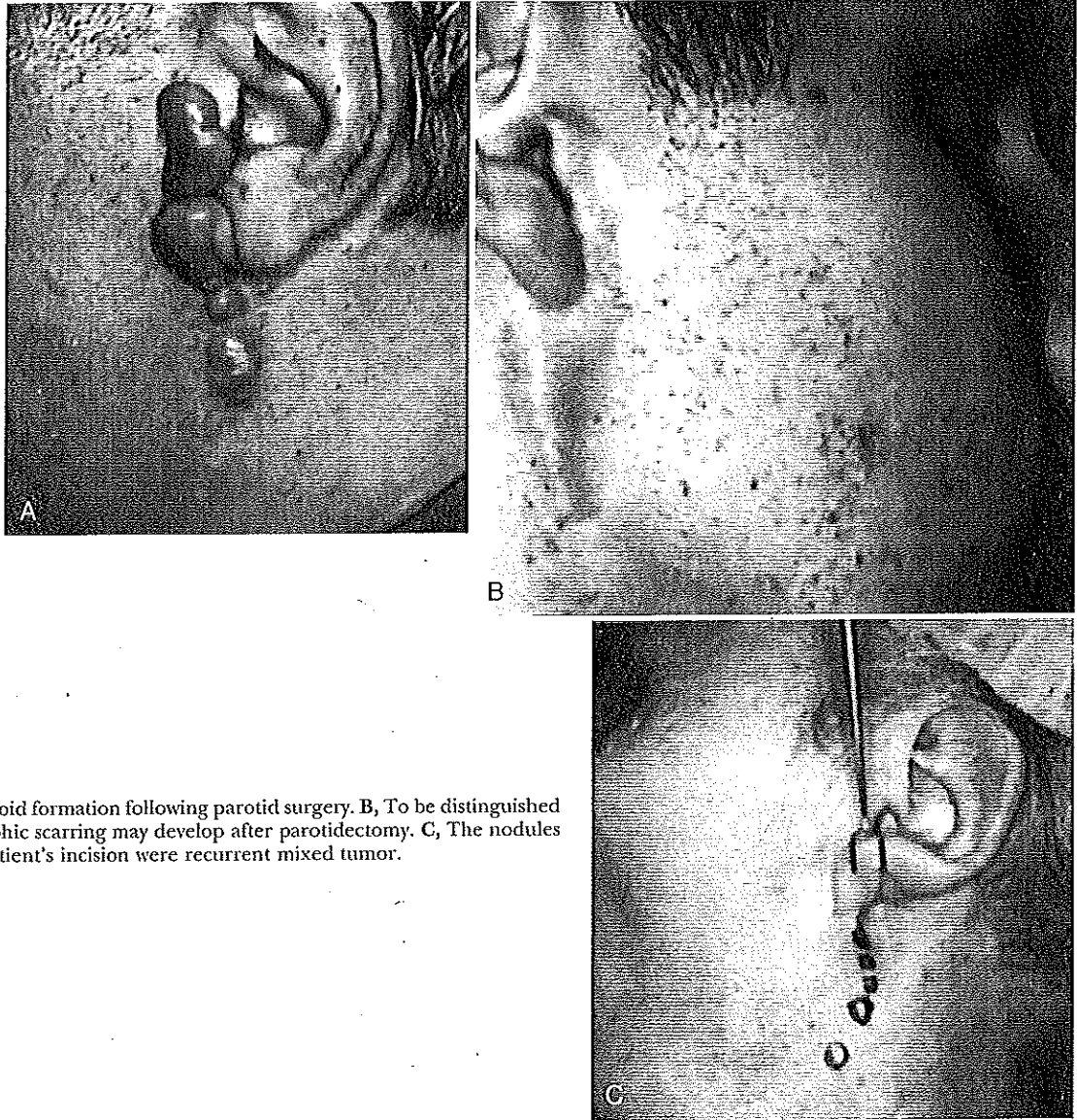
Unsightly scarring is rarely encountered in properly performed parotid surgery. The facial scar is located in a preauricular skin crease and then an appropriate cervical crease when properly executed. Keloid-forming patients may be managed expectantly with intraincisional steroid injections (Fig. 62-10). Wound closure should include approximation of subcutaneous tissues and careful reapproximation of the epithelium with fast-absorbing sutures and Steri-Strips. This results in a highly acceptable and easily camouflaged scar similar in many ways to the scar widely accepted for rhytidectomy.

