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Abstract Title: Psychosis in Paraneoplastic Syndrome and its Complications

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Introduction/Background: The International Classification of Diseases, tenth revision (ICD-10) defines "psychosis" as the "presence of hallucinations, delusions, or a limited number of abnormalities of behavior, such as gross excitement or overactivity, marked psychomotor retardation and catatonic behavior"; the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) similarly defines "psychotic features" to be delusions, hallucinations, or formal though disorder [1]. Psychosis is commonly seen in various psychiatric, neurodevelopmental, neurologic, and medical conditions and can occur due to a primary or secondary cause [2]. Primary psychosis is due to a psychiatric disorder while a secondary cause of psychosis is due to a medical or neurologic disorder [1].

Psychiatric manifestations like psychosis, as well as other symptoms like seizures, movement disorders, personality change, autonomic dysfunction, and even death can be seen in paraneoplastic syndromes [3, 4]. These syndromes occur due to malignancies secreting peptides, hormones, and cytokines or when there is a cross-reaction between the malignant tissue and non-malignant tissue [5]. There are two subtypes of antibodies seen in paraneoplastic syndromes: ones that target neural intracellular antigens and ones that target cell-surface antigens [3]. Antibodies that target neural intracellular antigens have a high association with cancer whereas the association is weaker with the other subtype [3]. Antibodies in both subtypes can be seen in the cerebrospinal fluid and patients can also present with abnormal neuroimaging and electroencephalography (EEG) [3, 6]. Studies have shown that early intervention leads to positive outcomes, and oftentimes, allow patients to almost completely return to baseline [7].

Description: Patient is a 50-year-old white male with a history of multiple myeloma who presented with altered mental status and acute psychosis. The patient was unable to give a clear history of the events preceding the hospitalization due to his clinical condition. Patient displayed disorganized thought process, flight of ideas, and aggressive behavior. A few days after admission, the patient started experiencing visual and auditory hallucinations. The acute onset of the patient's psychosis raised concern for an organic cause. A lumbar puncture (LP) was recommended at this time to assess for paraneoplastic syndrome. Neuroimaging was obtained and MRI showed T2/flair hyperintensities in a distribution that was slightly atypical of chronic microvascular change but without associated enhancement or restricted diffusion. Radiology recommended that correlation with a LP may be helpful. However, neurology believed that there was a low likelihood that the underlying cause is a paraneoplastic syndrome, and that they did not believe a LP was necessary at this time. Despite medication modifications and various tests, the patient's psychosis did not improve over a lengthy hospitalization nor was an underlying cause of the psychosis able to be determined. Due to the lack of answers and the patient's symptoms resembling delirium rather than a primary psychiatric disorder, a LP became more important and was performed. One week following the LP (with autoantibody assessments still in progress at the Mayo clinic), the patient was found to have rhythmic shaking of his

left arm and was unresponsive. Following the episode, he had a post-ictal confusion and brief lack of movement on the right side. EEG is also now in progress.

Discussion and Conclusion: Although the results for the LP are still pending, the focus of this case report is not the results, but rather the importance of a thorough evaluation of all organic causes of psychosis, as it can commonly occur due to secondary causes [1]. Even if CSF analysis comes back unrevealing, a LP is a procedure that should have been done earlier in the hospital stay that could have very well determined the underlying cause of the psychosis or just as importantly, ruled out potential underlying causes. Depending on what the underlying cause of the psychosis is, treatment can vastly vary, thus emphasizing again the importance of a thorough work-up and specifically in this case, the LP, regardless of the results. Detection of the secondary cause and then appropriately treating it can effectively eliminate the psychosis.

The importance in treating psychosis lies in the complications that occur. Psychosis presents as a roadblock for not only the deliverance of effective healthcare but also participation from the patient in their own healthcare [2]. Patients who are experiencing psychosis may not have the proper insight to effectively weigh treatments presented to them. Outside of the medical setting, patients with psychosis can face challenges in everyday life. Depending on the severity of the psychosis, patients may not be able to take care of themselves or function appropriately outside or inside the home. This leads to further complications like being unable to hold a job, being unable to take care of other health concerns, or even perform activities of daily living.

Due to the domino effect that psychosis can have on all aspects of a patient's life, a thorough and prompt work-up of all organic causes is crucial in patients who are experiencing acute psychosis. The longer treatment for psychosis is delayed, the consequences can become more and more severe.

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