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## Introduction

- Fibromuscular dysplasia (FMD) is an uncommonly recognized arteriopathy of medium-sized arteries
- FMD primarily affects the renal, carotid, and vertebral arterial beds, though it can also affect the mesenteric and lower extremity arteries. FMD can result in stenosis, aneurysm, or dissection of the affected vessel (Figure).
- While FMD primarily affects middle-aged women, men can also be affected but whether clinical manifestations of FMD vary by sex is unknown.

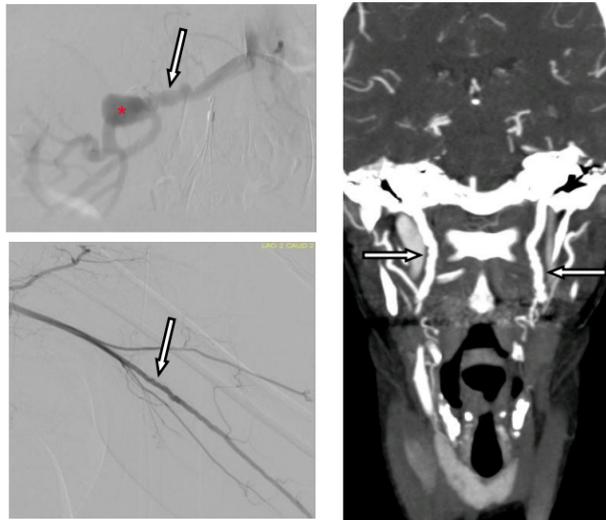


Figure: Arteriography showing typical "string of beads" (arrow) appearance of medial fibroplasia of (A) the right renal artery with associated renal artery aneurysm (\*), (B) left brachial artery, and (C) bilateral internal carotid arteries.

## Methods

- A multi-center registry of FMD patients formed in 2008.
- Michigan Cardiovascular Outcomes Research and Reporting Program (MCORRP) serves as the coordinating center.
- A standardized data collection form including physical examination completed for each patient at the time of enrollment.
- On-line data entry environment (Drupal) into MySQL database maintained by MCORRP.

## Methods (continued)

- Clinical characteristics are reported for the first 615 patients enrolled from 10 U.S. clinical centers.
- FMD diagnosis confirmed with imaging for all patients (angiography, CTA, MRA, or duplex US).
- Summary statistics presented as means  $\pm$  standard deviations and percentages.
- Differences in clinical characteristics by sex determined using Student's t-test and Fisher's exact test (Tables)

## Results

**Table 1: Patient Age and Family History**

	All N=615 No. (%)	Male N=52 No. (%)	Female N=563 No. (%)	P-value
Age at diagnosis (mean $\pm$ SD)	51.9 $\pm$ 13.5	52.1 $\pm$ 16.6	51.9 $\pm$ 13.1	0.94
Family history of hypertension	404/532 (75.9)	27/47 (57.4)	377/485 (77.7)	0.0032
Family history of stroke	227/490 (46.3)	10/39 (25.6)	217/451 (48.1)	0.0072
Family history of aneurysm	105/493 (21.3)	9/42 (21.4)	96/451 (21.3)	1.0
Family history of dissection	10/474 (2.1)	1/39 (2.6)	9/435 (2.1)	0.58

**Table 1:** Women with FMD are more likely to have family history of hypertension and stroke compared to men with FMD.

**Table 2: Presenting Signs or Symptoms**

	All N=615 No. (%)	Male N=52 No. (%)	Female N=563 No. (%)	P-value
Headache	305/537 (56.8)	22/47 (46.8)	283/490 (57.8)	0.17
Pulsatile tinnitus	168/503 (33.4)	4/44 (9.1)	164/459 (35.7)	0.0002
Cervical bruit	123/496 (24.8)	2/44 (4.5)	121/452 (26.8)	0.0004

