ORIGINAL RESEARCH

Title- Effect of early mobilization in mild and moderate intracerebral bleed patients.

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Abstract

Background. Intracranial hemorrhage (ICH) is acritical and often life-threatening condition characterized by bleeding within the intracranial vault, including the brain parenchyma and surrounding meningeal spaces. Earlymobilizationwas defined as early out-of-bed activities of daily living (ADLs), based on the concepts of very early mobilizationin stroke patients[3] and associated enhanced functional outcomes. Few studies have addressed early out-of-bed mobilization specifically in acute intracerebral hemorrhage (ICH) patients. Patient benefit in such cases is unclear, with early intervention timing and duration identical to those in standard care.

Aims and Objective. This is a prospective, observational, single center study done in Department of neurology GSVM medical college hospital Kanpur in 60 patients of mild to moderate intracerebral bleed patients: 1st March.2022 to 1st march 2024. The main aim of this study is 'Effect of early mobilization in mild and moderate intracerebral bleed patients. We investigated the efficacy of an early mobilization (EM) protocol, administered within 24 to 72 hours of stroke onset, for early functional independence in mild-moderate ICH patients.

Methods .In this study Sixty patients admitted to a stroke center with in 24 hours of ICH were randomly assigned to early mobilization (EM) or standard early rehabilitation (SER). The EM group under went an early out-of-bed mobilization protocol, whiletheSERgroupunderwentastandardprotocolfocusingonin-bedtraining in the stroke center. Intervention in bothgroupslasted30minutespersession,oncea day, 5 days a week. Motor subscales of the Functional Independence Measure (FIM-motor), Postural Assessment Scale for Stroke Patients, and Functional Ambulation Category (FAC) were evaluated (assessor-blinded) at base line, and at 2weeks, 4weeks, and 3 months after stroke. Length ofstayin the stroke enter was also recorded.

Results. mean time to first mobilization aftersymptom onset was 51.60 hours in the EM group and 135. 02 hours in the SER group (*P* <.001). At baseline, the 2 groups weresimilar regarding age, height, weight, gender, hematomavolume, stroke site, lesion location, initial NIHSS score,NIHSSupper-extremity and lower-extremity subscalescores, ICH score at admission, initial FIM-motor score, PASSscore, and FAC level. In addition, the mediannumberof treatment sessions per group during the acute phase was similar: EM 7.0 (range 2-18) versus SER 6.5 (range 2-19)(*P* = .988 between groups). The EM group showed significant improvement in FIM-motor score at all evaluated time points (*P*=.004) and in FAC outcomes at 2 weeks (*P* = .033) and 4 weeks (*P* = .011) after stroke. Length of stay in the stroke center was significantly shorter for the EM group(*P*=.004).

Conclusion-earlymobilizationinastrokecenterwithin24 to 72 hours of stroke onset, specifically in patients with mild or mild-moderateI CH, andusinganEM protocol with standard intervention time and session frequency, may be more effective than standard early rehabilitation in achievingfunctionalindependencewithin3monthsofstroke.

Keywords- early mobilization, standard early rehabilitation, intracerebral hemorrhage.

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Introduction-

Intracranialhemorrhage(ICH)isacriticalandoftenlife-threateningconditioncharacterized by bleeding within the intracranial vault, including the brain parenchyma and surroundingmeningeal spaces. Intracranial hemorrhage is defined as any bleeding within the intracranial vault.The mortality rate is extremely high, reaching approximately 50% within the first month and for those who survive, there is a notable risk of severe disability.In an intensive care unit (ICU), early mobilization, implementingmobilitywithin72hoursofICUadmission,isusedwith the intention of maintaining or restoring musculoskeletal strength and function, and potentially improving over-allfunctionality.[1,2]Recently,earlymobilizationwasdefinedas early out-of-bed activities of daily living (ADLs), based on the concepts of very early mobilization in stroke patients[3] and associated enhanced unctionaloutcomes.[4-6]Veryearlymobilization with higher-frequency sessions in an out-of-bed mobility-based training protocol within 24 hours ofstroke onset may be associated with a worse outcome at 3monthspoststroke,[7,8]butmoststudiesexamined thebeneficial effects of early mobilization commencing within 24 to72 hours of stroke.[4,9-12] However, early mobilization within24 to 72 hours might also worsen any poststroke hypertension and increase the risk of rebleeding, resulting in early deterioration after acute intracerebral hemorrhage(ICH).[13]

