e-ISSN: 2987-131X

Sriwijaya Journal of Otorhinolaryngology (SJORL)

Journal website: https://phlox.or.id/index.php/sjorl

The Role of Systemic Steroid Administration in Meniere's Syndrome: A Case Report

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ARTICLE INFO

Keywords:
Meniere's syndrome
Prednisone
Systemic steroids
Tinnitus
Vertigo

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The author has reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/sjorl.v2i1.112

A B S T R A C T

Introduction: Meniere's syndrome is an inner ear disease characterized by episodes of spontaneous vertigo, tinnitus, hearing fluctuations, and a feeling of fullness in the ear. Treatment varies depending on severity, and systemic steroids may be an option in cases resistant to first-line therapy. This case report aims to present treatment for Meniere's syndrome. **Case presentation:** We report the case of a 35-year-old woman with Meniere's syndrome who did not improve with standard therapy. The patient was given oral prednisone 40 mg per day for 5 days, followed by tapering the dose for 2 weeks. **Conclusion:** Administration of systemic steroids to these patients resulted in significant improvement in symptoms of vertigo, tinnitus, and hearing fluctuations. The patient did not experience any significant side effects.

1. Introduction

Meniere's syndrome is an idiopathic disease of the inner ear, characterized by episodes of spontaneous vertigo, tinnitus, hearing fluctuations, and a feeling of fullness in the ear. The exact cause is not yet known, but it is thought to be related to endolymphatic hydrops, which is an excessive buildup of fluid in the inner ear. Treatment of Meniere's syndrome aims to control symptoms and prevent further ear damage. Meniere's syndrome affects approximately 0.1% of the population. The prevalence is higher in adults aged 40-60 years. Women are more at risk of developing Meniere's syndrome than men. The exact cause of Meniere's syndrome is still unknown. However, several factors are thought to play a role in the development of this disease. Endolymphatic hydrops (Excessive fluid buildup in the inner ear) cause distension and damage to the structures of the inner ear, which further impairs balance and hearing. A family history of Meniere's syndrome increases the risk of developing this disease. Some research suggests that an abnormal immune system may play a role in the development of Meniere's syndrome. Exposure to stress, allergies, and head trauma can trigger episodes of Meniere's syndrome in some people. The main symptoms of Meniere's syndrome include vertigo, which is spinning dizziness that can last for several minutes to several hours, tinnitus, which is a ringing, buzzing, or hissing sound in the ear, hearing fluctuation, which is hearing loss that can vary from

mild to severe, a feeling of fullness in the ear, which is a sensation of blockage or fullness in the ear. These symptoms usually come in episodes, which may occur several times a week or several times a year. These episodes can be triggered by stress, fatigue, changes in air pressure, or consumption of alcohol and caffeine.[1-3]

The diagnosis of Meniere's syndrome is made based on physical examination, hearing tests, and balance tests. A physical examination may reveal nystagmus, which is abnormal eye movement. Hearing tests can show sensorineural hearing fluctuations. Balance tests can show balance disorders. Doctors need to rule out other diagnoses that can cause similar symptoms, such as vestibular disease, brain tumors, and multiple sclerosis. Treatment of Meniere's syndrome aims to control symptoms and prevent further ear damage. First-line therapy usually includes diuretics i.e. these drugs help reduce fluid buildup in the inner ear, a low salt diet i.e. reducing salt consumption can help reduce water retention and improve fluid balance and antivertigo drugs which help relieve vertigo symptoms. In cases resistant to first-line therapy, systemic steroids may be an option. Systemic steroids have anti-inflammatory and immunosuppressive effects that can help reduce inflammation and pressure in the inner ear.[4-7]

2. Case Presentation

A 35-year-old woman came to the community health center with the chief complaint of severe rotating vertigo, tinnitus, and hearing fluctuations for 3 months. Patients report that vertigo often recurs without provocation and can last for several hours. This vertigo causes nausea and vomiting and makes the patient unable to carry out normal activities. The patient also complained of tinnitus, namely a continuous ringing sound in the right ear. In addition, the patient felt hearing fluctuations in the right ear, where her hearing decreased for some time and then returned to normal. The patient has tried diuretics and antivertigo drugs to treat his symptoms, but there has been no significant improvement. The patient had no history of chronic disease, drug allergies, or head trauma. On physical examination, spontaneous horizontal nystagmus to the left was found, namely uncontrolled horizontal eye movements. This nystagmus is a sign of disturbance in the balance system.

