

REVIEW ARTICLE

Medicine Science 2019;8(3):766-9

Recognizing trismus symptoms, prevention and treatment**Bijal Amin , Sathees B Chandra***Barry University, Biomedical Sciences Program, 11300 NE Second Ave Miami, USA*

Received 26 January 2019; Accepted 04 April 2019

Available online 30.05.2019 with doi:10.5455/medscience.2019.08.9037

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Trismus is a painful condition that can occur due to several causes such as: wisdom tooth removal, dental work, surgery in or around your mouth, and radiation therapy in head and neck cancer patients. It is a common topic of interest due to its vast causes and prevalence in the dental and medical community. Inflammation and contraction of the mastication muscles causes limited painful opening of the mouth and possible radiating pain to the ears and head. This condition can last from weeks to months. To date there is no set of curative treatment, however, there is ongoing research into prevention and treatment options, which can greatly vary according to the initial cause(s) of trismus in patients. The purpose of this paper serves to bring awareness to the medical and dental communities, individuals with trismus, and family members of those who suffer from this condition in the hopes that individuals can take the appropriate measures necessary to prepare and deal with this condition.

Keywords: Trismus, restricted mouth opening, HRQL, radiation-therapy induced trismus

Introduction

The condition where muscles involved in mastication (masseter, lateral pterygoid, medial pterygoid, and temporal muscles) are inflamed or contracted causing Restricted Mouth Opening (RMO) is known as Trismus [1]. The mastication muscles make up one of the major muscle groups in the head, besides those controlling facial expression. Together, these muscles allow for movement of the jaw and if impaired, can drastically affect an individual's health-related quality of life (HRQL) [3]. HRQL is defined by the World Health Organization (WHO) as an "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHO 1997). The HRQL is assessed from the point of view of the patient living with trismus. The assessment includes their physical, mental, emotional, and social standards. HRQL focuses on the impact a change in health condition causes to the quality of life in individuals [4]. In trismus patients it includes but is not limited to difficulty in communication, mastication, and oral hygiene upkeep all resulting in a deficient HRQL [2-4].

Trismus is often referred to as lockjaw and can be mistaken for Tetanus solely based on symptoms the patients experience. Common symptoms of both include: stiffness of muscles surrounding mandible, fever-like symptoms, and difficulty with swallowing and breathing. However, trismus and tetanus are very different conditions. The key difference being that tetanus is caused solely by the bacterium, *Clostridium Tetani*, affecting not only your neck region but also all areas of your body. On the contrary, trismus is induced from other primary causes such as infection, oral surgery including wisdom tooth removal, trauma, Temporomandibular Joint Disorder (TMJD), and radiation therapy to the head and neck regions; directly only impacting your oral cavity [6]. From these risk factors the majority of cases are due to radiation therapy from head and neck (H&N) cancer patients. The Oral Cancer Foundation states that 10 to 40 percent of those with H&N cancer receiving radiation will develop trismus [7]. Trismus induced via radiation therapy in these patients is more likely to develop when the following factors are present together or alone: involvement of masticatory muscles, increased tumor size, and high radiation dosage [4,5]. Patients who develop trismus post-radiation therapy usually develop this condition 3-6 months following treatment received but can arise unexpectedly as well. "Post-treatment trismus is unpredictable in both its frequency and severity" [1].

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This article serves to provide a systemic review of trismus and its leading causes along with symptoms, HRQL of patients, prevention

and treatment options. The HRQL serves as one of the most critical aspects of patients with trismus; their quality of life is severely altered and depending on the severity of their disease can range in how immensely their quality of life is impacted. Prevention is also another important criterion that many should be aware of prior to undergoing any dental work or surgery treatment for existing issues. The purpose of this paper serves to bring awareness to the medical and dental communities, individuals with trismus, and family members of those who suffer. From spreading awareness of the signs and symptoms, causes, and preventions, individuals can take the appropriate measures necessary to prepare and deal with this condition.

Signs& Symptoms of Trismus

Trismus is an extremely painful and life-altering condition. Symptoms experienced include popping and grating of the jaw joints, fever, contraction of jaw muscles, limited movement of the jaw, and radiating pain to the head and neck regions. The main symptom dealt with is restricted mouth opening (RMO) [1,8,3,9]. This includes limited jaw movement and increased jaw pain and spasms in the muscles of mastication. Patients may also suffer from headaches, earaches, and fevers if an infection is present [8]. Trismus can cause many secondary issues leading to a subpar quality of life in patients. Some of the secondary symptoms include difficulty in mastication, swallowing, breathing, and speech impairment [8,3].

