2024 SNMMI Poster Award Candidate

Hoefs Physiologic System (H) for Reporting the Results of the Quantitative Liver-Spleen Scan (QLSS) as Processed by HEPATIQ

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BACKGROUND

(1) Gradual accumulation of hepatic fibrosis is the hallmark of progressive CLD eventually causing cirrhosis with abnormal hepatic function and portal hypertension. (2) Physiologic staging with HEPATIQ involves measuring quantitative function with PHM, functional spleen volume (fSV) and functional liver volume (fLV). A PHM < 95 or fSV >2.5 cc/lb IBW indicates cirrhosis and patients likely to have clinical outcomes. The PHM correlates with the functional mass of the liver (r2=.904) (AmJGastro;92:2054). Both PHM and fSV correlate closely with clinical outcomes (Hepat;55:1019). (3) The interpretation of the QLSS could be enhanced by interpretive score and we are presenting one termed the "Hoefs Physiologic system" based on combinations of these variables.

Physiologic information is obtained indirectly from anatomic imaging with ultrasound (US), CT and MRI. None of these are direct measurements of quantitative hepatic function. Elasticity is limited finding similar results with cirrhosis compared to moderately severe hepatitis in which there is no fibrosis. By contrast, nuclear medicine techniques directly measures pathophysiology which translates into clinical disease. The QLSS measures the intra-hepatic hemodynamic abnormality (IHHA) of CLD that correlates with quantitative hepatic function. The PHM that measures IHHA correlates with (1) The functional mass of the liver (Am J Gastro, 92, 2054) and (2) clinical outcomes (Hepatology, 55, 1019). Furthermore, fLV correlates with fat and fSV with portal hypertension (or infiltrative disease). We introduce the H scoring for reporting.

METHODS

702 QLSS were identified in 520 patients. QLSS was processed by HEPATIQ for PHM (n=100-110), fSV (n<2.5 cc/lb IBW), and fLV (7-12 cc/lb IBW). The H score categorizes according to PHM (H0-H5): PHM normal (H0), with fLV <7 (H1) or large >12 (H2) The fSV could be normal <2.5, mildly increased (p) (2.5-4.9) or greatly increased (ps)(>4.9) in the above categories. H3 is compensated cirrhosis likely, H4 decompensated cirrhosis very likely and H5 Liver transplant candidate.

Patients were categorized clinically as non-cirrhotic (NC) and cirrhotic (C). Cirrhotic patients could be C1 never had a decompensation; C2 had a decompensation, but recovered and not requiring further treatment; C3 decompensation requiring continuing treatment; and C4 liver transplant candidate. The H score predictions were compared with these clinical designations.

RESULTS

- All patients with a PHM <95 had cirrhosis or recent liver transplant.
- No H0, H1, Hp, Hps, H1, H1p, H1ps, H2 or H2ps had active decompensation (C3, C4).

Based on these results, it is proposed that the H-score be refined further as follows: H0 - Normal liver function, H1 -Borderline liver function. H2-Steatotic cirrhosis likely. H3-Non-steatotic cirrhosis likely. H4-Liver decompensation likely. H5-Liver transplant candidate. HA-Acute liver disease likely. HS-Steatotic liver disease likely.

H Score QLSS	Clinical Assessment Score					
Score	TOTAL	NC	CI	C2	C3	C4
H0	**387**	**370**	**11**	**6**		
H0p *	22	15	7			
H0ps **	5	3	2			
H1 (fLV <7)	**104**	**95**	**3**	**6**		
H1p *	1	0	1			
H1ps **	0					
H2 (fLV >12)	**41**	**35**	**6**			
H2p *	26	18	7	1		
H2ps **	10	5	5			
H3	**72**	**0**	**26**	**26**	**20**	**0**
H4	**19**	**0**	**4**	**5**	**8**	**2**
H5	**15**	**0**	**4**	**2**	**7**	**2**
	702	**541**	**76**	**46**	**35**	**4**

* p = fSV 2.5-4.9 cc/lb IBW **ps = fSV > 2.5-4.9 cc/lb IBW

CONCLUSIONS

- Categorization with the new H scoring system of the QLSS correlates with clinical liver disease.
- A patient shifting from H0, H1, H2, H3, H4 and H5 indicates progression of CLD.
- Massive splenomegaly with normal PHM (H0ps) is frequently due to splenic lymphoma or non-cirrhotic portal hypertension.