Diagnosis of FNH: Comparison of Gd-EOB-DTPA with Gd-BOPTA, Preliminary Results from a Multicentric US Study.

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Introduction: Gadolinium contrast agents with hepatobiliary excretion such as Gd-EOB-DTPA and Gd-BOPTA are highly accurate for detection and characterization of liver lesions, including focal nodular hyperplasia (FNH) (1-4). In this study, we report preliminary results from a US multicentric study, comparing Gd-EOB-DTPA and Gd-BOPTA qualitatively and quantitatively for diagnosis of FNH.

Methods: This is a retrospective multicentric study involving 3 US institutions. Preliminary results from a single center are reported here. Inclusion criteria were patients with FNHs who underwent both Gd-EOB-DTPA and Gd-BOPTA-enhanced MRI (at same field strength) including dynamic (arterial ART, portal venous PV, equilibrium EQU) and delayed hepatobiliary (HB) phases for both studies (obtained at 10 and 20 min for Gd-EOB and 1 to 2 hours for BOPTA), using single 10 ml single dose for Gd-EOB-DTPA and 0.1 mmol/Kg for Gd-BOPTA. 11 preliminary patients with FNH (F/M 9/2, mean age 41 y) were analyzed by 2 observers in consensus as follows:

- Qualitative evaluation: lesion conspicuity on dynamic and delayed phases (0-3 scale, 0: hypo-, 1: isointense, 2: mildly hyperintense, 3: strongly hyperintense).
- Quantitative evaluation:
  - Lesion enhancement: SIR (signal intensity ratio)=[(SI post – SI pre)/SI pre]x100
  - Lesion CNR (contrast to noise ratio)= (SI lesion – SI liver)/SD noise.

Contrast agents were compared in terms of lesion conspicuity and lesion SIR and CNR (using a paired Wilcoxon test).

Lesion consp.	ART	PV	EQU	HB 10 min	HB 20 min
Gd-EOB	2.78 ± 0.43	1.57 ± 0.79	2.11 ± 0.66	2.22 ± 1.04	2.17 ± 1.15
Gd-BOPTA	2.87 ± 0.34	1.61 ± 0.78	1.61 ± 0.78	1.96 ± 1.11	1.96 ± 1.11
p	0.8	0.789	0.586	0.124	0.205
SIR (%)	**ART**	**PV**	**EQU**	**HB 10 min**	**HB 20 min**
Gd-EOB	111.6 ± 37.1	96.9 ± 50.4	127.8 ± 25.4	128.5 ± 22.8	135.4 ± 24.9
Gd-BOPTA	128.2 ± 48.8	132.5 ± 40.2	119.8 ± 35.9	99.9 ± 69.1	99.9 ± 69.1
p	**0.023**	**0.022**	0.749	**0.046**	**0.017**
CNR	**ART**	**PVP**	**EQU**	**HB 10 min**	**HB 20 min**
Gd-EOB	31.7 ± 24.6	7.32 ± 27.8	-1.0 ± 26.4	-8.9 ± 22.8	-11.3 ± 26.3
Gd-BOPTA	63.8 ± 62.5	18.4 ± 24.5	17.4 ± 21.3	-3.19 ± 42.0	-3.19 ± 42.0
p	**0.002**	0.117	**0.017**	0.207	0.08

Qualitative lesion conspicuity, SIR and CNR values obtained at dynamic and delayed HB phases (10-20 min for EOB and 1 to 2 hours for BOPTA-data is repeated) for both contrast agents in 11 patients with 23 FNHs. Significant p-values are bolded.

Results: 23 FNHs (mean size 3.0 cm, range 1.2-6.4 cm) were identified and analyzed in 11 preliminary patients (1 to 5 lesions per patient). Mean delay between MR studies was 372 days (range, 221-551 days). Lesion conspicuity was equivalent for both contrast agents at all phases. SIR were significantly higher at the ART and PV phases for BOPTA, and higher at HB phase for EOB. CNR were significantly higher at ART and EQU phases for BOPTA, and not significantly different for HB phase. In addition, lesion SIR was slightly higher at 20 min vs. 10 min post EOB injection (p=0.03), whereas CNR and lesion conspicuity at 10 and 20 min post Gd-EOB injection were equivalent (p=0.420-0.789) **(Table and Fig 1-3)**.

