#### **CASE REPORT**

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# An osteopathic approach for a patient with sequela after treatment for a cheek squamous cell carcinoma

# Abstract

Surgical and radiation treatment for head and neck cancer are associated with both chronic and acute pain. While traditional treatment options, commonly antiepileptics and opioids, can be effective, many patients may still experience significant and debilitating pain.

This case report describes a 61-year-old woman with a past medical history of spindle type squamous cell carcinoma in the left cheek that metastasized to the left parotid and submandibular glands. She was treated with surgical excision followed by radiation. She presented to the Osteopathic Manipulative Medicine clinic with the complaint of severe left sided facial pain, and limited range of motion that resolved with osteopathic manipulation.

#### Introduction

Cancers of the head and neck (HNC) represent 5% of all malignancies.<sup>1</sup> The complexity of this region can result in cancers with a variety of phenotypes, histology and degrees of invasiveness and are associated with tobacco use, carcinogen exposure and previous infection by human papillomavirus types 16 and 18.<sup>2</sup> Traditional treatment for these cancers is dependent on cancer stage, location, and cell characteristics, but commonly includes radiation, surgical excision and systemic therapy. Most patients opt to receive a combination of surgical resection and chemo or radiation therapy to ensure complete treatment of the cancer.<sup>3</sup> While this approach is generally successful, the resulting adverse effects can cause decreases in quality of life for these patients.<sup>3</sup> Common side effects of treatment for head and neck cancer include dysphagia, speech problems, tinnitus and pain.<sup>4</sup> Pain, both acute and chronic, is experienced by >50% of HNC patients, and patients with pain report a lower quality of life.<sup>5</sup>

As HNC is generally located in areas related to breathing, speaking, eating and associated with body image, there can be severe effects on a patient's sense of self and quality of life when these areas are affected.<sup>6</sup> HNC is associated with a higher rate of suicide as compared to other cancers and the general population as a result of the psychologically distressing nature of the cancer, lingering effects of treatment, and the increased risk of substance abuse resulting from pain.<sup>7</sup> Additionally, as treatments improve and survivorship increases, the quality of life for patients in addition to their general wellbeing has become

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# Keywords

Head and neck, head cancer, OMT, sequela, squamous cell carcinoma, face cancer, quality of life after cancer, osteopathic medicine, osteopathic cranial manipulative medicine, muscle energy, indirect myofascial release increasingly important.8

The purpose of this case report is to provide an example for an osteopathic approach to a patient experiencing facial pain and decreased cervical range of motion after radical surgical excision and radiation for HNC.

# **Report of Case**

#### **History of Present Illness**

A 61-year-old female presented to the Osteopathic Manipulative Medicine clinic in August of 2021 with severe left sided face and jaw pain that started after treatment for spindle type squamous cell carcinoma of the left cheek 14 months earlier. The patient indicated she had pain in her mandible, stretching from her left ear canal to the submandibular soft tissue region that increased with light palpation of the ear or the jaw. She described this pain as a constant red-hot poker that made it difficult for her to concentrate. Additionally, she complained of pain at the left mental foramen and bilateral cervical region. Her left mental foramen pain was sharp, shooting pain that spread to the lower half of the jaw. She also noted a limited range of motion in the head and neck regions due to fibrotic changes in the tissue secondary to radiation in the region. She assessed her present level of discomfort as an eight out of ten on the Likert scale while having taken a dose of 20mg of oxycodone prior to her appointment. She denied any changes in smell, taste, or associated headaches.

Prior to her first visit at the Osteopathic medical clinic, she had been evaluated and treated by multiple other providers. In May 2020, she was evaluated by a local Otolaryngologist (ENT) for the abnormal nevus on her left cheek. Biopsy of the cheek revealed spindle type squamous cell carcinoma with deep margins. She underwent subsequent micrographically oriented histographic surgery (MOHS) in June 2020 with clear margins. Five to six days postoperatively she noted a lump in the left parotid region. Her primary care physician placed her on antibiotics for suspected folliculitis that seemed to resolve with treatment. Approximately 3 months later, she noted another lump on the left side of her face ventral to the left ear.

