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Radioembolization-Induced Liver Disease (REILD) in Hepatocellular Carcinoma (HCC) Patients after Treatment with Yttrium-90 (Y90) - A retrospective cohort study

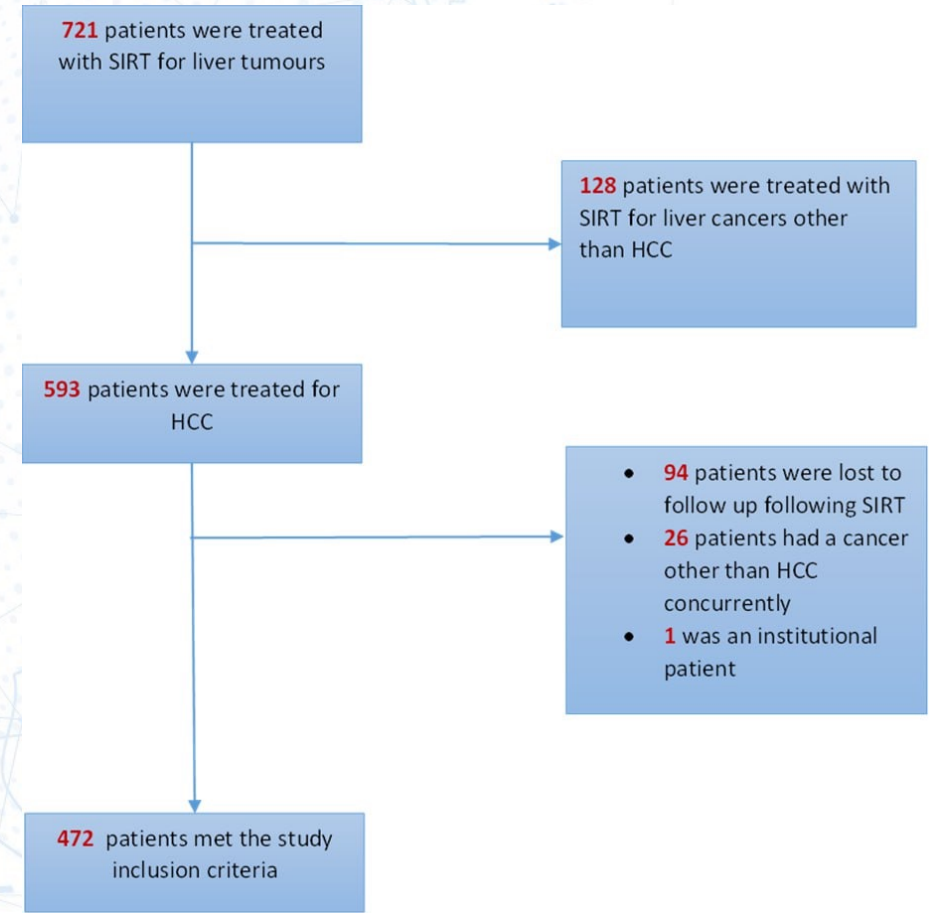
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Background + Aim

- Radioembolization-Induced Liver Disease (REILD) is defined as veno-occlusive liver injury caused by radiation treatment to nontumourous parenchyma
- Incidence varied between 0-8% in most reports
- Risk factors remain poorly defined and previous reports were based on relatively small cohorts
- **Aim: Determine the risk factors for REILD in a cohort of patients treated with Y90 Selective Internal Radiation Therapy (SIRT-Y90) for HCC in a high-volume tertiary institution**

Methods

- This is a retrospective cohort of 472 patients treated with SIRT-Y90 for non-metastatic HCC from 2007 to 2019 at the National Cancer Centre Singapore (NCCS) and Singapore General Hospital (SGH)
- Patients that were treated for liver cancers other than HCC, had a concurrent cancer or lost to follow up were excluded



