Asian Journal of Pediatric Research

Volume 12, Issue 4, Page 5-8, 2023; Article no.AJPR.98968
ISSN: 2582-2950

Therapeutic Plasma Exchange in Treatment of Autoimmune Encephalitis: A Case Report

Sangeeta Pathak [a*], Ruchi Dubey [a], Surjit Singh [a], Tamojit Chakroborthy [a] and Satish Kaushik [a]

[a] Department of Transfusion Medicine, Max Super Specialty Hospital, New Delhi, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJPR/2023/v12i4245

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/98968

Case Study

Received: 01/03/2023
Accepted: 03/05/2023
Published: 11/05/2023

ABSTRACT

The present study highlights the Therapeutic Plasma Exchange in treatment of Autoimmune Encephalitis. Due to the similarities in the clinical, imaging, and laboratory findings of many forms of autoimmune and infectious encephalitis, autoimmune encephalitis is frequently a difficult clinical diagnosis. Diagnosis of autoimmune encephalitis is based on the clinical course, serological evidence of autoimmunity, EEG changes, evidence of intrathecal inflammation in the cerebrospinal fluid and neuroimaging by MRI. In view of the suspected diagnosis of Autoimmune Encephalopathy with super refractory Status Epilepticus, Methylprednisolone was later added to the treatment. This case represents an interesting scenario of sero-negative encephalitis in which an early diagnosis could be made and treatment initiated in time.

Keywords: Intrathecal inflammation; neuroimaging; autoimmune encephalitis; malignancy.

**Corresponding author: Email: sangeeta.pathak@maxhealthcare.com;*

1. INTRODUCTION

"Autoimmune encephalitis (or autoimmune encephalopathy) is a diverse group of inflammatory and neuro-psychiatric disorders characterized by sub-acute alteration of memory, cognitive decline, focal neurological deficits, episodes of seizures and abnormal movements. Autoimmune encephalitis is often a difficult clinical diagnosis due to the similarities in the clinical, imaging and laboratory findings of many forms of autoimmune and infectious encephalitis" [1].

"Earlier, it used to be regarded as a rare paraneoplastic disease with poor prognosis. However, with the recent recognition of membrane-surface directed antibodies, it is now known that in a substantial proportion of cases there is no association with any malignancy and there is a good prognosis if treated. Hence, early recognition and prompt initiation of immunotherapies are of great importance" [2].

Pathogenesis is usually mediated by antibodies to neuronal proteins. The antibodies target receptors and cell surface proteins involved in synaptic transmission, plasticity or neuronal excitability, such as N-methyl D-aspartate receptor and leucine-rich, glioma inactivated protein and contactin-associated protein like, that are associated with voltage-gated-potassium channels (VGKC).

The resulting syndromes vary according to the antibody, with phenotypes that resemble those in which the function of the antigen is modified pharmacologically or genetically.

"The disorder most frequent in the pediatric population is anti-N-methyl-D-aspartate (anti-NMDA) receptor encephalitis in which the antibodies target the NR1 subunit of the receptor" [3].

Diagnosis of autoimmune encephalitis is based on the clinical course, serological evidence of autoimmunity, EEG changes, evidence of intrathecal inflammation in the cerebrospinal fluid and neuroimaging by MRI. In many instances, first-line steroids, intravenous immunoglobulins, and plasmapheresis, and second-line Rituximab and Cyclophosphamide are used as the best treatment regimen.

"Autoimmune encephalitis may relapse, so follow-up care is important" [1].

2. CASE PRESENTATION

A one year old, 10-kg male baby was admitted in the Pediatric Intensive Care Unit with the chief complaints of:

- 101^{0}F fever since 4 days (not associated with rashes and chills).
- Decreased intake and drowsiness since one day.

On examination, the patient was found to be drowsy with decreased activity but responding to verbal stimuli. No other significant finding except neck stiffness was detected.

Diagnosis following treatment and investigations: Suprarefractory Status Epilepticus with Suspected autoimmune encephalitis.

2.1 Course in Hospital

After admission, the child developed GTCS (Generalized Tonic- Clonic Seizure) and was put on anti-epilepsy drugs, antibiotics, IV fluids with mechanical ventilator support.

The initial investigations revealed a hemoglobin of 10.4 gm% with a total WBC count of 3000/cumm and platelet count of 205,000/cumm. Blood and CSF culture tests were negative. Urine routine & microscopy, serum electrolytes, renal and liver function tests, MRI scan were normal. No focal lesions were seen in the brain. Chest X-ray showed haziness in left upper and right lower zones. MP, Typhidot were also negative.

PAN Neurotropic virus, NMDAR, VGKC receptor antibody reports were found negative.

EEG revealed non convulsive status epilepticus for which the patient was put on Midazolam, along with Thiopentone and IVIG.

In view of the suspected diagnosis of Autoimmune Encephalopathy with super refractory Status Epilepticus, Methylprednisolone was later added to the treatment.

However, despite 15 days of treatment, patient continued to have high spikes of fever with frequent seizures. Patient developed infection during the interim period for which he was treated with IV antibiotics.

Due to no improvement in the clinical status, therapeutic apheresis in the form of Therapeutic Plasma Exchange (TPE) was planned.

2.2 Therapeutic Plasma Exchange (TPE)

Therapeutic Plasma Exchange (also known as Therapeutic Plasmapheresis) was performed on the COM.TEC apheresis device (Fresenius Kabi). Patient underwent one cycles or sitting of TPE daily for 6 consecutive days.

