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Surgical Management of Orofacial Pain Disorders: A Review

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Abstract: ***Orofacial pain disorders encompass a wide spectrum of conditions that can significantly impact an individual's quality of life. While non-surgical approaches are often the first line of treatment, there are instances where surgical interventions become necessary for effective pain management. Chronic orofacial pain presents a significant diagnostic and therapeutic challenge across various conditions. It is widely acknowledged that surgical interventions should be considered as a last resort, after exhausting less invasive treatment options, for addressing these chronic pain issues. This comprehensive review article aims to provide an in-depth analysis of various surgical techniques employed in the management of orofacial pain disorders.***
Keywords: Orofacial pain, surgical management, temporomandibular joint, trigeminal neuralgia, myofascial pain syndrome.

I. INTRODUCTION

Pain, as defined by the International Association for the Study of Pain (IASP), is a distressing sensory and emotional experience linked to actual or potential tissue damage. This definition underscores the intricate nature of pain perception.[1] Orofacial pain disorders encompass a broad spectrum of conditions that afflict individuals with persistent and often debilitating pain in the oral and facial regions. These conditions can range from temporomandibular joint disorders and trigeminal neuralgia to myofascial pain syndrome and glossopharyngeal neuralgia, among others. Temporomandibular Disorders (TMD) are the most common chronic orofacial pain conditions, characterized by musculoskeletal pain and dysfunction in the temporomandibular joint (TMJ) and/or masticatory muscles. Treatment typically begins with conservative approaches, but in some cases, chronic and persistent pain may require further intervention.[2] The management of orofacial pain is complex, and in many instances, non-surgical interventions are the initial approach. However, there are situations where surgical treatments become a crucial part of the pain management strategy. Surgical procedures are typically considered when conservative treatments have proven ineffective in providing relief and improving the patient's quality of life. Surgical intervention is typically considered when conservative or non-surgical treatments have proven ineffective in providing adequate pain relief and improving the patient's quality of life. Many orofacial pain conditions, especially chronic ones, may not respond well to medications, physical therapy, or other non-invasive therapies alone.[3] This comprehensive review article delves into the various surgical techniques utilized in the management of orofacial pain disorders. It aims to shed light on the indications, surgical procedures, outcomes, and potential complications associated with each surgical approach. Furthermore, it underscores the importance of adopting a multidisciplinary approach when evaluating and treating these challenging conditions, as collaboration among dental professionals, oral surgeons, neurologists, and physical therapists is often essential for optimal patient care.

II. TEMPOROMANDIBULAR JOINT

Temporomandibular Joint (TMJ) Surgery is a category of surgical procedures aimed at addressing issues related to the temporomandibular joint, which can lead to temporomandibular disorders (TMDs).[4] Arthrocentesis is a minimally invasive surgical procedure used to treat various temporomandibular joint disorders (TMDs), particularly when conservative treatments have proven ineffective. This procedure involves flushing the upper joint space of the TMJ with an irrigating solution to alleviate pain and improve joint function. Arthrocentesis reduces pain by removing inflammatory cells and mediators from the joint space and increases mandibular mobility by eliminating intra-articular adhesions and negative pressure within the joint.[5] It helps recover disc and fossa space, reducing mechanical obstructions caused by disc displacement and osteophytes. TMJ arthrocentesis can be performed under local anesthesia, intravenous conscious sedation, or general anesthesia.The classical technique involves the insertion of two needles into the upper joint compartment, one for injecting the irrigating solution and the other for aspirating it. The single-needle technique uses a single needle for both injection and ejection of the irrigating solution. The procedure involves injecting a saline solution (e.g., Ringer's lactate) into the superior joint space to distend it and break adhesions, followed by aspiration.

