SMRT Student Scope Submission

Title and Author(s)

Title: Cardiac MRI Imaging

Authors: Bridget Pomponio

Supervisor Name: Anthony Festa R.T. (R) (MR)
Hospital of the University of Pennsylvania

Date of Submission: 02/14/07

Introduction or Patient History

59 year-old male with a history of renal cell cancer, status post right nephrectomy. A cardiac MRI was ordered to evaluate a right atrial mass seen on CT and echocardiography.

Patient Preparation and Scan Set up

The exam was completed on a Siemens Avanto 1.5 Tesla scanner. The patient was screened for any ferrous metal objects in or on his body prior to beginning the exam. The patient was placed supine on the table.

The technologist placed EKG leads on the patient's chest to monitor his heart rhythm. It is very important to obtain good skin contact, so the patient's chest was shaved prior to applying the leads on his skin. EKG leads allow the technologist to perform cardiac gating. Cardiac gating allows MR image acquisition to be obtained during a constant portion of the cardiac cycle which helps to avoid image motion. The objective of cardiac gating is to acquire an R wave that is substantially larger than the T or S wave shown on the EKG. The images are obtained during the R to R interval, which provides the best image quality.

Cardiac gating can be difficult in the magnetic environment. This is because the blood flow in the heart produces additional voltage in the presence of the magnetic field which is known as the magneto-hydrodynamic effect. Once the patient enters the magnet, additional noise caused by the magnetic field may obscure the R wave. The technologist may need to reposition the EKG leads to reduce this effect.

The body array coil was placed on the patient's chest. The spine coil was also used. The power injector was filled with 40 ml of Omniscan gadolinium and 40 ml of saline, which would be administered to the patient during the exam. The patient was given a headset to wear, so he could hear the breathing instructions the technologist would give him during the exam. The patient was also provided with an emergency ball so that he could contact the technologist if needed.

Fat-suppressed t-1 weighted gradient echo images were obtained before and after the intravenous administration of gadolinium. First pass perfusion and recovery delayed enhancement sequences were also obtained.

MR Imaging Parameters

Series	Sequence	TR (ms)	TE (ms)	T/S	Matrix	NX
1	3 Plan Loc iPAT	337.1	1.16	8	256x256	1
2	Axial Haste	520	44	5	256x256	1
3	VLA trufi cine FourC	29.6	1.3	6	192x192	1
4	WholeHeart	29.6	1.3	6	192x192	1
5	Ax 2d FS	172	2.3	6	192x256	1

Findings and Discussions

According to the patient report, “There is a large right ventricular mass, with a broad base attachment to the free right ventricle wall near the anterior tricuspid leaflet insertion. The majority of the mass demonstrates no definitive contrast enhancement. There is, however, a small area of delayed enhancement near the tricuspid valve attachment, likely reflecting fibrosis, but viable tumor cannot be completely excluded. There is moderate tricuspid regurgitation related to incomplete leaflet coaptation caused by thrombus”.

Conclusions

Cardiac MRI is a useful tool in diagnosing both acquired and congenital heart disease. By using cardiac MRI, physicians are able to obtain information often obtained by a number of modalities in a single exam.

MRI is a useful tool in evaluating masses in the heart. Cardiac tumors are extremely rare and the majority of them are benign. Most tumors will enhance with gadolinium on MRI. This is useful in differentiating them from thrombus, which will not enhance, as seen on this patient. The most common mass of the heart is thrombus.

Although this patient had extensive metastatic disease, his physicians could use the information from this study to aide in his treatment plan.

References

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