Table 1. Summary of the results for 32 subjects with MGDA.

ID	Sex	Age	MGDA Side	Orbital ON	Prechias ON	Optic Chiasm	CPC/Other	NPH lesion	MMD
P1	M	16M	Right	N	Large Rt	Thickened Rt, angled	+ 2.5 mm	Nodule	
P2	M	13Y	Left	N	Large Lt	Thickened Lt		Nodule	+
P3	F	14M	Bilateral	N Rt Large Lt	N Rt Large Lt	Thickened Lt Trace periph enh	+	Nodule	
P4	F	11Y	Bilateral	Large Rt Small Lt	Large Rt N Lt	Thickened bilaterally	+ 1 mm	Nodule	+
P5	F	11M	Right	Large Rt	Large RT	Thickened Rt, distorted Trace periph enh	+ 1.5 mm	Nodule	
P6	M	14Y	Right	N	N	Distorted	+ 7 mm cephalocele	Nodule	
P7	F	15Y	Left	N	N	Thickened Lt, distorted	+ 1 mm	Tubular	+
P8	M	2Y	Right	Large Rt	Large Rt	Thickened Rt Trace periph enh	+		
P9	M	14Y	Left	N	N	N			
P10	F	3Y	Left	Large Lt	Large Lt	Thickened Lt, distorted	+		
P11	F	16Y	Left	Large Lt	Large Lt	Thickened Lt			
P12	M	10Y	Left	N	Large Lt	Thickened Lt			
P13	F	18M	Left	Large Lt	Large Lt	Thickened Lt, angled	+		
P14	F	6M	Right	Large Rt	N	N			
P15	M	14Y	Right	Large Rt	Large Rt	Thickened Rt			+
P16	M	6M	Left	Large Lt	Large Rt	Thickened Lt		Nodule	
P17	F	11M	Left	Small Lt	Large Lt	Thickened Lt	+	Nodule	
P18	M	21M	Left	N	N	N			
P19	F	12M	Left	Large Lt	Small Lt	Thickened Lt, angled			
P20	F	9M	Right	Large Rt	N	N			
P21	F	4Y	Left	N	N	N	+		
P22	F	8Y	Right	N	N	N			
P23	F	4Y	Left	Large Lt	N	N			
P24	M	2Y	Right	N	N	N	+		
P25	M	5Y	Bilateral	N	N	Angled Lt	+ 2 mm		+
P26	M	2Y	Left	N	N	N	+		+
P27	M	5Y	Left	Small Lt	N	N			
P28	M	2Y	Right	Large Rt	Large Rt	Thickened Rt, angled	+	Nodule	+
P29	M	5Y	Left	Small Lt	N	Thickened Lt, angled			
P30	M	3M	Left	Large Lt	N	N			
P31	F	5Y	Left	Small Lt	Large Lt	Small Rt, Thickened Lt Trace periph enh Lt	Off midline cleft	Tubular	
P32	M	4Y	Left	Large Lt	Large Lt	Thickened lt	+ 3 mm	Nodule	

Abbreviations: ON = Optic Nerve; Prechias = Prechiasmatic; CPC = Craniopharyngeal canal; NPH = Nasopharyngeal; MMD = Moyamoya disease; M = Male; F = Female; N = Normal, Rt = Right; Lt = Left; Periph = Peripheral; Enh = Enhancement; + = persistent CPC with measurement provided for diastatic margins.

MRI protocols: representative parameters.

3T System, 32 to 64 channel head coil:

Brain

1) Sagittal T1 magnetization prepared rapid gradient echo (MPRAGE): Repetition time (TR); 2530 ms; echo time (TE): 3.39 ms; number of excitations (NEX): 1; flip angle: 7°; inversion time (TI): 1450 ms; field of view (FOV): 22 cm; acceleration factor: 2.
2) Axial and coronal fast spin echo (FSE) T2 weighted images (T2WI): TR: 11,730 ms; TE: 89 ms; NEX: 2; flip angle: 120°; FOV: 20 cm; acceleration factor: 2.
3) Axial fluid attenuated inversion recovery (FLAIR): TR: 9000 ms, TE: 137 ms, TI: 2500 ms, NEX: 1, flip angle: 150°, FOV: 20 cm, acceleration factor: 2.
4) Axial diffusion weighted imaging (DWI): directions: 10, slice thickness: 3 mm; TR: 5000 ms; TE: 95 ms; flip angle: 90°; FOV: 22 cm; acceleration factor: 2.
5) Sagittal gadolinium-enhanced (Gd+) fat-suppressed (FS) T1 sampling perfection with application optimized contrast using different flip angle evolution (SPACE): TR: 600 ms; TE: 12 ms; NEX: 1; flip angle: T1 variable; FOV: 22 cm; acceleration factor: 1.

Orbits

1) High-resolution axial and coronal FS T2WI: TR: 6000 ms; TE: 94 ms; NEX: 3; flip angle: 120°; FOV: 16 cm; acceleration factor: 2.
2) High-resolution axial T1WI images: TR: 605 ms; TE: 10 ms; NEX: 2; flip angle: 90°; FOV: 16 cm.
3) Axial REadout Segmentation Of Long Variable Echo trains (RESOLVE) DWI: TR: 5050 ms; TE: 80 ms; flip angle: 160°; FOV: 18 cm; acceleration factor: 2.
4) High-resolution axial and coronal Gd+ FS T1WI: TR: 600 ms; TE: 11 ms; NEX: 2; flip angle: 150°; FOV: 16 cm; acceleration factor: 2.