The limitation in jaw movement causes eating difficulties, which can result in severe malnourishment and weight loss in some patients. It is difficult to consume nutritious and healthy food when one is unable to open their mouth fully, preventing chewing [9,10]. The type and amount of food that is consumed daily may be restricted or limited causing a drastic change in the individuals' diet. Another difficulty with food can be expected with swallowing, if there is restricted movement of the jaw it does not provide enough room for mastication, or for the tongue to help with swallowing [7,8]. This can present the patient with complications of aspiration while trying to consume food. Speech difficulties are also common clinical symptoms; with limited jaw movement it is challenging and painful to form proper words and sentences often leading to slurring and discomfort [10]. Lastly a common side effect of trismus includes poor oral hygiene. Often times it is difficult to brush your teeth, rinse your mouth, and floss because of the limitation in opening. Cancer patients who have received RT are of particular importance with oral hygiene concerns. They have a higher risk of developing oral complications such as xerostomia (dry mouth), pain in the temporomandibular joint, and mucositis [9,12-14].

Trismus is a complex condition because it can present as either temporary or permanent. The best way to familiarize oneself with trismus is by acknowledging the signs and symptoms, and not ignoring any discomfort from existing primary causes. Regardless of the duration of the condition all symptoms and complications pose as difficulties that affect the quality of life in an individual. Short and long-term effects of this disease can take a toll on an individuals' physical and mental health.

Trismus and long -term effects on patients' health –related quality of life

As discussed, HRQL is defined as an individuals' personal

experience of living with a health condition and the long-term affect it has on their physical and mental health [15,16,4]. A patients' HRQL can be measured using different variables and questionnaires. In one specific study conducted in Sweden a questionnaire was used to measure the HRQL in patients post trismus, either induced via cancer or temporomandibular joint dysfunction. The 3 categories in the questionnaire included: muscular tension, jaw related problems, and eating limitations. The results concluded that all patients with trismus regardless of how it was acquired, reported significantly higher discomfort with the 3 categories mentioned above [17]. Trismus overall affects a persons' health in terms of difficulty with mastication, swallowing, breathing, speech, and other criteria. Patients complained that the health-related impairments weren't the only downfall in assessing their HRQL [10,12,16].

With the complications of trismus come other factors in terms of social, economic and family disparities that patients experienced. Patients experienced difficulty in working and family life. The amount of pain suffered was another factor that affected their mental health. Depression, anxiety and insomnia are often associated with pain and can affect an individual's social, work and family life [5,15,17] The quality of life in each individual with trismus will greatly vary, however it is important to become aware of the many causes as well as the most common ones. The leading cause of Trismus is from radiation post-surgery in head and neck cancer patients.

Trismus induced by radiation from head and neck cancer patients

Cancers of the head and neck can affect many areas such as the neck, mouth, throat, nose, sinuses, lymph nodes in the upper extremities, and salivary glands [17,18]. "Squamous cell carcinoma (SCC) of the head and neck accounts for greater than 90% of all upper aerodigestive tract malignancies [14,18]" [20]. Radiotherapy is a significant treatment protocol to manage head and neck cancer; a high-rate complication from radiotherapy is trismus leading to restricted mouth opening [20,21].

In one specific study 40 patients who received radiotherapy (RT) to the muscles involved in mastication and/or ligaments of the temporomandibular joint (TMJ) between February of 2005 and December of 2006 were observed for post-RT induced trismus. The study concluded, "Trismus was identified in 45% of subjects who had received curative doses of RT" [21]. In cancer patients, trismus can be a result of nerve damage, scar tissue formation post RT, or both. The most frequent cause of trismus is observed in RT patients, occurring from radiation-induced fibrosis [5, 22]. Fibrosis is defined as the development of connective tissue from an injury or surgery leading to scarring. The process requires the differentiation of fibroblasts into myofibroblasts that is stimulated via inflammation from radiation injury [23]. Myofibroblasts secrete excess collagen and extracellular matrix elements; due to a decrease in the remodeling enzyme the secreted elements aggregate causing the formation of scarring [15,24]. Subsequent fibrosis formation, specifically in head and neck cancer patients, causes significant quality of life impairment due to the reduction of tissue compliance [22,24] Although radiation induced trismus is the leading cause for this condition it is not the sole cause. There are many other causes and it is important to be aware them all.

Trismus affects the long-term quality of life in many individuals; it is best to learn prevention techniques prior to any surgery affecting the mastication muscles and nerves.

Possible control and prevention of trismus pre and post-radiation treatment

Trismus is not only a painful condition but also affects an individual's short and long-term quality of life. It is crucial to take measures both pre and post-surgery to avoid acquiring this condition and prevent the severity and frequency of it [25]. Trismus prevention is assessed on a case-by-case basis, however, prior to symptoms one should take physical measures at home such as exercising and massaging the jaw, maintaining proper oral hygiene, and practicing good posture to help with prevention. Another prevention technique may be prevalent for RT patients by reducing the radiation dosage if approved by your physician [26]. On the contrary there are still many exercises one can incorporate into their daily routine at home to help.