Methods

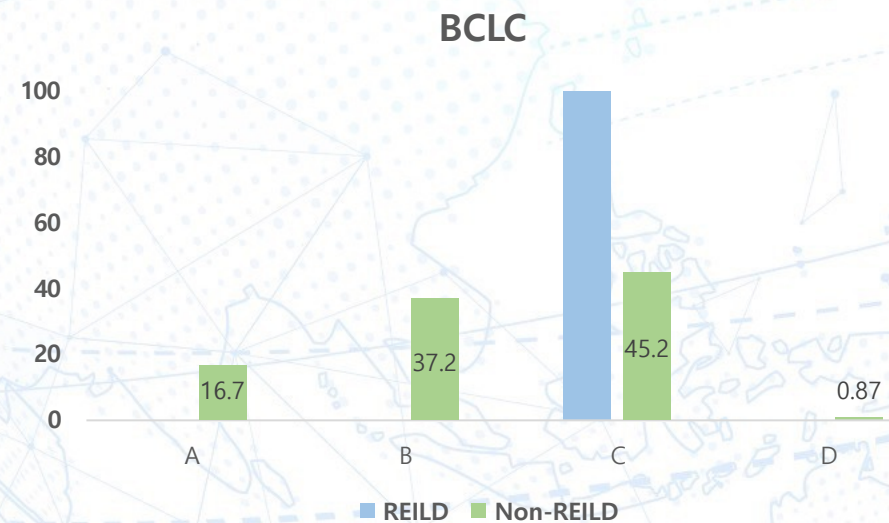
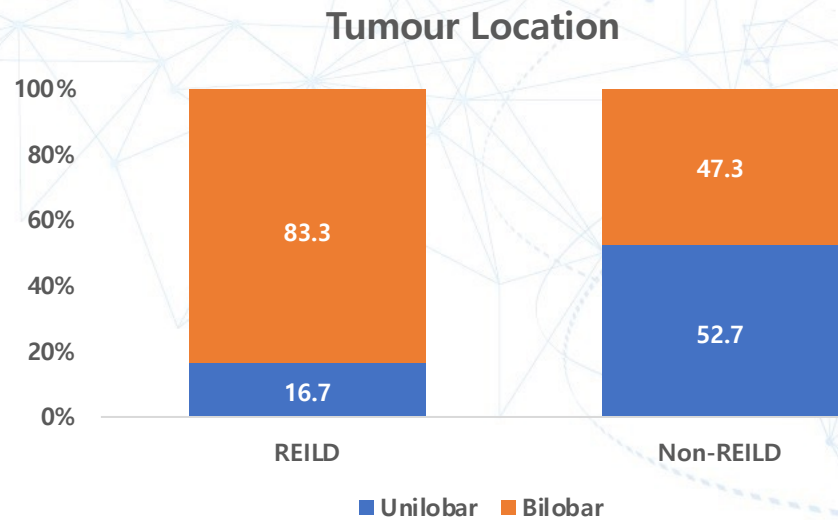
- REILD definition: Presence of ascites and jaundice between 4-12 weeks post Y90 in the absence of tumour progression or bile duct obstruction
- Patient demographics, clinical history, pertinent laboratory values and radiological findings were collected pre- and 6 months post-treatment
- Univariate and multivariate analyses of major clinical factors were carried out

Results

- 12 patients (2.54%) developed REILD
- Risk factors:
 - Baseline ALBI score of 2 (P=0.037)

Results

- Risk factors:
 - Bilobar HCC (P=0.012)
 - BCLC C HCC (P=0.002)



Results

- Outcomes:
 - Majority of patients (8/12, 66.7%) developed low WBC count post Y90, all due to a decrease in lymphocytes, whereby lymphocyte count decreased by a mean of 53.4%
 - No patients demised from REILD

