

# Simultanagnosia as a cause of visual disturbance following Posterior Reversible Encephalopathy Syndrome (PRES): A case report

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Simultanagnosia resulting from dorsal stream dysfunction is an under recognized condition. In this case report we describe the case of a young woman who developed posterior reversible encephalopathy syndrome (PRES), and who recovered visual acuities of 20/20 in each eye, along with normal visual fields and contrast sensitivities, yet experienced persistent symptoms of perceptual dysfunction. Detailed and systematic history taking revealed consistent visual difficulties typical of dorsal stream dysfunction. After a detailed explanation of her symptomatology and training in a range of strategies to cope, the patient experienced a great improvement in her day-to-day functioning.

**Key words:** Balint syndrome, neuro-rehabilitation, posterior reversible encephalopathy syndrome, simultanagnosia

Following primary processing in the occipital lobes, the visual information is conveyed to the posterior parietal lobes (PPLs) via the dorsal stream and to the inferior temporal lobes via the ventral stream. The PPLs non-consciously create a three-dimensional mental map of the surroundings that guides accurate body movements and also facilitate focusing visual attention on the object of interest. The inferior temporal lobes facilitate recognition of objects, shapes, people, and routes.<sup>[1]</sup> In this report, we present the case of a young woman with symptoms of dorsal stream dysfunction, but normal traditional parameters of vision like visual acuity and visual fields.

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## Case Report

A 29-year-female fashion designer, presented with a one-month history of "blurred vision". She had suffered from intrapartum eclampsia with Posterior Reversible Encephalopathy Syndrome (PRES) causing sudden, painless, complete loss of vision (no light perception) in both eyes. With control of seizures and blood pressure, her general condition improved and during the ensuing week her measured parameters of vision returned to normal. But still she experienced some disturbance of vision. On examination at different clinics her visual acuities were found to be 20/20 and visual fields were normal in each eye. Finally, she was accorded a diagnosis of functional visual impairment and given antidepressants by a psychiatrist, which were ineffective.

When seen in our clinic (6 months after onset of vision loss) her best-corrected visual acuities were again 20/20 with -5.0 diopter spherical correction in each eye. Humphrey Visual Field analysis, contrast sensitivity, color vision (Ishihara's chart) and ocular examination were normal. When asked to describe her visual difficulties, she explained that she had to hold cloth close to her face for some time to understand its color, texture, and pattern. While reading or writing something, she had to hold the paper close to her face. At the dressing table, it took her a long time to find her bindi, among the other items of makeup, and once found, it was hard to figure out exactly where to apply it on her face, unless she got very close to the mirror. Also, immediately finding specific items in the kitchen, among other items was very difficult and time consuming.

From this history, we suspected issues with higher visual processing and administered a structured inventory of questions to enquire in detail about other visual difficulties.<sup>[2]</sup> Her responses and our assessment were consistent with profound simultanagnosia (inability to process multiple visual stimuli or multiple competing sensory stimuli at the same time). Moreover, impaired visual guidance of her upper and lower limbs (or optic ataxia) was evident, as well as an inability to see fast moving targets. All these features are typical of dorsal stream and bilateral posterior parietal lobe dysfunction and consistent with a diagnosis of Balint syndrome.

MRI brain carried out at the time of vision loss showed restricted diffusion in bilateral posterior parietal lobes as shown in Fig. 1.

In light of the evidence of bilateral dorsal stream dysfunction with bilateral PPL injury manifest on neuroimaging, we provided her with a program of rehabilitational strategies, to simplify and declutter her environment as much as possible at home and in the work place, as detailed in Table 1.<sup>[3]</sup>

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As a result of understanding the origin and nature of her visual difficulties and following these simple adaptations, her daily tasks became much easier and she stopped her anti-depressants. Later, she went on to pursue a Masters Degree in Business Administration and is successfully parenting a new child too.