Post-procedure, patients are typically placed on a soft diet, and range of motion exercises is initiated. Analgesics may be prescribed as needed. Various modifications to the arthrocentesis technique have been developed over time, such as using double needles in a single cannula, Shepard's single cannula, automatic irrigation under high pressure, and concentric needles units. Complications associated with arthrocentesis may include injury to the facial nerve, fifth nerve deficit, otic injury, edema due to fluid leakage, needle breakage, acute joint inflammation, and more. Contraindications include inflammatory foci, bacteremia, adjacent osteomyelitis, coagulopathy, and malignant tumors. The success rate of arthrocentesis varies, with some studies reporting success rates ranging from 70% to 95%. Prognosis may be influenced by factors such as age, duration of symptoms, oral habits (e.g., bruxism), and the presence of associated conditions like clenching.[6] Arthroscopy to remove excess joint tissue and realign the jaw.[7] Open joint surgery involves making a larger incision to access the TMJ directly.[8] This approach allows for more extensive joint manipulation and correction. Total joint replacement, also known as TMJ prosthetic replacement, involves replacing part or all of the TMJ with an artificial joint made of biocompatible materials. Total joint replacement aims to restore joint function and alleviate pain in cases where other interventions have been ineffective.[9] Computer Aided Design (CAD) and Computer Aided Engineering (CAE) techniques are presently being used to design and manufacture patient-fitted TMJR devices. The surgery time is significantly reduced with the patient fitted devices as there is no shimming of bone and/or cementation is needed.[10,11]

III. TRIGEMINAL NEURALGIA

Trigeminal neuralgia is one of the most common orofacial neuralgias. It primarily affects the trigeminal nerve, which is responsible for facial sensation. TN is characterized by recurrent, sudden, and severe electric-shock-like or stabbing pain on one side of the face. Pain often occurs in brief, intense bursts triggered by activities like eating, talking, or even light touch. The pain is typically localized to one side of the face, often in the region of the cheek, jaw, or eye. Trigeminal neuralgia is a severe facial pain disorder that can be challenging to manage. While medication is often the first-line treatment, surgical interventions may be considered when medications are ineffective or cause intolerable side effects. Microvascular Decompression (MVD) is a surgical technique employed to alleviate symptoms such as pain and muscle twitching, which arise due to the compression of a nerve by either an artery or a vein. Among the available treatments for trigeminal neuralgia, MVD stands out for its ability to provide prolonged relief from pain and its relatively low incidence of permanent facial numbness following surgery. The primary objective of Microvascular Decompression is to mitigate the discomfort stemming from the continuous pressure exerted by a pulsating blood vessel on the trigeminal nerve. This pressure results in the transmission of painful impulses originating from the face. The procedure is conducted with the patient under general anesthesia. It involves the shaving of hair from the area behind the ear and the removal of a small section of the skull. Subsequently, the surgeon identifies the trigeminal nerve and inserts Teflon pieces to create a barrier between the nerve and the troublesome blood vessel(s). To conclude the procedure, a thin metal mesh is employed to cover the area where the bone was removed.[12] Radiofrequency Ablation (RFA) is a minimally invasive procedure used to treat trigeminal neuralgia by targeting the nerve fibers responsible for transmitting pain signals. During RFA, a thin needle is inserted through the skin and guided to the trigeminal nerve using imaging techniques.

Radiofrequency energy is then applied to create a lesion on the nerve, which disrupts its ability to transmit pain signals. RFA can provide effective pain relief, and the procedure is less invasive compared to MVD.[13] However, its effects may not be as long-lasting, and some patients may require repeat treatments over time. Stereotactic surgery employs precise radiation beams to intentionally harm nerve tissue, particularly the trigeminal nerve, in order to hinder or interrupt the transmission of pain signals within the brain. This technique is applied to address trigeminal neuralgia, a condition characterized by facial pain. Stereotactic radiosurgery directs focused radiation toward the trigeminal nerve root with the aim of disrupting the pain signals it carries.[14]

IV. MYOFASCIAL PAIN DYSFUNCTION (MPD)

Myofascial Pain Dysfunction (MPD) is a condition that affects both muscles and fascia. It is characterized by painful points known as trigger points, which can be single or multiple and are located within taut muscle bands. These trigger points can elicit referred pain patterns and are often associated with symptoms such as headaches and restricted mouth opening. MPD is prevalent among individuals aged 30 to 50 years, particularly in women. While the exact cause of MPD remains unknown, various factors like bruxism, head-neck trauma, psychological factors, anxiety, and depression have been suggested as potential triggers. Three primary interventions used for MPD treatment are Botulinum toxin-A injections, local anesthesia injections, and dry needling. Botulinum toxin-A, commonly known as Botox, is thought to break the pain cycle by blocking acetylcholine release, reducing muscle contraction for several months. Local anesthetics inhibit pain by interrupting neural conduction through sodium ion channel inhibition.

