

VOLUME 1, ISSUE 2

SEPTEMBER 2009, Rs.100

EVERY 2 MONTHS

PHYSIO**T**IMES

India's first Magazine for Physiotherapists, of Physiotherapists, by Physiotherapists

Marketing Mantra

Getting the financial assistance
to start your own PT centre

Student Corner

Muscle relaxants for the
treatment of spasms
and spasticity

Physio-Yoga &
Stroke rehabilitation
by Dr. Nilima Patel

Physio Speaks
Interview with
Prof. Umasankar
Mohanty

Evidence
based
Clinical
pearls

Expert Speaks

Role of Physiotherapists
in Disaster Management
by Dr. Ali Irani

Reader's Desk

Bharat Natyam &
Physiotherapy - Is
there a correlation?

Review Article

Stroke Rehabilitation:
Adapting research
findings into clinical
practice. Are we ready?

Physiotherapy in

Stroke
Rehabilitation -
Recovery or
compensation?

In this issue <<

Journal Scan
Case Report
News & Events
Best of the Web
Book Review

CASE REPORT



neuroregenerative neurorehabilitation therapy using autologous bone marrow derived Stem cells in concert with intensive Physiotherapy in a case of spinal cord Injury

Author: Dr.Mamta Lohia (B.PT)



Co-authors:

Dr. V. C. Jacob (B.Sc, DPTH, MIAP), Dr. Hema Biju (B.OTH, M.S (O.T), Dr. Omshree Shetty (PhD), Ms. Pooja Vijaygopal (B.Tech), Dr. Prerna Badhe (M.D), Dr. Nandini Gokulchandran (M.D), Dr. Alok Sharma (M.S, MCh)

Institute: NeuroGen Brain and Spine Institute, Surana Sethia Hospital, Suman Nagar, Sion-Trombay Road, Chembur, Mumbai-71

Key Words: Neurorehabilitation, NRRT, Neuroregeneration, Stem Cells

Abstract: Often spinal cord injury is more frequent in younger age groups. Mostly they result from damage caused by traumatic events such as motor vehicle accidents, falls, or gunshot wounds.

The physical, personal, financial and social impact of injury is such that most patients are lost in follow ups or succumb to life-threatening complications associated with spinal cord injury. Thus, Spinal cord injury is a low incidence, high costing disability requiring tremendous changes in an individual's lifestyle.

Here presented is a case of a 22 year old girl who had suffered spine injury due to a road traffic accident 3 years back. She was given

Neuroregenerative Rehabilitation Therapy (NRRT) using autologous bone marrow derived mononucleocytes. Detailed report of her evaluations and therapy is discussed further.



Figure 1: Prior to the therapy at NeuroGen

Introduction: Accidents are the fourth most common cause of death in India after heart diseases, cancer and stroke. Statistics from the NSCID (National Spinal Cord Injury Database) indicate that accidents involving motor vehicles are the most frequent

cause of traumatic spinal cord injury (46%), followed by falls (19.6%), acts of violence (17.8%), recreational sports injuries (10.7%), and other etiologies (6.3%). [Susan B O'Sullivan. Physical Rehabilitation, 5th Edition]

Traumatic spinal cord injury results in the death of multiple cell types at the injury site i.e motor neurons, interneuron, and glial populations. Spinal cord injuries tend to sever the connection of the spinal cord to the brain, compromising the survival of the cord and the survival of all neurons below the injury site.

Therefore, an effective intervention would both restore depleted cell types and rebuild the road for neuronal projections, in particular, the local injury site.

CASE REPORT

Case Report: A 22 year old girl who had suffered spinal cord injury due to road traffic accident and had D5, D6 vertebra fracture was leading a paraplegic life since three years. The fracture was stabilized with a transpedicular instrumentation and Harrington Rods. She was on rehabilitation since then for a year. Two years later she was then given Neuroregenerative rehabilitation therapy .



Figure 2

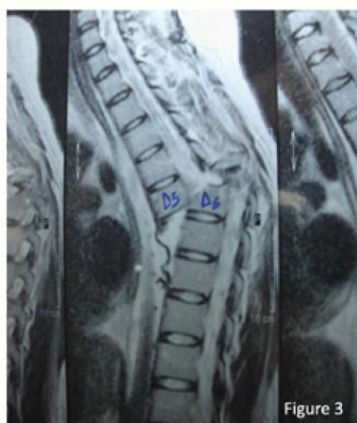


Figure 3

Figure 2&3: MRI of the dorsal spine showing traumatic grade IV anterolisthesis of D5 vertebra over D6 with complete transection

Examination: Prior to therapy, on examination she was found to be hypertonic in both the lower limbs with spasticity of grade III according to modified Ashworths scale. She was hyper reflexic and had sensory loss below T4 level. She had a neurogenic type of bladder and was on indwelling



Figure 4

Figure 4: X-Ray of the dorsal spine showing transpedicular instrumentation with Harrington rods to stabilize D5-D6 fracture.

catheter, since three years.