First bite syndrome describes pain in the area of the resected parotid gland when a meal is started. It is hypothesized that sympathetic denervation of the incompletely removed parotid gland causes pain (possibly a cramp). This is a benign, self-limiting postoperative occurrence.<sup>17</sup>

Only a small percentage of patients encounter symptomatic Frey's syndrome (gustatory sweating). However, it has been estimated that many patients do have detectable aberrant innervation of the cutaneous sweat glands if carefully tested. Troublesome Frey's syndrome may be due to excessive thinning of the skin flap in an extensive "complete" parotidectomy. Some authors have suggested that transposition of muscle (sternomastoid) fascia (superficial muscular aponeurosis) or implantation of acellular dermis into the wound may effectively reduce these symptoms.<sup>17-19</sup> Management of symptomatic Frey's syndrome should first employ use of topical anticholinergic products (non-scented deodorants). Botulinum toxin injection results in good temporary relief. Division of the preganglionic parasympathetic nerves is associated with only temporary relief, with recurrence of symptoms 6 to 12 months later. Elevation of the skin flap with interposition of vascularized tissue (muscle-fascia) or even free fat has been reported to achieve relief. These procedures should be reserved for very symptomatic patients because of the risk of injury while elevating the skin flap off of the previously dissected facial nerve.

Recurrence of benign pleomorphic adenoma can perhaps be considered the ultimate complication. Happily, recurrence following a properly performed parotidectomy with facial nerve dissection is an exceedingly unusual occurrence. "Old" reports suggest one fourth to one half of patients may experience recurrence following removal of pleomorphic adenoma.<sup>7,9</sup> These reports, perhaps, are misleading because surgeons in the first half of this century employed enucleation as a treatment of choice for parotid lesions. Surgeons today recognize the importance of removing the entire capsule of the lesion while preserving the integrity of the facial nerve. It is clear, however, that the facial nerve can be safely peeled off the capsule of the tumor without encountering a significant incidence of recurrent pleomorphic adenoma.<sup>5</sup>

Capsular rupture during surgery may provoke great anxiety in the surgeon. Reports suggest that tumor spillage need not be associated with an increased incidence of recurrence.<sup>20,21</sup> The author's group



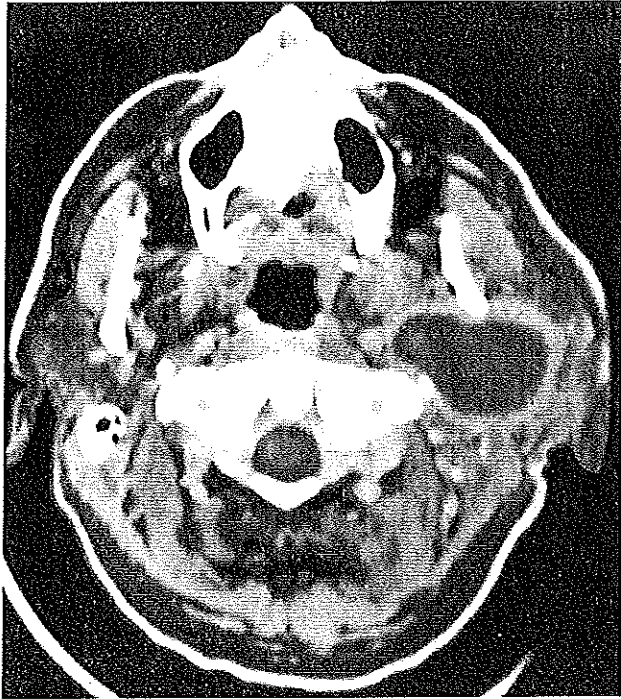
**Figure 62-10.** A, Keloid formation following parotid surgery. B, To be distinguished from keloid, hypertrophic scarring may develop after parotidectomy. C, The nodules palpable under this patient's incision were recurrent mixed tumor.

recommends that the surgical wound be carefully irrigated with copious amounts of normal saline solution at the completion of all procedures. This is especially important if the capsule has been violated and tumor spilled during surgery.