Hearing tests showed sensorineural hearing fluctuations in the right ear. Sensorineural hearing fluctuations are a type of hearing loss caused by damage to the hair cells in the inner ear. Based on the history, physical examination and supporting examinations, the patient was diagnosed with Meniere's syndrome. The patient was given oral prednisone 40 mg per day for 5 days, followed by tapering the dose for 2 weeks. Prednisone is a steroid drug that has anti-inflammatory and immunosuppressive effects. After treatment, patients experienced significant improvement in symptoms of vertigo, tinnitus, and hearing fluctuations. The vertigo did not recur, the tinnitus was significantly reduced, and the patient's hearing returned to normal. The patient experienced no significant side effects from prednisone.

3. Discussion

Prednisone is a steroid drug that has anti-inflammatory and immunosuppressive effects. The mechanism of action of prednisone in controlling the symptoms of Meniere's syndrome is based on several aspects of biological plausibility. Meniere's syndrome is thought to be related to endolymphatic hydrops, which is an excessive buildup of fluid in the inner ear. This fluid buildup can cause inflammation and pressure in the inner ear, which can trigger symptoms of vertigo, tinnitus, and hearing fluctuations. Prednisone has anti-inflammatory effects that can help reduce inflammation in the inner ear. This can help reduce pressure in the inner ear and relieve symptoms of Meniere's syndrome. Prednisone also has immunosuppressive effects that can help suppress the immune system. An overactive immune system is thought to play a role in the pathogenesis of Meniere's syndrome. By suppressing the immune system, prednisone can help reduce inflammation and prevent damage to cells in the inner ear.[8,9]

Prednisone can help reduce pressure in the inner ear. Inflammation can cause swelling and blockage in

the inner ear, which then increases pressure. This can trigger various symptoms of Meniere's syndrome, such as vertigo, tinnitus, and hearing fluctuations. Prednisone, as an anti-inflammatory drug, can help reduce inflammation and swelling in the inner ear. This can help reduce pressure and relieve symptoms of Meniere's syndrome. Prednisone inhibits the release of prostaglandins, leukotrienes, and cytokines, which are major inflammatory mediators. This helps reduce inflammation and swelling in the inner ear. Prednisone helps stabilize cell membranes, thereby reducing their permeability and preventing the entry of inflammatory cells into the tissue. This helps prevent further inflammation and reduces swelling. Prednisone suppresses the activity of immune cells, such as T and B lymphocytes. This helps reduce the inflammatory response and prevents further tissue damage.[10-12]

Prednisone can indeed inhibit the release of prostaglandins, leukotrienes, and cytokines, which are the main inflammatory mediators. This helps reduce inflammation and swelling in the inner ear. Prednisone inhibits the enzyme phospholipase A2, which is responsible for producing prostaglandins and leukotrienes. Prostaglandins and leukotrienes are inflammatory mediators that cause inflammation and swelling. Prednisone enters cells and binds to the glucocorticoid receptor. Prednisone binding alters the structure of the glucocorticoid receptor complex. The altered glucocorticoid receptor complex then binds to DNA in the cell nucleus. The binding of the glucocorticoid receptor complex to DNA inhibits transcription of the gene encoding the enzyme phospholipase A2. Decreased production of the phospholipase A2 enzyme causes a decrease in the production of prostaglandins and leukotrienes. By inhibiting the enzyme phospholipase A2 and reducing the production of prostaglandins and leukotrienes, prednisone can help reduce inflammation and swelling.[13,14]

Prednisone inhibits the transcription of genes encoding cytokines. Cytokines are inflammatory mediators that cause inflammation and swelling. Prednisone enters cells and binds to the glucocorticoid receptor. Prednisone binding alters the structure of the glucocorticoid receptor complex. The altered glucocorticoid receptor complex then binds to DNA in the cell nucleus. The binding of the glucocorticoid receptor complex to DNA inhibits the transcription of genes encoding cytokines. Decreased transcription of cytokine genes causes a decrease in cytokine production. By inhibiting cytokine gene transcription and reducing cytokine production, prednisone can help reduce inflammation and swelling.[15,16]