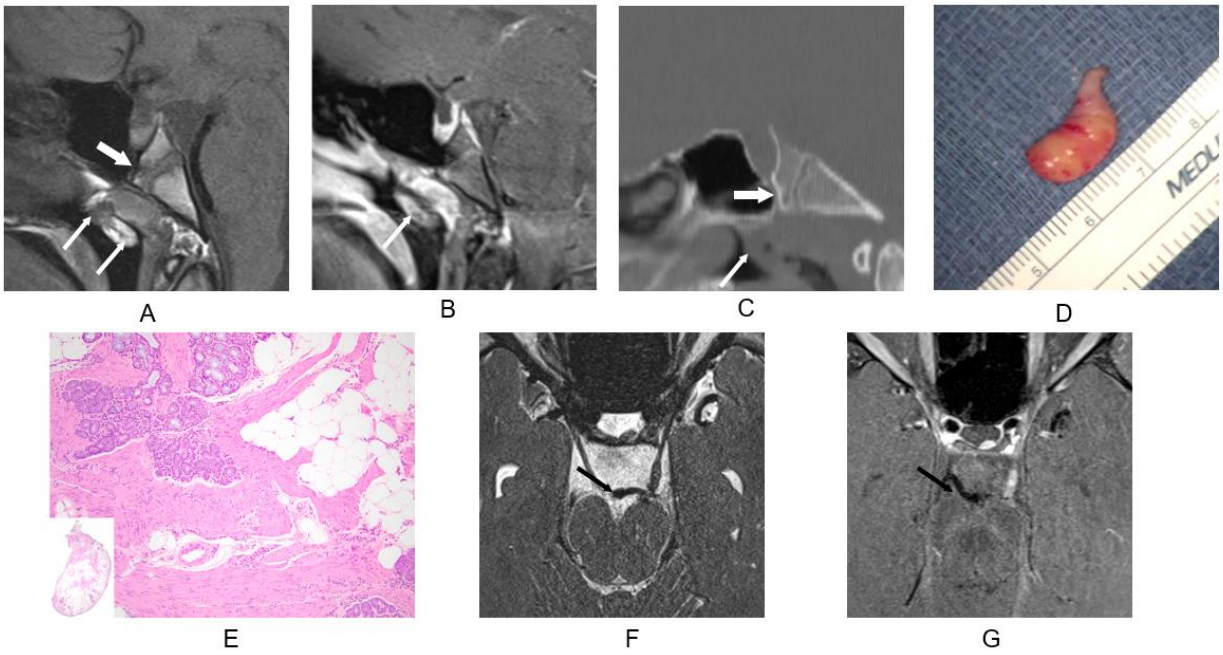
System 1.5T, 18 channel head coil:

Brain

1) Sagittal T1WI TR: 459 ms; TE: 10 ms; Acquisitions: 2; Flip Angle: 90°; FOV: 16 cm.
2) FSE T2WI: TR, 4050 ms; TE, 102 ms; FOV, 20 cm.
3) Axial FLAIR (TR, 10,000 ms; TE, 160 ms; TI, 2200 ms; FOV, 20 cm.
4) Axial DWI: directions = 6, slice thickness: 4 mm; TR: 5322 ms; TE: 80 ms; flip angle: 90°; FOV: 135 cm; acceleration factor: 2.
5) Axial Gd+ FS T1: TR: 546 ms; TE: 9.7 ms; NEX: 2; flip angle: 90°; FOV: 18 cm.

Orbits:

1) High-resolution axial and coronal FS T2WI: TR: 5230 ms, TE: 118 ms, NEX: 3, Flip Angle: 150°, FOV: 16 cm, acceleration factor: 2.
2) Axial and coronal T1WI: TR: 400 ms, TE: 10 ms, NEX: 2, Flip Angle: 90°, FOV: 16 cm.
3) Axial RESOLVE DWI: TR: 4000 ms; TE: 77 ms; NEX: 2; Flip Angle: 180°; FOV: 22 cm; acceleration factor: 2.
4) High-resolution axial and coronal Gd+ FS T1WI: TR: 400-650 ms; TE: 10 ms; NEX: 2; flip angle: 90°; FOV: 16 cm.



Supplental Figure 4 with Pathology. Tubular nasopharyngeal hamartoma and oculomotor nerve abnormality. (A – G) P7; 15 year old female with left MGDA. (A) Sagittal T1 and (B) sagittal contrast-enhanced fat suppressed T1 weighted MR images showing a deep set pituitary fossa and persistent CPC (long, wide white arrow) and heterogeneous, part fatty and part enhancing tubular lesion protruding into the nasopharynx (long, thin white arrows). (C) Reformatted sagittal CT image showing the CPC and tubular nasopharyngeal lesion. (D) Surgical specimen of the resected craniopharyngeal-canal-associated nasopharyngeal mass. (E) Pathological exam (hematoxylin and eosin stain) showed a polypoid mass (inset) lined by respiratory mucosa and containing a disorganized admixture of adipose tissue, seromucinous glands, and ganglionated smooth muscle. (F) Axial T2 SPACE MR showing asymmetric thickening of the cisternal segment of the left oculomotor nerve (black arrow), ipsilateral to the MGDA. (G) Axial fat-suppressed T1 weighted MR shows that the oculomotor nerve enhances avidly with contrast (black arrow). This finding appeared stable at 2 year follow-up.