

Cisterna Chyli in Autosomal Dominant Polycystic Kidney Disease

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Target audience: Radiologists, MRI technologists, Nephrologists.

Purpose: Cisterna chyli drains lymphatic fluid from the abdomen, pelvis and lower extremities (Fig 1). We found prominent cisterna chyli on MRI of patients with autosomal dominant polycystic kidney disease (ADPKD) and tested the hypothesis that cisterna chyli (Cis) enlargement is associated with biomarkers of ADPKD.

Methods: Retrospective, cross-sectional analysis of abdominal and pelvic MRI (1.5T, GE) in 70 ADPKD, (Male 44.3%, median age = 53 years) were compared with 70 age- and gender-matched controls without ADPKD, cirrhosis, or cholestasis. Diameter of Cisterna chyli located between T12-L2 was measured on axial single shot fast spin echo sequence (SSFSE) using TR=758 ms, TE=89 ms, slice thickness 4-6 mm, matrix size 256 x 256, NEX 0.54-0.56, and field of view 39 x 31 cm² (Fig 2). The maximum diameter of Cisterna chyli of ADPKD and non-ADPKD subjects were compared and associations of Cis diameter with renal phenotype (estimated GFR [eGFR;MDRD formula]), total kidney volume (TKV) and cyst fraction (cyst volume/kidney volume) were assessed in ADPKD by Spearman's Rank Correlation test and Wilcoxon signed-rank test for non-parametric matched data.

Results: Subjects with ADPKD had larger median/range Cis diameter [6.1mm (3 to 9.7mm)] compared to those without ADPKD [3.4 mm (0 to 9.6mm), p<0.0001]. The prevalence of enlarged cisterna chyli (diameter>5.0 mm) was higher in ADPKD than non-ADPKD (58% vs 10%). Cisterna chyli diameter was inversely correlated with renal function (eGFR, r=-0.41, p<0.001) and directly correlated with TKV (r=0.57, p<0.001), total cyst fraction(r=0.61, p<0.001) in ADPKD. There was a significant direct relationship between age and Cis (r=0.29, p<0.001). We also noted prominent retroperitoneal lymphatics in patients with ADPKD. The liver volume correlated with the cisterna chyli diameter (r=0.17, p<0.040). (Table 1)

Discussion: MRI is more likely than CT to detect the cisterna chyli. The fluid sensitive sequences on MRI differentiate normal cisterna chyli from pathological lesions such as lymphadenopathy and tumor [1]. Although the normal upper limit of Cis diameter varies in other reports, it is ≤5.0 mm. [1, 2]. There were significant associations with biomarkers of kidney disease severity (increasing TKV, decreasing eGFR) and liver volume [3]. Although this study was not designed to assess causality, we speculate that the Cis becomes engorged by drainage of fluid into the lymphatic system from the cystic liver and kidneys; this process may be amplified by the concurrent inflammatory processes in these organs.

Conclusion: Enlarged cisterna chyli is commonly encountered in ADPKD patients but not in age and gender-matched controls. This finding is associated with biomarkers of disease severity in ADPKD.

Table 1:

Variable	Significant Correlations	Spearman's Rho	P-Value
Cisterna Chyli	eGFR	-0.41	<0.001
	ADPKD Status (Yes/No)	0.45	<0.001
	Total Kidney Volume	0.68	<0.001
	Left Renal Cyst Volume	0.57	<0.001
	Right Renal Cyst volume	0.57	<0.001
	Total Cyst Fraction	0.61	<0.001
	Liver Volume	0.61	<0.001

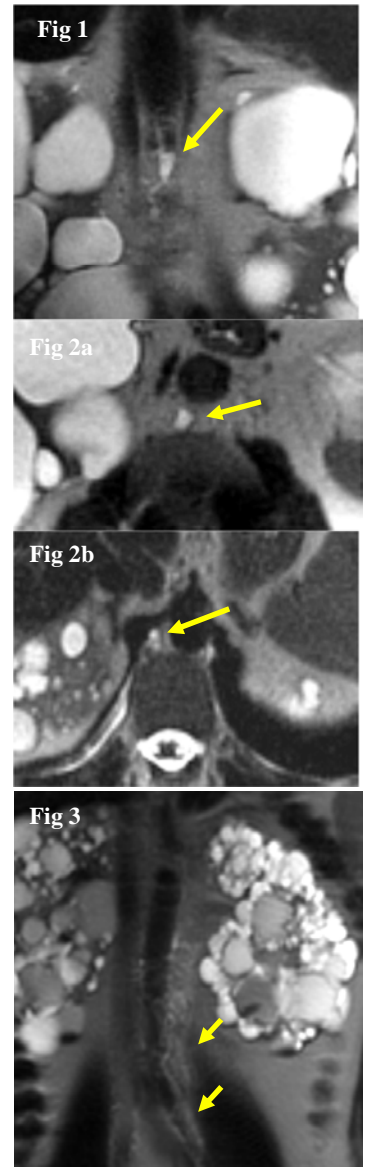


Fig 1. Dilated cisterna chyli sac in Cor SSFSE image. Fig 2. Engorged cisterna chyli (yellow arrows) in two ADPKD patients: 6 mm (a) and 8 mm (b). Fig 3. Arrows showing dilated retroperitoneal lymphatics in ADPKD patient.

References

- 1) Erden A., AJR 2005;184:35-40.
- 2) Pinto, P.S., et al., Radiographics 2004; 24: 809-817.
- 3) Chapman AB., Clin J Am Soc Nephrol. 2012 Mar;7(3):479-86.