Prednisone induces the synthesis of anti-inflammatory proteins, such as lipocortin. Lipocortin helps inhibit the activity of the phospholipase A2 enzyme, thereby reducing the production of prostaglandins and leukotrienes. Prednisone enters cells and binds to the glucocorticoid receptor. Prednisone binding alters the structure of the glucocorticoid receptor complex. The altered glucocorticoid receptor complex then binds to DNA in the cell nucleus. The binding of the glucocorticoid receptor complex to DNA increases the transcription of genes encoding anti-inflammatory proteins, such as lipocortin. Increased transcription of the lipocortin gene causes increased lipocortin production. Lipocortin binds to the phospholipase A2 enzyme and inhibits its activity. A decrease in the activity of the phospholipase A2 enzyme causes a decrease in the production of prostaglandins and leukotrienes. By inducing the synthesis of anti-inflammatory proteins, such as lipocortin, and inhibiting the activity of the phospholipase A2 enzyme, prednisone can help reduce inflammation and swelling. By inhibiting the release of prostaglandins, leukotrienes, and cytokines, and inducing the synthesis of anti-inflammatory proteins, prednisone can help reduce inflammation and swelling in the inner ear.[14,15]

Prednisone has a mild diuretic effect that can help increase fluid absorption in the inner ear. This can help reduce the amount of excessive fluid associated with endolymphatic hydrops, the cause of Meniere's syndrome. Prednisone can increase the activity of aldosterone, a hormone that helps regulate water and electrolyte balance in the body. Aldosterone works in the kidneys to increase sodium and water reabsorption, which can help reduce the amount of fluid throughout the body, including in the inner ear. Prednisone helps stabilize cell membranes, including

capillary cells in the inner ear. This can help reduce capillary permeability, thereby preventing fluid leakage into surrounding tissue. Prednisone can help increase blood flow to the inner ear. This can help increase fluid and electrolyte absorption from the inner ear. By increasing fluid absorption and reducing the amount of excess fluid, prednisone can help relieve pressure in the inner ear and relieve symptoms of Meniere's syndrome.[16,17]

Prednisone can help increase fluid absorption in the inner ear, thereby helping to reduce the amount of excessive fluid and relieve pressure. This can help relieve symptoms of Meniere's syndrome, such as vertigo, tinnitus, and hearing fluctuations. Prednisone increases the activity of the sodium-potassium pump in the cells of the inner ear. This pump helps remove sodium and water from the cells, thereby helping to reduce the amount of fluid in the inner ear. Prednisone increases aquaporin expression in inner ear cells. Aquaporins are proteins that help move water across cell membranes. Increased expression of aquaporins helps increase water absorption in the inner ear. Prednisone helps reduce capillary permeability in the inner ear. Capillaries are small blood vessels that help exchange fluids between blood and tissue. Decreased capillary permeability helps prevent fluid leakage into the inner ear. By increasing fluid absorption and reducing leakage, prednisone can help reduce the amount of excessive fluid in the inner ear. This can help relieve pressure and relieve symptoms of Meniere's syndrome.[17,18]

Several clinical studies suggest that prednisone can be effective in controlling the symptoms of Meniere's syndrome. One of the studies you mentioned found that oral prednisone 40 mg per day for 5 days produced significant improvements in symptoms of vertigo and tinnitus in patients with Meniere's syndrome. Another study compared prednisone with betahistine (a drug commonly used for Meniere's syndrome) and found that prednisone was more effective in reducing the frequency and severity of vertigo attacks. Another study found that oral prednisone 30 mg per day for 7 days improved the control of vertigo and tinnitus in patients with Meniere's syndrome. A study found that intratympanic prednisone (injected into the ear) can help reduce the frequency and severity of vertigo attacks in patients with Meniere's syndrome.[19,20]

4. Conclusion

Administration of systemic steroids to patients with Meniere's syndrome who are resistant to first-line therapy can result in significant improvement in symptoms of vertigo, tinnitus, and hearing fluctuations.

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