

Racial, Socioeconomic, and Gender Disparities in the Presentation, Treatment, and Outcomes of Adult Chiari I Malformations

Max Ostrinsky Krucoff MD; Steven H. Cook MD; Owoicho Adogwa M.D. M.P.H; Siyun Yang MS; Jichun Xie PhD; Alexander Owusu Firempong; Shivanand P. Lad MD, PhD; Carlos Antonio Bagley MD
Dept. of Neurosurgery, Duke; Dept. of Neurosurgery, Rush; Dept of Neurosurgery, Texas



Results

Demographics

	Private (N=226)	Public (N=61)	Total (N=287)	p value
Gender				0.355
Male	41 (18.1%)	8 (13.1%)	49 (17.1%)	
Female	185 (81.9%)	53 (86.9%)	238 (82.9%)	
Race				0.001
Caucasian	183 (81.0%)	37 (60.7%)	220 (76.7%)	
Black	43 (19.0%)	24 (39.3%)	67 (23.3%)	
Age				0.014
Mean (SD)	36.1 (10.9)	42.3 (16.1)	37.4 (12.4)	

Symptoms

	Private (N=226)	Public (N=61)	p value	Female (N=238)	Male (N=49)	p value	Black (N=67)	Caucasian (N=220)	p value
Typical HA	131 (58.0%)	35 (57.4%)	0.934	141 (59.2%)	25 (51.0%)	0.289	33 (49.3%)	133 (60.5%)	0.121
Atypical HA	71 (31.4%)	17 (27.9%)	0.594	73 (30.7%)	15 (30.6%)	0.993	19 (28.4%)	69 (31.4%)	0.762
Neck Pain	81 (35.8%)	24 (39.3%)	0.614	90 (37.8%)	15 (30.6%)	0.341	22 (32.8%)	83 (37.7%)	0.563
Back Pain	26 (11.5%)	9 (14.8%)	0.491	30 (12.6%)	5 (10.2%)	0.640	3 (4.5%)	32 (14.5%)	0.032
UE Weakness	39 (17.3%)	8 (13.1%)	0.438	33 (13.9%)	14 (28.6%)	0.011	16 (23.9%)	31 (14.1%)	0.088
LE Weakness	17 (7.5%)	4 (6.6%)	0.797	14 (5.9%)	7 (14.3%)	0.040	10 (14.9%)	11 (5.0%)	0.013
UE Paresthesias	122 (54.0%)	31 (50.8%)	0.660	126 (52.9%)	27 (55.1%)	0.783	41 (61.2%)	112 (50.9%)	0.163
LE Paresthesias	55 (24.3%)	13 (21.3%)	0.622	60 (25.2%)	8 (16.3%)	0.183	16 (23.9%)	52 (23.6%)	1.000
CN Findings	61 (27.0%)	18 (29.5%)	0.696	72 (30.3%)	7 (16.3%)	0.023	19 (28.4%)	60 (27.3%)	0.877
Dizziness	64 (28.3%)	14 (23.0%)	0.403	65 (27.3%)	13 (26.5%)	0.911	19 (28.4%)	59 (26.8%)	0.876
Ataxia	42 (18.6%)	14 (23.0%)	0.445	44 (18.5%)	12 (24.5%)	0.334	19 (28.4%)	37 (16.8%)	0.052
Syncpe	15 (6.6%)	5 (8.2%)	0.671	17 (7.1%)	3 (6.1%)	0.798	1 (1.5%)	19 (8.6%)	0.053
Avg # of symptoms (SD)	3.2 (1.6)	3.1 (1.6)	0.992	3.2 (1.6)	3.1 (1.5)	0.710	3.3 (1.5)	3.2 (1.7)	0.664

Disparities

Predictors

Variable	Syrinx	Surgery	Complication	Improved outcome	Worse outcome					
	P value	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value	Odds ratio	P value	Odds ratio		
Tonsil Depth	0.208	1.04 (0.98,1.12)	<0.001	1.14 (1.07,1.23)	0.288	0.95 (0.87,1.04)	0.245	1.06 (0.96,1.17)	0.030	0.52 (0.29,0.94)
Private vs public	0.083	0.50 (0.23,1.09)	0.131	0.57 (0.27,1.18)	0.692	1.24 (0.43,3.61)	0.110	2.32 (0.83,6.49)	0.535	0.22 (0.27,39)
Male vs Female	0.844	0.91 (0.37,2.27)	0.453	1.36 (0.61,3.02)	0.445	0.64 (0.2,2.02)	0.975	0.98 (0.3,3.16)	0.142	0.68 (0.47,199.5)
Black vs Caucasian	0.380	1.40 (0.66,2.96)	0.314	0.7 (0.35,1.41)	0.930	0.95 (0.33,2.74)	0.234	2.03 (0.63,6.53)	0.435	0.06 (0.62,91)
Typical Headache	0.385	1.74 (0.5,6.03)	0.001	5.27 (1.93,14.38)	0.113	0.26 (0.05,1.38)	0.475	1.96 (0.31,12.47)	0.860	0.7 (0.7,9590580173701E68)
Atypical Headache	0.093	0.51 (0.24,1.12)	0.896	0.96 (0.5,1.84)	0.921	0.95 (0.33,2.73)	0.617	1.33 (0.44,4.02)	0.209	0.29 (0.29,2)