When a patient is encountered with recurrent pleomorphic adenoma, multifocal disease should be expected. Preoperative imaging with CT or MRI may help identify the full extent of tumor. The presence of multifocal tumor is a possible explanation why the average patient with recurrent pleomorphic adenoma experiences more than a single recurrence.<sup>22,23</sup> Every effort should be made to preserve the integrity of the facial nerve while completely removing all parotid tissue. We do not advocate the routine use of radiation therapy for management of benign parotid disease.

## TOTAL PAROTIDECTOMY WITH FACIAL NERVE DISSECTION

A total parotidectomy is required for tumors involving the deep lobe of the parotid gland that are, by definition, medial to the facial nerve and in patients with chronic recurrent parotid sialadenitis.<sup>6</sup> Some of these tumors may extend into the parapharyngeal space. When suspected preoperatively, it is appropriate to investigate with imaging employing either CT or MRI (Fig. 62-11). Removal of tumor involving the parotid tissue both medial to and lateral to the facial nerve requires that superficial parotidectomy with facial nerve dissection be accomplished before deep lobe resection. When the tissue lateral to the facial nerve is uninvolved, it can be pedicled anteriorly during removal of the deep lobe tumor, subsequent to which it can be returned to



**Figure 62-11.** This axial computed tomography scan displays a tumor that arose in the parotid gland medial to the facial nerve and has extended through the stylomandibular tunnel into the parapharyngeal space.

its anatomic position for closure. They provide normal contour to the face. Patients should be counseled that total parotidectomy is associated with an increased risk to the facial nerve owing to the necessity to dissect out and retract the facial nerve during tumor removal. Nevertheless, the vast majority of deep lobe tumors are benign and every effort must be made to preserve the integrity of the facial nerve.

Recurrent painful swelling of the parotid gland with purulent sialorrhea characterizes chronic parotitis. This somewhat unusual condition may be diagnosed in patients with Sjögren's syndrome. In other circumstances, chronic parotitis may be caused by structural abnormality of the duct or through development of ductal stricture subsequent to sialolithiasis, infection, or trauma. Every effort should be made to manage these patients conservatively. Antibiotics, sialogogues, warm compresses, and massage may be effective in some situations. Unfortunately, recurrent infection with pain may eventually be deemed intolerable by both patient and physician. Under these circumstances, parotidectomy is the treatment of choice. Superficial parotidectomy for chronic parotitis is advocated by some and, no doubt, is generally effective.<sup>24,25</sup> Retained glandular tissue and remnants of Stensen's duct may be the source of recurrent symptoms in some patients, however. Accordingly, we recommend total parotidectomy in patients requiring surgical management of chronic parotitis.<sup>6</sup>

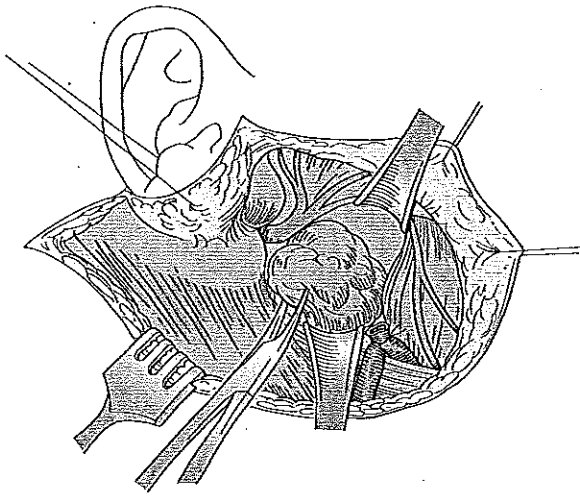
Other forms of treatment can be considered but have shortcomings. Tympanic neurectomy may have an

