Outcome in TBI Patients with Early Physiotherapy and Post-discharge Rehabilitation: Indian Experience

Vijayasekhar Venkata Manda[1] Rajesh Pathi[1] K. Hema Swaroop[1] T. Phaneeswar[1] Kadali Satyavaraprasad[1]

[1] Department of Neurosurgery, Andhra Medical College, Chinna Waltair, Visakhapatnam, India

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Address for correspondence Vijayasekhar Venkata Manda, MS, Mch, Department of Neurosurgery, Andhra Medical College, Flat No S-2 Padma Palace Apartments, Opposite Old CBI Bus stop, Chinna Waltair, Visakhapatnam 530003, India (e-mail: nsvijayasekhar@gmail.com).

Abstract

Introduction Traumatic brain injury (TBI) is a major cause of death and disability worldwide and early initiation of physiotherapy with continuing rehabilitation may improve outcomes.

Methods All adult TBI patients with GCS 5–12 admitted from May 2018 to December 2019 were included. Early physiotherapy was initiated before the fifth day of admission and continued post discharge. Patients and families were educated in a rehabilitation program with printed handouts and video clips. All patients are followed up via telephone/video calls after discharge. We assessed the Glasgow Outcome Score (GOS) and disability at 15, 30, and 90 days post discharge, and 180 days follow-up was also suggested but only a few (38) patients reported. Data were compared with matched patients treated in previous years.

Results A total of 1,233 patients were studied. At 3-month follow-up by telephonic and video calls, GOS 5 was noted (63.7%; 174/ 273) in 2019 compared with (41.3%; 41/ 98) in 2018. The number of discharges increased after initiation of physiotherapy and rehabilitation programs (38%; 288/759 in 2019 versus 24%; 115/474 in 2018). Post-discharge deaths were also less (5.9%; 17/288) in 2019 compared with (14.8%; 17/115) in 2018.

Conclusion Early rehabilitation and post-discharge therapy are associated with improved outcomes of TBI patients. Refinements in data collection and communication improve patient follow-up and functional outcomes.

Keywords

- early physiotherapy
- communication
- GOS
- post-discharge rehabilitation
- traumatic brain injury

Introduction

India is the second-most populous country in the world, comprising 29 states and 7 union territories, with a population of 1.38 billion as of January 01, 2020,.[1,2] Traumatic brain injury (TBI) is a leading cause of morbidity, mortality, disability, and socioeconomic loss in India.[3] The increased economy in India led to increased vehicular density due to urbanization and industrialization that has contributed to a significant increase in TBI. Although injuries and deaths occur in all age groups, the majority occur in youth and more often in males.[4]

Approximately 90% of the world's road fatalities occur in low- and middle-income countries,[5] although they only have half of the worlds' vehicles. It is estimated that by 2050, India will have the maximum number of automobiles in the world, overtaking the United States.[6]

Over a quarter of the world's trauma deaths occur in India. It is estimated that nearly 1.5 to 2 million persons are injured and 1 million die every year in the country. Road traffic injuries are the leading cause (60%) of TBIs, followed by falls (20–25%) and violence (10%), with alcohol involvement in 15–20% of TBIs.[7] Unfortunately, along with economic prosperity, data

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suggest an increase of 63% in accident-related deaths between 2004–2013.[4,8]

Road traffic accidents most often affect earning members of the family (20–40 years) and this loss of manpower and productivity affects the entire family directly, severely affecting the country's economy.[9] Pedestrians and motorcyclists are the most common victims of road traffic accidents in India, and this offers an opportunity for improvement.

India and other developing countries face major challenges of prevention, pre-hospital care, and rehabilitation in their rapidly changing environments to reduce the burden of TBIs.[10] Several studies abroad and a few studies from India show that early intervention by rehabilitation improves morbidity (functional outcome) in addition to reducing mortality.[11] Early physiotherapy and post discharge rehabilitation often improve outcomes, reduce post-discharge deterioration, and improve the quality of life. Rehabilitation is the need of the hour, especially in India where the impact of TBIs is huge.

