Orthodontic treatment for a patient with multiple sclerosis

Manal A Bakathir

Abstract:
Multiple sclerosis (MS) is a chronic, autoimmune inflammatory disorder of the central nervous system (CNS) that affects myelinated axons, destroying the myelin and damaging axons to varying degrees. The course of MS is highly varied and unpredictable. Metals used during orthodontic treatment can negatively affect imaging techniques used to diagnose and monitor the progression of MS, while medications used to treat MS can negatively affect orthodontic tooth movement. The present case report highlights some of the challenges encountered during orthodontic treatment of a patient with MS and how to overcome them. The patient was a 20-year-old woman with complaints of diastema and spacing in the upper arch. Although closing the spaces was challenging due to some of the MS medications, she was treated successfully, without complications, within 20 months using closing loops.

Keywords:
Diastema, multiple sclerosis, orthodontic treatment, spacing

Introduction

Multiple sclerosis (MS) is a chronic, inflammatory autoimmune neurological disease that affects the central nervous system (CNS). Its cause is unknown; however, several factors may play a role in its etiology. It affects myelinated axons in the CNS, destroying the myelin and damaging axons to varying degrees.[1] MS has been classified into different types: relapsing remitting; secondary progressive; primary progressive; and progressive relapsing. Fortunately, 85–90% of patients have the least aggressive type, relapsing-remitting MS (RRMS), which is characterized by relapses and remissions that can last months to years without the development of new symptoms. RRMS can progress to secondary-progressive MS within a 19-year period, with a steady increase in disability. However, 10–15% of cases are primary-progressive MS, involving a steady increase in disability and no remission.[2] The rarest type is progressive-relapsing MS, in which patients experience a constant increase in disability that includes exacerbations without any symptom-free remissions.[3]

In addition to fatigue, pain, speech, or swallowing issues, many systemic, visual, cognitive, and emotional symptoms arise.[3] MS may cause various symptoms that can negatively affect the patient’s ability to clean their teeth, or use intermaxillary elastics and removable appliances during orthodontic treatment.[4] These symptoms include muscle weakness, abnormal muscle spasms, difficulties with mobility, and coordination and balance issues.[4] Moreover, all MS symptoms can be exacerbated by increase in body temperature (Uhthoff’s phenomenon).

More than 400,000 individuals in the United States, and approximately 2.3 million globally have MS.[2,3] Although the Arabian Gulf region is situated in a low-risk zone for MS[6] and Saudi Arabia has low MS prevalence (25 per 100,000),[7] some studies have reported indications of increasing MS incidence in Saudi Arabia.[6]
Clinical diagnosis of MS must be supported by evidence from other tests, such as neurological examinations, magnetic resonance imaging (MRI), evoked potential tests, and, possibly, a spinal fluid test. MRI is an important diagnostic tool in MS, and is used to track disease progression over time and determine treatment effectiveness. Areas of damaged myelin and injured tissue (lesions) caused by MS can be visualized as white ovoid plaques on MRI.

Treatment of MS includes at least three types of therapy aimed at reducing the biological activity of the disease, treating the symptoms of specific clinical complaints, and repairing neural damage. MS diagnosis and treatment can be highly impacted by orthodontic treatment. Different metals used during orthodontic treatment can negatively affect MRI accuracy. Additionally, some medications used to treat MS, such as interferons and nonsteroidal antiinflammatory drugs (NSAIDs), can negatively affect orthodontic treatment by slowing tooth movement.

Prompted, in part, by the lack of studies regarding orthodontic treatment of patients with MS, the present article highlights some of the difficulties the orthodontist may encounter during the treatment of an MS patient and how to overcome them.

**Case Report**

**Dental and medical history**

The patient was a 20-year-old woman presenting at the orthodontic clinic with a Class III malocclusion on a Class III skeletal base. Her complaint was spacing in the upper arch and the presence of a 3-mm diastema. She had a single tooth in cross bite. This was complicated by a low frenum and multiple cavities.

