

Paresthesia of the Lower Lip: Delayed Complication of Radiotherapy to Nasopharynx

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ABSTRACT

Paresthesia of the lower lip may develop following injury to the inferior alveolar nerve or mental nerve. The most common cause of lip paresthesia is iatrogenic where inadvertent injury takes place during surgery. Paresthesia may also develop as a result of pathology interfering with the integrity of nerve. While expanding benign lesions cause paresthesia by compression of the nerve, malignant lesions do so by invading the nerve tissue. Ionizing radiation may also cause damage to the nerves. The adverse effects of radiation therapy on oral health are well known with the most emphasis given to osteoradionecrosis. Our case is the first report that the inferior alveolar nerve or mental nerve is at risk of long term side effects of radiotherapy to the nasopharyngeal region.

Key Words: Lower lip, paresthesia, radiation, mental nerve

Introduction

Radiation therapy is used for head and neck malignancies as primary therapy, adjuvant to surgery or in conjunction with chemotherapy. It can improve the prognosis to a great deal, but often at the expense of several side effects that present either in short-term or in long-term. The most common complications of head and neck radiotherapy that have an impact in the oral health are mucositis, xerostomia, loss of taste, limitation of mouth opening, dysphagia, caries and osteoradionecrosis.^[1,2] Radiation therapy may also result in nerve damage leading to paresthesia or palsy. Neuropathy affecting cranial nerves, especially those transversing the neck was reported as a side effect of radiation to the area for nasopharyngeal carcinomas.^[1-4]

Radiation may have an effect either on an isolated cranial nerve or on the bunch of nerves crossing the therapy field.^[3,8,9] Dysfunction of lower cranial nerves (IX, X, XI, XII) were reported much more often than the upper cranial nerves (II, III, IV, V, VI, VII) and the most commonly involved nerve was the hypoglossal nerve.^[3,4,7,8,9]

A handful of cases on neuropathy of the trigeminal nerve following radiotherapy for the head and neck cancer were reported.^[2,5,6,7] Cases of post-irradiation neuromyotonia affecting motor branches of trigeminal nerve were described.^[5,6] Diaz et al reported two patients manifested as sustained muscle contraction of the floor of the mouth as a delayed effect of radiation therapy. While Marti-Fabregas et al^[6] presented a patient with episodic involuntary contraction in

the lower facial and masseter muscles. Rong et al^[7] mentioned that 15 patients showed trigeminal neuropathy which presented with asymmetric sensitivity to facial stimulus and masseter muscle weakness in some cases, however no detail was given regarding the sensitive branches of the nerve. He et al^[2] reported one case of isolated trigeminal nerve palsy and two cases of nerve palsy affecting trigeminal, hypoglossus and vagus nerves among patients that were subject to radiotherapy for nasopharyngeal cancer but again, no detail was given. Luk et al^[9] noted that out of 965 patients who received radiotherapy, 4 patients developed neuropathy involving trigeminal nerve. The only detail given was that 2 cases involved mandibular branch, one case maxillary branch and one case ophthalmic and mandibular branch. To the knowledge of the authors, there is no published report specifically on mental nerve neuropathy as a result of radiation therapy.

Case Report

A 31 year old female patient presented to our clinic with a complaint of numbness on the right lower lip. The patient claimed that the paresthesia initiated just after the restoration of mandibular anterior teeth with crown-bridge work about 2.5 year ago. She denied any trauma or surgery performed to the region that might cause nerve damage. The paresthesia was limited to the gingiva on the buccal aspect of the right anterior teeth at the beginning, which progressed slowly extending towards the right lower lip.

Her medical history revealed she received radiation therapy to the right side of the neck as primary treatment of nasopharyngeal cancer in 2001. Despite our best efforts, detailed data on the

fractionation and the total dose of the radiation received could not be retrieved. No metastasis or recurrence was detected in regular follow-up. She was healthy looking with no constitutional symptoms like fever, weight loss and fatigue.

Intraoral examination revealed healthy looking gingiva with no apparent scar tissue residual to previous incision line. There was no local swelling or sign of inflammation. She had an 8-unit fixed partial denture which had right and left canines and first premolars as abutments. No excessive bone resorption was noted on radiography albeit her recollection that, teeth were extracted due to periodontal problems. Canine teeth on both sides had root canal treatment before the start of the radiation therapy. Percussion and palpation tests yielded negative results. The teeth on both sides responded to electrical pulp test.

