

Chapter 34 – Mandibular Osteotomy Approaches

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MANDIBULOTOMY

Mandibulotomy is undertaken to facilitate exposure for extirpation of oral and oropharyngeal lesions. The use of mandibulotomy to allow an anterior approach to the parapharyngeal space and skull base has also been proposed.^[1,2]

The site of the mandibulotomy may vary from patient to patient. Lateral mandibulotomy, performed through the body of the mandible, has largely been abandoned because the rate of complications was high when the procedure was performed in patients who subsequently required postoperative radiation therapy and because anesthesia of the lip was unavoidable. Accordingly, most surgeons today perform mandibulotomy anterior (mesial) to the mental foramen.

PATIENT SELECTION

Preoperative assessment is a critical component of patient care. Assessment begins with the history and physical examination. Inspection and palpation are frequently the most accurate means of assessing the dimension and depth of infiltration of the tumor in the oral cavity or oropharynx. Lesions involving the soft palate and tonsil and the retromolar trigone, the posterior third of the mobile tongue, and the adjacent tongue base and those involving the posterior aspect of the floor of the mouth and the ventral surface of the tongue may be best suited for a mandible-sparing procedure if the periosteum of the mandible is not involved with cancer. Adequate exposure is critical to ensure that the margins of resection are adequate. Additionally, reconstruction is greatly facilitated and healing enhanced if the repair is performed with comfortable surgical exposure.

Mandibulotomy is ideally suited to facilitate exposure for surgical management of tumors of the oral cavity, the oropharynx, and occasionally the parapharyngeal space.^[3,4] It is performed when a transoral procedure would be compromised by lack of exposure. Mandibulotomy is not appropriate in patients who require removal of a portion of the mandible because of involvement with tumor.^[5–8] The evolution of head and neck surgery has been accompanied by an appreciation of the severe cosmetic and functional deformities that accompany mandibulectomy. Accordingly, mandibulectomy is reserved for patients who require resection of bone because of infiltration by or proximity to tumor rather than for exposure of the tumor.

Evaluation of bone involvement is a clinical challenge. Bone scanning, computed tomography (CT), and magnetic resonance imaging (MRI) have all been advocated.^[9–12] Invasion of the mandibular cortex is often best studied with CT scans. Spread through the medullary space may be better identified with MRI. Unfortunately, these imaging techniques may miss subtle involvement of bone by tumor. There is no replacement for good clinical judgment. If a rim of normal tissue exists between the tumor and bone, the mandible may be spared. If the periosteum is involved, marginal or rim mandibulotomy should be considered.^[13,14] When the mandibular cortex or marrow space is involved by tumor, we recommend segmental mandibulectomy.

If a satisfactory margin of soft tissue can be obtained without removal of bone, continuity of the mandible should be preserved for both functional and cosmetic reasons. Nevertheless, exposure for resection and subsequent reconstruction may be limited by the mandible. In these circumstances, mandibulotomy enhances the exposure needed to appropriately perform the resection and reconstruction.

PREOPERATIVE EVALUATION

Preoperatively, it is important to determine whether the surgical exposure would be inadequate if the procedure were performed transorally. The presence of intact dentition, trismus, and a posterior location of the lesion to be resected are features suggesting that mandibulotomy would be appropriate to enhance exposure.

In general, edentulous ectomorphic persons are best suited for transoral removal of limited lesions (T1 to T2). In contrast, fully dentulous mesomorphic persons may present a surgical challenge that would compromise adequate tumor excision if the surgeon is limited to a transoral approach.

Palpation of the lesion is an important component of the preoperative evaluation. Lesions that cannot be fully encompassed digitally in the office may be relatively inaccessible at the posterior limits in the operating room.

Fixation to the mandible is a contraindication to this approach. If the mandible is grossly invaded, we prefer segmental mandibulectomy. The area of bone to be removed is determined preoperatively, and osteotomies are created during surgery to facilitate exposure.

If the tumor is fixed to the periosteum, marginal mandibulectomy is preferred. A combination of marginal mandibulectomy and anterior mandibulotomy is to be avoided because it is frequently associated with mandibular fracture postoperatively. Exposure in patients requiring marginal mandibulectomy may be improved by using a midline lip- and chin-splitting incision and elevation of the facial flap. This technique is appropriate in patients in whom the transoral approach is inadequate for marginal mandibulectomy and excision of the tumor.