immediate effect on the volume of parotid secretions. Reduction in parasympathetic input may result in amelioration of symptoms. Unfortunately, tympanic neurectomy is unreliable for the management of chronic parotitis. This probably reflects the complex parasympathetic innervation of the salivary tissue and the propensity for spontaneous reinnervation. Low-dose external beam irradiation therapy may be effective. It is unlikely that the irradiation exerts its effect through sterilization of saliva. In all likelihood, the irradiation destroys the glandular tissue, which in turn promotes fibrosis and eventual resolution. The author's group does not advocate irradiation for chronic parotitis. This represents the general trend toward avoidance of irradiation therapy for benign disease. However, in older patients deemed too fragile for surgical intervention, this approach may be appropriate. Ligation of the parotid duct produces acute obstruction with resultant swelling and pain. Eventually, parenchymal atrophy ensues, resulting in fibrosis and dysfunction that may produce resolution of the recurring infectious problems. Unfortunately, this approach almost invariably results in acute pain and swelling and may be accompanied by fistulization of the duct with continuing problems.

Patients undergoing total parotidectomy for chronic parotitis have an increased risk of injury to the facial nerve compared with patients undergoing superficial parotidectomy for benign neoplasms. This reflects the fibrosis and obscuration of tissue planes that may ensue following acute infection. Every effort should be made to postpone surgery until the gland can be rendered as quiescent as possible through the administration of antibiotics and local measures. The author's group's experience with 26 patients requiring total parotidectomy for chronic parotitis confirms this observation.<sup>7</sup> Five patients (26%) experienced immediate postoperative facial weakness, which resolved in 3 months in all but one patient. The use of intraoperative facial nerve monitoring has made identification of the facial nerve easier in the setting of chronic inflammation, fibrosis, and obscured planes. The availability of newer techniques of sialoendoscopy, which allows stone removal and duct dilatation, may reduce the incidence of chronic parotitis in future years.

## SURGICAL APPROACHES

Total parotidectomy must be preceded by superficial parotidectomy. This requires the somewhat "nononcologic" dissection of the facial nerve with removal of the superficial lobe of the parotid gland. This approach, however, has proved highly satisfactory in managing benign neoplasms of the parotid and, in fact, may be employed to successfully manage many parotid malignancies when combined with the use of postoperative radiation therapy, thereby allowing preservation of the integrity of the facial nerve. The facial nerve is gently dissected off the deep lobe of the parotid gland and retracted, and the residual gland is passed under its branches and delivered to the operative field



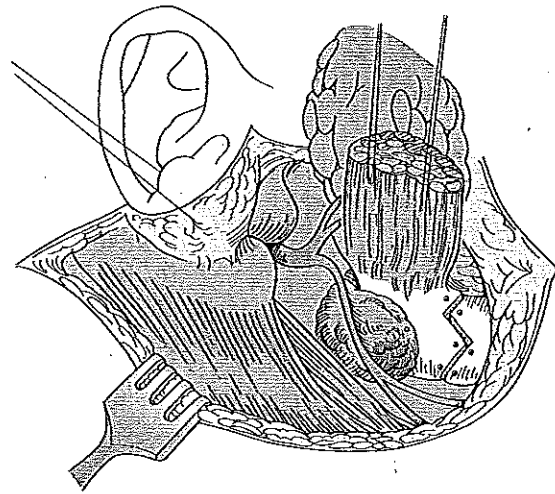
**Figure 62-12.** The facial nerve is gently retracted as a pleomorphic adenoma that developed in the tissue medial to the facial nerve is dissected out.

