Usefulness of Multidetector Computed Tomography Angiography (MDCTA) in hemophilic patients previous to embolization of the middle geniculate artery (MGA)

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INTRODUCTION

The knee is the most frequently affected joint in patients with hemophilic arthropathy. This is caused by repetitive intra-articular bleeding and synovitis, which damage it's osseous and cartilaginous structures, leading to permanent sequelae and disability in the affected patients. Due to the fact that patients in the pediatric age are the most affected, prevention/blockage of repetitive bleeding is of utmost importance as to avoid increased physical and psychological damage in them.[1]

MDCT is a non-invasive method that obtains high-resolution images of great diagnostic quality, it's fastness allows us to properly evaluate vascular structures during their arterial phase. Post-processing techniques such as maximum intensity projection (MIP), volume rendering (VR) and bone suppression facilitate vascular analysis. [2]

In this exhibit, we evaluate the efficacy of MDCTA as to identify the medium geniculate artery (MGA) previous to its embolization in hemophilic patients. Embolization of the MGA avoids further bleeding and subsequent increased osteoarticular damage to the knee.

OBJECTIVE

Evaluate the efficiency of MDCTA as to identify the MGA in hemophilic patients.

METHOD

From March 2009 to June 2011, nine hemophilic patients with recurrent bleeding in the knee were referred from the Centro de Enseñanza de Hemofilia to the UNEME de Imagenologia de Villahermosa in order to perform bilateral popliteal artery (PA) MDCTA.

These studies were done in a 64-row CT scanner. The images obtained were processed with MIP and VR techniques.

Visualization, caliber and length of each MGA were evaluated. The degree of knee damage was graded according to the Arnold-Hilgartner classification (AHC). [3]

Radiation dose received was also documented.

RESULTS

1. In 16 of the 18 knees the MGA was visualized (88.8%).
2. Two MGA arose directly from the PA.
3. Anatomical variants found were:
   a) 12 MGA arose directly from a common trunk as the superior geniculate artery (SGA).
   b) In 2 patients, 2 MGA's were found: 1 arose from the common trunk and the other from the PA.
4. Caliber and length of the MGA were related to the degree of articular damage.
5. MGA origin and anatomy were well depicted with both techniques, VR and MIP.
6. Mean radiation dose per study was 454 mGy.

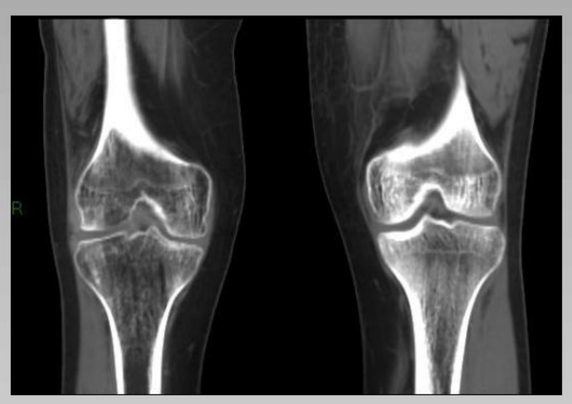

Fig. 1

Coronal knee CT (bone window) demonstrate joint changes AHC grades II-III in the right knee. Left knee is normal.

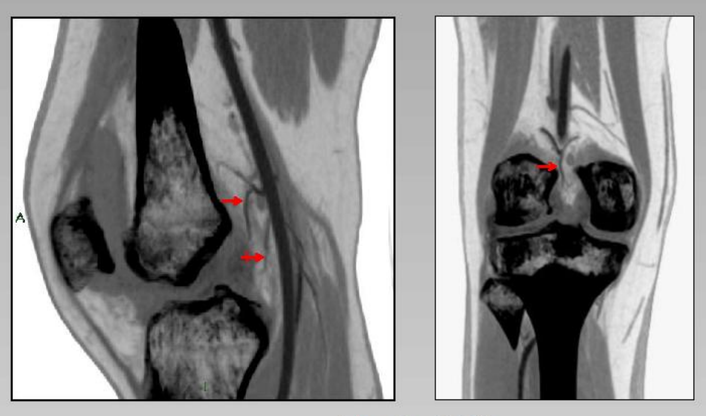

Fig. 2a & 2b

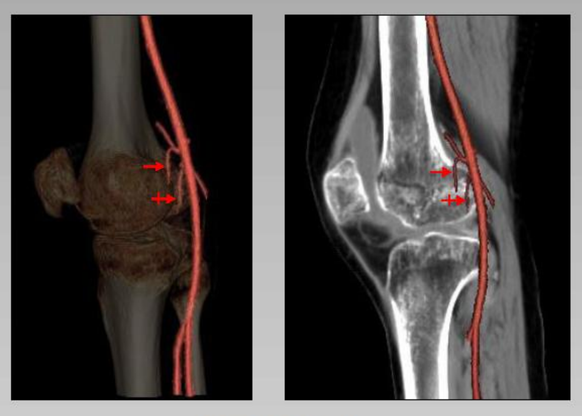

Fig. 3a & 3b

Fig. 2 and 3. Joint effusion and 2 MGA's.
2a sagital and 2b coronal PA MDCTA MIP technique. 3a and 3b sagital VR and fusion techniques.
Techniques mentioned clearly depict two MGA's, one originates from the common trunk for the SMG and MGA (→), the second directly from the popliteal artery (↔).

TABLE

No.	AGE	SEX	MGA	VISUALIZATION	ORIGIN	CALIBER (mm)	LENGHT (mm)	ARNOLD-HILGARTNER CLASSIFICATION	RADIATION DOSE (mGy)
1	12	M	RIGHT	YES	TRUNK	2.5	13	IV	-
			LEFT	YES	PA	1.7	27.8	II	
2	7	M	RIGHT	YES	PA	0.7	4.3	II	510.54
			LEFT	NO	-	-	-	-	
3	17	M	RIGHT	2	T & P	1.5/1.0	20.3/21.5	II	445.11
			LEFT	NO	-	-	-	-	
4	15	M	RIGHT	YES	TRUNK	2.3	9.6	III/IV	470.42
			LEFT	YES	TRUNK	1.8	6	II/III	
5	14	M	RIGHT	YES	TRUNK	1.4	20.7	II	410.36
			LEFT	YES	TRUNK	1.1	18	III	
6	13	M	RIGHT	YES	TRUNK	1.2	8.8	0	600.56
			LEFT	YES	TRUNK	1.4	22	III	
7	12	M	RIGHT	2	T & P	1.7/0.9	25.6/22	IV	432.38
			LEFT	YES	TRUNK	0.8	16.4	III/IV	
8	13	M	RIGHT	YES	TRUNK	0.6	14.3	I	452.76
			LEFT	YES	TRUNK	0.9	12	III	
9	9	M	RIGHT	YES	TRUNK	1.4	11	II/III	313.08
			LEFT	YES	TRUNK	0.8	8.5	II	

CONCLUSIONS

1. PA MDCTA proved its efficacy in the visualization of the MGA.
2. There were a high percentage of anatomical variants.
3. Caliber and length of the MGA may be increased in patients in advanced stages.
4. Radiation dose received is not significant.

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