Most patients are imaged preoperatively to better assess the extent of the lesion and the status of the cervical lymphatics. MRI clearly enhances the soft tissue interfaces, whereas CT perhaps better delineates the interface between bone and soft tissue. Neither imaging technique, however, can detect subtle amounts of bone involvement. Accordingly, physical evaluation remains the critical assessment tool.

SURGICAL APPROACHES

Mandibulotomy is almost always undertaken as a part of another surgical procedure. General anesthesia is established as required. Tracheotomy should be carried out at the onset of the procedure to remove the endotracheal tube from the oral cavity and thus improve exposure. Usually, the cutaneous incision is developed in the midline and oriented vertically. The vermilion is marked to facilitate reapproximation of the lip at the completion of the case, and the lip is split (Fig. 34-1). The incision is then carried laterally in the gingivobuccal sulcus, and a 5- to 8-mm cuff of vestibular mucosa is left to facilitate closure at the completion of the procedure. At the site of the intended mandibulotomy, the mucosal incision is carried to the mandible. Periosteum is not elevated but is incised sharply.

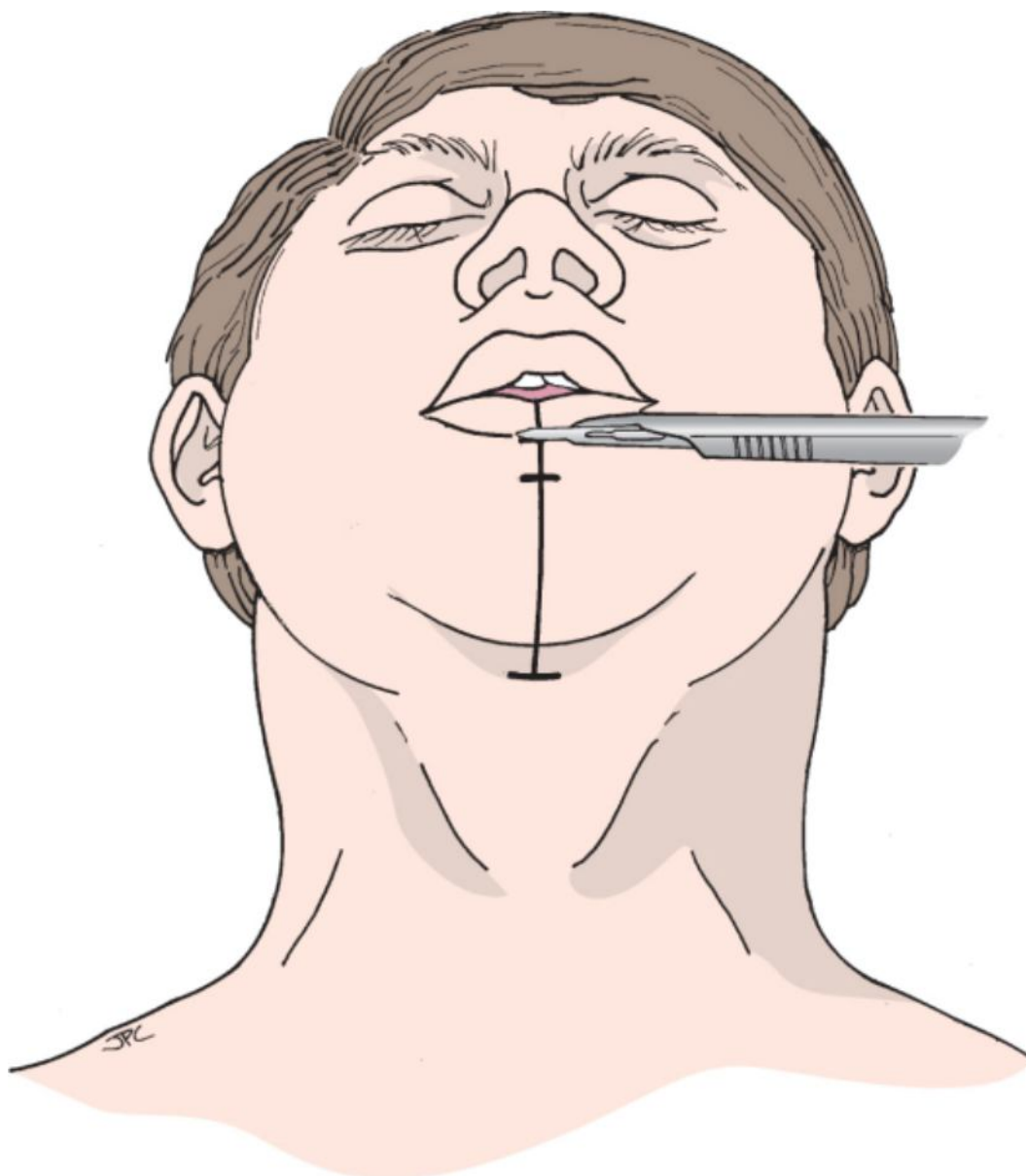


Figure 34-1 The vermillion is marked horizontally with a knife blade before dividing the lip. This facilitates approximation of the vermillion at the conclusion of the procedure.

An alternative to a lip-splitting incision is a visor flap. In this circumstance, a horizontal incision is made in a submandibular skin crease and carried across the midline to the contralateral angle of the mandible. Then, working in a subplatysmal plane, the soft tissue is