(Fig. 62-12). Continued stimulation of the nerve with the electrical unit should be avoided because it may contribute to postoperative paresis. The operation must be modified somewhat in patients with chronic sialadenitis such that all identifiable salivary gland tissue be removed. This may require dissection and retraction of multiple branches of the facial nerves. The initial superficial lobe parotidectomy should be modified by carrying the dissection along Stensen's duct anterior to the masseter muscle, through buccal space, and down the mucosa. This is of greatest importance in patients with sialadenitis caused by calculus. Leaving a segment of Stensen's duct with a calculus will be followed by subsequent infection. We have also encountered patients who have had spontaneous fistulization of Stensen's duct owing to complete obstruction from a large calculus. In such cases, an ellipse of chronically infected skin should be excised in continuity with the specimen and the skin defect closed. Hemostasis should be ensured by the use of ligatures, the wound irrigated, and a suction drain inserted into the depth of the wound with an attempt to avoid direct contact with the nerve. The wound is closed in layers, employing fast-absorbing sutures for the skin and Steri-Strips applied to support the wound. A bulky compressive dressing is employed in every case.

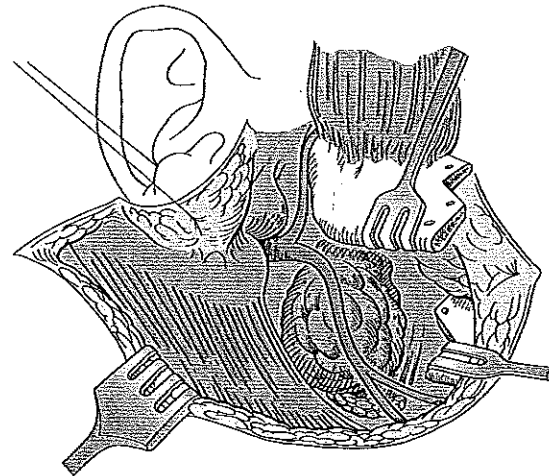
Mandibulotomy is sometimes advocated to improve access to very large lesions of the deep lobe of the parotid gland (Figs. 62-13 and 62-14). Before division of the bone, a fixation plate should be fitted and screw holes drilled. This helps ensure accurate reduction at the completion of surgery, thereby maintaining occlusal relationships.

### POSTOPERATIVE MANAGEMENT

The patient should be observed in the recovery room for facial motion. Paresis is an indication that the facial



**Figure 62-13.** Mandibulotomy may occasionally be employed to better expose a tumor that extends medial to the mandible.



**Figure 62-14.** The mandible is retracted, allowing dissection of the tumor and delivery into the wound.

nerve is intact and will recover. The patient can be reassured that even if paresis progresses to paralysis in the early postoperative hours, recovery is expected.

### RADICAL PAROTIDECTOMY

When the facial nerve is dissected out and preserved during the course of parotid surgery, the procedure is compromised from an oncologic point of view. However, experience with the management of even high-grade parotid malignancies suggests that it is appropriate to dissect out and preserve a functional facial nerve, even in the face of high-grade malignancy involving the glandular parenchyma (Fig. 62-15). This reflects the devastating impact of facial nerve resection and the observation that local regional control can be achieved

