

Predictors of Miraculous Recovery at 90 Days after Mechanical Thrombectomy for Large Vessel Occlusions

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Introduction

Very good outcomes which can be considered “miraculous recoveries” have been observed in patients presenting with large stroke syndromes who undergo mechanical thrombectomy (MT). In a large sample of stroke patients treated at our stroke center, we aimed to identify patient-level factors that may predict miraculous recovery after MT.

Methods

Consecutive acute ischemic stroke (AIS) patients who underwent MT for large vessel occlusions at a single center between January 2015 and November 2017 were retrospectively identified. The primary outcome measure was modified Rankin Score (mRS) at 90 days after MT, with a “miraculous recovery” defined as a 90 day mRS of 0-2. A multivariate regression model was built to assess factors that predicted miraculous recovery.

Results

A total of 219 patients were included who had an AIS and underwent MT (mean age 71 [SD 15], female 129 [59%]). Of these patients, 72 (33%) showed miraculous recovery and 146 (67%) did not. Indicators that miraculous recovery would not be achieved included older age (odds ratio 0.922; 95% confidence interval [CI] 0.889-0.958; $P < 0.0001$), high initial NIHSS (odds ratio 0.917; 95% CI 0.854-0.984; $P = 0.016$), and high post-procedural NIHSS (odds ratio 0.803; 95% CI 0.740-0.871; $P < 0.0001$). Miraculous recovery was associated with status as a current or former smoker (odds ratio 2.643; 95% CI 1.034-6.759; $P = 0.042$).

Table 1. Demographics	All (219)	mRS 0-2 (72)	mRS 3-6 (146)	P-Values (F & ANOVA)
Demographics n (SD)				
Age	71 (15)	62 (15)	75 (14)	< 0.0001
BMI	28 (8)	29 (8)	27 (8)	0.137
Demographics n (%)				
Female	129 (59)	37 (51)	92 (63)	0.202
Comorbidities n (%)				
Atrial Fibrillation	107 (49)	29 (40)	77 (53)	0.083
Coronary Artery Disease	48 (22)	15 (21)	33 (23)	0.767
Conductive Heart Failure	51 (23)	18 (25)	33 (23)	0.774
Diabetes Mellitus	65 (29)	14 (19)	46 (32)	0.061
Hypertension	88 (40)	30 (42)	58 (40)	0.483
Hyperlipidemia	128 (58)	44 (61)	84 (58)	0.002
Myocardial Infarction	15 (7)	8 (11)	7 (5)	0.552
Obesity	87 (39)	25 (35)	62 (43)	0.370
Smoking	94 (43)	42 (58)	52 (36)	0.0005
Stroke/TIA	36 (16)	7 (10)	29 (20)	0.074
Medications n (%)				
Aspirin	95 (44)	30 (42)	65 (45)	0.689
Coumadin	27 (12)	3 (4)	24 (17)	0.003
NOAC	25 (11)	10 (14)	15 (10)	0.431
Plavix	20 (9)	5 (7)	15 (10)	0.423
Treatment n (%)				
Allylate Administration	119 (54)	46 (64)	73 (50)	0.053
Immediate and Post-Procedural NIHSS n (SD)				
Initial NIHSS	16 (7)	13 (7)	18 (6)	< 0.0001
Post-Procedure NIHSS	32 (13)	4 (5)	28 (19)	< 0.0001
Site of Occlusion n (%)				
Supraclinoid ICA / T-occlusion	37 (17)	7 (10)	30 (21)	0.058
M1	115 (52)	42 (58)	73 (50)	0.177
M2	27 (12)	6 (8)	21 (14)	0.202
Distal MCA	4 (2)	1 (1)	3 (2)	0.790
Trigeminal	15 (7)	7 (10)	8 (6)	0.244
Vertebrobasilar	23 (11)	9 (12)	14 (10)	0.521
Final TICI Scores n (%)				
0-2a	52 (24)	7 (10)	45 (31)	0.001
2b-3	167 (76)	65 (90)	102 (70)	-
Post 72hr Outcomes n (%)				
Death	15 (7)	0 (0)	15 (10)	0.005
Acute Ischemic Stroke	8 (4)	3 (4)	5 (3)	0.784
Perforation Hemorrhage	5 (2)	3 (4)	2 (1)	1.0
Symptomatic Reperfusion Hemorrhage	23 (11)	2 (3)	21 (14)	0.009
Discharge Disposition n (%)				
Home	38 (17)	13 (18)	25 (17)	< 0.0001
SNH/ Acute Rehab/ SNF	108 (49)	32 (44)	76 (52)	0.071
LTAC/ Hospice/ Skilled	73 (34)	5 (7)	68 (46)	< 0.0001

Table 2. Binomial Univariate Logistic Regression Analysis

Risk Factor	Odds Ratio [95% Confidence Interval]	P-Value
Age	0.941 [0.920-0.962]	<0.0001
Sex	0.620 [0.350-1.09]	0.102
DM	0.525 [0.266-1.03]	0.063
HTN	0.459 [0.249-0.847]	0.013
Smoking	2.531 [1.420-4.512]	0.002
Stroke/TIA	0.454 [0.188-1.096]	0.079
Coumadin	0.233 [0.067-0.802]	0.021
tPA	1.769 [0.991-3.160]	0.054
Initial NIHSS	0.800 [0.860-0.943]	<0.0001
Post-Procedure NIHSS	0.795 [0.745-0.847]	<0.0001
Final TICI	4.137 [1.759-9.730]	0.001
Symptomatic Hemorrhage	0.210 [0.061-0.722]	0.013
Supraclinoid ICA / T-occlusion	0.434 [0.180-1.047]	0.063

Table 3. Binomial Multivariate Logistic Regression Analysis

Risk Factor	Odds Ratio [95% Confidence Interval]	P-Value
Age	0.922 [0.889-0.958]	<0.0001
Smoking	2.643 [1.034-6.759]	0.042
Initial NIHSS	0.917 [0.854-0.984]	0.016
Post-procedure NIHSS	0.803 [0.740-0.871]	<0.0001

Conclusions

In a large population of patients who underwent MT for AIS, factors that were found to be independently associated with an increased probability of miraculous recovery (90 day post-procedure mRS 0-2) were younger age, smoking, low initial NIHSS, and low post-procedural NIHSS. These data may help inform discussions with patients and their surrogate decision-makers regarding expectations after mechanical thrombectomy for large vessel occlusions.

Learning Objectives

1. Identify predictive factors associated with miraculous recovery, defined as modified Rankin Score of 0-2 at 90 days, for patients who underwent mechanical thrombectomy following large vessel occlusion in acute ischemic stroke.