

**Cerebroprotein Hydrolysate in the Management of Acute Spinal Cord Injury**Dr. I.D. Chaurasia<sup>1\*</sup>, Dr Puspendra Gahlot<sup>2</sup>, Dr. Mahim Koshariya<sup>3</sup>, Dr. Arvind Rai<sup>4</sup>, Dr. M.C.Songra<sup>5</sup><sup>1</sup>Assistant Professor Neurosurgery, Department of Surgery, Gandhi Medical College & Associated Hamidia, Hospital, Bhopal, India<sup>2</sup>Resident, Department of Surgery, Gandhi Medical College & Associated Hamidia, Hospital, Bhopal, India<sup>3</sup>Associate Professor, Department of Surgery, Gandhi Medical College & Associated Hamidia, Hospital, Bhopal, India<sup>4</sup>Professor, Department of Surgery, Gandhi Medical College & Associated Hamidia, Hospital, Bhopal, India<sup>5</sup>Professor & Head, Department of Surgery, Gandhi Medical College & Associated Hamidia, Hospital, Bhopal, India**Original Research Article****\*Corresponding author**

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**Abstract:** Spinal cord injury is an extremely serious and world most disasterous type of physical trauma that can have a lasting and significant impact on most aspects of daily life leading to a grievous clinical situation, for which there is no effective treatment till today. Anyone who survived from such injury used to live with morbidily and other complication. In case of acute spinal cord injury methylprednisolone is a standard treatment option. It can result in Tetraplegia /quadriplegia, paraplegia and other lifetime disabilities. Cerebroproteinhydrolysate a neuropeptide synthetic preparation having neurotropic and neuroprotective role, being successfully used in the treatment of Alzheimers disease, in acute cerebrovascular strokes, traumatic brain injury with proven benefits. Few studies support its role in spinal cord injury benefits. Cerebroproteinhydrolysate is a mixture of different neurotrophic factors such as BDNF, GDNF and NGF used to treat the normal SCI our experience showed that Cerebroprotein hydrolysate resulted in good neuroprotection. This prospective study was conducted in the neurosurgery unit of surgery department in Gandhi medical college &Associated Hamidia Hospital Bhopal in this study 120 patients of acute spinal cord injury were enrolled who reported in the emergency ward within 8 hours of injury. We assessed the efficacy and safety of cerebroproteinhydrolysate in the treatment of traumatic acute spinal cord injury and its outcome. Cerebroproteinhydrolysate treated group was compared to the conventional therapy (controlled) group. There was a statistically significant (p value=0.001) seen in improvement in terms of functional outcome in patients treated with cerebroproteinhydrolysate These patients have significant motor and partial sensory recovery including the sensations of touch, pressure, vibration and pain: from A to B score on ASIA scale. Initial prehospital management of traumatic acute spinal cord injury is crucial for the morbidity and mortality following acute SCI. For a long time no proper and promising treatment for SCI was available. This study shows that cerebroprotiendhydrolaste has beneficial outcomes as immediate neuroprotective therapy and ensuring the spinal cord perfusion pressure augmentation has no complications and the results are promising. Our results suggest that patients with traumatic acute spinal cord injuries when treated with cerebroproteinhydrolysate are benefitted significantly in regards to functional outcome and it can be safely used. Though a large size randomized control trials are required to authenticate its potential benefits.

**Keywords:** Cerebroproteinhydrolysate, Neuroprotection, Paraplegia, Spinal Cord Injury (SCI), Blood Spinal Cord Barrier (BSCB).

**INTRODUCTION**

Spinal cord injury (SCI) is a debilitating disease and can occur following motor vehicle accidents or falls. Depending on the magnitude and severity, SCI could result in the quadriplegia/tetraplegia, paraplegia and other lifetime disabilities [1, 2]. Anyone who survived from such injury used to live

with morbidity and other complications such as breathing problems, blood clots, kidney failure, urinary problem & pressure sores, DVT and constipation etc. SCI can occur at any age but it is most frequent in young adult age group ie productive age group between 20-45 years Spinal cord injury is mostly either traumatic but it can also be nondramatic also.

Traumatic injuries are caused by (RTA) Road traffic accident, Domestic work related accidents, sport's injury and stab injuries etc [3, 4]. While the nondramatic SCI can be caused by infections, cyst or tumours and osteoporosis etc. Spinal cord injury (SCI) is either complete or incomplete. In complete spinal cord injury the normal spinal cord is disrupted which can result from contusion, compression, penetrating or maceration of the spinal cord. The spinal cord lesion consists of. Neuronal injury, blood vessel injury, central grey matter bleeding, spinal cord oedema and dural injury. Following SCI damage to the nerve cell, nerve fibres and supporting cells continues within the spinal cord after hours and continues for several days or even for weeks, this is the secondary damage. During secondary spinal cord damage there is blood flow changes (damage blood flow) at the level of injury, excessive release of the neurotransmitters (Glutamate), inflammatory response, attack of free radicals on neurons and neuronal apoptosis. During the delayed secondary spinal cord injury the treatment may reduce the extent of damage and disability like methleprednisolone given continuously within 8 hours of the injury. Methleprednisolone improves recovery (NASCIS trial I, II, III). The immediate surgical treatment is to remove the compressing element, correction of misalignment and stabilization of the spine.