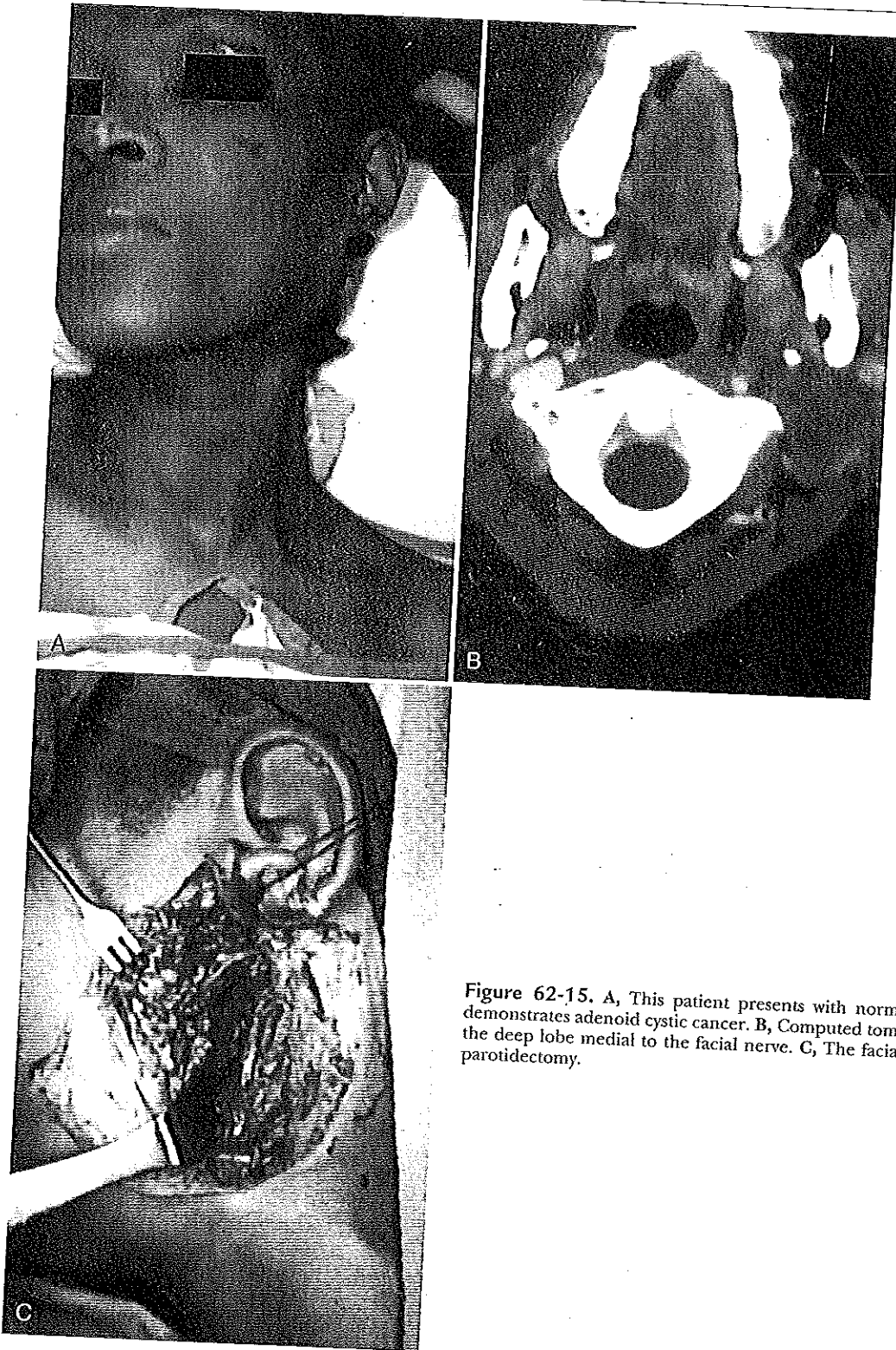
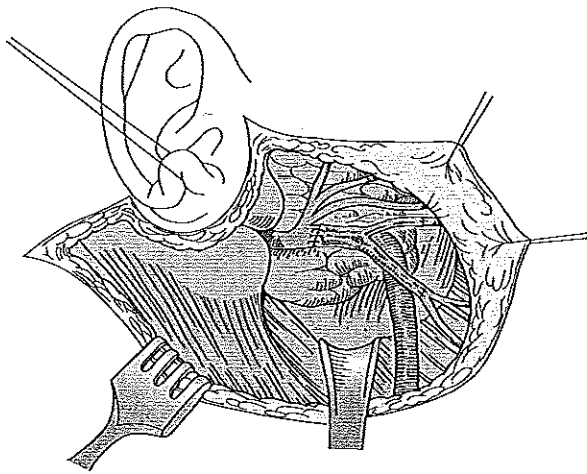


Figure 62-15. A, This patient presents with normal facial nerve function. Biopsy demonstrates adenoid cystic cancer. B, Computed tomography confirms extension into the deep lobe medial to the facial nerve. C, The facial nerve is preserved during total parotidectomy.

with the appropriate application of postoperative irradiation therapy. A more radical en bloc resection of the parotid gland is appropriate in treating patients who present with facial paralysis as well as in the management of patients with extensive carcinoma with involvement of surrounding structures such as the skin, masseter muscle, mandible, or temporal bone.

