

Cardiac MRI Transposition of the Great Arteries Studies Template

This template is designed to provide a structured framework for reporting cardiac MRI Transposition of the Great Arteries studies, based on the SCMR Reporting guidelines (JCMR 2024; 26(2):101062).

Section I: General Information:

Administrative:

Site ID: ()

Site of Service: inpatient hospital, outpatient facility, free standing imaging center, ambulatory care office, or mobile unit, other (drop down and free text)

Scanner: Manufacturer, Field strength (Drop down and free text)

Demographics:

Patient Identifiers:

Patient's full name,

Date of birth, age

Medical record number

Scheduling and performance of study

1. Date of procedure ()
2. Primary indication for test ()
3. Referring physician
4. Study quality (Drop down), reasons for suboptimal study
5. Technologist
6. Reporting physician

History and risk factors – (pulled directly from EMR)

1. Height
2. Weight
3. BSA, formula used (drop down)
4. Oxygen saturation
5. Blood pressure
6. **Clinical Indication for the Study:** State the clinical reason for performing the cardiac MRI study. **Optional: Other Relevant Investigations:** Relevant cardiac investigations, such as electrocardiogram (ECG), echocardiography reports, or nuclear imaging results

Non-imaging findings associated with examinations:

1. Contrast agent
 - a. Name,
 - b. Dose, and



- c. Administrative route (default to IV)
2. Sedation (none, conscious sedation, GETA with/without apnea)
3. Additional medications and indication (dobutamine, isoproterenol, lidocaine), dose, drip/bolus
4. Acquisition (breath-held, free breathing)
5. Limitations/complications

Section II: General Techniques:

Listing of sequences used (drop down to pick and choose)

- i. Cine
- ii. Velocity-encoded / phase contrast cine
- iii. FSE/black blood imaging*
- iv. MR contrast angiography vs 3D whole heart sequence (SSFP/GRE)
- v. Tagged and other strain-encoding cine*
- vi. T1- and T2-weighted imaging (T1w; T2w)*
- vii. Quantitative T1 and T2 mapping*
- viii. Myocardial perfusion*
- ix. Late gadolinium enhancement*
- x. 4D flow imaging*

*As needed clinically/with IV placement

Method of acquisition: Study was performed using above listed sequences with imaging in short axis, long axis, outflow tract orthogonal planes using 2D/ 3D data sets.

Software used to analyze the study:

Section III: Findings:

Situs, segmental anatomy:

Cardiac position (drop down to pick and choose):

- I. Levocardia
- II. Mesocardia
- III. Dextrocardia
- IV. Dextroposition

Apex position (drop down to pick and choose):

- I. Leftward
- II. Midline
- III. Rightward
- IV. Dextroposition

Great artery position (aorta relative to PA, drop down to pick and choose):

- I. Normal



- II. Aorta rightward
- III. Aorta leftward
- IV. Aorta anterior
- V. Aorta posterior
- VI. Side-by-side, aorta rightward
- VII. Side-by-side, aorta leftward

Segmental (drop down to pick and choose, if applicable):

Atrial: S, I, A, X

Ventricular: D, L, X

Great artery: S, D, L, I, X

Concordance (drop down to pick and choose):

AV: Concordant, discordant, concordant after repair

VA: Concordant, discordant, concordant after surgical repair

Systemic venous anatomy:

SVC: Normal to RA, Present to LA, absent

IVC: Normal to RA, Present to LA, interrupted

LSVC: Absent, present to CS, present to LA

Innominate vein: Present, absent, small

If atrial switch: SVC limb: size, stenosis/narrowing, location of narrowing

IVC limb: size, stenosis/narrowing, location of narrowing

Pulmonary venous anatomy:

Type out: Normal to left atrium, TAPVR to (innominate vein, SVC, IVC, coronary sinus, etc),

PAPVR of (specific veins) to (cardiac structure), Ipsilateral veins (right to RA, left to LA)

Pulmonary vein stenosis/narrowing: Present (specific veins), absent

If atrial switch: Pulmonary venous baffle: Patent, Non-obstructed, Obstructed

Atrium:

Right atrium: dilated (mild, moderate, severe), normal

Left atrium: dilated (mild, moderate, severe), normal

Atrial appendages: Normal, juxtaposition to left/right, bilateral right, bilateral left

Atrial communication: present, absent

If present: type (PFO, secundum ASD, SV ASD, primum ASD, common atrium), size (small, moderate, large)

If atrial switch: Baffle position (hemi-Mustard, Mustard, Senning)

Evidence of baffle leak: Yes, no, location

AV valves:

Mitral Valve: Normal/increased thickness, Normal/decreased mobility, No/mild/moderate/severe regurgitation visually. No stenosis visually

Tricuspid Valve: Normal/increased thickness, Normal/decreased mobility, No/mild/moderate/severe regurgitation visually. No stenosis visually

