Detection and its clinical significance of thoracic duct using MRCP sequence at 3.0 Tesla

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Introduction The thoracic duct is the biggest lymphatic duct which receives about 3/4 lymph in the whole body，but the thoracic duct is difficult to show due to its small size and the particular position. The methods at present to depict the thoracic duct have some drawbacks. Recently, it was reported that the thoracic duct could be visualized by using magnetic resonance with highly fluid-sensitive sequence such as half-Fourier fast spin echo (FSE) technique at 1.5 Tesla MR System. To our knowledge, there was no report to detect the thoracic duct with MR cholangiopancreatography (MRCP) protocol at 3.0 Tesla.

Objective Our aim is to detect the configuration, dimensions of the thoracic duct with MRCP protocol and to probe the potential morphological changes of the thoracic duct caused by some disorders.

Methods Three dimensional MRCP were performed in a total of 139 patients (82 males, 57 females; range 18-71 yr, mean age, 47.4 yr), and all examinations were performed with a 3.0 Tesla clinical scanner (Signa Excite, GE) using an 8-channel torso phased-array coil. After the maximum intensity projection (MIP) processing of MRCP, forty-two patients were excluded because of poor reconstructional images. The coronal and sagittal MIP reconstructural images were obtained for measurement and evaluation of the dimension of the thoracic duct. The differences of the parameters measured above in the groups including a control group, portal hypertension group and choledochus obstruction group were compared using one-way analysis of variance test.

Results On the MIP images, the thoracic duct was shown in 69.78%, and the most common configuration of the cisterna chyli was tubular or saccular in 73.20%. The mean longitudinal, anteroposterior and transverse diameters of the cisterna chyli were (26.04±10.45) mm, (5.08±2.08) mm, and (5.02±2.13) mm respectively. Meanwhile, the anteroposterior and transverse diameters of the thoracic duct were (3.08±0.44) mm and (3.58±0.13) mm in control group. There was a significant difference of the transverse of the thoracic duct in the control group and in the risk groups (F=5.638, P=0.005), but the differences of other parameters were not found in this study (P>0.05).

Conclusion Noncontrast-enhanced MR with MRCP technique may be used feasibly to detect the morphological features of the thoracic duct, and the portal hypertension may influence the dimension of thoracic duct.

Table 2: Difference of the measurements of the thoracic duct and cisterna chyli in three groups

Group	n	Cisterna chyli				Thoracic duct	
		Length (mm)	Transverse (mm)	Anteroposterior (mm)	Number of lymphatic channels(n)	Transverse (mm)	Anteroposteri (mm)
1(control)	57	26.94±10.24	4.96±1.89	4.86±2.01	3.06±1.46	3.58±0.13	3.08±0.44
2	14	23.56±9.32	5.49±2.63	4.65±2.56	2.33±0.99	4.83±0.38	3.32±0.79
3	26	25.19±11.47	4.94±2.44	5.29±2.02	2.56±1.25	3.65±0.31	3.26±0.50
P value(F)	97	0.529 (0.64)	0.755 (0.336)	0.411(0.899)	0.127(2.112)	0.005(5.638)	0.067(2.785)

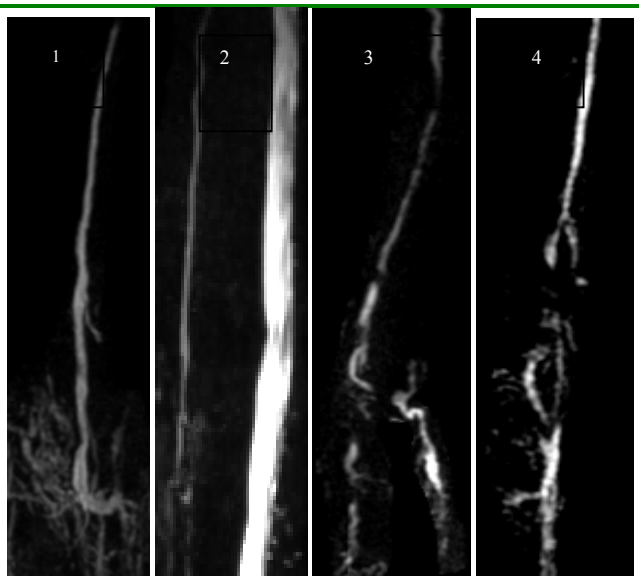

Fig.1. Coronal MIP image shows the thoracic duct as a long, thin and longitudinal tubulea, and the cisterna chyli is L-shaped. Fig.2. Sagittal MIP images show the relationship of the thoracic duct and the spinal cord. Fig.3. Thoracic duct begins with two separate cisterna chyli, which then are combined. Fig. 4: Two separate channels of the middle thoracic duct are combined.