Follow up fine needle aspirate showed cells suspicious for malignancy and PET/CT confirmed a 1.6 cm mass in the left parotid gland and 2.6 x1.6 cm left submandibular mass superficial to the submandibular gland. She

was referred to oncology for further evaluation and treatment. She underwent subsequent left superficial parotidectomy with facial nerve dissection, left submandibular gland resection and preservation as well as left level 1 through 3 neck dissection in November 2020. Following surgery, she underwent 9 weeks of radiation to the left bucco-facial lymph nodes, left parotid lymph nodes, and left cervical lymph nodes level 1B-V from December 2020 to February 2021. The patient healed well from surgery, but had new complaints of left-sided acute on chronic temporomandibular joint, mandibular branch trigeminal nerve, and middle ear pain that radiated to the left submandibular soft tissue. Furthermore, she reported bilateral pain and a notable reduction in cervical range of motion that manifested subsequent to the second surgical procedure. As treatment for her post-surgical and post-radiation symptoms, she began seeing a chiropractor and a speech therapist. She was referred to the clinic by the speech therapist, who felt the patient's needs could be better addressed through osteopathic manipulative treatment (OMT).

#### Past Medical History

Prior to her cancer diagnosis, she was relatively healthy with a history of endometriosis and intermittent temporomandibular joint pain (TMD), neither requiring medication management. Surgically, in addition to surgeries for her HNC, she had lysis of abdominal adhesions, finger repair, a cyst excised from her hip and dental implants. Family history was significant for a maternal aunt with breast cancer. Socially, the patient was a former tobacco user and stated she recently quit in November 2020.

#### **Intial Physical Exam**

The patient was well groomed, nourished, and in no acute distress. She was oriented to person, place and time with normal mood and affect. Physical exam of the head and neck was normocephalic and atraumatic. There was visible healed scarring over the left inferior zygoma as well as the left mid-auricular line from the base of the skull down to the level of C5-6, moving anteriorly to the midline and then superiorly to the submental space of the jaw. Extraocular motion was intact bilaterally. Hearing was also intact bilaterally. Her trachea was located midline. Her respirations were regular and unlabored. Her abdomen was nondistended. Osteopathic structural exam revealed: left anterior and posterior cervical hypertonicity with fibrosis of superficial fascia, epidermis, and

dermis, right sidebending rotation cranial strain, hypertonicity of left anterior and posterior digastric muscles, left masseter, left mylohyoid, left stylohyoid, and bilateral platysma hypertonicity, and exquisite tenderness over the left V3 distribution of the trigeminal nerve was also noted. The hyoid was flexed, rotated right and sidebent right.

#### **Initial Treatment**

Initially, muscle energy (MET) was attempted for the cervical hypertonicity, however, the patient could not tolerate deep pressure to the region. Therefore, indirect myofascial release (MFR) was initiated instead. Osteo-pathic cranial manipulative medicine (OCMM) was used to correct the right sidebending rotation cranial strain pattern. The patient had improved cranial rhythmic impulse (CRI) amplitude and frequency following treatment. Anterior facial structures were treated with soft tissue (ST). Indirect myofascial release was used to treat the hyoid somatic dysfunction.

# Subsequent Care

The patient presented 2 weeks after the initial OMT treatment for follow-up and had noticed some improvement in facial pain, now rating it as 6/10 on the Likert pain scale while still taking narcotic pain medication. Pain remained constant in nature and she noted that she continued to wake up with jaw clenching and pain in the middle of the night.

For 3 months the patient followed up every 2-3 weeks for a total of 5 visits. Treatment focused on improving skin and fascial fibrosis with the use of soft tissue and myofascial release. Once cervical cutaneous and fascial fibrosis improved, cervical muscle hypertonicity was treated with balanced ligamentous tension (BLT) and MFR. Treatment of specific cervical somatic dysfunctions were treated with Still technique and high velocity low amplitude (HVLA) starting with her second OMT treatment. Cranial strain patterns were addressed with cranial manipulation. Counterstrain targeted at releasing tension and tenderness in the muscles of mastication were assessed and treated at each visit including the masseter, mylohyoid, stylohyoid, platysma and digastric muscles. Post treatment resulted in improved mobility of the jaw with less discomfort. Inhibitory techniques were used in the mandibular distribution of the trigeminal nerve and trigeminal nerve pain resolved after the third follow up treatment. Motion of the hyoid using MFR was important to improving the radicular pain from the left ear to the inferior jaw. At the end of the fifth visit, the patient had full, non-painful, cervical range of motion and resolution of trigeminal neuralgia pain. The pain radiating from the ear to the inferior jaw resolved after four months of treatment. The patient's pre-existing temporomandibular joint dysfunction, initially worsened by the radiation treatments and surgical procedures following her cancer diagnosis, improved with manipulation. OMT continues to be helpful in alleviating the patient's discomfort and normalizing the anatomy and physiology impacted by these physical stressors.