Optional free text

Left ventricle:

Drop down:

Size: Small, Normal, Dilated, degree of dilation - (drop down to pick and choose)

Wall thickness: Thin, Normal, Hypertrophied - (drop down to pick and choose)

Systolic function: Normal, Decreased, Mildly decreased, Moderately decreased, Severely decreased. (drop down to pick and choose)

Aneurysms: If present, should be defined as true or false and described further

Regional wall motion: septal flattening, described qualitatively especially in relation to the septum

Right ventricle:

Size: Small, Normal, Dilated, degree of dilation - (drop down to pick and choose). RV:LV volume ratio

Wall thickness: Thin, Normal, Hypertrophied

Systolic function: Normal, Decreased, Mildly decreased, Moderately decreased, Severely decreased. (drop down to pick and choose)

Aneurysms: If present, should be defined as true or false and described further

Ventricular septum:

VSDs: No residual, residual + size, additional VSDs

Valves: - (drop down to pick and choose)

Neo-Aortic Valve: Tricuspid/ Bicuspid/ functionally bicuspid/ other/unknown, Normal/increased thickness, Normal/decreased mobility, No/mild/moderate/ severe regurgitation visually, degree of regurgitation (RF% by PC, volumetric analysis if able). No stenosis visually

Neo-Pulmonic Valve: Presence/absence, Normal/increased thickness, Normal/decreased



mobility, No/mild/moderate/ severe regurgitation visually. Degree of regurgitation (RF by PC, volumetric analysis if able). No stenosis visually

Outflow tracts:

RVOT: unobstructed, obstructed, dilated

LVOT: unobstructed, obstructed, dilated

Pulmonary arteries:

MPA: Location relative to chest wall/aorta, dilated (degree), hypoplastic (degree), absent.

Discrete obstruction/narrowing, present/absent stent

Branch Pas: Position relative to the aorta (Lecompte), Confluent/non-confluent, orientation relative to each other

RPA: dilated (degree), hypoplastic (degree), absent. Discrete obstruction/narrowing (AP/lateral vs left/right), present/absent stent

LPA: dilated (degree), hypoplastic (degree), absent. Discrete obstruction/narrowing (AP/lateral vs left/right), present/absent stent

Flow differential: QpR:QpL (PA flows): x:y%, QpRPV:QpLPV (pulmonary vein flows): x:y%

Aorta:

Aortic root: Normal, dilated, hypoplastic

Aortic anastomosis: Narrowed, not narrowed, dephasing artifact

Ascending aorta: Normal, dilated (degree), hypoplastic (degree)

Arch branching pattern: Left, left normal branching, left aberrant subclavian, right, right mirror image branching, right aberrant subclavian

Arch appearance: Dilated, hypoplastic, coarctation (degree, location)

Coronary arteries:

RCA following re-implantation: Origin, course, proximal obstruction

LCA following re-implantation: origin, course, proximal obstruction

L circumflex: origin (from RCA vs LCA), course

Pericardium: (drop down to pick and choose)

Thickness – normal/ increased

Effusion – None/ trivial/ small/ moderate/ large

Pleural effusion: (drop down to pick and choose)

Present/ Absent



If Present,
Size: Trivial/ Small/ Moderate/ Large
Location: Right/ Left

Qp:Qs

Qp:Qs is x:1 based on (great artery flow, volumetric analysis, venous return)

Myocardial Perfusion: Evidence/no evidence of perfusion defects on first pass perfusion,
location (if present)

Late gadolinium enhancement (LGE): (drop down to pick and choose)

Late gadolinium enhancement imaging of the myocardium is normal. No evidence of scar, infiltration or infarction.

(Or)

Late gadolinium enhancement imaging of the myocardium is abnormal.

Subepicardial/ intramural/ subendocardial/ transmural enhancement is present, involving (i. $\leq 25\%$ ii. 26% to $\leq 50\%$ iii. 51% to $\leq 75\%$ iv. 76% to 100%) of the transmural thickness in the (segments) in Location: Reference location of segments for LV and RV.

Total mass of LGE tissue (optional): grams (g) and (%) percentage relative to the total myocardial mass.

Pattern of involvement is:

Subendocardial/ Transmural and is indicative of Ischemic injury (myocardial infarction)

Epicardial/ Midmyocardial and is indicative of Non ischemic injury or infiltration (myocarditis, hypertrophic cardiomyopathy, sarcoidosis, etc.)