In 2018, a TBI pilot project was initiated in Visakhapatnam, Andhra Pradesh, as a part of studying the effects of head injuries in five selected cities in India. In Visakhapatnam, King George Hospital, a tertiary care teaching hospital is chosen for this study. The objectives of this study are four-fold, including prevention, pre-hospital care with rapid transportation, definitive treatment, and early rehabilitation. Education and involvement by the public and stakeholders is an integrated part of this pilot study. The present study focuses to assess the outcome in TBI patients, with early initiation (before 5 days of admission) of rehabilitation that is continued post discharge. The outcomes in the form of GOS and mortality are assessed and compared with other similar studies.[11]

Materials and Methods

Study design: Prospective and comparative study

Inclusion Criteria

All adult (>18 years) TBI patients with GCS 5–12 admitted to KGH from May 2018 to December 2019 were included in the study.

Exclusion Criteria

Children age < 18 years, patients with GCS <4 and 13–15.

Methodology

Included patients were initiated with early physiotherapy on first post trauma/operative day along with the medical and nursing team in and out of the intensive care unit (ICU) in the acute stage, with the following aims:

Primary objectives:

i. Positioning and turning of the patient (if allowed) to maintain soft tissue length, and prevent pressure ulcer formation.
ii. Regular passive movements to maintain joint range of motion.
iii. Breathing techniques and postural drainage without head tilt, with or without suction to remove secretions (if not ventilated).
iv. To note the vital signs and assess the conscious level periodically, to assist the Neurosurgical team to judge prognosis and plan further management.

Secondary objectives (physiotherapy in the later stage was aimed to):

i. Normalize muscle tone.
ii. Improve strength, endurance.
iii. Improve posture and balance.
iv. Restore function.
v. Assist in the rehabilitation process.

Patient/family members were demonstrated with some basic physiotherapy techniques during the hospital stay to continue after discharge in case of non-availability of rehabilitation facility or professional personnel.

At the time of discharge, patients received a rehabilitation program supported by printed handouts. Few video clippings were shown to family members for better understanding and continuation of rehabilitation exercises at their residence.

Patients were asked to visit the hospital for review. For those who cannot attend, video or telephone call follow-up was made to assess the patient health status at three intervals (15 days, 1 month, and 3 months) from the date of discharge.

On the follow-up call, the patient or the attendee was asked a standard set of questions based on which the patient status can be marked on the GOS scale. The three follow-up GOS scores are compared with the GOS at discharge to grade the level of improvement. The patients and attenders were guided to seek medical attention if any alarming signs were noticed during the follow-up calls.

Results

Of the total of 1,233 patients of TBI treated in the Department of Neurosurgery over a period of 18 months (May 2018–Oct 2019), 560 were included in the present study. Patients treated during the period of May 2018 to December 2018 did not receive physiotherapy, those treated from January 2019 until October 2019 were given physiotherapy and rehabilitation,

At 3-month follow-up, GOS was 5 (63.7%; 174/ 273) in 2019 compared with (41.3%; 41/ 98) patients in 2018. In-hospital deaths were reduced after the initiation of early physiotherapy and rehabilitation program that increased the number of discharged patients (38%; 288/759) in 2019 versus 24% (115/474 in 2018). Post-discharge deaths were also lower in the treatment and education group (5.9%; 17/288) in 2019 compared with 14.8% (17/115) in 2018 (►**Table 1**).

Out of 1,233 patients, 78 died at the hospital, 1,155 were followed up, 76 were lost to follow-up and subsequently, 17 people died during subsequent follow-up. The majority of the patients came for follow-up at 1 month.