ICH is associated with a different pathophysiology and acute management strategythan cerebral infarction, and it is possible that early mobilization may have different effects in patients with ICH rather than ischemia. However, there have been relatively fewfindings in stroke intervention trials of early mobilization involving participants with hemorrhagic stroke.[16,17] Among ADLmeasuresforstrokepatients,theFunctionalIndependenceMeasure(FIM) is a widely used functional performance instrumentdeveloped specifically for inpatient acute rehabilitation.[33] Theaimofthisrandomized,controlledstudywasto investigate if an early out-of-bed mobilization protocolstartedwithin24to72hoursofstrokeonset(comparedwithan early standard rehabilitation protocol), and with intervention time and daily session duration similar to those instandard care, would lead to improvements in functionalindependence measures during the early period in patientswith acute ICH.

Methods-

This is a prospective, observational, single center study done in Department of neurology GSVM medical college hospital Kanpur in 60 patients of mild to moderate intracerebral bleed patients: 1st March.2022 to 1st march 2024. The main aim of this study is ‘Effect of early mobilization in mild and moderate intracerebral bleed patients. Weinvestigatedtheefficacyofanearlymobilization(EM)protocol,administeredwithin24to72hoursofstrokeonset,forearlyfunctionalindependenceinmild-moderateICHpatients.

ICHstrokepatients admitted to the stroke center were screened andconsecutively enrolled after meeting the eligibility criteriafor intensive antihypertensive treatment (primarily intravenous nicardipine infusion). The study was approved bythe institutional review board. Written informed consent was obtainedfrom all participants before randomization. All researchprocedureswereconductedinaccordancewithethicalstandards of the Declaration of Helsinki.Theprimaryendpointwastotalscoreonthemotorsub-scaleoftheFIM(FIM-motor)assessed3monthsafterstroke.

Studysamplesizecalculationswerebasedonalowerestimateof17pointsforminimumclinicallyimportantdifference(MCID)inFIM-motorassessmentbetweenthe2groups at all follow-up points.Twenty-seven subjects pergroup would be required, assuming a standard deviation ofapproximately30%ina2-tailedtest,withan⍰levelof.05andapowerlevelof80%.Atotalof60patientswereincludedtoallowforadropoutrateofapproximately10%.

Patients presented to the stroke center at NTUH ≤24 hoursafter ICH were considered for the study.

Inclusion criteriawere: a first-time primary ICH with unilateral hemiparesis/hemiplegia confirmed via computed tomography; no contraindicationstomobilization(earlyintervention)within72hours of stroke onset (based on the medical team’s clinicaljudgment, systolic blood pressure (SBP) <160 mm Hg atrest,restingheartrate<130bpm,oxygensaturation>92%withoutsupplementation,andnohydrocephalusbeforeinterventionand age 20 to 80 years.[39-41]

Exclusion criteria were secondary ICH due to trauma,surgery,hemorrhagictransformationfromstroke,oranunderlying mass; living alone and unable to complete thebaseline survey because of serious aphasia, language difficulties,orcognitivedeficit;othermedicalconditions,including severe heart failure, acute coronary syndrome,active gastrointestinal blood loss, or lower-limb disorders,preventing early mobilization; and an inability to provideinformed consent or previous enrollment in another intervention trial. In addition, we excluded patients with rapidearly deterioration of symptoms within 24 hours of stroke,those who underwent immediate surgery; and those with aconcurrent diagnosis of rapidly deteriorating disease (eg,terminal cancer).

