

Protection of the Marginal Mandibular Branch Using Checkpoint Stimulator in Open Reduction and Internal Fixation of Mandible Fracture



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Background

Various approaches have been suggested for surgical access to mandibular fracture sites. Although intraoral approach is often favored due to its less invasive characteristics, conventional extraoral procedures such as the Risdon's approach still maintain their value as they offer more definitive surgical management and are still requisite for unfavorable fractures of the mandible.¹

The main concern of Risdon's submandibular approach is widely reported postoperative neuropraxia of the marginal mandibular branch of the facial nerve (MMN) which is imminent during surgery near the inferior border of the posterior mandible as well as the submandibular triangle.^{1,2} Injury to the MMN has been reported in 0-4% of patients after open reduction and fixation of mandibular fractures.² Permanent injury to the MMN presents as a weak smile owing to the paresis of depressor anguli oris, depressor labii inferioris and lower fibers of the orbicularis oris and mentalis muscles and is a serious complication with both functional and aesthetic outcomes.¹⁻³ The corrections of resultant deformity in MMN function may require further complex surgical procedures. Therefore, protection of MMN is essential to avoid unfavorable outcomes.⁴

Nerve monitoring is an adjunctive method to assist the surgeon with the functional preservation of a motor nerve or nerves. Facial nerve monitoring has been widely used in otologic, neurologic and skull base surgery.⁵ The objective of this report is present utilization of the Checkpoint Nerve Locator/Stimulator to avoid injury to MMN in an open reduction and internal fixation of a mandibular fracture.

Case Report: Open Reduction and Internal Fixation of Mandible Fracture

72 year old female patient was referred to our clinic with chief complaint of pain around a dental implant on the left side of her mandible. A CT scan was obtained and it confirmed pathological fracture of the atrophic mandible due to osteomyelitis around the failing dental implant. Removal of the dental implant, debridement of the surgical site as well as re-approximation and fixation of the segments were set as the main goals of the surgical treatment. Due to unfavorable localization of the fracture line and the need for exploration of the inferior border of the mandible, an extraoral approach consisting of a Risdon's incision was performed.

An incision through the skin and subcutaneous tissue following an inferior neck crease approximately 2 cm below the mandible was made and dissection continued through the platysma muscle and the superficial layer of the deep

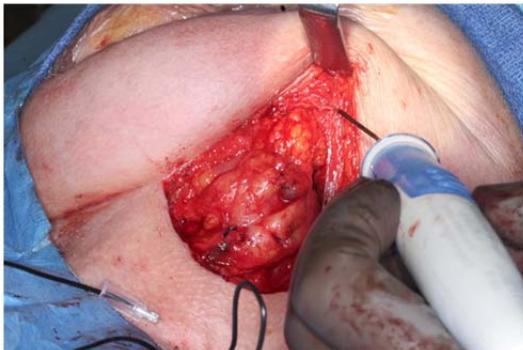
cervical fascia. During this dissection, the Checkpoint stimulator (Checkpoint Surgical, Cleveland, OH) was used to identify and preserve the marginal mandibular branch of the facial nerve.

Our experience with the Checkpoint stimulator indicates a reliable means of nerve monitoring with advantages over previously utilized monitoring systems. The biphasic waveform employed by the Checkpoint ensures a limited tissue contact and seems to prevent nerve fatigue, which may lead to false negative outcomes.



We have used the device with a current level of 2 mA and a pulse width of 100 microseconds and observed clear and reproducible tetanic contractions of the muscles innervated by MMN. Higher amplitude settings and an adjustable pulse width may be of further benefit and render the device exclusively useful when operating on dense or fibrous tissues.

We believe that using Checkpoint nerve stimulator in this case not only helped us to avoid a possible injury to MMN, but also saved us a considerable amount of surgery time during dissection as we felt more comfortable during dissection with the ability to stimulate through surrounding tissue to activate and locate the MMN before visualizing it.



Following identification and preservation of the MMN with the aid of a Checkpoint stimulator, dissection was continued down to the inferior border of the mandible, implant was removed, debridement, re-approximation, fixation of the segments were carried out and a reconstruction plate was placed at the inferior border of the mandible.

As anticipated, patient displayed a natural function of the MMN following surgery and a natural course of healing was observed.

References

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The Checkpoint Stimulator is a single-use, sterile device intended to provide electrical stimulation of exposed motor nerves or muscle tissue to locate and identify nerves and to test nerve and muscle excitability. Do not use this Stimulator when paralyzing anesthetic agents are in effect, as an absent or inconsistent response to stimulation may result in inaccurate assessment of nerve and muscle function. For a complete list of warnings and precautions regarding the use of the Stimulator please see www.checkpointsurgical.com