Advanced tissue characterization if performed: (drop down)

i. Global or regional native myocardial T2*: decreased/ normal value

ii. Global or regional native myocardial T1: increased/ decreased/ normal value

iii. Global or regional native myocardial T2: increased/ decreased/ normal value

iv. Global or regional ECV (extra cellular volume fraction): increased/ normal value absolute value (%) - optional

Findings are within normal limits, suggestive of myocardial iron overload, myocardial edema, infiltrative cardiomyopathy, other - (drop down to pick and choose)

V. Extra-cardiac findings: None/ Other

Quantitative assessment:

Ventricular volumes (Z-scores calculated using [insert reference])



Heart rate (bpm)

Left Ventricle:

- LV end-diastolic volume (LVEDV) (Z-score):
- LVEDV index=LVEDV/body surface area (BSA):
- LV end-systolic volume (LVESV) (Z-score):
- LVESV index=LVESV/BSA:
- LV stroke volume (LVSV):
- LV ejection fraction (LVEF):
- LV cardiac output (LVCO):
- LV cardiac index (LVCI):
- LV mass (LVM) (Z-score):
- LV mass indexed (LVM/BSA):

Right Ventricle:

- RV end-diastolic volume (RVEDV) (Z-score):
- RVEDV index=RVEDV/body surface area (BSA):
- RV end-systolic volume (RVESV) (Z-score):
- RVESV index=RVESV/BSA:
- RV stroke volume (RVSV):
- RV ejection fraction (RVEF):
- RV cardiac output (RVCO):
- RV cardiac index (RVCI):
- RV mass (g): (Z-score):
- RV mass indexed (g/m²):

Cardiac flows:

Aorta - Cardiac Output [] L/min at a heart rate of [] beats per minute

Forward [] mL, Reverse [] mL, Net [] mL Regurgitant fraction [] %

Main pulmonary artery - Cardiac Output [] L/min at a heart rate of [] beats per minute

Forward [] mL, Reverse [] mL, Net [] mL Regurgitant fraction [] %

Right pulmonary artery - Cardiac Output [] L/min at a heart rate of [] beats per minute

Forward [] mL, Reverse [] mL, Net [] mL Regurgitant fraction [] %

Left pulmonary artery - Cardiac Output [] L/min at a heart rate of [] beats per minute

Forward [] mL, Reverse [] mL, Net [] mL Regurgitant fraction [] %

Optional flows:



SVC - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

IVC - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

Descending aorta - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL Regurgitant fraction [] %

LUPV - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

LLPV - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

RUPV - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

RLPV - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL, Reverse [] mL, Net [] mL

Mitral valve - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL

Tricuspid valve - Cardiac Output [] L/min at a heart rate of [] beats per minute
Forward [] mL

AV valve regurgitation (if significant, PC imaging performed):

Tricuspid valve: [] % by comparing AV valve inflow volume to the aortic net stroke volume, or [] % comparing the ventricular stroke volume to the aortic forward stroke volume.

Mitral valve: [] % by comparing AV valve inflow volume to the aortic net stroke volume, or [] % comparing the ventricular stroke volume to the aortic forward stroke volume.

Measurements: (Measurements made from the contrast MRA/non contrast MRA/cine images in (systole/diastole/unspecified))

Neo-aortic valve annulus (cm): [] x [] (measurement made from MRA/cine imaging)

Aortic mid-sinus(cm): [] x [] x [] (cusp to commissure), [] x [] x [] (cusp to cusp) (measurement made from MRA/cine imaging)

Aortic sinotubular junction(cm): [] x [] (measurement made from MRA/cine imaging)

Ascending aorta anastomosis(cm): [] X [] (anterior-posterior x right-left)

Ascending aorta(cm) at the level of the RPA: [] X [] (anterior-posterior x right-left)



Proximal transverse arch (cm, proximal to left common carotid): [] X []

Distal transverse arch (cm); proximal to LSCA): [] X []

Aortic isthmus (cm): [] x [] (anterior-posterior x right-left)

Descending aorta at the diaphragm(cm): [] x [] (anterior-posterior x right-left)

Right ventricular outflow tract (cm): [] x [] (right-left x superior-inferior)

Neo-pulmonary valve: [] x [] (right-left x superior-inferior)

Main pulmonary artery(cm): [] x [] (right-left x superior-inferior) proximal [] x [] (right-left x superior-inferior); mid [] x [] (right-left x superior-inferior); distal [] x [] (right-left x superior-inferior) , MPA length (annulus to bifurcation)

Right pulmonary artery(cm): Proximal [] x [] (right-left x superior-inferior) (Z-score []). Mid (between aorta/SVC): [] x [] (right-left x superior-inferior). Distal [] x [] (right-left x superior-inferior) (Z-score [])

Left pulmonary artery(cm): Proximal [] x [] (right-left x superior-inferior) (Z-score []). Mid [] x [] (right-left x superior-inferior) (Z-score [])

Impression:

X year old male/female/non-binary with history of TOF s/p (repair type)

1. LV size/function
2. RV size/function
3. Description of RVOT/neo-pulmonary valve/MPA, degree of regurgitation
4. PA appearance, flow differential
5. Aorta, dilation of root/ascending aorta
6. Neo-aortic regurgitation
7. Perfusion defects, if applicable
8. LGE, if applicable