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May 2nd, 12:00 AM

Maternal Morbidity Outcomes in Idiopathic Moyamoya Syndrome in New York State

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BACKGROUND

- Pregnancy is associated with an increased risk of stroke in young women
- Idiopathic moyamoya syndrome (IMMS) is a rare condition characterized by progressive narrowing of large cerebral arteries resulting in flimsy collaterals prone to rupture or thrombosis
- Data are limited on pregnancy outcomes in women with IMMS
- We hypothesized that IMMS would be associated with increased pregnancy morbidity, including stroke

METHODS

- Using the New York State Department of Health Statewide Planning and Research Cooperative System data from 2000-2014 and the International Classification for Diseases Ninth Edition (ICD-9), we identified all women aged 18 and older with diagnoses of IMMS (ICD-9 437.5) who had hospitalizations for delivery at any time either prior, concomitant or subsequent to IMMS diagnosis
- We excluded patients with Down syndrome (ICD-9 758.0), neurofibromatosis type 1 (ICD-9 237.71) and sickle cell disease (ICD-9 282.6) at time of IMMS diagnosis
- We then aggregated all pregnancies for these identified patients occurring between January 1, 1994 to December 31, 2014
 - Pregnancies were considered exposed if IMMS diagnosis occurred prior to or within 1 year of delivery
 - Intermediate unexposed pregnancies were those within 2-5 years prior IMMS diagnosis
 - Unexposed pregnancies occurred 6 or more years prior IMMS diagnosis
- Pregnancy morbidity was defined as admission within 1 year of delivery for any of the Center for Disease Control and Prevention's severe maternal morbidity indicators, including stroke
- We compared the morbidity of IMMS-exposed pregnancies to intermediate unexposed and unexposed pregnancies
- Generalized estimating equations were used to calculate odds ratio (OR) and 95% confidence intervals (95%CI) as well as adjust for women with multiple pregnancies occurring in both exposed and unexposed periods