Study participants were randomized into 1 of 2 groups andunderwent different rehabilitation protocols: early mobilizationwithin24to72hoursofstrokeonset(EMgroup);orstandardearlyrehabilitation(SERgroup).

Afterrandomization,abaselineassessmentofdemographicanddiseasecharacteristics,andamedicalhistorywerecon-ducted for each participant. Outcome measures were collectedatbaseline(preintervention),andat2weeks,4weeks, and 3 months after stroke onset. Secondary outcomes included the Postural AssessmentScaleforStrokePatients(PASS),[51]the FunctionalAmbulation Category (FAC),[52] and the mean duration ofstay in the stroke center. Thedurationofstayinthestrokecenterwasdefinedasthetimefromadmissionto being declared medically fit for discharge by the seniorICUclinician.

Alladverseevents,includingneurologicdeterioration, hypotension, falls, and line dislodgements,duringtheinterventionperiodswererecorded.

Statistical analysis- Results were analyzed using Statistical Package for theSocialSciencesversion22.0(IBMSPSSStatistics,Armonk,NY,USA).Weassessedallpatientswhounderwentatleast1treatmentsession(intention-to-treatprinciple),andintent-to-treat analyses were used for all outcome comparisons.Descriptivestatisticswereexpressedasmean(standarddeviation,SD)forcontinuousvariables,andasmedian(interquartilerange,IQR)forordinalvariables.Number(n)and percent (%) were used for categoric variables. All continuousvariableswerefirstassessedfornormalityusingtheShapiro-Wilk test and transformed when necessary to meettheassumptionofnormaldistribution.Desc riptivestatisticswere used to define relevant patient characteristics.

For total FIM-motor and PASS scores, we explored theassociationsbetweenpotentialfactorsandoutcomesofinterest using a linear mixed model. TheMann-Whitney*U*testwasusedtoidentifyanysignificant differencesinFACmeasurementsbetweenthe2groups.Theindependent-samples*t*testwasusedtoidentifyanysignificantdifferencesinmean duration of stay in the stroke center. All hypothesistests used a significance level of *P* <.05.

Results-

Sixty patients were randomized into 2 groups, with equal numbers (n = 30) in eachgroup. After 3 months' follow-up, there were 2 dropouts ineachgroupduetofamilyreasons,butallpatientswereincluded in the final analysis. Participant characteristics atstudy enrollment are shown in Table 1, which were equivalent in the 2 groups except for 1outcome measure: mean time to first mobilization aftersymptom onset was 51.60 hours(SD14.15)intheEMgroupand135.02hours (SD33.05)inthe SER group (*P* <.001). At baseline, the 2 groups weresimilar regarding age, height, weight, gender, hematomavolume, stroke site, lesion location, initial NIHSS score,NIHSSupper-extremityandlower-extremitysubscalescores, ICH score at admission, initial FIM-motor score,PASSscore,andFAClevel.Inaddition,themediannumberof treatment sessions per group during the acute phase wassimilar: EM 7.0 (range 2-18) versus SER 6.5 (range 2-19)(*P* = .988 between groups). None of the participants ineither group experienced adverse effects, including neuro-logicdeterioration,hypotension,falls,orlinedislodgements, during early rehabilitation or mobilization.

Table 2 shows total FIM-motor score, FIM-motor self-care tasks subscale score, FIM-motor transfers plus loco-motionsubscalescore,andtotalPASSscoreinthe 2groupsat baseline, and at 2 weeks, 4 weeks, and 3 months afterstroke.Inthepreliminaryregressionanalysis fortotalFIM-motor scores, including group, time, and the group × timeinteraction term as fixed effects, and baseline FIM-motorscores as a random effect, no statistically significant differencewasfoundintheinteractionterm(*F*=0.004,*P*=.949).SimilarresultswerenotedfortheFIM-motorself-care tasks subscale (*F* = 0.231, *P* = .631), for theFIM-motortransferspluslocomotionabilitysubscales (*F*= 0.016,*P*= .901),andforPASSscore(*F*=0.235,*P* = .628). Thus, subsequent analysis did not include theinteraction term in the model.