According to ASIA impairment scale her score was A with complete transection of the cord and no motor or sensory functions preserved in sacral segments S4 and S5. On Functional Independent Measure (FIM) her score on admission was 74 with lot of assistance required for dressing , sphincter activities, transfers and locomotion. For most of her daily activities she was dependent on her care giver.

Neuroregenerative Rehabilitation Therapy (NRRT) protocol involves holistic approach towards the total well being of the patient. NRRT at Neurogen integrates regenerative medicine using intrathecal administration of autologous Bone Marrow derived Mononucleocytes (BMMNCs) and Rehabilitation therapy. Rehabilitation is an integrated approach, which aims to make a disabled person into a "differently abled person" & to accomplish this we have a team comprising of physiotherapists, occupational therapist, urologist, neuro-physician, and neuro-psychologist committed to give the

best health care for people with incurable/intractable neurological disorders & traumatic/non traumatic spinal cord injuries.

Intervention

Neuroregenerative therapy

Bone marrow (100ml) was aspirated from the iliac bone after local anesthesia was administered in the region of the anterior superior iliac spine. Nearly 100 ml of bone marrow was aspirated and collected. The bone marrow was subjected to density gradient separation .Mononucleocytes (MNC) were obtained after density gradient separation. Viable count of the isolated MNCs were taken. The MNCS were checked for CD34+ by FACS analysis. 6.7×10^7 cells/ml were then injected intrathecally in L4-5 using a lumbar puncture needle and catheter.

Rehabilitation Therapy: The therapy was designed according to the patients needs. She was put on vigorous upper extremities strengthening exercises with the help of weights and push up bars. She was made to do Mat exercises which included active rolling, coming to all fours position and maintaining it, bridging activities, abdominal strengthening exercises, dynamic sitting and reach outs to improve trunk control.

There after she was made to wear bilateral push knee splints and high boots with posterior steel shank and was then made to stand in parallel bars. In standing she was made to release her hands off the bars (Knee Ankle Foot Orthoses) and was asked to maintain her balance which thus improved her standing balance eventually. She was also taught transfer techniques by doing push ups she was made to do independent transfers from bed to wheel chair and from wheelchair to toilet seat.

CASE REPORT



Figure 5: Patient is being taught to hike pelvis and attempt to walk in the parallel bars.



Figure 6: Post rehabilitation patient is independently transferring from wheel chair to chair at the same level

She was made to do extensive rehabilitation for a month, which included the above mentioned exercises & in addition was also taught donning & doffing of splints, upper & lower body dressing independently.

Outcome

Post Rehabilitation therapy for 4 weeks, reassessment of the patient showed following improvements. Her spasticity reduced significantly from grade III to grade I (According to Modified Ashworths Scale). She had improved trunk control & could sit without support and perform reach outs. The patient could now stand with the help of a walker with bilateral push knee splints and high boots with posterior steel shank hike her pelvis and walk upto nearly 25 meters independently without getting fatigued. She learned to perform self intermittent catheterization, under the supervision of an urologist and used to perform it independently

every 4-5 hourly. This made her independent in her sphincter activities. She became independent in all her Daily Activities of Personal Hygiene, Transfers, & Dressing activities. On Functional Independence Measure (FIM) her score improved from 74 to 104. She had a sense of well being. Her outlook towards life changed. She enrolled in an institute for further studies & pursued her higher education.



Figure 7: Patient wearing bilateral push knee splints and high boots with posterior steel shank and standing on the parallel bars performing balance activities.

Discussion

Till now the conventional treatment of spinal cord injury included decompression & stabilization of the spine followed by rehabilitation. The functional expectations for patients with spinal cord injury differed according to the level of injury for eg: A patient with D5-D6 level of injury is expected to have independence in bed activities, personal hygiene and mobile wheelchair life. Before coming to Neurogen, the patient was not at all independent in the above mentioned areas. Neuro Regenerative Rehabilitation therapy emphasises on the combination of stem cell therapy & extensive rehabilitation, which in turn gives a boost and direction to the

injected stem cells & patient's will power. Thus, post NRRT and extensive rehabilitation patient achieved much more than expected from her, for e.g. she could now walk with the help of KAFO's and Walker.

Bone marrow derived stem cells (BMSC) are effective in neuronal regeneration from following points: They produce trophic factors in host tissue after transplantation, which is beneficial to the tissue protection and restoration, they have a potential to differentiate into local cells in response to environmental signals and cues, they are known to home onto the site of injury and help in repair, they also promote angiogenesis, thereby acting as conduits for delivery of necessary trophic factors. (Procop DJ, Science 1997)

Apart from their individual impact, research shows that vigorous active exercise enhances the effect of stem cells by: helping the mobilization of local stem cells. (A. Schmidt, S Bierwirth et al Br. J of Sports med 2009 as well as encouraging angiogenesis. Hence, in toto, the concept of NRRT endeavors to combine the impact of neuroregeneration and rehabilitation for a better therapy outcome.



Neurogen Team
Author can be contacted at
mamta@neurogen.in