The patient was diagnosed with RRMS 2 years before the orthodontic assessment. She experienced fatigue, pain, muscle weakness, tingling, shivering, some visual problems, and infrequent exacerbation of symptoms that lasted for 1 to 2 weeks. She was receiving betaferon injections three times weekly and taking NSAIDs daily, along with antiepileptic, antivertigo drugs, and cortisone.

**Treatment objectives and plan**

After consultation with her neurologist, the skeletal relations were accepted, and the objectives were to improve the patient’s oral hygiene and restore the carious teeth. The orthodontic treatment objectives were to close the diastema, achieve canine and molar Class I, correct the cross bite, and close the spaces. This was performed through orthodontic fixed appliance and Class III elastics in the following sequence: (1) Bonding of upper and lower teeth with preadjusted edgewise appliances; 0.022” × 0.028” slot [Damon prescription (Ormco Inc., West Collins, Orange, CA)] and Class III elastics; (2) Leveling and aligning; (3) Arch coordination and space closure; (4) Finishing and detailing; and (5) Upper and lower fixed 3-3 retainers, along with Hawley retainers to retain the achieved results.

**Treatment progress**

After 6 months of leveling and aligning, attempts were made to close the spaces over a 6-month period using a power chain with very slow progression. Closing loops were then applied on top of the power chain using 0.017” × 0.025” titanium molybdenum alloy wire with re-activation every month for 5 months.

**Treatment results**

Treatment was completed with satisfactory results within 20 months. Bone level and root integrity were maintained throughout treatment. Regarding her MS condition, the patient underwent MRI 1 month before orthodontic treatment and 1 month after de-bonding. According to her physician’s report, compared with the previous examination, there was development of a few small new lesions and decrease in some of the previously reported lesions. There was also non-enhancement of the previously reported enhanced lesion on the right side. No definitive MRI evidence of MS activity was reported.

**Discussion**

The patient’s chief complaint of spacing in the upper arch was successfully treated and her chief complaint was adequately addressed within a 20-month period.
After treatment, the patient was informed about bite settling and referred for extraction of the upper third molars because they were impacted and the patient had extracted the opposing lower third molars before starting the orthodontic treatment.

The patient had the least aggressive type of MS – RRMS – and was taking cortisone, betaferon, and NSAIDs, along with antiepileptic and antivertigo drugs. Before treatment, her physician was consulted regarding her medical condition and previous MRI experiences. After initiating her treatment, we were aware that she might require MRI during her orthodontic treatment in the event of a serious seizure attack. Fortunately, the patient did not experience an attack; however, she experienced minor symptoms including tingling and shivering.

Before bonding, the patient was advised to have ceramic or plastic brackets to avoid de-bonding in case she required MRI during treatment. This was because ceramic, plastic, and titanium brackets found to cause only minimal distortion on MRI.\textsuperscript{[9,11]} However, the patient refused and, instead, requested metallic brackets; therefore, we applied stainless steel brackets. The patient was recommended and advised to use an electric toothbrush.\textsuperscript{[4]} It was important to schedule her orthodontic follow-up appointments at convenient time and setting the clinic at a comfortable temperature during her treatment to avoid the possibility of any serious attacks or exacerbation.\textsuperscript{[2,4]}

Although some studies have suggested that corticosteroids, atypical MS medication, can cause faster orthodontic tooth movement,\textsuperscript{[12,13]} the patient was taking medications that were suggested to slow the rate of tooth movement (e.g., NSAIDs and an interferon).\textsuperscript{[12,14]} In this case report, orthodontic tooth movement was observed to be slow during closing of the spaces when using power chain. Hence, closing loops were successfully used and spaces closed faster. The patient did not require MRI scan during the orthodontic treatment. The MRI was taken after removal of the fixed appliance. This case suggests that orthodontic treatment for patients with RRMS can
be successfully completed within 20 months without the need for MRI scanning during this period.

Further studies are required to investigate potential complications the orthodontist may encounter during orthodontic treatment of patients with MS, especially those relating to orthodontic therapy of considerable duration.

**Conclusion**

This case report describes successful treatment of a patient with RRMS without complications. Mechanics that shorten the treatment duration, such as closing loops, might be considered.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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