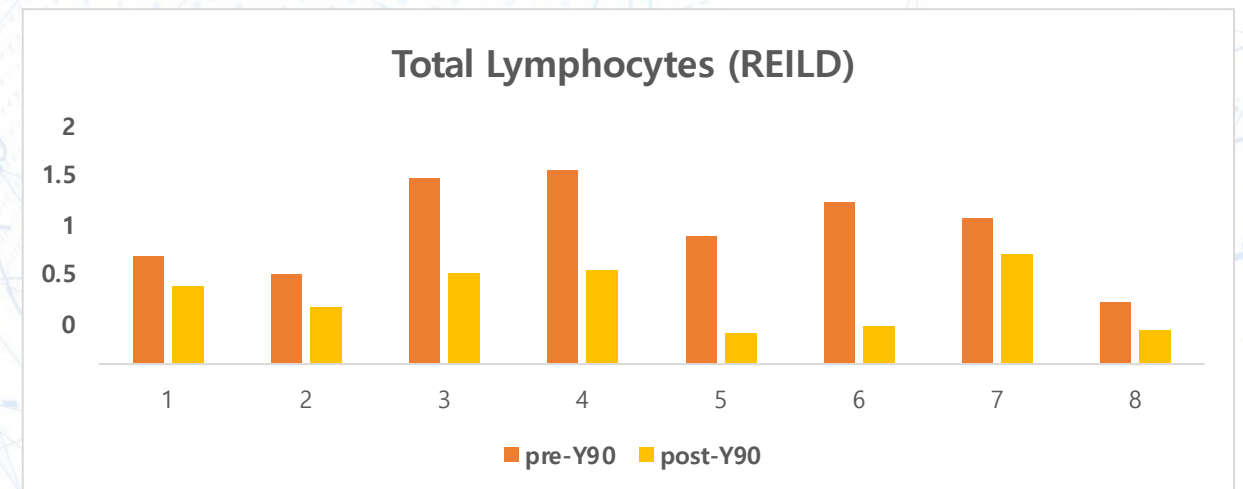


Table 1: Summary of Clinical Findings of REILD Patients Post Y90 SIRT

Baseline Characteristics		N = 12	Proportions
Gender	Male	8	66.7%
	Female	4	33.3%
Ethnicity	Chinese	7	58.3%
	Malay	0	0.00%
	Indian	2	16.7%
	Others	3	25.0%
Alcohol	Y	1	11.1%
	N	8	88.9%
	NA	3	
Change in WBC	Increased	4	33.3%
	Decreased	8	66.7%
Percentage Decrease in WBC (N = 8)	Mean (SD)	27.4 (18.9)	
	Median (IQR)	25.1 (12.9-34.2)	
Change in Lymphocytes	Increased	0	0.00%
	Decreased	12	100%
Percentage Decrease in Lymphocytes (N = 12)	Mean (SD)	53.4 (21.7)	
	Median (IQR)	51.2 (34.5-76.1)	
T:N Ratio	Mean (SD)	3.8 (2.08)	
	Median (IQR)	3.46 (2.79-5.37)	
Time Between REILD and Progression of Disease (PD) (Weeks)	Mean (SD)	7.92 (7.73)	
	Median (IQR)	5.86 (1.86-11.7)	
Time Between PD and Death (Weeks)	Mean (SD)	9.89 (6.94)	
	Median (IQR)	10.3 (5.57-13)	

Table 2: Comparison between REILD and Non-REILD Patients

Baseline Characteristics		REILD N = 12 (2.54%)	Non-REILD N = 460 (97.5%)	P
Age	Mean (SD)	65.3 (9.41)	64.0 (11.2)	0.664
	Median (IQR)	64 (60.5-69.0)	65 (58.0-71.0)	
Child Pugh	A	8 (66.7%)	391 (85.0%)	0.075
	B	4 (33.3%)	69 (15.0%)	
ALBI Grade	1	0 (0.00%)	130 (28.3%)	0.037
	2	21 (100%)	297 (64.6%)	
	3	0 (0.00%)	33 (7.17%)	
	4	0 (0.00%)	0 (0.00%)	
BCLC Stage	A	0 (0.00%)	77 (16.7%)	0.002
	B	0 (0.00%)	171 (37.2%)	
	C	12 (100%)	208 (45.2%)	
	D	0 (0.00%)	4 (0.870%)	
Aetiology of Hepatitis	Viral (Hep B/C)	8 (66.7%)	292 (63.5%)	0.450
	Non-Viral	4 (33.3%)	118 (25.7%)	
	Others	0 (0.00%)	50 (10.9%)	
Post Y90 AFP	<400	3 (25.0%)	265 (67.3%)	0.002
	>=400	9 (75.0%)	129 (32.7%)	
Tumour Burden	NA	0	66	
	Solitary	2 (16.7%)	142 (31.0%)	0.203
	2-5 tumours	1 (8.33%)	90 (19.7%)	
	>5 tumours	9 (75.0%)	226 (49.3%)	
Tumour Location	NA	0	2	
	<u>Unilobar</u>	2 (16.7%)	241 (52.7%)	0.012
	<u>Bilobar</u>	10 (83.3%)	216 (47.3%)	
Administered Y90 Dose (Gbg)	NA	0	3	
	Mean (SD)	1.74 (1.03)	1.67 (0.951)	0.842
Predicted Mean Radiation Dose to Tumour (Gy)	Median (IQR)	1.50 (1.33-1.90)	1.40 (0.945-2.20)	
	Mean (SD)	162 (62.1)	154 (83.9)	0.808
	Median (IQR)	138 (121-180)	132 (96.9-191)	

Conclusions

- REILD development did not correlate with age or administered Y90 dose
- Severity of cirrhosis estimated by the ALBI score is one of the most important risk factors for REILD development post SIRT-Y90
- Lymphocytopenia is a common early sign of the development of REILD

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