Pinprick test, touch sensibility test and two point discrimination test were performed to delineate the function of the mental nerve and extend of the paresthesia. Pinprick and touch sensibility tests showed negative response in the labial gingiva on the buccal aspect of incisors on the right side extending to the first premolar region intraorally. Extraorally, the patch of sensory deficit extended from approximately 0.5 cm medial to right lower lip commissure to approximately 0.5 cm distal to the midline. The paresthesia spread out to skin underneath lower lip but the chin was spared. (Fig. 1)

While the patient could discriminate the two-point in horizontal direction no discrimination could be attained in vertical direction on the affected side of the lip. She had no complaint of tingling, pain or burning sensation.



Fig. 1 The patch showing numb area extending from approximately 0.5 cm medial to right lower lip commissure to approximately 0.5 cm distal to the midline, spreading out to skin underneath lower lip.

The functions of other cranial nerves were delineated by physical examination. A cone beam computed tomography was ordered in order to exclude any condition, metastasis or any other pathology that may be interfering with inferior alveolar canal. Tomography images showed no lesion along the course of the inferior alveolar canal or any narrowing or deflection of the inferior alveolar canal from its route. (Fig. 2)

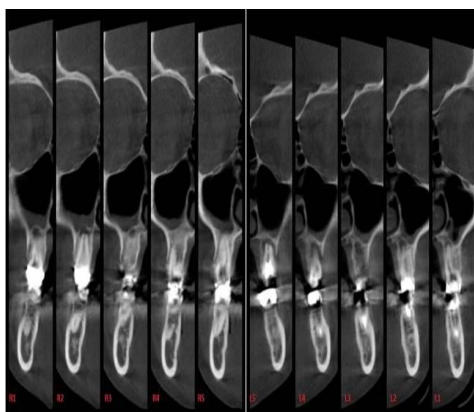


Fig. 2 Tomography images showing the corpus of the mandible from distal of the right first molar (R1) towards mesial of the right first molar (R5) and again mesial of the left first molar towards distal of the left first molar).

Note: The sclerosis near the inferior alveolar canal on the right side of the jaw, most notable in sections R2 and R3.

The patient was scheduled for a long term follow-up.

Discussion

In our case, clinical and radiographic examinations showed there were no local factors that can cause mental nerve neuropathy. She had no other systemic illnesses that may have an effect on the nerve tissue. Metastatic involvement was not detectable along the course of the nerve. After ruling out the other possible etiologies and finding out that the inferior alveolar nerve was included in the radiotherapy field, radiation-induced peripheral nerve injury was thought the most likely etiology. Therefore we describe the first detailed case of lip paresthesia as an adverse effect of radiation therapy. In addition, most of the studies reported motor function deficit of the cranial nerves.^[4] In this study we report the impairment of the sensitive function due to the adverse effects of radiation therapy with no palsy of the muscles innervated by the branches of the mandibular nerve. A wide range of latency period from 12 months to 240 months before the occurrence of the signs and symptoms of the lower cranial nerve (glossopharyngeal, vagus, accessory and hypoglossal nerves) neuropathy was reported, while 90% of the neuropathies occurred within 10 years after radiotherapy.^[4,7,8] Likewise, in our case report neuropathy of the inferior alveolar nerve developed almost 10 years after the radiotherapy.

Radiation may exert its effect either directly or through free radical formation, in either case ionization of the atoms which make up the DNA, RNA, and other enzymes takes place. Cell damage can also occur as a result of inflammation, endothelial damage and microvascular thrombosis and chronic activation of fibroblasts. A radiation-induced fibro-

atrophic mechanism, in which dysregulation of fibroblastic activity leading to fibrosis and atrophic tissue with markedly diminished vascularity of the connective tissue has been gaining popularity. [10,11,12] Tuan et al stated that fibrotic muscles damage nerves by entrapping them in addition to leading to injury of vessels supplying the nerves. Late degenerative changes and demyelination of Schwann cells were reported. [11,12]

Following its course in the infratemporal fossa, inferior alveolar nerve enters inferior alveolar canal on the medial aspect of the mandible and travels within the bony canal until it exits mandible on the mental foramen to innervate the soft tissue. Our patient had numbness of the soft tissues and the molar teeth responded to electrical stimulation. Hence we presume the mental nerve was most probably subjected to compression by the fibrosis of soft tissue around the nerve which occurred over a long period of time.