RESULTS

Fig 1. Study Population Flow Diagram

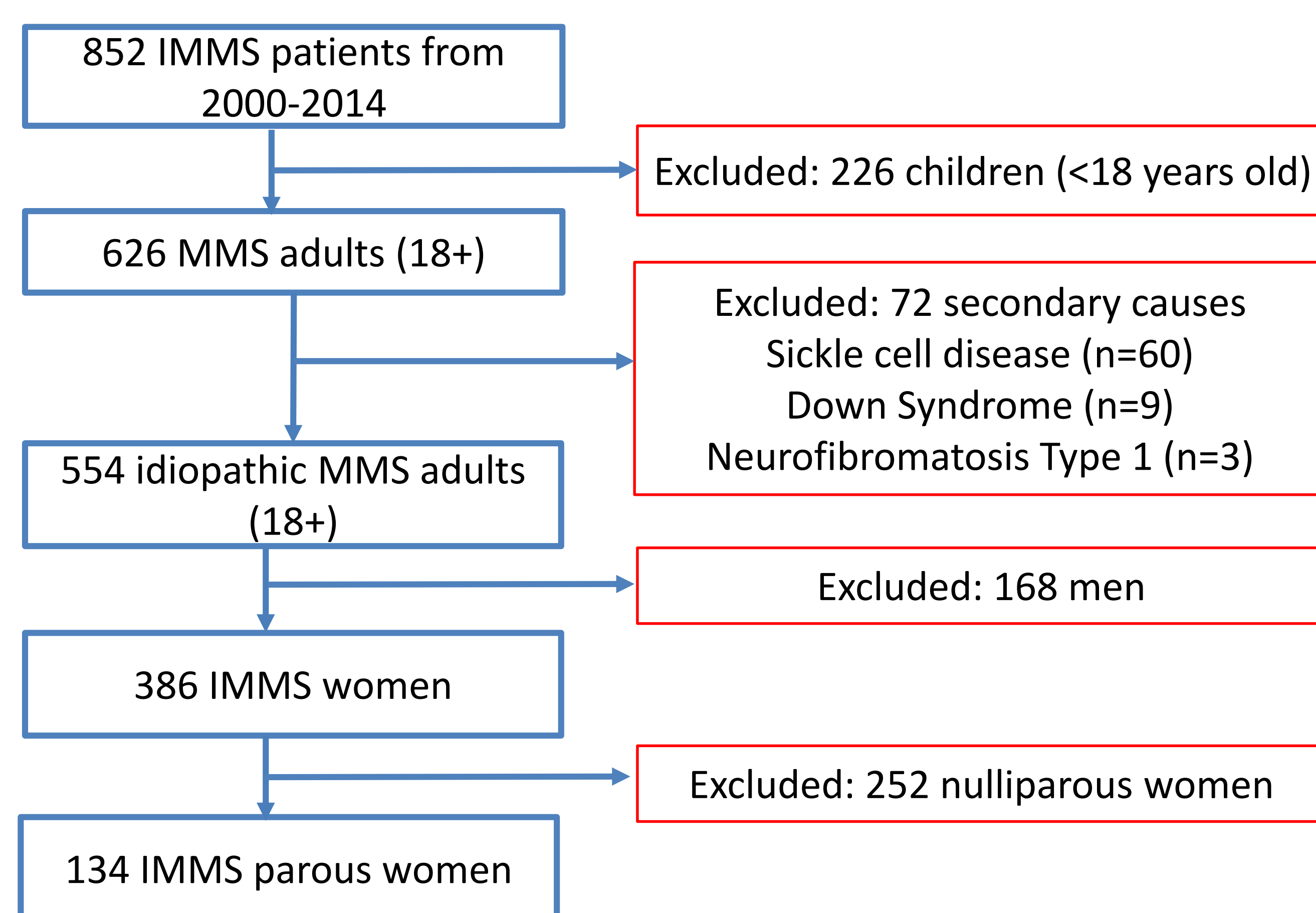
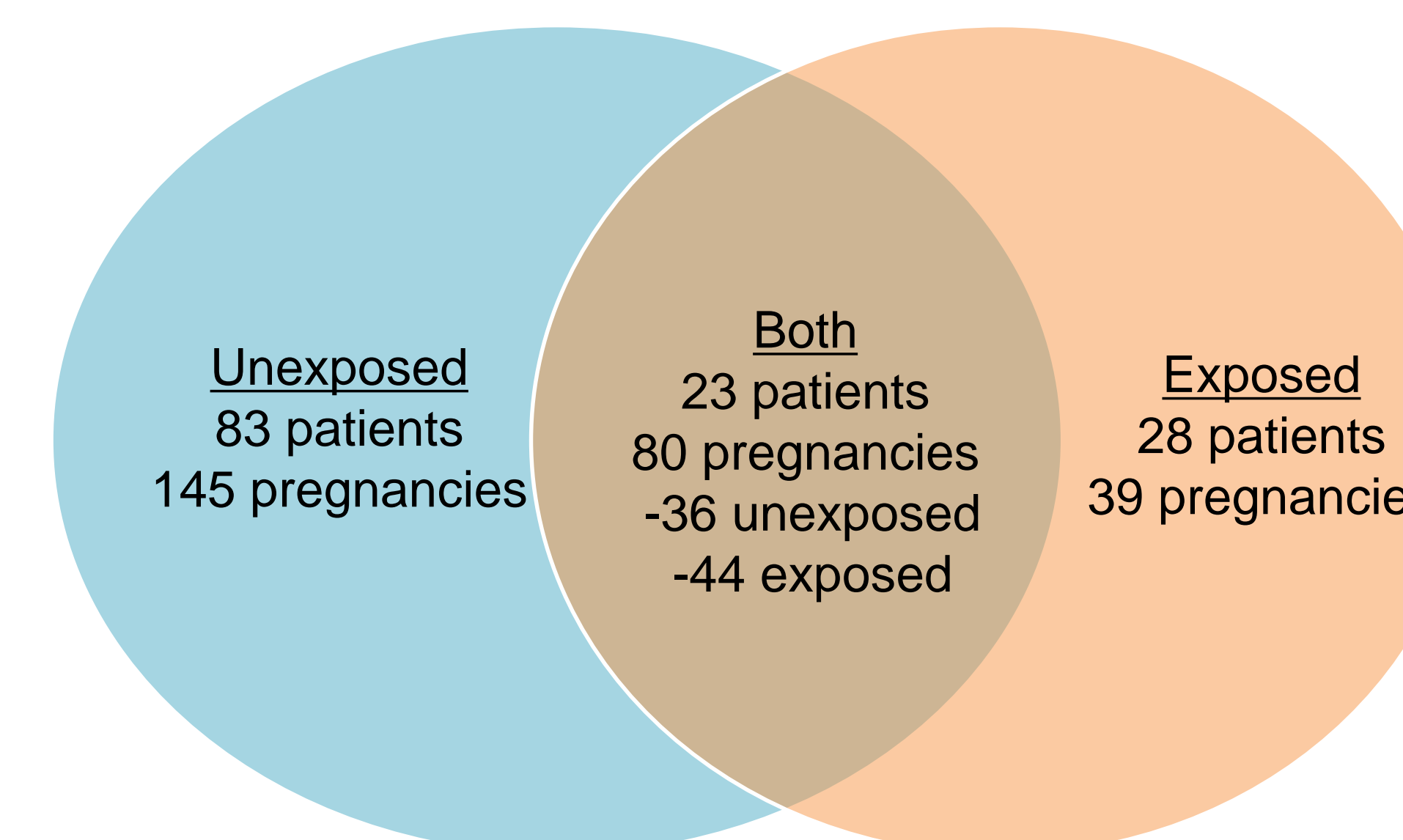


