Chapter 6

Novel Techniques for Trigeminal Neuralgia Including Trigeminal Neurostimulators

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ABSTRACT

Several innovative surgical options for the management of trigeminal neuralgia have emerged over the past 40 years. In addition to microvascular decompression, other techniques have been introduced for the treatment of trigeminal neuralgia and facial nerve pain. This chapter describes the following novel therapeutic modalities: endoscopic microvascular decompression, radiosurgery, radiofrequency, thermocoagulation, glycerol rhizotomy, balloon compression, Gasserian ganglion stimulation, and subcutaneous trigeminal nerve stimulation. For each of these techniques, this chapter provides a description of the procedure, criteria for patient selection, and discusses published data regarding patient outcomes.

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INTRODUCTION

Patients with trigeminal neuropathic pain refractory to medical management can be treated with a variety of minimally invasive surgical approaches that either augment or differ from standard microvascular decompression (MVD). For example, endoscopy is increasingly being used to augment traditional microvascular decompressions due to improvements in visualization of the source of vascular or structural compression and ability to intra-operatively confirm an adequate decompression (Artz et al., 2008; C. H. Halpern, S. S. Lang, & J. Y. Lee, 2013; Lang, Chen, & Lee, 2012; Sandell, Ringstad, & Eide, 2014). Other minimally invasive techniques that differ from microvascular decompression include stereotactic radiosurgery surgery (SRS), percutaneous radiofrequency nerve ablation, rhizotomy, balloon compression, and neurostimulation, all of which rely on nerve root lesioning or manipulation to alleviate painful symptoms. Specifically, SRS utilizes radiation, while radiofrequency thermocoagulation and glycerol rhizotomy use percutaneously delivered heat currents and chemicals to achieve nerve root destruction (Hakanson, 1981; Kanpolat, Savas, Bekar, & Berk, 2001; J. K. Lee, Choi, Ko, Choi, & Lim, 2012; William H. Sweet & James G. Wepsic, 1974). Balloon compression similarly utilizes percutaneous placement of an inflatable balloon to cause physical compression of the trigeminal ganglia (Mullan & Lichtor, 1983). Percutaneously delivered neurostimulators can also be used to modulate nerve signals within the trigeminal nerve and distal branches (Holsheimer, 2001). This chapter will discuss the operative nuances of each of these techniques and the published data regarding their comparative efficacy to treat trigeminal nerve pain.

NOVEL NEUROSURGICAL TECHNIQUES

Endoscopic MVD

Brief Description of Procedure

Similarl to the traditional open MVD (O-MVD), endoscopic microvascular decompression (E-MVD) is also approached via a small retrosigmoid craniectomy to expose the borders of the transverse and sigmoid sinuses (Artz et al., 2008; C. H. Halpern et al., 2013; Lang et al., 2012; Sandell et al., 2014). A 1-2 cm dural opening is made and the dural flap is retracted. An endoscope is then inserted through the dural opening. A 0-degree endoscope is typically used, although angled endoscopes may expedite identification of root entry zone vascular anatomy and enhance visualization of the neurovascular conflict in the case of a prominent petrous ridge.
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