At present, there is no well-established treatment to relieve signs and symptoms associated with radiation-induced neuropathy. Various modalities targeting possible pathophysiology of the radiation-induced nerve damage have been tried. Hyperbaric oxygen therapy has been used with an aim of increasing oxygenation of the irradiated tissues. [13] Carbamazepine therapy was shown to be useful to reverse neuromyotonia in facial and trigeminal nerve distribution. [5,6] New treatment strategies targeting radiation induced fibrosis were sought to reverse the nerve dysfunction. Delanian et al [10] claimed satisfactory outcome with a long term-treatment protocol using a combination of pentoxifylline, tocopherol and clodronate that apparently had properties of enhancement blood flow to the area, antioxidant and inhibition of chronic inflammation, respectively.

In our case, with the patient's consent, we scheduled the patient for follow up rather than placing her to a long term-trial-medical treatment as we thought the risks of the treatment outweigh the benefits. We think more research is needed to establish a standard treatment protocol for radiation induced neuropathy.

References

1. Tuan JK, Ha TC, Ong WS, Siow TR, Tham IW, Yap SP et al. Late toxicities after conventional radiation therapy alone for nasopharyngeal carcinoma. *Radiother Oncol* 2012;104(3):305-11.
2. He X, Ye M, Guo X, Pan Z, Zhang Z, He S et al. Treatment outcome of patients with stages I-II nasopharyngeal carcinoma after late course accelerated hyperfractionation radiotherapy alone. *Oral Oncol* 2012;48(10):1058-63
3. Kong L, Lu JJ, Liss AL, Hu C, Guo X, Wu Yet al. Radiation-induced cranial nerve palsy: a cross-sectional study of nasopharyngeal cancer patients after definitive radiotherapy. *Int J Radiat Oncol Biol Phys* 2011;79(5):1421-7.
4. Shin HY, Park HJ, Choi YC, Kim SM. Clinical and electromyographic features of radiation-induced lower cranial neuropathy. *Clin Neurophysiol* 2013;124(3):598-602.
5. Diaz JM, Urban ES, Schiffman JS, Peterson AC. Post-irradiation neuromyotonia affecting trigeminal nerve distribution as unusual presentation. *Neurology* 1992; 42:1102-1104.
6. Marti-Fabregas J, Montero J, Lopez-Villegas D, Quer M. Post-irradiation neuromyotonia in bilateral facial and trigeminal nerve distribution. *Neurology* 1997;48(4):1107-9.
7. Rong X, Tang Y, Chen M M, Lu K, Peng Y. Radiation-induced cranial

- neuropathy in patients with nasopharyngeal carcinoma. A follow-up study. *Strahlenther Onkol* 2012;188(3):282-6.
8. Lin YS, Jen YM, Lin JC. Radiation-related cranial nerve palsy in patients with nasopharyngeal carcinoma. *Cancer* 2002;95(2):404-9.
 9. Luk YS, Shum JS, Sze HC, Chan LL, Ng WT, Lee AW. Predictive factors and radiological features of radiation-induced cranial nerve palsy in patients with nasopharyngeal carcinoma following radical radiotherapy. *Oral Oncol* 2013;49(1):49-54
 10. Delanian S, Lefaix JL. The radiation-induced fibroatrophic process: therapeutic perspective via the antioxidant pathway. *Radiother Oncol* 2004;73 (2)119–131.
 11. Vasic L. Radiation-induced peripheral neuropathies: etiopathogenesis, risk factors, differential diagnostics, symptoms and treatment. *ArchOncol* 2007;15(3-4):81-4.
 12. Dropcho EJ. Neurotoxicity of radiation therapy. *NeurolClin* 2010;28:217–34.
 13. Levy RL, Miller NR. Hyperbaric oxygen therapy for radiation-induced optic neuropathy. *Ann Acad Med Singapore* 2006;35(3):151-7.



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