On an average, 2154 ml whole blood was processed and 970 m plasma removed per sitting (Table 1).

The procedures were uneventful with no significant adverse effects reported.

Post-TPE procedures, the patient's clinical condition showed marked improvement and no fresh episodes of seizures were seen.

Repeat NMDAR, VGKC receptor tests were negative. Repeat EEG did show epileptiform discharges.

The child was discharged in a stable afebrile condition after a seizures –free week with multiple antiepileptic medication, physiotherapy and nursing care.

3. DISCUSSION

Many authors have reported cases of auto-antibody mediated encephalitis with improved survival following aggressive treatment with TPE. Simabukuro MM, et al. [4], Abdulhafeez M. Khair [5] and Gastaldi, M [6] have presented various review articles on various forms of autoimmune mediated encephalopathies and the role of plasmapheresis and Immunotherapy in their management.

However, in 60% of cases of encephalitis, the cause remains unknown. Seronegative autoimmune encephalitis is a subgroup of encephalitis with suspected immunologic origin but with no identifiable pathogenic autoantibody [7].

"TPE has been recommended as a standalone secondary treatment for Acute Disseminated Encephalomyelitis (ADEM) after high-dose IV corticosteroid failure by the American Society for Apheresis (ASFA). ADEM as well as Voltage gated potassium channel (VGKC) antibody related encephalitis are considered as Category II disease indications for Therapeutic Apheresis as per the ASFA guidelines" [8,9].

"Category II indications are those disorders for which apheresis is accepted as second line therapy, either as a standalone treatment or in conjunction with other modes of treatment" [8].

"In the latest 2016 ASFA guidelines, N-methyl D-aspartate receptor (NMDAR) antibody encephalitis has been included as a Category I indication, which includes disorders for which apheresis is accepted as first-line therapy, either as a primary standalone treatment or in conjunction with other modes of treatment" [9].

In the case of encephalitis described here, the patient showed a remarkable clinical recovery following Therapeutic Apheresis.

Initially the patient was treated for GTCS, but with persistence of symptoms and subsequent deterioration of his condition, the diagnosis was reconsidered and he was treated as a case of auto immune encephalitis. The antibody tests, however, were negative. With no positive outcome from other modalities of treatment, TPE was performed using albumin and saline as the replacement fluids (albumin 90%, normal saline 10%) [10].

Table 1. Therapeutic plasma exchange

Sl. no	TBV processed (ml)	Plasma volume removed (ml)	Replacement fluid volume (ml)	Replacement Fluids (ml) 5% Albumin	Normal Saline	Procedure time (min)
1	1811	1107	990	750	240	89
2	2053	1015	937	750	187	97
3	2036	1110	1000	750	250	111
4	2080	897	794	750	44	144
5	2085	900	798	750	48	160
6	2860	790	700	650	50	203

After six sittings of TPE, the child became afebrile, seizure-free and hemodynamically stable.

This experience of sustained remission with clinical improvement in a patient of suspected autoimmune encephalitis following TPE procedures is in-line with a similar case report of adult sero-negative auto-immune encephalitis who responded to plasmapheresis and rituximab [7].

4. CONCLUSION

Therapeutic Plasmapheresis can be a successful treatment modality for treatment of autoimmune encephalitis when instituted promptly. This case represents an interesting scenario of sero-negative encephalitis in which an early diagnosis could be made and treatment initiated in time.

Despite a category I and II recommendation of TPE for encephalitis from the American Society for Apheresis, therapeutic plasma exchange remains underutilized.

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

ACKNOWLEDGEMENTS

The authors would like to thank Drs. Chandra Shekhar Singh and Rekha Mittal from the Departments of Pediatrics for their constructive feedback.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Eric Lancaster. The diagnosis and treatment of autoimmune encephalitis. J Clin Neurol. 2016;12(1):1-13
2. Sara Machado, Amélia Nogueira Pinto, Sarosh R. Irani. What you should know about autoimmune encephalitis? Arq Neuropsiquiatr. 2012;70(10):879-885.
3. Thaís Armangue and Mar Petit-Pedrol, et al., Autoimmune encephalitis in children. J Child Neurol. 2012;27(11):1460–1469.
4. Mateus Mistieri Simabukuro. Dement Neuropsychology. 2014;8(1):87-89
5. Abdulhafeez M. Khair. Utility of plasmapheresis in autoimmune-mediated encephalopathy in children. Potentials and Challenges, Hindawi Publishing Corporation, Neurology Research International; 2016.
Article ID 7685807.
6. Gastaldi M, Thouin A, Vincent A. Antibody-mediated autoimmune encephalopathies and immunotherapies. Neurotherapeutics. 2016;13:147.
7. Muhammad Fahmi Ismail et al, A neuropsychiatric presentation of seronegative autoimmune encephalitis: A case report; J Med Cases. 2015;6(10):468-471.
8. Schwartz J, Winters JL, et al, Guidelines on the use of therapeutic apheresis in clinical practice-evidence-based approach from the Writing Committee of the American Society for Apheresis. The sixth special issue. J Clin Apher. 2013;28:145–284.
9. Schwartz J, Padmanabhan A, et al, Guidelines on the use of therapeutic apheresis in clinical practice—Evidence-based approach from the Writing Committee of the American Society for Apheresis. The Seventh Special Issue; J Clin Apheresis. 2016;31:149–162
10. Giancarlo Liumbruno. Recommendations for the use of albumin and immune-globulins, Blood Transfusion. 2009;7(3): 216–234.
DOI: 10.2450/2009.0094-09

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/98968