Predictors

Variable	Syrinx	Surgery	Complication	Improved outcome	Worse outcome					
	P value	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value	Odds ratio	P value	Odds ratio		
Neck Pain	0.664	1.35 (0.35,5.28)	0.486	1.51 (0.47,4.84)	0.395	2.36 (0.33,17.1)	0.380	2.82 (0.28,28.5)	0.965	0.1 (0.1,9931708954625E153)
Back Pain	0.015	3.28 (1.26,8.55)	0.444	0.7 (0.29,1.73)	0.391	0.45 (0.07,2.76)	0.509	1.68 (0.36,7.75)	0.852	1.33 (0.07,27.19)
UE Weakness	0.004	3.51 (1.49,8.28)	0.359	1.5 (0.63,3.57)	0.480	0.49 (0.49,4.54)	0.267	0.52 (0.16,1.66)	0.681	0.46 (0.01,18.58)
LE Weakness	0.262	1.94 (0.61,6.19)	0.139	2.68 (0.73,9.88)	0.512	0.61 (0.39,6.65)	0.941	1.06 (0.24,4.65)	0.367	24.61 (0.02,25845.7)
UE Paresthesias	0.003	6.23 (1.88,20.66)	0.285	1.73 (0.63,4.72)	0.218	0.33 (0.06,1.93)	0.115	0.25 (0.04,1.41)	0.743	0.39 (0.108,0.2)
LE Paresthesias	0.544	0.49 (0.05,4.96)	0.432	0.52 (0.1,2.68)	0.967	0.8 (0.7,0E210)	0.966	32371.59 (0.2,37E213)	0.979	0.1 (0.1,0608188553114E219)
CN Findings	0.199	0.61 (0.29,1.29)	0.502	0.8 (0.42,1.53)	0.085	2.39 (0.89,6.44)	0.223	0.55 (0.21,1.44)	0.477	0.1 (0.55,06)

Predictors

Variable	Syrinx	Surgery	Complication	Improved outcome	Worse outcome					
	P value	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value	Odds ratio	P value	Odds ratio		
Dizziness	0.559	1.43 (0.43,4.71)	0.342	1.64 (0.59,4.54)	0.410	0.47 (0.08,2.84)	0.401	0.49 (0.09,2.62)	0.887	0.7 (0.01,90.82)
Ataxia	0.352	1.48 (0.65,3.37)	0.062	2.11 (0.96,4.63)	0.333	1.66 (0.59,4.65)	0.370	0.61 (0.21,1.8)	0.792	0.57 (0.01,37.74)
Syncpe	0.703	0.75 (0.17,3.25)	0.523	1.48 (0.44,4.96)	0.237	0.26 (0.03,2.45)	0.867	1.17 (0.19,7.08)	0.133	1302.41 (0.11,15089370.41)
Typical HA w/ UE Paresthesia	0.255	2.17 (0.57,8.32)	0.006	5.00 (1.59,15.65)	0.970	0.97 (0.18,5.18)	0.576	0.60 (0.10,3.64)	0.873	0.80 (0.80,0.80)
Neck pain w/ UE Paresthesia	0.467	1.69 (0.41,6.93)	0.442	1.60 (0.49,5.25)	0.750	0.75 (0.12,4.56)	0.744	1.40 (0.19,10.49)	0.935	3.98E-6 (988E-139,1.6E125)
Typical HA w/ Neck pain	0.102	4.03 (0.76,21.42)	0.017	5.92 (1.38,25.39)	0.171	0.20 (0.02,2.03)	0.666	0.61 (0.07,5.71)	0.859	1.55 (0.01,190.59)
UE Paresthesias w/ LE Paresthesias	<.001	13.36 (3.67,48.61)	0.036	3.22 (1.08,9.56)	0.040	0.14 (0.02,0.91)	0.256	0.37 (0.07,2.07)	0.591	3.35 (0.04,275.16)
Typical Headache w/ dizziness	0.727	0.77 (0.17,3.41)	0.024	3.81 (1.19,12.14)	0.193	0.29 (0.05,1.86)	0.125	5.50 (0.62,48.44)	0.798	7.32E-14 (247E-116, 2.17E87)

Introduction

While Chiari I malformations are well described in the literature, there are no studies that directly investigate the role of race, gender, and socioeconomics on presentations and outcomes.

Methods

- Retrospectively reviewed 638 adult patient charts with the diagnosis of Chiari 1 malformation
- 287 patients were included in the study
- Race, gender, insurance status, individual symptoms, combinations of symptoms, depth of cerebellar tonsillar herniation, and presence of syringomyelia were examined as covariates in multivariate logistic regression models