Table1. ParticipantCharacteristics.

Group	SER(n=30)	EM(n=30)	*P*
Age(years),mean±SD	59.33±13.13	58.77±11.68	.860[a]
Height(cm),mean±SD	165.00±9.34	164.73±8.31	.907[a]
Weight(kg),mean±SD	68.67±17.45	71.01±17.41	.606[a]
Gender(female/male),n	8:22	9:21	.774[b]
Lesionsite(right/left),n	11:19	14:15	.400[b]
TheICHscore(0/1)	26:4	24:6	.488[b]
ICHlocation(supratentorial/infratentorial),n	27:	27:3	1.000[b]

	3		
ICHvolume(mL),mean±SD	10.03±6.33	6.65±7.95	.073[a]
Timetofirstphysicaltherapyintervention(hours),mean± SD	47.70±16.77	41.80±17.0 7	.182[a]
Timetofirstmobilization(hours),mean±SD	135.02±33.05	51.60±14.1 5	<.001*[a]
NIHSStotalscoresatadmission,median(range)	6.5(2-15)	5(2-20)	.165[c]
NIHSSscoresatupperextremitiessub scores,median(range)	2(0 -4)	1(0-4)	.173[c]
NIHSSscoresatlowerextremitiessub scores,median(range)	2(0 -4)	1(0-4)	.178[c]
InitialPASSscores,mean±SD	5.37±6.03	7.40±5.05	.162[a]
InitialFIM-motorscores,mean± SD	18.90±9.87	18.53±4.82	.856[a]
initialFAClevel,median(IQR)	0(0 -0)	0(0-0)	.161[d]

Abbreviations:SER,standardearlyrehabilitation;EM,earlymobilization;ICH,intracerebralhemorrhage;ICHscores,TheIntracerebralHemorrhageScore;NIHSS,NationalInstituteofHealthStrokeScale;PASS,PosturalAssessmentScaleforStrokepatients;FIM-motor:motorsubscalesoftheFunctionalIndependenceMeasure;FAC,FunctionalAmbulationCategory;IQR,interquartilerange.

Table2. TheLeveloftheFACMeasureatEachFollow-upAssessmentinBothGroups.

			Group		
Variables	Time	SER(n=30)		EM(n=30)	*P*(GroupEffect)
FAC	2weekspoststroke,median(IQR)	3(0.75-4)		3(3-4)	.033*
	4weekspoststroke,median(IQR)	3(3-4.25)		5(3-5)	.011*
	3-monthfollow-upafterstroke,median(IQR)	4(3-5)		5(4-5)	.08

Abbreviations:SER,standardearlyrehabilitation;EM,earlymobilization;FAC,FunctionalAmbulationCategory;IQR,interquartilerange.
*SignificantdifferencebyMann-Whitney*U*test(*P*<.05).

We found that group effectswere significant at all evaluation times for FIM-motor totalscore (F = 8.859, P = .004), FIM-motor self-care taskssubscale score (F = 8.868, P = .005), and FIM-motortranferspluslocomotionabilitysubscalescore(F=4.997,P=.029).However,nosignificantgroupeffectwas care protocol (dose-matched therapy), specifically in acute ICH patients in a stroke center and starting within 24 to 72hoursofstrokeonset.

