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is characterized by painful dystonic spasms of the cervical muscles and can be caused by neck dissection, radiation, or both (LOE = 0); b) should refer HNC survivors for comprehensive neuromusculoskeletal management if cervical dystonia or neuropathy is found; this may include referral to a rehabilitation specialist (LOE = 0); and c) should prescribe nerve-stabilizing agents, such as pregabalin, gabapentin, or refer to a specialist for botulinum toxin type A (BTX-A) injections into the affected muscles for pain management and spasm control as indicated (LOE = 0, IIA). Painful dystonic spasms of the cervical muscles may be present in some HNC survivors. The sternocleidomastoid (if preserved), scalene, and trapezius muscles are most often involved. This painful condition is best termed cervical dystonia, but it differs clinically and pathophysiologically from the cervical dystonia that results from central nervous system disorders and degenerative conditions, in that the dystonic activity after HNC treatment is often progressive, which is in contrast to idiopathic and other central nervous system-mediated cervical dystonias and thus may be amenable to treatment options aimed at stretching and strengthening muscles and stabilizing neuromuscular units through targeted physical modalities. There are no standardized diagnostic criteria for post-HNC acquired cervical dystonia, but symptoms typically involve more than one of the following: rotation of the neck, elevation of a shoulder, repetitive flexion of the neck, pain that is worse with stress, and relief of symptoms through sensory "tricks," such as touching the chin. Cervical dystonia in HNC patients can result from neck dissection that disrupts the cervical anatomy and damages the cervical plexus and nerve roots. Subsequent uncontrolled ectopic activity in these neural structures causes painful spasms in the muscles they innervate. The condition may worsen as scarring progresses. Radiation to the neck can cause progressive fibrosis of the nerve roots and plexus as well as any peripheral nerves and muscles in the radiation field, with adverse effects on these structures that further exacerbate propensity for painful spasm. The effect of spasm and progressive radiation fibrosis can lead to severe neck contracture. Radiation fibrosis syndrome is the clinical manifestation of progressive tissue fibrosis that results from radiation.³⁸ Radiation treatment techniques can impact the risk of side effects. A prospective, randomized study comparing the outcomes and toxicities of intensity-modulated RT (IMRT) versus conventional 2-dimensional RT for the treatment of nasopharyngeal carcinoma reported the percentage of patients with neck fibrosis as 2.3% after IMRT and 11.3% after conventional 2-dimensional RT.³⁹ The mean follow-up was 42 months (range, 1–83 months). Another study evaluating late toxicity after conventional radiation in nasopharyngeal carcinoma found that 169 of 771 patients (22%) had neck fibrosis.⁴⁰ No definitive diagnostic criteria are available for the diagnosis of neck fibrosis, making it difficult to accurately ascertain incidence rates. The primary treatment modality for acquired cervical dystonia requires a comprehensive musculoskeletal approach emphasizing neuromuscular reeducation, proprioceptive retraining, myofascial release, lymphedema management, and restoration of ROM. As such, treatment often must involve a multidisciplinary team, which may include physiatry, physical therapy, occupational therapy, and speech-language pathology. Nerve-stabilizing agents, such as pregabalin, gabapentin,⁴¹ and duloxetine, may be added to control neuropathic pain and spasm. Opioids may be necessary for acute flares of pain in severe cases.^{38, 42} Botulinum toxin has both analgesic and muscle-relaxing properties.⁴³ While several formulations of botulinum toxin are approved by the US Food and Drug Administration for the treatment of cervical dystonia, there are few data on the use of botulinum toxin to treat radiation-induced cervical dystonia or cervical dystonia associated with neck dissection. BTX-A has demonstrated efficacy in treating radiation-induced cervical dystonia in HNC patients in a small retrospective study.⁴⁴ A smaller retrospective review demonstrated improvement of cervical disability scores in six HNC patients who were injected with BTX-A into the sternocleidomastoid muscle and three patients who were injected into the pectoralis major pedicle flap.⁴⁵ Another small study demonstrated the efficacy of BTX-A infiltration in alleviating muscle spasms in pectoralis major flaps after reconstruction of HNC patients.⁴⁶ BTX-A may also be useful in alleviating the neuropathic pain associated with neck dissection in HNC patients.