#### **AIM AND OBJECTIVE**

The aims of the study is to assess the efficacy and safety of the cerebroproteinhydrolysate and to assess the clinical outcome in the patients included in present study, whether there is difference in the outcome with regards to the standard treatment including methylprednisolone versus cerebroproteinhydrolysate. The methylprednisolone is an anti-inflammatory drug and is effective when administered within 8 hours of the injury however there are various limitation of this drug [5, 6]. In severe SCI with complete paralysis the higher doses of methylprednisolone are given which result in several complications such as muscles weakness, blood clot in the veins and /or no improvement in the injury. Cerebroprotein hydrolysate a promising drug in the treatment of SCI which available for clinical use induces Neuroprotection and help in regeneration of neurons. Higher doses of cerebroproteinhydrolysate are effective in the SCI patients.

#### **METHODS**

120 patients of traumatic spinal cord injury were enrolled in the present study this study included patients with acute traumatic spinal cord injury who reported in the emergency casualty department and admitted within 8 hours of the injury. After admissions and primary management complete neurological evaluation was done with x-ray, CT scan and /or Magnetic resonance imaging (MRI). Is a period of 18 month from a total of 120 patients with traumatic

spinal cord injuries two groups were made, each group consist of 60 patients. Group I the control group received usual conventional treatment Methleprednisolone + methylcobalamine and supportive treatment and the group II (study group) patients received intravenous cerebroprotein hydrolysate 60 mg 12hourly for a period of 21 days and a protocol of intravenous fluids to ensures the spinal cord perfusion presence augmentation.

These patients are examined for other injures also and proper care of airway, breathing and circulation was taken i.e. fluids hydration is looked properly.

#### **Source of data**

All Consecutive Spinal Cord Injury (SCI) patients admitted in department of Surgery from January 2014 -December 2016 at Gandhi Medical College & Associated Hamidia Hospital, Bhopal are included in this study.

#### **Inclusion criteria**

All Spinal cord injury (SCI) patients who reported in emergency casualty ward within 8 hours of injury were admitted in the neurosurgery unit of surgery department.

#### **Exclusion criteria**

- Head injury patients were totally excluded - Patients with deranged consciousness/altered sensorium.
- Patients with abdominal trauma. - Patients not giving consent, non-cooperative attendee.
- Immunocompromised patients (e.g. H.I.V patients).

#### **OBSERVATIONS**

SCI is most common in younger age group i.e.in productive between 20-45 years. Males are more susceptible for spinal cord injury and males are majority in numbers in present study. Majority of cases of spinal cord injury in our study are because of road traffic injury followed by fall from height. All Cervical injury patients had tetraplegia / quadraplegia, dorsal injury patients & dorsolumbar injury patients had paraplegia. Out of 42 patients in cerebroprotienhydrolaste treated group. 10 patients were of cervical injury, 26 patients were of dorsal injury and 6 patients were of dorsolumbar injury (D11 -L1). 28 patients with complete SCI received usual treatment: Methleprednisolone and surgery for decompression, stabilization, and realignment of the spine and fourteen patients (only A score on ASIA scale) received cerebroprotienhydrolaste and a protocol of intravenous fluids ensures the spinal cord perfusion pressure augmentation. Group 1 patients who received conventional Methylprednisolone no significant motor

improvements were observed but late sensory improvement was seen after 6 months.

Group 2 patients who received cerebroproteinhydrolyaste in dose of 60 mg two times per day minimum for 3 weeks, significant motor improvement was observed along with sensory improvement.

## RESULTS

We have compared the cerebroproteinhydrolysate group to the conventionally treated group (controlled Group). There was a statistically significant (P value = 0.001) improvement was seen in terms of functional outcome in patients treated with cerebroprotien hydrolysate. These patients have significant motor and partial sensory recovery including the sensation of Touch, Pressure, Vibrant and pain: from A to B scale on ASIA scale. The possible mechanism of cerebroprotienhydrolysate