Dry needling involves inserting thin needles into affected areas, potentially influencing muscle activity and blood flow. Trigger Point Deactivation Surgery is a procedure designed to address the discomfort and pain associated with trigger points within affected muscles. This surgical intervention involves the targeted removal or release of nodules or tight muscle bands responsible for the pain.[15] By addressing these trigger points surgically, it aims to provide relief and improve the patient's overall well-being. On the other hand, Botulinum Toxin Injections, often referred to as Botox, are another approach to managing trigger points. In this procedure, Botulinum toxin is injected directly into the trigger points. Botox works by temporarily paralyzing or relaxing the muscles, which subsequently reduces pain and tension in the affected areas. Surgical Release of Muscle Trigger Points takes a surgical route to alleviate the tension caused by muscle trigger points. It involves making incisions to access and address the problematic muscle trigger points, aiming to relieve pain and enhance the patient's quality of life. These interventions cater to different aspects of trigger point management, offering patients options to suit their specific needs and conditions.[16]

V. GLOSSOPHARYNGEAL NEURALGIA

Glossopharyngeal neuralgia affects the glossopharyngeal nerve, which controls sensation in the throat, tonsils, and the back of the tongue. Patients with GN experience intense, stabbing pain at the back of the throat, tonsils, or base of the tongue, typically triggered by swallowing, talking, or coughing. Microvascular Decompression is aimed at relieving the pain associated with glossopharyngeal neuralgia by addressing the compression of the glossopharyngeal nerve by nearby blood vessels. This surgical method involves repositioning or insulating the nerve to alleviate pain. Glycerol Injection is a minimally invasive procedure involving the injection of glycerol into the glossopharyngeal nerve. This aims to disrupt the pain signals and provide relief from glossopharyngeal neuralgia.[17] Radiofrequency Ablation is a surgical technique using focused radiofrequency energy to create lesions on the glossopharyngeal nerve. This interrupts the transmission of pain signals, offering relief from neuralgia symptoms.

VI. NEUROPATHIC PAIN

Neuropathic pain is a type of chronic pain that results from damage or dysfunction of the nervous system. It can occur due to various conditions, such as nerve injuries, diabetes, multiple sclerosis, or even without an obvious underlying cause. Neuropathic pain is often described as a burning, tingling, shooting, or electric shock-like sensation. Painful response to a normally painful stimulus, called hyperalgesia. Peripheral Nerve Decompression is surgical approach to address neuropathic pain by relieving pressure or entrapment on peripheral nerves. This procedure involves releasing or decompressing the affected nerves to alleviate pain symptoms. Various techniques, such as spinal cord stimulation and peripheral nerve stimulation, are employed to modulate abnormal nerve activity. These methods use implanted devices to send electrical signals to the nerves, effectively reducing neuropathic pain. Spinal Cord Stimulation involves implanting a device near the spinal cord to deliver electrical impulses. This stimulation disrupts pain signals and can provide relief for individuals suffering from neuropathic pain conditions.[18]

VII. OTHER TECHNIQUES

Alveolar nerve decompression is a surgical procedure designed to alleviate symptoms associated with nerve compression in the oral region. This procedure involves relieving pressure or entrapment on the alveolar nerve, which can cause facial pain or sensory disturbances.[19] Tooth extraction may be considered as a treatment option for individuals experiencing atypical facial pain when dental issues or abnormalities are suspected to contribute to the pain.[20] Extracting a problematic tooth can sometimes provide relief from facial pain symptoms. Myectomy involves the removal or modification of specific muscle tissues to relieve pain or improve muscle function. Orthognathic surgery works to correct problems with the bite to relieve orofacial pain caused by misalignments. Orthognathic surgery involves repositioning the jaw or facial bones to correct structural abnormalities that may be contributing to orofacial pain.[21]

VIII. CONCLUSION

In conclusion, various surgical interventions and techniques are available to address different types of facial pain and related conditions. These procedures are often considered when conservative treatments have proven ineffective, and they aim to target the underlying causes of pain and discomfort. Ultimately, the choice of surgical intervention depends on the specific diagnosis, the patient's individual circumstances, and the recommendations of healthcare professionals. These surgical approaches aim to alleviate pain, improve function, and enhance the overall quality of life for individuals dealing with facial pain and related conditions. It is essential for patients to discuss their symptoms and treatment options with their healthcare providers to determine the most suitable approach for their unique situation.