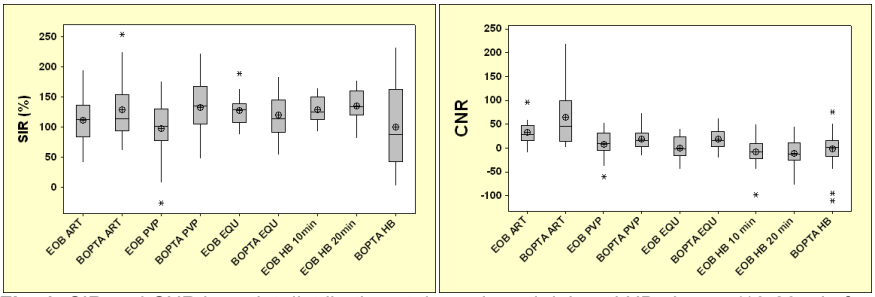

Fig. 1: SIR and CNR box-plot distribution at dynamic and delayed HB phases (10-20 min for EOB and 1 to 2 hours for BOPTA) in 11 patients with 23 FNHs. * outliers. Top and bottom of boxes: 25-75% percentiles, horizontal line in box: median value, target sign in box: mean.

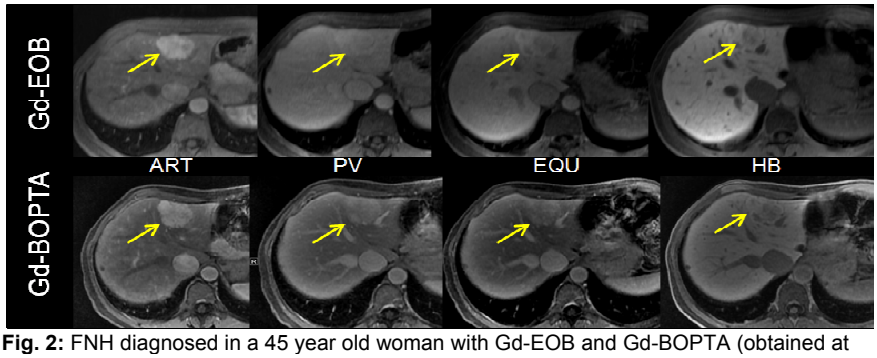

Fig. 2: FNH diagnosed in a 45 year old woman with Gd-EOB and Gd-BOPTA (obtained at 16 month interval at 1.5T). There is equivalent lesion conspicuity at ART, PV, and EQU, and slightly better conspicuity at the 20 min EOB HB phase compared to delayed BOPTA. Note also brighter liver signal with EOB at HB phase.

Conclusion: These preliminary results indicate advantage for BOPTA at the arterial phase (given the difference in injected dose), and advantage for EOB at the HB phase (given the higher hepatocyte uptake). However, since qualitative lesion conspicuity was equivalent between contrast agents, and given the shorter delay to obtain a HB phase (as low as 10 min) with Gd-EOB-DTPA , this contrast agent may be a better choice for diagnosing FNH.

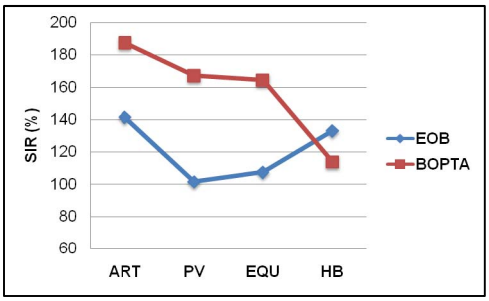

Fig. 3: SIR for FNH seen in Fig. 2. Quantitative enhancement was higher at dynamic phases and lower at the HB phase for BOPTA (only 20 min post EOB is shown).

References
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