elevated up to the labial mandibular sulcus. The mucosa is divided and the oral cavity entered, with a rim of approximately 5 mm of mucosa left on the surface of the mandible to facilitate closure at the completion of the procedure. This technique avoids a midline skin incision, but the mental nerve must be divided bilaterally to afford adequate retraction of the visor flap during surgical extirpation. Some patients may regain sensation, but the long-term functional effect of denervating the lower lip has not been quantitated. We believe that the morbidity associated with bilateral mental nerve sacrifice justifies the performance of a midline lip-splitting incision.

The mandibulotomy should be performed anterior to the mental foramen. In an edentulous patient, the exact site of osteotomy is not critical. In patients with intact dentition, a tooth should be extracted and the mandibulotomy performed through the middle of the tooth socket (Fig. 34-2). If the mandibulotomy is performed immediately between two intact teeth, both may be lost. Incisor teeth are rarely extracted for this purpose because the cosmetic affect of missing this anterior tooth is too noticeable. Accordingly, mandibulotomy is performed lateral to the midline through the site of the extracted first bicuspid tooth or at the point where a tooth has previously been lost. In general, mandibulotomy should not be performed in the body of the mandible posterior to the mental foramen, especially in patients who may require postoperative radiation therapy. The combination of radiation therapy and loss of blood supply to the bone secondary to division of the artery in the mental canal frequently results in ischemic necrosis of the body of the mandible.