⁴⁷ It is recommended that primary care clinicians: a) should conduct baseline assessment of HNC survivor shoulder function posttreatment to assess for strength, ROM, and impingement signs and continue to assess as follow-up for ongoing complications or worsening condition (LOE = IIA); and b) should refer HNC survivors to a rehabilitation specialist for improvement to pain, disability, and ROM where shoulder morbidity exists (LOE = IA). Shoulder pain and dysfunction are present in as many as 70% of patients after neck dissection.⁴⁸ While there are many contributing factors to shoulder pain and dysfunction, the primary cause is likely damage to the SAN from neck dissection. Perturbation of shoulder motion from weakness of the trapezius and other denervated shoulder girdle muscles can lead to rotator cuff tendonitis, adhesive capsulitis, myofascial pain, and more.⁴⁹ RT can also damage the SAN and other neuromuscular structures. The clinical manifestations of radiation fibrosis syndrome may take months or years to develop.³⁸ Primary care clinicians should assess shoulder function by a directed history and physical examination after HNC treatment and continue to assess patients for emerging pain or functional impairment. HNC survivors with shoulder pain and dysfunction should be referred to a rehabilitation specialist familiar with this complex patient population. Progressive resistance training (PRT) for HNC patients with SAN neuropraxia/neurectomy-related shoulder dysfunction seemed to be better than standard physical therapy in a small RCT in terms of improving active shoulder external rotation, shoulder pain, and overall scores for shoulder pain and disability.⁵⁰ HNC survivors with SAN damage and shoulder dysfunction who underwent a PRT program had significantly reduced shoulder pain and disability as well as improved upper extremity muscular strength and endurance compared with those who underwent a standardized therapeutic exercise protocol.⁵¹ A Cochrane review concluded that there was limited evidence that PRT is more effective than standard physical therapy for shoulder dysfunction in patients treated for HNC in terms of improving pain, disability, and ROM at the shoulder joint, but there was not sufficient evidence to conclude that quality of life (QoL) is improved.⁵⁰⁻⁵³ In addition to strengthening programs, restrictions like adhesive capsulitis may need to be addressed with further medical intervention. Although there are no specific recommendations for shoulder dysfunction in the HNC population, recommendations for shoulder dysfunction from the general population may include an intraarticular corticosteroid injection for pain modulation, capsular distension under ultrasound or fluoroscopic guidance, or 3-quadrant ultrasound to deep heat collagen structures.^{54, 55} For patients who completed HNC treatment relatively recently, sonographic heating of the shoulder should only be done with medical supervision because of the theoretical chance of tumor spread due to increased blood flow brought on by heating. For impairments like myofascial pain, trigger-point injections may be beneficial in reducing focal dystonia and pain.⁵⁶ It is recommended that primary care clinicians: a) should refer HNC survivors to rehabilitation specialists and dental professionals to prevent trismus and to treat trismus as soon as it is diagnosed (LOE = 0); and b) should prescribe nerve-stabilizing agents to combat pain and spasms, which may also ease physical therapy and stretching devices (LOE = IIA). Trismus is defined as the inability to fully open the mouth. Quantitatively, a ≤35 mm maximum interincisal distance (MID) cutoff point for defining trismus has a sensitivity of 0.71 and a specificity of 0.98.⁵⁷ Other studies have validated the ≤35 mm cutoff point for defining trismus.⁵⁸ The 3-finger test is a quick clinical surrogate (where trismus is suspected in any patient who cannot place 3 vertically stacked fingers between the incisors). Trismus is a common complication of the treatment of HNC especially in patients with oral and oropharyngeal cancers and has a deleterious impact on QoL in this population.⁵⁹ Patients with trismus may have difficulty with eating, speaking, maintaining oral hygiene, being examined for cancer recurrence, engaging in oral intimacy, and a variety of other important aspects of daily life. One study found the incidence of trismus for multiple types of HNC was 9% pretreatment and 28% 1-year posttreatment when defined as ≤35 mm.⁶⁰ The highest prevalence of trismus (38%) was observed 6 months after treatment. Patients with tonsillar tumors were most likely to develop trismus.⁶⁰ Another study demonstrated that about half of patients who underwent primary treatment for oral or oropharyngeal cancer developed trismus (MID

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