Patients presenting with a high-grade malignancy involving the parotid gland and normal facial function are counseled that resection of all or part of the facial nerve may be necessary. Additionally, manipulation of the nerve during surgery may result in temporary paresis of branches that are preserved. Under normal circumstances in dealing with a moderate-sized or small



**Figure 62-16.** A cable graft is used to construct the lower division of the facial nerve. The upper division has been preserved intact. The nerve graft has been split to accommodate two branches.

neoplasm, it is possible to anticipate that some branches of the facial nerve will be at greater risk than others. At the time of surgery, facial nerve branches that can be successfully dissected free from the tumor are preserved. The branches with evidence of preoperative paresis or those that cannot be successfully dissected free from the tumor may require resection and subsequent repair (Fig. 62-16). Neck dissection is required in case of high-grade malignancy and can be easily performed at the same setting as the parotidectomy. The incision is carried into the head and modified as appropriate for the type of neck dissection being planned. Although keeping the specimen in one piece is possible, it is not necessary and may impair facial nerve identification.

### SURGICAL APPROACHES

When patients present with total facial paralysis owing to tumor infiltration, recovery should not be expected. Accordingly, attempts to dissect out and preserve the facial nerve are unnecessary. On the other hand, it is appropriate to identify the facial nerve proximal and distal to the neoplasm so that facial nerve repair can be achieved after resection of the tumor. This may require some form of a mastoidectomy (e.g., taking down the mastoid cortex, removing the mastoid tip, and identifying the facial nerve in the vertical section of the temporal bone). Frozen section of the distal as well as the proximal nerve should be accomplished before nerve repair. Similarly, the distal branches of the facial nerve should be identified during tumor resection. This is facilitated through the use of an electrostimulator in patients with some residual intact function. Unfortunately, patients who present with total paralysis may not be stimulated. Accordingly, the surgeon may be challenged by the need to find the distal branches as they

exit the parotid gland. In general, reconstruction of the facial nerve in cases in which it is resected anterior to the lateral canthus produces such minimal functional recovery that it is not generally undertaken. These patients are better served with some form of reconstruction for the corner of the mouth and a gold weight in the upper lid. "Dynamic" reconstruction with innervated muscle, for example, the temporalis, may result in some voluntary motion. Fascial sling procedures and facelifts produce "static" improvement, the results of which, unfortunately, may deteriorate with aging. Following extended radical parotidectomy, soft tissue defects are covered with regional flaps or split-thickness graft.

### FACIAL NERVE REPAIR

When the facial nerve is injured either inadvertently or as a planned part of the procedure, it should be repaired in almost every circumstance. The best functional results with facial nerve repair are obtained by anastomosis of the divided nerve. More often, however, an anatomic portion of the nerve is lost. In such cases, the continuity can be reestablished through insertion of a free nerve (cable) graft (see Fig. 62-16). Reanimation of the face through use of an adjacent cranial nerve (the 12th cranial nerve) is only undertaken when reestablishment of the continuity of the facial nerve is not possible.

### SURGICAL APPROACHES

When the facial nerve has been divided, as in surgical or external trauma, it should be anastomosed. This requires trimming the cut ends of the nerve and applying two or three extremely fine (7-0 or 8-0) sutures, employing the operating microscope. Only the epineurium need be approximated. This should be accomplished with no tension on the suture line and the cut ends of the nerve must oppose each other.

