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Case Report

"My jaw feels heavy": An unusual complaint of an undiagnosed Myasthenia Gravis patient

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Abstract: Myasthenia Gravis (MG) is characterized clinically by weakness of the skeletal muscle and fatigability on exertion. Frequently, patients will initially present with an ocular symptom of ptosis, diplopia or both. On rare occasions, patients may present to the dentist with a peculiar complaint. We report a patient who complained of a 'heavy and dropping' jaw. He was unable to occlude or masticate, making him resort to manually moving his lower jaw during meal times. This condition usually worsened as the day progressed. Upon further evaluation, MG was confirmed. With treatment, the patient was able to occlude and achieved maximum intercuspation without any guidance. This case report discusses a case of newly diagnosed MG that presented with a rare and uncommon complaint of a weak mandible with inability to masticate. We have highlighted specific clinical features of MG to allow prompt recognition as well as discussion on dental management of such patient when presenting to a dentist.

Key words: Myasthenia Gravis, Bulbar palsy, Jaw weakness, Mastication.

Introduction

Myasthenia Gravis (MG) is a rare autoimmune neuromuscular disorder, where the antibodies directed toward the acetylcholine receptors at the neuromuscular junctions lead to interruption between the communication of the nerve and muscle. This disorder may be congenital or acquired[1]. The clinical hallmark presentation of this disease is characterized by weakness of the skeletal muscle and fatigability on exertion. This disease was thus named myasthenia gravis due to a frequently fatal outcome in the past[1,2].

Myasthenia gravis can occur at any age, with the average onset of this disease in females at 28 years of age and 42 years of age in males[2,3]. Women are affected more than men with a ratio of 3:2[4]. The epidemiology of the disease varies globally. Based on the Myasthenia Gravis Foundation of America, the prevalence of the disease in the United States is estimated to be 14 to 20 per million population[5], while it is estimated to be 15 cases per million population in the United Kingdom[6]. A local clinical survey done shows an average of 5.15 new cases every year, with an average of 2.6 cases per 10,000 admission, with an apparent higher prevalence among the ethnic Chinese compared to Malays and Indians[7].

About 85% of patients presented with an initial complaint of ocular origin, either ptosis (32%), diplopia (14%), both ptosis and diplopia (36%) or blurred vision (3%)[2]. Other common complaints include weakness of the leg, generalized fatigue, dysphagia, dysarthria or dyspnoea[5]. However, occasionally patients may present to the dentist with unusual complaints and presentations. This case report presents a rare case of a previously undiagnosed myasthenia gravis patient who presented with an atypical primary complaint.

Case Report

This is a case of a 37-year-old Malay man who walked into the Oral and Maxillofacial Surgery clinic in Hospital Raja Permaisuri Bainun, Ipoh complaining of 'heavy and dropping' jaw for about 2 months. He was unable to close his mouth, chew or clench completely and this condition gradually worsened towards the end of the day. Patient frequently uses

the aid of his hand to manually push his lower jaw during meal times. Patient's symptoms were not associated with any pain. Relevant oral and maxillofacial history revealed that he sustained multiple facial bone fractures involving the zygoma, maxilla, mandible and nasal bone ten years ago. He underwent open reduction and internal fixation (ORIF) with uneventful healing. Patient also claimed to have minimal dysphagia, generalized body weakness and weight loss about 2kg over 2 months' time. He has made multiple visits to various medical and dental practitioners, but only to be sent back home in disappointment. Convinced that something was not right about himself, he decided to visit our department to eliminate any possibility of his current condition being a complication of ORIF done ten years back.

Upon clinical examination, we noted that he had slight ptosis of bilateral eyelids which he was unaware of. Facial nerve assessment was done clinically and there was no sign of palsy. No other cranial nerve deficiencies were noted on our examination. No abnormalities were detected over bilateral temporomandibular joints and muscles of mastication. Mouth opening was adequate, however the patient had difficulty to occlude his dentition even though there were no interferences. Upper and lower limb assessment power was five over five according to Medical Research Council (MRC) Scale muscle power scale. Dental panoramic tomography and blood investigation such as full blood count, renal profile and coagulation profile were taken and showed no abnormalities. We did not proceed with ice test at that point as patient had provided us with sufficient and detailed history which helped us with coming up with the provisional diagnosis of Myasthenia Gravis. Patient was subsequently referred to an internal medicine specialist where a test for acetylcholine receptor antibodies (ACHr Ab) was done. The normal value for ACHr Ab was none or <0.05 nmol/L, however the patient's result showed a reading of >8.00 nmol/L, hence confirming the diagnosis of MG. Pyridostigmine and Prednisolone treatment commenced.