## Discussion

Posterior reversible encephalopathy syndrome (PRES) is a neurological disorder of (sub) acute onset characterized by varied neurological symptoms, which may include headache, impaired visual acuity or visual field deficits, disorders of

consciousness, confusion, seizures, and focal neurological deficits with distinctive neuroimaging findings.<sup>[4-7]</sup> In accordance with the frequent involvement of the occipital lobes, visual disturbances such as a deterioration of visual acuity, visual field deficits including hemianopia and cortical blindness or visual hallucinations can be observed in about two third of all PRES patients.<sup>[4]</sup>

The posterior parietal lobes (PPLs) analyze complex visual information and facilitate focus on objects of interest. In this case, loss of PPL neural tissue may have led to slow, sequential processing of incoming sensory data, instead of the usual rapid, parallel processing. The patient discovered that she had to hold objects closer to sequentially identify elements of pattern in order to slowly build up a mental picture, as a compensatory strategy in order to perform any visual task, despite having normal visual acuities. By getting closer to objects, she was effectively reducing the clutter of surrounding items, allowing her to see single elements at a time.

Clear explanation of her visual symptoms, supported by the neuro-radiological findings relieved the family of stress. The strategies suggested to declutter and take breaks during work by going to quiet uncluttered locations without much visual information and distraction helped her immensely to cope and adapt to her new vision.

## Conclusion

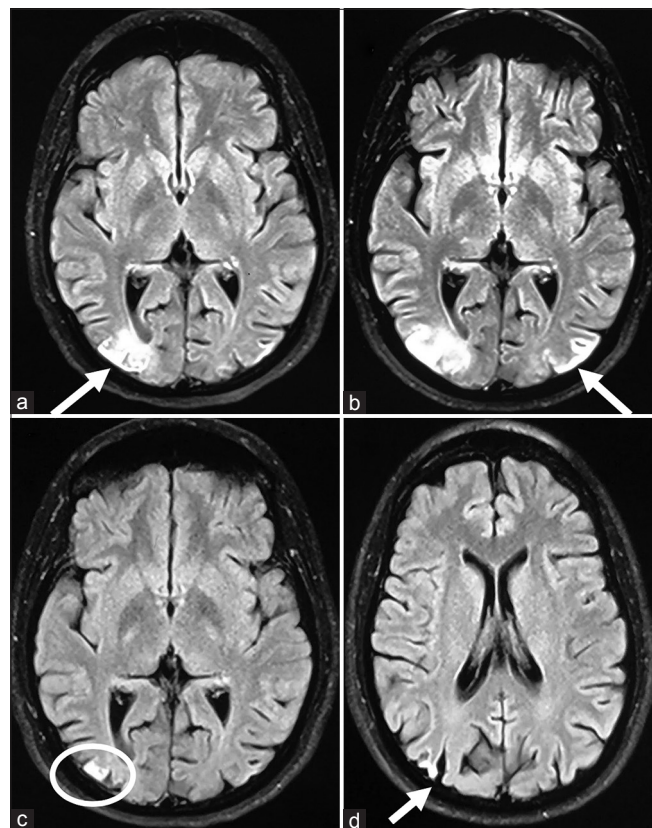
Symptoms due to dorsal or ventral stream dysfunction, such as simultanagnosia, as in this case, often go unrecognized. They can result from any neuropathology affecting the posterior parietal lobes or inferior temporal lobes. A high index of suspicion in such cases is needed, especially when the patient's symptoms cannot be fully explained by ocular examination. Structured history taking corroborated by brain imaging affords an effective way to recognize these issues. Understanding the origin of the visual difficulties and simple environmental modifications help such patients carry out their day-to-day tasks more effectively.

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## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published



**Figure 1:** Axial FLAIR sections of MRI performed at the onset of symptoms (a and b) during the eclamptic state, and on follow up at 13 months (c and d). The white arrows on a and b point to foci of acute cortical and subcortical signal abnormality with swelling in both posterior parietal lobes. On follow up, while the left sided changes resolve, on right side there is focal gliosis (c- circled) and atrophy (d-arrow) consistent with mature injury

**Table 1: Describing details of different cognitive visual difficulties and suggested strategies to cope**

Cognitive visual difficulty	Suggested strategy
Inability to find objects at the dressing table	Keep a bare minimum of essential cosmetics and place them wide apart rather than storing them in a cluster
Difficulty in finding things in the kitchen	Label each kitchen container with color coded stickers
Inability to cope with new places, especially if there is a lot to see	Arrive at new places ahead of time, and actively analyze the environment slowly, and systematically, focusing upon one object at a time in order to construct a complete picture in memory
Difficulty in reading	Use a typoscope, reading stand and a bar magnifier as required.

and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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