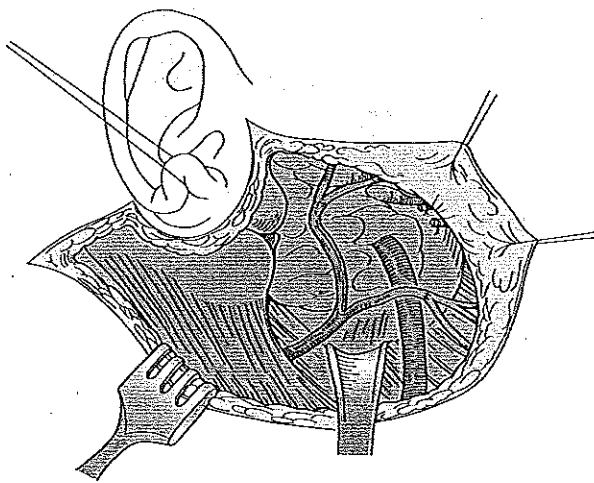
When a segment of facial nerve is removed, for instance, during excision of a malignant tumor, it is appropriate to harvest a nerve of appropriate diameter and length to reconstruct the facial nerve. The greater auricular or the sural nerve is most appropriate. The fascicles of these nerves may be separated to allow reconstruction of more than one branch of the facial nerve when indicated. Efforts should be made to preferentially reconstruct orbital and perioral branches at the expense of the buccal, frontal, and cervical branches. The fourth cervical nerve may also be used to good advantage where peripheral branches are removed. It provides an anatomic unit similar to that of the facial nerve with a larger "main trunk" and distinct smaller branches similar in diameter to the remaining branches. If a neck dissection is performed at the same procedure, it is important to plan ahead for possible nerve graft harvest when dissecting in the vicinity of the cervical and greater auricular nerves.

Postoperative radiation therapy may have a detrimental effect on nerve regeneration from grafts. Some

authors report minimal impact,<sup>26,27</sup> whereas others report results that suggest the compromised function when the graft is irradiated.<sup>28,29</sup> Some return of function can be expected, however, and reconstruction is indicated. Use of an adjacent motor cranial nerve is only indicated when reestablishment of the integrity of the facial nerve is not possible. This situation rarely exists in routine parotid surgery; however, when the facial nerve has been injured in the internal auditory meatus or at the brain stem, reconstruction may not be possible. In these cases, it may be appropriate to employ adjacent motor cranial nerves, recognizing that this requires sacrifice of other functions to achieve some improvement in facial function. Use of the hypoglossal nerve is most widely acknowledged as being the most successful in achieving facial tone. Use of the hypoglossal nerve to reinnervate facial musculature may result in discrete return of facial motion and improved tone. Use of the hypoglossal nerve results in ipsilateral tongue paralysis. Most patients tolerate this remarkably well; however, it is nonetheless a deficit that must be discussed with the patient preoperatively.

The hypoglossal nerve is identified as it passes anterior to the external carotid artery. It is dissected far anteriorly, to obtain sufficient length to allow anastomosis with the distal facial nerve without tension. Fascicles of the hypoglossal nerve can be separated to allow reconstruction of various branches of the facial nerve (Fig. 62-17).

Success is defined as improved tone. This is an important concept because selective discrete reinnervation is not possible. Accordingly, the patient should be counseled preoperatively that improved tone is a victory.



**Figure 62-17.** Hypoglossal-facial nerve anastomosis. The hypoglossal nerve has been split to allow reinnervation of the upper and lower divisions of the facial nerve.

## PEARLS

- FNAB is a test. Sensitivity approaches 90% to 95%; however, false-positive results are observed 5% to 15% of the time.
- Open biopsy and permanent pathologic evaluation are indicated when resection of a normal facial nerve is required.
- Sarcoid can cause facial paralysis.
- Pleomorphic adenoma must be completely excised.
- Comprehensive removal of all parotid tissue may be most effective in control of recurrent bacterial parotitis.
- The facial nerve is at highest risk during surgery for cancer, chronic parotitis, and deep lobe tumors.
- Postoperative radiation is indicated for high-grade parotid cancer.

## PITFALLS

- All patients will have a scar and should be so advised.
- The greater auricular nerve is intentionally transected during parotidectomy. This results in periauricular numbness. Recovery takes months and is incomplete.
- *First bite syndrome* refers to pain upon eating. It is believed to be due to spasm and may resolve spontaneously.
- Symptomatic Frey's syndrome, a relatively unusual problem, may be treated with topical antiperspirants or injection of Botox.

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