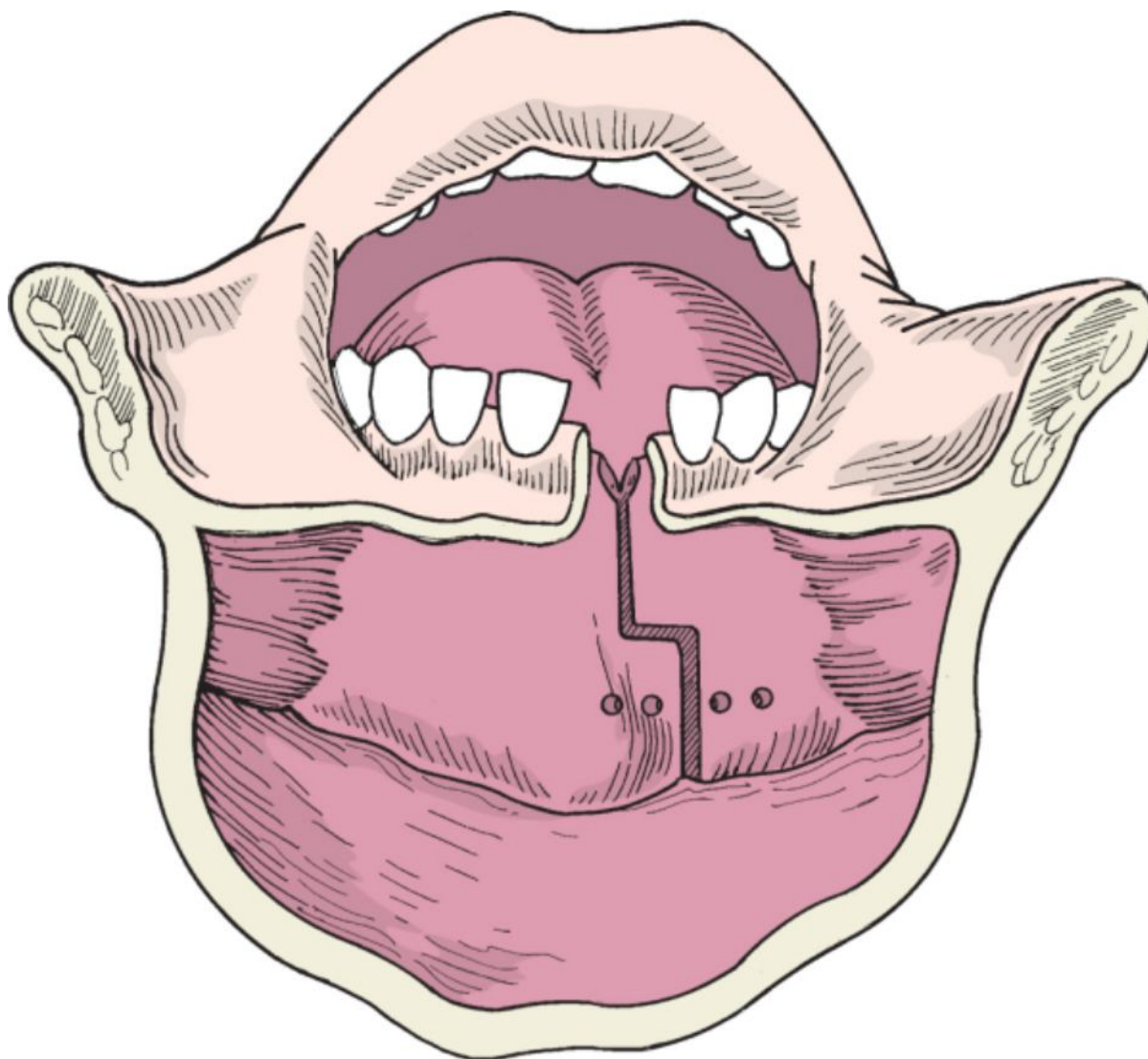


Figure 34-2 The mandibulotomy is undertaken through the socket of an extracted tooth.

With today's rigid fixation techniques, almost any type of mandibulotomy may be undertaken. A straight vertical mandibulotomy can be adequately fixed, but we continue to favor a stair-step mandibulotomy. When plates are used, we place the fixation plate and drill the screw holes before actual performance of the osteotomy to ensure proper alignment of the bone fragments during the reconstruction phase (Fig. 34-3). The mucosa of the floor of the mouth is then incised, and the mandible is retracted laterally (Fig. 34-4). Exposure of tumors in the posterior oral cavity and oropharynx is improved when the mylohyoid muscle is divided while the submandibular gland and its associated duct are retracted medially with the tongue.