Interestingly in this case, the patient's initial visit required indirect myofascial release with a very light contact since she could not tolerate deeper palpation and by the second visit, she tolerated more direct techniques including HVLA and MET to the cervical region. She was given home jaw stretches for associated TMD to stretch the left facial fascia and skin associated with radiation fibrosis. She completed daily stretching at home without significant pain. As many of her initial symptoms resolved, her underlying TMD did not. She required continued treatment for TMD and in particular the pterygoid muscles using inhibitory and MFR techniques. Additionally, since her initial resection, she continues to follow up with her oncology care team and has remained cancer free to date.

# Discussion

This case demonstrates how OMT can improve fascial fibrosis, head and neck range of motion, pain, and mental health for a patient following treatment for HNC cancer. As one of the main tenets of osteopathic medicine, that structure and function are interrelated, this patient's regional structures had changed as a result of surgery and radiation to the area. There was enough of a change that the patient was no longer able to compensate or provide self-healing back to a level of homeostasis without further treatment. In 1982, the Education Council of Osteopathic Principles (ECOP) developed a five-model construct focusing on different viewpoints or lenses with which to evaluate and treat patients.<sup>12</sup> These five models include biomechanical-structural, respiratory-circulatory, neurological, metabolic-energetic, and behavior-biopsychosocial. More recently, a sixth model has been introduced, the bioenergetic model, which will not be covered in this article.<sup>12</sup>

From the metabolic-energetic viewpoint, prior to the patient being treated with OMT, she continued to have significant facial and neuropathic pain that affected the quality and duration of her sleep. Her inability to get restorative sleep, contributed to her difficulties with self-healing, as well as decreased work and home productivity. Methods targeting the restoration of dermal and fascial tone, along with the liberation of underlying neurological structures, resulted in an elevation of her daily pain threshold, enabling her to attain rejuvenating and restorative sleep. She noticed that with improved sleep, she was more active, and the intensity and duration of pain also improved. This improved pain perception has also been described in a meta-analysis by Afolale et al.9 Similarly, she perceived an enhanced effectiveness and prolonged duration of her opioid and neuropathic pain medications, thereby extending the interval before requiring the subsequent dose.

Radiation for HNC has been associated with a number of quality-of-life decreasing side effects including dental caries, fibrosis and Radiation Induced Peripheral Neuropathy or RIPN.<sup>6,10</sup> The pathophysiology of RIPN involves radiation induced fibrosis resulting in "chronic inflammation" and eventually retractile fibrosis.<sup>10</sup> Our patient presented with fibrotic tissue texture changes in the cervical region as well as the left mandibular and maxillary regions. Clinically, RIPN can also cause symptoms related to the involved nerve distribution. Our patient underwent surgical intervention and subsequent radiation around the facial nerve (CN VII) making it a likely area for RIPN to occur and indeed there were initially fibrotic changes in the more superficial tissue layers that impinged the surrounding nerves. Using a neurologic perspective, myofascial release and soft tissue provided improved resting potential of the fascia and more superficial layers. This allowed improved mobility in those layers that were previously pasted down to the deeper muscle layers. As fascia also encases muscle fibers, interaction and homeostasis within the fascial layers improved the palpable resting tone of the associated muscles in the head, face, and neck regions. Inhibitory techniques to the pterygoid plexus further decreased noxious neural input to the brain and improved resting muscle tone for the muscles of mastication, improving jaw mobility, and reducing discomfort.

Biomechanic-structurally, surgery to the left salivary gland in addition to radiation over the region inhibited saliva production on her left side. As a result of overall decreased oral secretions, this patient continues to struggle with dry mouth and the sequalae it causes. In addition to using mouth rinses, she will occasionally chew gum which causes her TMD pain to flare. Education regarding chewing gum's role in TMD were necessary and other adaptations to help with lower saliva production were discussed. She has also adapted to difficulty being able to swallow as a result of decreased saliva production by eating softer meals, consuming more protein dense shakes, and having fluids available at all meals to help soften food making it easier to swallow.