Prevention exercises involve massaging masseter muscles from the outside 2-3 times a day for 30 seconds. It is also advised to keep your jaw relaxed and is important to avoid stressful situations where jaw clenching is natural. Exercises in movement of your jaw, including moving your mouth up and down and side-to-side to help stretch the jaw muscles avoiding restricted mouth movement. In addition, passive stretching exercise, which involves stretching your mouth with your forefinger and thumb, can help control and extend mouth-opening limitations that may be present during trismus [27]. This exercise is done by placing your thumb on the maxillary portion of your mouth and the index finger on the mandible then slowly push both parts of your mouth in opposite directions allowing for distention. It is important that while performing this exercise not to resist or bite down but rather let your fingers do the work of pushing apart your maxilla and mandible. Maintaining good posture is another key in prevention of trismus. Simple exercises can help with posture such as neck stretches in the forward, backward, left and right positions, holding stretches for 30 seconds and performing them twice a day can help with the delay of the onset of trismus [28]. In addition, chin tucks and shoulder blade pinches will also help with improvement of posture. Lastly, maintaining proper oral hygiene such as brushing after every meal, flossing, and removing dentures and cleaning them if applicable is also a criterion for prevention of trismus [29].

Because the onset of trismus cannot be predicted it is important to maintain prevention techniques prior to any dental surgery or RT session for head and neck cancer that may affect and involve the masticatory muscles [8,30]. All prevention techniques mentioned above should be consulted with a physician and if extreme pain does occur while performing exercises one must immediately contact a health professional. The prevention techniques mentioned above may also be used during treatment protocol.

Recent advancements and treatment options of trismus

Treatment and management of trismus varies just like the prevention depending on the severity and frequency of trismus and on a case-by-case basis contingent on the underlying cause. The various treatment options include physical therapy, medication, jaw-stretching devices, dietary changes and if severe, surgery is also an option [31-33]. Mild pain post-surgery is normal but if persistent one should immediately contact their physician and

will be prescribed treatment in the form of: muscle relaxants, heat therapy, analgesics, and a soft diet if aspiration and mastication poses as a threat to the patients' overall well-being [6,35].

Muscle relaxants can help relax the contracted mastication muscles if the pain is more severe and unbearable, although this is not a permanent fix it does temporarily help relieve pain and discomfort. In addition, heat therapy is another form of treatment that is widely used, it is comprised of placing a hot towel to the area causing discomfort for 15-20 minutes every hour [6,36]. Analgesics such as diazepam or benzodiazepine can be administered for more severe cases of pain. The initial phase of tightness and pain in the jaw post RT or surgery is referred to as the acute phase [6,33]. Once this phase is over the patient must immediately start physical therapy to extend the motion and movement of the jaw this may include using devices such as TheraBite to aid in slowly allowing for stretching and relaxation of the mastication muscles [33,35,36].

Trismus is a condition caused by a variety of primary issues and treating each case is different so all treatment will not be the same nor will all physicians recommend the same approach [10,14]. In one case an 18-year old man was in a fight causing him to suffer damage to the masseter muscles from trauma. After 1 month he was unable to move his jaw due to severe trismus. The physicians first approached conservative measures such as massaging of the jaw, analgesics such as steroids to reduce inflammation, and exercise of the mandible with and without jaw extension tools. Unfortunately, in this specific case the jaw-opening tool would not fit into the patients mouth and daily physical therapy did not improve the severity of trismus. As a last resort the physicians used a surgical approach to remove the fibrous tissue from the patients' mouth [37]. This is just one example of how each case of trismus requires a different approach depending on how it was obtained and the severity of the condition.

Conclusion

Trismus is overall a condition that cannot be controlled; the frequency, duration, and severity are all factors that are unpredictable. There are many aspects that can play a role in trismus and the best route to tackle it is through prevention. If oral surgery, RT for head and neck cancer, or infections near the masticatory muscles are conducted, then post and pre-surgery exercises are ideal even without existing symptoms of trismus present. Trismus can be short-term or long-term and can drastically affect the quality of life of patients who have to live with the pain and discomfort on a daily basis. The exact cause of the onset of trismus is unknown and while studies are being conducted, it is best to acknowledge this condition and be familiar with measures that can be taken to prevent any level of severity.

Competing interests

The author confirms that this article content has no conflict of interest.

Financial Disclosure

All authors declare no financial support.

Ethical approval

As it is a compilation study, we do not have an ethics committee approval.

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