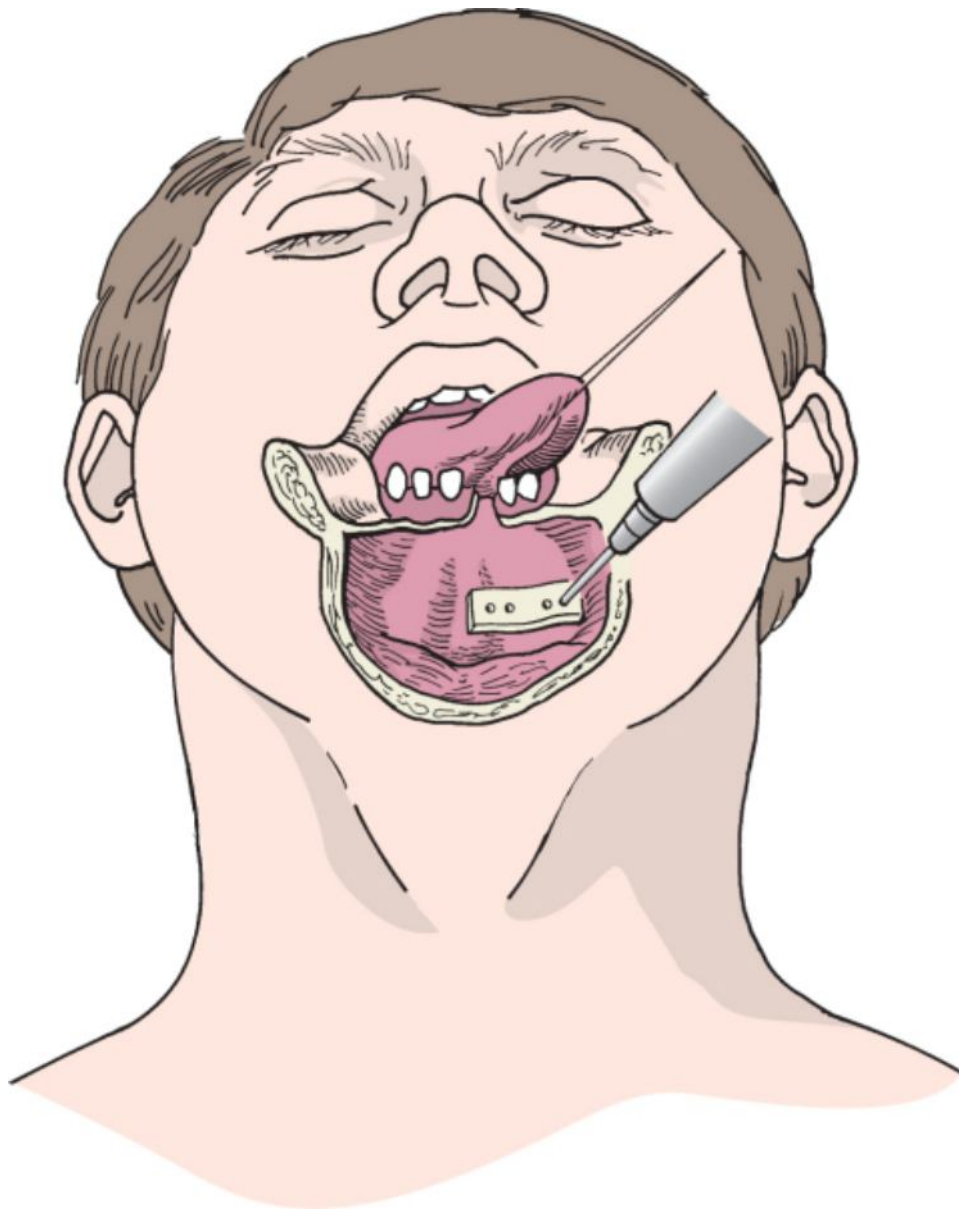


Figure 34-3 The plate is placed over the site of the proposed mandibulotomy, and holes are drilled before actually dividing the bone.