Head and neck cancer is considered the most psychologically distressing of all cancers due to the location and the general prognosis of disease.<sup>7</sup> Patients that do survive are then faced with a lifetime of side effects from treatments that result in a decreased quality of life, depression, and suicide.<sup>6</sup> For this reason, a shift in focus beyond survivorship has become increasingly important. When this patient presented to the clinic, the initial goal was to not only improve her range of motion, specifically in the head and neck, but also to improve her pain so as to improve the behavioral-biopsychosocial aspects of her life. In our case, the patient experienced severe post-radiation fibrosis of the left side of her neck and head resulting in her inability to turn or side bend her head in any meaningful way. She was also suffering with pain throughout the left mandibular trigeminal nerve and was experiencing physiological distress as a result of her symptoms. Through multiple sessions of OMT, she slowly started to see improvement in her range of motion and she no longer felt the sharp pain with movement because the dermal, subcutaneous, and fascial layers were more mobile. This improved her ability to eat, carry a conversation, and drive without significant pain which ultimately helped her to feel more like herself prior to her cancer diagnosis and enjoy social interactions. Psychological distress in HNC survivors can prevent full rehabilitation and may result in failure to regain maximum function.<sup>11</sup> For this reason, addressing the mental health component along with the physical symptoms was vital for this patient's recovery. OMT offered an effective approach to managing both her pain and fibrotic symptoms, in a noninvasive and sustainable manner. Moreover, given her improved tolerance for deeper palpation during subsequent treatments, she was instructed in a personalized home exercise regimen. Exercises were adapted from MET techniques used in the office that the patient responded well to. This allowed her the ability to be a partner in her healing and gave her control of her health outcomes. This was empowering to the patient and also contributed to an improvement in her emotional state.

Numerous studies have shown a relationship between pain and fatigue in individuals with persistent pain.<sup>13</sup> At the time of this patient's first OMT encounter, she had persistent pain for greater than 6 months. According to the World Health Organization, treatment for pain resulting from surgery or from surgically related damage is generally focused around physical therapy, cognitive behavior therapy (CBT), and analgesics. The choice of analgesia in this case is dependent on the severity of pain experienced by the patient. As pain becomes more severe, treatment options may escalate from NSAIDs, non-opioids to opioids and dual action opioid compounds as recommended by the WHO.<sup>1</sup> Our patient was initially on a combination of oxycodone 20mg every 6 hours and Lyrica 150mg daily which she stated reduced her pain but not to a manageable level. She consistently noted increased fatigue and decrease energy to participate in previously enjoyed hobbies. Following the completion of her treatment, the introduction of Botox injections to the left masticatory muscles, alongside ongoing osteopathic manipulative treatment (OMT), has markedly ameliorated her temporomandibular disorder (TMD) pain. This has facilitated her current efforts to taper off opioid medications and reduce her daily Lyrica dosage. From a metabolic-energetic perspective, her energy had returned and she was able to successfully make it through her work day and have energy to participate in her hobbies again.

As mentioned previously, this patient had significant superficial fibrosis on initial evaluation which was compressing on underlying structures including muscles and surrounding vasculature. From a cardiovascular-respiratory

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viewpoint, OMT played a significant role improving the overall tone of these superficial structures thereby resolving pressure placed on vascular structures and surrounding muscles in the cervical region. As tone normalized so did the restricted blood flow to those regions. Likewise, freer movement of the accessory respiratory muscles in the cervical region following OMT improved this patient's work of breathing.

# Conclusion

Head and neck cancer survivorship continues to grow as more patients have access to treatments and as treatment modalities improve. As a result of the increase in this population, there are more patients suffering from side effects of their treatments resulting in decreased quality of life. Generally, as patient care has become more individualized, the pain management modalities have also become more patient specific.1 There is greater acceptance that individuals may benefit from additional or alternative therapies for their symptoms. Non-traditional pain management options including analgesic nerve blocks, yoga, meditation, acupuncture, and chiropractic research is being conducted to determine if these modalities are beneficial.<sup>1</sup> As more research continues to be done regarding the treatment of these effects, OMT should not be discounted as a possible treatment modality for pain management and mobility for patients in the post radiation and surgical resection stage of treatment. Additionally, the osteopathic understanding that the body, mind, and spirit are interrelated and engaging in all of those areas with treatment, makes the osteopathic physician well suited to provide lasting benefit to this group of individuals.

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