Fig 2. Distribution of exposed and unexposed pregnancies



	Exposed (n=83)	Intermediate Unexposed (n=62)	Unexposed (n=119)	P-value
	N (%)	N (%)	N (%)	
Age (Mean ± Standard deviation)	26.2 ± 7.3	32.2 ± 7.3	39.0 ± 8.0	
Insurance Status				
Medicare/Medicaid	21 (25.3%)	15 (24.2%)	19 (16.0%)	0.01
Private	11 (13.3%)	1 (1.6%)	6 (5.0%)	
Other	51 (61.4%)	46 (74.2%)	94 (79.0%)	
Pregnancy Number				
1 (First pregnancy)	28 (20.9%)	35 (26.1%)	71 (53.0%)	<.0001
2 (Second pregnancy)	21 (33.9%)	12 (19.4%)	29 (46.8%)	
3+ (Third or greater pregnancy)	34 (50.0%)	15 (22.1%)	19 (27.9%)	
CDC indicator	25 (30.1%)	15 (24.2%)	19 (16.0%)	0.001
Stroke	6 (7.2%)	2 (3.2%)	3 (2.5%)	0.02
CDC indicator and/or stroke	29 (34.9%)	17 (27.4%)	21 (17.7%)	0.0003
Death	1 (1.2%)	0 (0.0%)	0 (0.0%)	0.3
ECIC	10 (12.1%)	0 (0.0%)	0 (0.0%)	<.0001
C section	38 (45.8%)	27 (43.6%)	9 (7.6%)	<.0001

	N (%)
Non-Hispanic White	51 (38.1%)
Non-Hispanic Black	27 (20.1%)
Hispanic	19 (14.2%)
Other	24 (17.9%)
Asian	13 (9.7%)

	OR (95% CI)	P-value
Age, CDC and stroke (ref = unexposed)		
Exposed	2.3 (0.8-6.9)	0.1
Intermediate unexposed	1.6 (0.6-4.1)	0.4

RESULTS

- We identified 134 patients with 264 pregnancies in total
- A majority of pregnancies were unexposed (45.1%, n=119) compared to exposed (31.4%, n= 83) and intermediate unexposed (23.4%, n=62)
- There were 23 (17.1%) women that had both exposed and unexposed pregnancies
- Severe maternal morbidity was highest for exposed pregnancies compared to intermediate unexposed and unexposed (34.9% vs. 27.4% vs 17.7%; p=0.0003)
- After adjusting for age and multiple pregnancies, there were no significant odds of severe maternal morbidity or stroke in exposed pregnancies compared to unexposed pregnancies (OR: 2.3, 95% CI: 0.8-6.9)

CONCLUSION

- Pregnancies within 1 year prior or any time after IMMS diagnosis did not have increased maternal morbidity compared to unexposed pregnancies after adjusting for age and clustering of women with multiple pregnancies
- Prospective studies are needed to better characterize increased maternal risks for women with moyamoya syndrome and develop preventive strategies