OurresultsdemonstratedthattheEMversus SER protocol produced significantly greater FIM-motor scores, and may accelerate ADL restoration within 3monthsofICH.PatientswhounderwenttheEMratherthanSER protocol after ICH also had a shorter duration of stayinthestrokecenterandreportedsignificantly greaterwalking independence within 4 weeks of stroke onset.RegardingevidencesupportingearlymobilizationandspecifictoICHpatients,onepreviousstudyshowedthatICHpatientsadmittedtoneurologywardsorrehabilitationunitswithin48hours,andwhounderwentveryearlyrehabilitation,hadsi gnificantlygreater ADL independence6monthsafterstroke,comparedwithpatientswhostartedrehabilitation>7daysafterstroke.[27]However,theaimofthecurrentstudy wastocomparetheefficacyofearlyrehabilitation,implementedwithin48hoursofstroke,withrehabilitationimplemented≥7dayspost-stroke,ratherthanto compare 2 different protocols started at the same time.[27]Intheprespecifieddose-responseanalysisof AVERT,trendsdisfavored“early”(timefromstrokeonsettofirstout-of-bedmobilization),moreintensiverehabilitationgroupwithhemorrhagicstrokewhencomparedwithusualcare,whichresultedinimprovedfunctionaloutcomes.[54]However,afollow-upanalysissuggestedthatthespecificfrequencyanddurationofmobilizationsessionsneededtobeoptimizedtoavoidtheharmfuleffectsofaggressiveearly mobilization.[54]

In other critically ill patients in ICUs, early mobility hasbeen linked to improved functional status.[57] In the presentstudy,totalFIM-motorscoreandFIM-motorsubscalescorefor self-care tasks highlighted important benefits within 3months after stroke: That is, an EM protocol started within24 to 72 hours of stroke onset promoted greater ADL independenceinmild-moderateacuteICHpatients.Indeed,functional recovery from a stroke event occurs through acombinationofspontaneousandexperience-dependentpro-cesses.[20] In our study, active and unsupported sitting out ofbed constituted early mobilization, with the opportunity tostand. The EM protocol used in our study may enhancemotor experiences or provide greater stimulation than anSER protocol. Moreover, we found early recovery of walking independence in the EM group, for which a similarlysignificant group difference was evident regarding FIM-motorsubscalescorefortransferspluslocomotionabilityat4weeksafterstroke.Thissuggeststhatpatientswhoreceivean EM protocol rather than standard care may be moreactive once transferred to an ordinary ward. Some previousresults showed that ambulation distance at ICU dischargewas greater in patients who received early active mobilizationintheICU,comparedwithpatientsforwhommobilizationwasstartedafterICUdischarge.[58,59]Inaddition,shorterICUstayshavebeenreportedinadultpatientswithprimaryneurologic injury receiving progressive EM therapy.[60] Inthe present study, while the EM protocol was implementedtoreducestrokeimpact,associated reductionsindurationofstay in the stroke center were also observed.

Besides the lack of significant differences in posturalstability at all evaluation time points, we also found no differences between the 2 groups in FAC-level outcomes at 3months poststroke. We cannot rule out the possibility thatother intensive training at the sub-acute stage might haveachievedsimilarimprovementsinwalkingability.However,theICHpatientsinourstudyhadrelativelylowNIHSSandICH scores at admission. Lower NIHSS scores indicatefewer neurologic deficits, and a previous study found thatparesis severity was a predictor of mobility 30 days afterstroke. An ICH score <3 predicts a good outcome at 30days,whichisdefinedasanmRSscoreof≤2.[39]Consistentwith the above, most participants in the present study hadgood posturecontrolaftertheacutephaseandhadwalkingrecoveryat3monthspoststroke;thus,itmay havebeendifficult to detect further progress regarding posture controloutcomes because of a ceiling effect. Another probable rea-sonisthatthestudywasunderpoweredtodetectsuchlong-termdifferencesinwalkingability;eachgroupwasofrelatively small size.

Conclusion-earlymobilizationinastrokecenterwithin24 to 72 hours of stroke onset, specifically in patients withmildormild-moderateICH,andusinganEMprotocolwithstandard intervention time and session frequency, may bemore effective than standard early rehabilitation in achievingfunctionalindependencewithin3monthsofstroke.

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