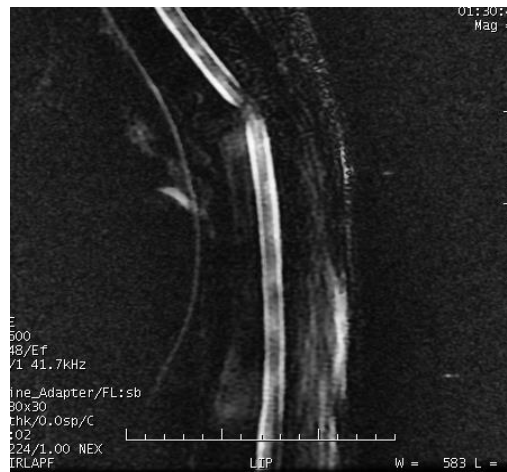
induced Neuroprotection in Spinal Cord injury probably is that cerebroproteinhydrolysate results in marked reduction in blood spinal cord barrier (BSCB) breakdown and edema formation in normal patients after SCI. there are many Neurotrophic factors such on BDNF, GDNF, CNTF or NGF[7,8] which can be used to treat the normal injures but in case of Spinal cord injury (SCI) cerebroproteinhydrolysate induces the neuroprotection, cerebroproteinhydrolysate contusion a combination of various neurotrophic factors, aminoacids, vitamins macronutrients and antioxidant enzymes. Cerebroprotein hydrolysate significantly reduces the blood spinal cord barrier(BSCB) permeability reduces the water content and also reduces the extent of neuronal cell damage inside the cord, therefore dose related cerebroprotein hydrolysate induces neuroprotection inside the cord. Data suggest that a higher dose of cerebroprotein hydrolysate has good results.



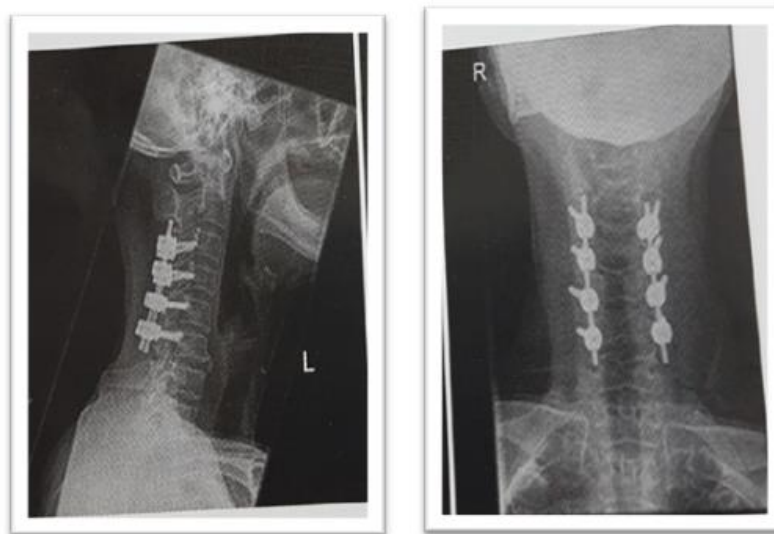
**Fig-01: Dislocation of D5 showing cord posterior cord compression and cord contusion which oedema C4 and C6 + tetraplegiacompression**



**Fig-2: Dislocation of C5 leading severe canal stenosis with cord constriction**



**Fig-3: D5 cord transaction at D5 level**



**Fig-4: Postoperative X-Ray of Cervical Spin**

## DISCUSSION

Immediate hospitalization and early treatment for spinal cord injury within eight hours of injury is of upmost importance patients with complete spinal cord injury have bleak chances of recovery.

If the surgical treatment is needed must be done, the decompression by removing the compressing element, gross alignment must be corrected and spinal stabilization must be done preferably within a period of eight hours.

Niklas Marklund is a an excellent recent material about the Spinal Cord regeneration said that “The current treatment option for patients with SCI are limited and the Neurosurgeon is crucial in the initial management, including the medical stabilization and the timing of surgical treatment “Also he showed that” initial prehospital management of SCI should follow the ATLS Principle including stabilization, airway management and blood pressure control. In specialized center and in intensive care unit (ICU), there is

improvement in patients management with reduction in morbidity with aggressive management of secondary abuse/ insult” Methylprednisolone is not standard of care anymore “optional at the best although could still be considered in view of the lake of other treatment options.

The current recommendation is to treat all the patients of Spinal Cord injury according to the local protocol. If steroids are recommended they should be started within 8 hours of the injury with the protocol of methylprednisolone ie 30 mg/kg as a bolus in 15 minutes and then 5-4 mg/kg/hr for a period of 23 hours and this infusion to be started 45 minutes after the bolus.

The prime and main aim in the management of spinal cord injury is to minimise the direct effect of trauma on spinal cord and to stop or abolish the secondary spinal cord injury,

## CONCLUSION

Initial prehospital management of traumatic acute spinal cord injury is crucial for the morbidity and mortality following acute SCI. For a long time no proper and promising treatment for SCI was available. This study shows that cerebroproteinhydrolyste has beneficial outcomes as immediate neuroprotective therapy and ensuring the spinal cord perfusion pressure augmentation has no complications and the results are promising. Our results suggest that patients with traumatic acute spinal cord injuries when treated with cerebroproteinhydrolysate are benefitted significantly in regards to functional outcome and it can be safely used. Though a large size randomized control trials are required to authenticate its potential benefits.

#### ABBREVIATIONS

SCI= Spinal cord injury

NGF= Nerve growth factor

BDNF= Brain derived growth factor

GDNF= Glial cell line derived Neurotrophic factor

BSCB= Blood spinal cord factor

ATLS= Advance trauma life support

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