## Results

**Table 2 (Cont'd): Presenting Signs or Symptoms**

	All N=615 No. (%)	Male N=52 No. (%)	Female N=563 No. (%)	P-value
Neck pain	124/492 (27.2)	6/45 (13.3)	128/447 (28.6)	0.034
Hemispheric TIA	50/523 (9.6)	2/46 (4.3)	48/477 (10.1)	0.29
Stroke	42/532 (7.9)	2/47 (4.3)	40/485 (8.3)	0.57
Hypertension	375/563 (66.6)	36/49 (73.5)	339/514 (66.0)	0.34
Flank/abdominal Pain	85/494 (17.2)	21/48 (43.8)	64/446 (14.3)	<0.0001
Abdominal bruit	53/491 (10.8)	0/43 (0)	53/448 (11.8)	0.009
Renal insufficiency	14/507 (2.8)	4/44 (9.1)	10/463 (2.2)	0.026
Renal infarction	7/100 (7.0)	3/7 (42.9)	4/93 (4.3)	0.0067

**Table 2** Women with FMD are more likely to present with symptoms related to carotid involvement (pulsatile tinnitus, neck pain, or cervical bruit) and men with FMD are more likely to present with symptoms related to renal involvement (flank/abdominal pain, renal insufficiency, renal infarction).

**Table 3: FMD Type**

	All N=615 No. (%)	Male N=52 No. (%)	Female N=563 No. (%)	P-value
Medial fibroplasia	344/577 (59.6)	26/45 (57.8)	318/532 (59.8)	0.87
Intimal fibroplasia	23/577 (4.0)	3/45 (6.7)	20/532 (3.8)	0.41
Perimedial fibroplasia	2/577 (0.3)	1/45 (2.2)	1/532 (0.2)	0.15
Medial plus intimal	5/577 (0.9)	2/45 (4.4)	3/532 (0.6)	0.051
Other/not reported	203/577 (35.2)	13/45 (28.9)	190/532 (35.7)	0.42

**Table 3:** Medial fibroplasia is the most common type of FMD for both men and women. There is no significant difference in type of FMD between men and women.

## Results

**Table 4: Arterial Bed Involvement**

	All N=615 No. (%)	Male N=52 No. (%)	Female N=563 No. (%)	P-value
No. arterial beds (mean $\pm$ SD) Median (Q1-Q3)	1.8 $\pm$ 1.0 1 (1-2)	1.8 $\pm$ 1.2 1 (1-2)	1.8 $\pm$ 0.09 1.5 (1-2)	0.84
Renal	382/507 (75.3)	35/39 (89.7)	347/468 (74.1)	0.032
Extracranial carotid	346/476 (72.7)	15/34 (44.1)	331/442 (74.9)	0.00043
Vertebral	110/329 (33.4)	6/27 (22.2)	104/302 (34.4)	0.29
Mesenteric	63/292 (21.6)	11/32 (34.4)	52/260 (20.0)	0.071
Intracranial Carotid	48/281 (17.1)	8/22 (36.4)	40/259 (15.4)	0.033
Any arterial dissection	123/567 (21.7)	19/48 (39.6)	104/519 (20.0)	0.0031
Any arterial aneurysm	124/559 (22.2)	20/49 (40.8)	104/510 (20.4)	0.002

**Table 4:** Renal and extracranial carotid arteries are the most commonly affected arterial beds, though women have higher rates of extracranial carotid involvement and men have higher rates of renal involvement. Aneurysm and dissection are not uncommon in men and women with FMD but occur more frequently in men.

## Conclusion

- There are important sex related differences in the clinical manifestations of FMD
- Men have higher rates of aneurysm, dissection, and renal artery manifestations
- Women have more cerebrovascular manifestations

## Conflict of Interest Disclosure

**Sponsor:** Fibromuscular Dysplasia Society of America (FMDSA), a non-profit organization.

**Disclosure:** Drs. Gornik and Olin are volunteer medical advisory board members to the FMDSA. Ms. Pamela Mace is a paid employee of FMDSA.