However, his disease was unusually aggressive during its course. Due to frequent upper respiratory tract infection and generalized limb weakness, he was admitted multiple times for acute exacerbation of MG. Contrast Enhanced Computed Tomography (CT) was taken and thymoma was noted (Figure 1). Multiple lung nodules were seen, with a tree-in-bud pattern of reticulonodular changes noted in the right upper lobe, suggesting infection. His condition was further complicated by newly diagnosed pulmonary tuberculosis and refractory myasthenia gravis in crisis leading to respiratory distress. Patient was subsequently admitted to ICU and was intubated for airway protection. Three attempts of failed extubation led to a tracheostomy for this patient. Intravenous immunoglobulin (IVIG) treatments were initiated as well. Once the patient was more stable, he was referred to a cardiothoracic surgeon and underwent open thymectomy. In our last review, the patient was able to bring both jaws together and achieved maximum intercuspation. Overall there is improvement in terms of muscle power.

Discussion

Myasthenia gravis (MG) is an autoimmune neuromuscular disorder characterized by skeletal muscle weakness and exertional fatigue resulted from an antibody-mediated attack directed against the acetylcholine receptor complex at neuromuscular junctions[2]. MG usually presents between 15-40 years of age, with predominance in females during younger ages but reversed in older ages[2]. Due to the reduced numbers of functional acetylcholine receptors at the muscle end-plate, thus the probability of nerve impulse will be decreased followed by reduced muscle action potential. Hence, it is not surprising that the cardinal symptoms of this disease include abnormal fatigability, fluctuating weakness of voluntary muscles especially the facial and eye muscles. The condition is often aggravated on exertion following exercise or towards the

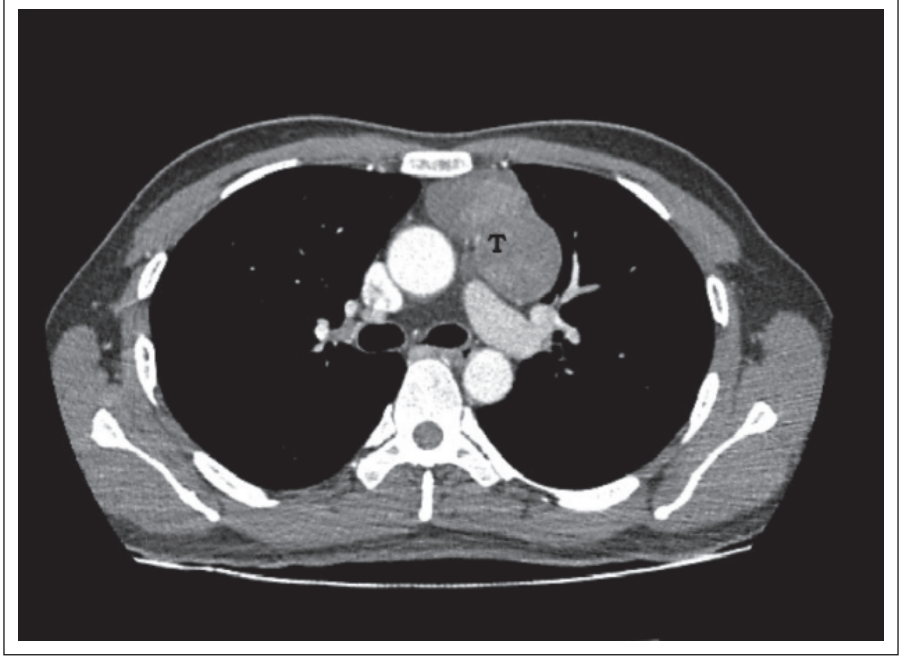

Figure 1. *Contrast enhanced CT scan thorax revealed a lobulated heterogeneous enhancing anterior mediastinal mass indicating thymoma (T).*

end of the day and improves with rest. The classic clinical presentations include ptosis, diplopia, blurred vision, weakness of legs, generalized fatigue, dysphagia, slurred and hypernasal speech, difficulty in chewing, weakness of arms, hands, neck, face and trunk or shortness of breath[2,3,5,8]. When the disease is confined to the extra ocular muscles, it is termed "Ocular myasthenia gravis". The term "Bulbar" or "Oculobulbar" can be used when there is presence of bulbar palsy. However, as the disease progresses, the muscle of the limbs may be affected especially those of the shoulder girdle, which plays a crucial part for all the upper arms and shoulder movement. Respiratory muscles may also be involved. Hence, when there is clinical evidence of a more generalized disease, often "Generalized myasthenia gravis" is used.