Table 1 Monthly data tabulations from 2018 (pre-rehabilitation/education) and 2019 (pre-rehabilitation/education)

	Total patients (3–15)	Total patients (5–12)	Expired in hospital	No. of discharged	Expired after discharge (5–12)	GOS1	GOS2	GOS3	GOS4	GOS5
May 18	55	24	11	13	3	0	0	3	3	4
Jun 18	64	28	13	15	5	1	0	1	4	4
Jul 18	76	36	16	20	3	3	2	1	3	8
Aug 18	68	19	10	9	2	0	0	1	2	4
Sep 18	47	18	4	14	0	4	0	2	3	5
Oct 18	57	19	5	14	0	4	0	2	5	3
Nov 18	56	25	8	17	2	0	1	1	5	8
Dec 18	51	25	12	13	2	0	0	2	4	5
	474	**194**	**79 (40.7)**	**115 (59.2)**	**17 (14.7)**	**12**	**3**	**13**	**29**	**41 (35.6)**
Jan 19	48	27	3	24	3	3	0	3	5	10
Feb 19	88	49	7	42	5	9	1	3	8	16
Mar 19	100	49	8	41	5	7	2	1	9	17
Apr 19	70	24	12	12	0	0	0	1	2	9
May 19	70	27	7	20	1	5	0	0	1	13
Jun 19	58	25	1	24	0	1	1	4	4	16
Jul 19	37	21	1	20	1	1	0	2	4	12
Aug 19	44	28	1	27	0	1	1	0	4	21
Sep 19	61	35	10	25	1	0	2	2	4	16
Oct 19	64	32	8	24	0	0	0	1	5	18
Nov 19	66	27	17	10	0	0	0	0	0	10
Dec 19	53	22	3	19	1	0	0	0	2	16
	759	366	78 (21.3)	288 (78.6)	17 (8.5)	27	7	17	48	174 (60.4)
Total	1233	560								

All patients were advised regular follow-up. A few were lost to follow-up (76). The probable reasons could be far-off places (interior places), financial constrictions, illiteracy, and ignorance.

Some of such patients when contacted over the telephone were informed that the patient was getting local treatment. From such patients, we could get data over the telephone.

For all these patients, only physiotherapy was suggested, none of them received occupational therapy. Those with minor cognitive deficits were advised to continue with pharmacological therapy.

Discussion

Traumatic brain injury is a major problem in developing and developed countries, and even with some success in reducing the incidence, it is still a leading cause of long-term morbidity. The recovery and prognosis of a TBI patient can be improved using available medical facilities and by introducing early physiotherapy with sustained rehabilitation. Contacting the patient and family post-discharge gains their confidence and also provides the team with a better understanding of the long-term outcomes.

Considering the socio-economic status of the patients, the family caregivers were provided with a basic set of exercise printouts and video clippings of basic physiotherapy, which we believe helped the motivated ones to achieve good GOS. Complication recognition such as wound issues, neurologic deterioration, warning signs of aspiration, respiratory distress afforded a more immediate consultation with the rehabilitation team which in some cases decreased the mortality.

A few patients were lost to follow-up during the study (17 in 2018 and 15 in 2019) due to various reasons. Low socioeconomic status and limited education often made correspondence difficult as the patients are from rural areas around the Visakhapatnam district, and very few patients from rural areas returned for an in-person visit (a natural limitation in LMICs).

We deliberately did not study the very severely injured (GCS < 5) and the mild head-injured (GCS > 12) patients in the study. A recent paper suggested similar outcomes after appropriate management in India and the US.[11] Our goal was to see if any improvements in mortality and long-term disability could be recognized using an early and dedicated effort in the TBI patients admitted with GCS 5–12 (to see if the above findings can be partly reversed).

Refinements to our approach with improved communication and data collection are planned. In some cases, the contact information was incorrect or the service was disconnected, making follow-up data collections inconsistent. If feasible, we are considering in-person home health evaluations for the future.

Conclusion

Early rehabilitation and post-discharge education using a home-based therapy program are feasible to improve TBI outcomes. Based on our findings, a dedicated rehabilitation addition to a head injury program should offer positive benefits for patients and their families. We hope to obtain long-term data from our dataset to see the sustainability of the initial positive findings.

Conflict of Interest
None declared.

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