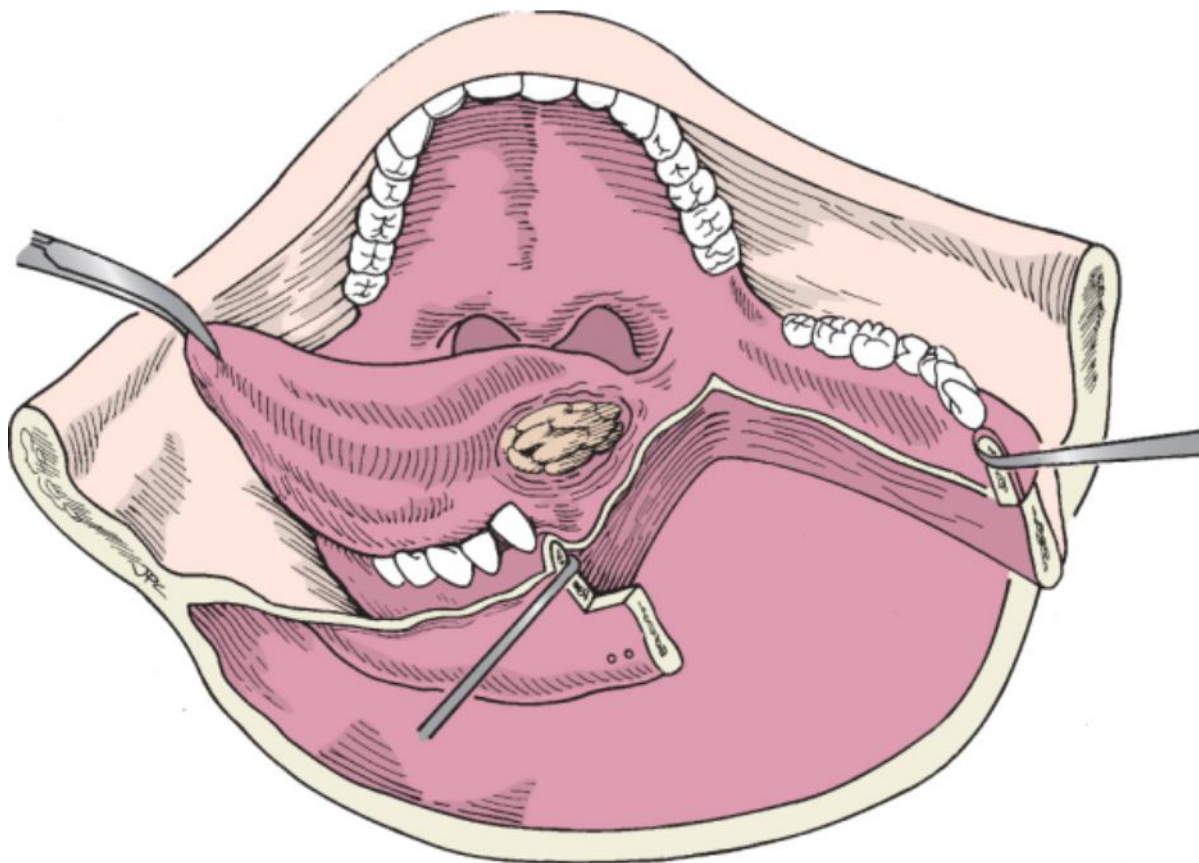


Figure 34-4 The mandible is retracted laterally as the mucosa of the floor of the mouth is incised. Care is taken to maintain the mucosa along the alveolus to facilitate closure.

After excision and reconstruction, the mandible is once again brought into anatomic position. The plate is fixed to bone through the screw holes previously drilled. A variety of plates and screws are available. The soft tissues are reapproximated, and the wound is drained as necessary.

POSTOPERATIVE MANAGEMENT

The patient may be returned to a liquid or soft diet as soon as healing of the soft tissue allows use of the oral cavity. Intermaxillary fixation is not necessary. Chewing of solid food should be postponed until approximately the sixth postoperative week. The integrity of the healing mandibulotomy can be ascertained clinically through direct inspection and evaluation of the mandibulotomy site. The decision to use postoperative radiation therapy in patients undergoing resection of malignant tumors is based on established criteria and protocol. Mandibulotomy is to be considered a surgical approach that facilitates tumor resection and reconstruction. When radiation therapy is needed, it may be undertaken without undue risk. Various investigators have indicated that a mandible-stabilizing plate has minimal effect on the tissue dose of radiation. The plate may minimally reduce the dose in some areas, as well as cause some "hot spots." Neither of these observations, however, significantly affects the efficacy or safety of postoperative radiation therapy, and dose adjustments are not required. Similarly, patients who have previously undergone radiation therapy may be at increased risk for postoperative osteonecrosis.

Midline labiomandibuloglossotomy (LMG) affords the surgeon exposure to the tongue base, the posterior wall of the oropharynx, the posterior wall of the hypopharynx, and the nasopharynx, as well as the cervical space, clivus, and basiocciput. This approach combines a mandibulotomy with a midline tongue-splitting approach. To achieve maximal exposure, most surgeons split the lip as well.^[1-11] Midline LMG is performed through an incision that gives wide exposure without jeopardizing the laterally placed neurovascular structures.