In view of only 4% of myasthenia gravis patients that ever complain of, or demonstrate chewing difficulty, it is very rare for a patient to initially present with such a complaint. Nevertheless, there were a few similar reported cases of newly diagnosed myasthenia gravis that first presented with this unusual complaint[9–11]. This was similar to our patient who primarily complained of difficulty in bringing his jaws together and achieving closure even though there was no interference. Often, these patients may seek consultation from a dentist or a doctor where they were either told "no abnormalities detected" or wrongly treated for other conditions such as temporomandibular joint disease[10,11]. MG is known to closely mimic jaw claudication whereby patients will also present with weakness of the facial muscles, difficulty in chewing, swallowing and speech. This condition usually worsens after talking but may improve following a brief period of rest. The distinct feature that differentiate MG from jaw claudication is the absence of pain. Jaw claudication is a classic symptom of temporal arteritis, but it is also often confused with symptoms of other conditions such as temporomandibular joint disease (TMJ), rheumatoid arthritis of TMJ, parotid gland tumours or atherosclerotic occlusion of external carotid artery[12]. Hence, it is not uncommon that the diagnosis of MG is frequently delayed and misdiagnosed owing to the fact that each patient exhibits unique complaints or clinical features[13].

Chewing problems can be quantified by masticatory performance or masticatory muscle activity. A study done by Weijian et al found that masticatory performance and masticatory muscle activity of patients with bulbar myasthenia gravis were lower compared to healthy controls[14]. Masticatory performance can be measured by an individual's capacity to grind or pulverize a test food whilst muscle activity is measuring of masticatory muscle activity needed to masticate food, therefore it is a measurement of force exerted during mastication. It was noted that MG patients often had difficulty in fragmenting the test food[14]. Masticatory muscle electromyograms (EMGs) revealed decreased maximal muscle activity of masseter and temporalis muscle, both of which are the main elevator muscles of mastication[15]. On the other hand, bite force measurement, which may be preferred for clinical evaluation of masticatory muscle function in patients with MG was also noted to be significantly lower in patients with bulbar MG[15]. Interestingly, according to Sasakura et al, bite force appeared to be inversely related to the concentration of anti-AChR antibody in blood, decreasing when the antibody titre was high and vice versa in response to treatment[11]. Reduced bite force may also occur due to impairment of the excitation-contraction coupling time in skeletal muscle[16]. These quantitative findings explain why there is a need for the patient to support the jaw during meal times and also to prevent the jaw from opening. Often, these situations can also recur in patients who are already in remission state[10,14,15].

Patients with chewing difficulty commonly complain of dysphagia as well due to weakness of oropharyngeal muscles. Oropharyngeal dysphagia can be defined as difficulty in swallowing or impairment in the movement of swallowed material from the pharynx to the stomach[17]. The prevalence of dysphagia together with difficulty chewing was found more frequently in males, with up to 30% of incidence during onset[13]. Due to their inability to chew and swallow properly, patients tend to rely on a softer diet and they may also exhibit a certain posture when swallowing. The combined impact of difficulty in masticating together with dysphagia may compromise a patient's nutritional well-being and impair their quality of life[14]. It is not surprising to see patients lose more than 10kg months prior to diagnosis[14]. This can be observed in our patient where he claims to have lost about 2kg in weight and generalized body weakness due to his inability to eat well, although his body weakness may also have been contributed by the disease itself. In addition to that, dysphagia may lead to difficulty in managing secretions and also increased risk of dehydration, aspiration pneumonia and other pulmonary sequelae[18].

While there is no clear precipitating factor for MG, some of the patients exhibit worsening symptoms when triggered by infections, emotional stress, physical trauma, surgeries, pregnancy or childbirth, hyperthyroid or on thyroid therapy, allergic reaction or administration of certain medications[2]. MG patients also have a higher risk of infection especially respiratory tract infections[19]. For instance, our patient had several episodes of upper respiratory tract infections which led to acute exacerbation of MG, which caused the patient multiple hospital admissions. Besides that, the newly diagnosed pulmonary tuberculosis could be a contributing factor that complicated the myasthenia crisis at a later stage, resulting in respiratory failure which required intubation and mechanical ventilation.

Generally, all patients with MG should undergo thymus imaging with either CT or MRI[20]. Thymus is considered to play a major role in MG pathogenesis. Thymus anomalies are commonly seen in patients with MG and AChR autoantibodies. The pathologic changes with thymic abnormalities are in the form of hyperplasia (60-70%) or thymoma (10-15%)[21]. In our case, CT scan revealed presence of anterior mediastinal mass, likely to represent thymoma, which was later confirmed via histopathological examination. The presence of thymoma will usually cause MG to progress rapidly and become more severe[3]. Although thymectomy has become a widespread procedure in treatment of MG, the indication of removal is still being debated. However, thymectomy is warranted for all cases with thymomas regardless of the stage of MG[21]. Due to the risk of perioperative complications of thymectomy, patients should achieve optimum control of myasthenia first, even if there is a need to delay the surgery[20]. In the case of our patient, he underwent open thymectomy and is currently still under follow up. Although there is still some muscle weakness, there has been tremendous improvement in terms of power as well as quality of life.