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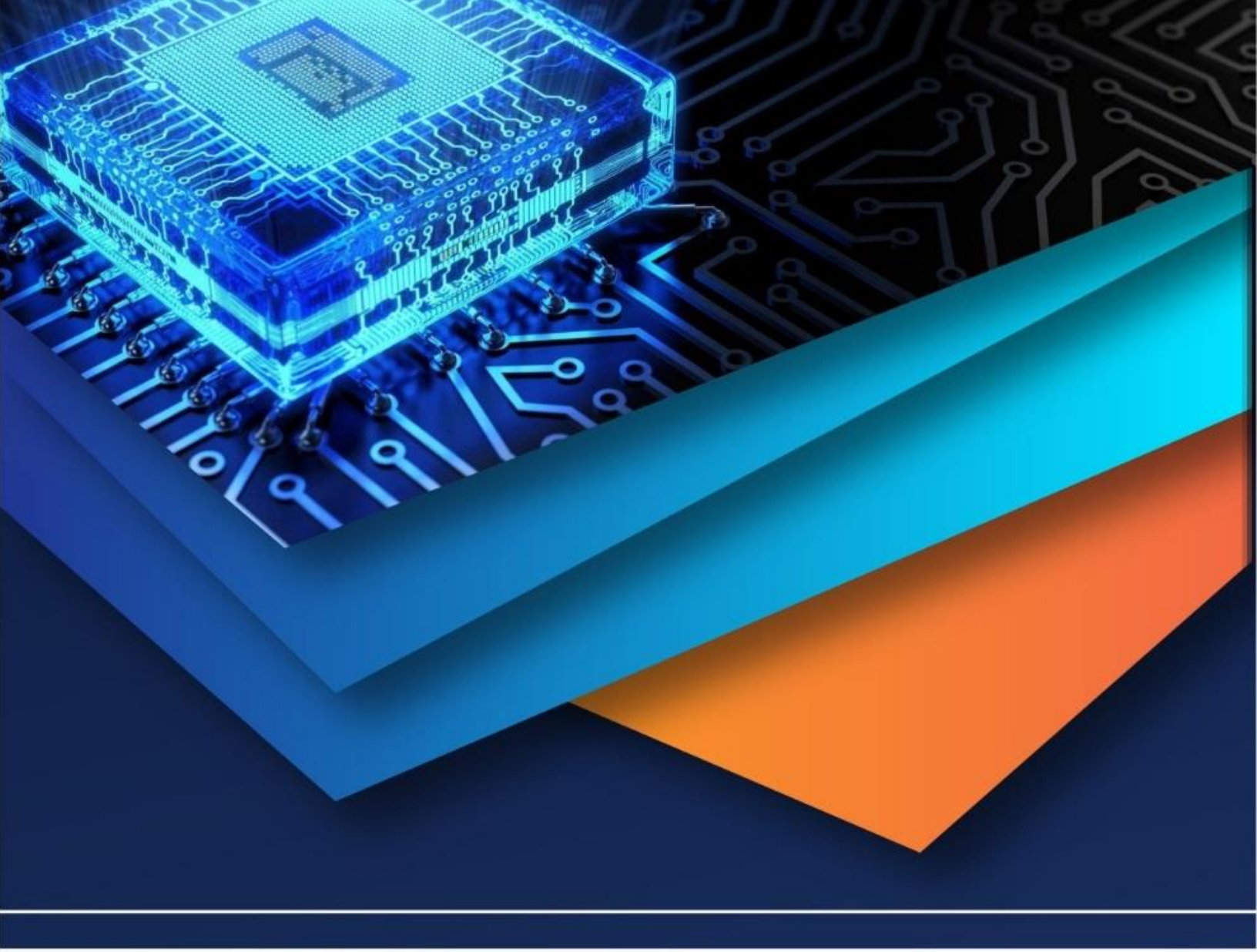

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