This case report intends to highlight that a MG patient could present with a simple complaint of difficulty in chewing. However, it is crucial for an oral healthcare provider to be able to recognize other symptoms of MG so that appropriate clinical investigations can be done and prompt referrals can be made to avoid delayed treatment and further complications. As seen in our case, a patient may complain of reduced strength

in his or her muscles of mastication or chewing difficulties, which results in weight loss which may inevitably lead to malnutrition. It is common to observe the myasthenic facies which is characterized as a sleepy, expressionless, apathetic appearance due to weakness of the muscles of facial expression and bilateral ptosis[22]. Involvement of the palatal and pharyngeal muscles may result in dysphonia, with thickened, indistinct, hypernasal speech[10]. Intraorally, a furrowed, flaccid clinical appearance of the tongue may be seen due to lipomatosis in patients with MG[22]. In severe cases, it can result in a triple longitudinal furrowing of the tongue. Lipomatosis of the tongue is connected with an increasing atrophy of the musculature of the tongue[23]. Chronic mucocutaneous candidiasis may result from dysfunctional T cells due to thymoma[24]. Immunosuppressant therapy further increases the chances of MG patients to develop fungal infections and have delayed wound healing[25].

Dental management of MG patients is an important point to discuss in view of the unique challenge it poses for dentists. A good communication between patient, neurologist and the dentist are of utmost importance. Special management consideration should be practiced for optimal patient care during dental treatment. When the patient presents with chewing difficulties, we should advise them to consume their main meal earlier in the day when muscles are stronger. Consumption of softer food in small portions can also be helpful. To take advantage of the greater muscular strength noted during morning hours, short early appointments are advisable[26]. Ideally, dentists should proceed with treatment when the oral anticholinesterase agents are at a peak which is usually about 1 to 2 hours after administration of anticholinesterase agents[14]. The use of a mouth prop may be of assistance to keep MG patient's mouth open during procedures. It is vital to establish a supportive relationship between dentist and patient to reduce emotional stress which may predispose patients to myasthenia crisis.

Failure of the supraglottic constrictors to seal the laryngeal inlet in combination with an increased saliva production due to the muscarinic side effect of the anti-cholinesterase results in possibility of aspiration of saliva or any dental debris during treatments[27]. The use of rubber dams and high-volume suctions may be helpful in these instances. With regards to local anaesthetics, ester type local anaesthetics that are hydrolysed by plasma cholinesterase have reduced effectiveness in MG patients on anti-cholinesterase therapy, however, amide type local anaesthetic can be administered safely[14]. Antibiotic prescription for MG patients is advisable after consultation with patient's neurologist. Due to the muscle relaxing properties of certain antibiotics (such as tetracycline, polymyxin, aminoglycosides and erythromycin) their use should be carefully selected[14]. Generally, penicillin and it's derivatives are not associated with neuromuscular blocking properties, however aggravation of MG following administration has been described[28,29].

Prevention of oro-dental disease is essential in MG patients. There is a need for constant reinforcement of oral hygiene and an emphasis on excellent plaque control. Electric toothbrushes or manual brushes with modified handles may decrease the muscle effort required to accomplish effective oral hygiene[26]. In patients with an increased risk of caries, fissure sealants and topical fluoride application should be considered as it is important to maintain patient's own dentition due to limitation in tolerating dentures because of poor muscle control[30].

Conclusion

This is a case of undiagnosed MG with a peculiar and atypical chief complaint. As MG patients rarely come with an initial presentation of jaw weakness and an inability to masticate, it is easy for the oral healthcare provider to misdiagnose such patients. Meticulous clerking in combination with close observation for other possible clinical manifestation such as ocular ptosis, facial and masticatory muscle weakness, expressionless face, hypernasal or hypophonic voice, history of nasal regurgitation, atrophic, furrowed and flaccid tongue may lead to suspicion of MG.

Although this disease is rare and the cause is still unknown, MG is symptomatically treatable. Early detection and prompt medical management may help in controlling the disease and preventing further complications. This atypical presentation is rare and hardly encountered by dentists, hence increased awareness is necessary for prompt referral and proper management when we come across such cases. A multi-disciplinary collaboration, close monitoring and daily maintenance are essential for optimal health and quality of life of the patient.

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Ethical Approval

Medical Research & Ethical Committee Malaysia: NMRR-20-10-52588.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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