Outcomes of Patients with Hilar Cholangiocarcinoma Undergoing Preoperative Right Portal Vein Embolization

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Disclosure

- All the authors declare nothing to disclose

Objectives

- To assess the safety and efficacy of preoperative right portal vein embolization (PVE) in patients with hilar cholangiocarcinoma in intention-to-treat basis

- To evaluate predictive factors associated with sufficient left liver hypertrophy after right PVE

Methods

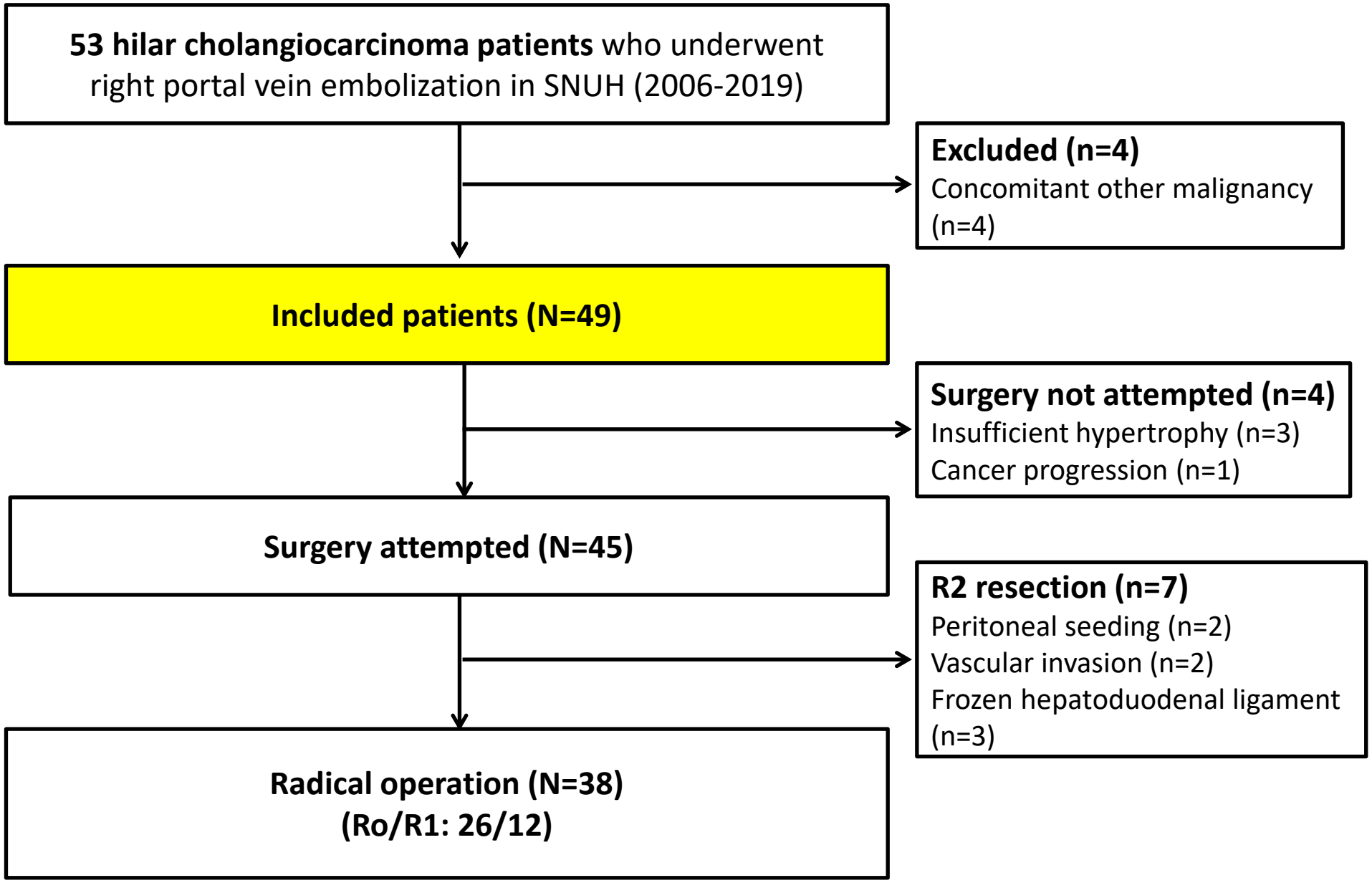
- **Study design**
  - ✓ Retrospective study, single tertiary center (SNUH)

- **Study population**
  - ✓ Patients with hilar cholangiocarcinoma who underwent preoperative right PVE before major hepatectomy between 2006 and 2019

- **Definition**
  - ✓ Future liver remnant (FLR): left liver, regardless of the type of surgery
  - ✓ FLR volume(ml): preoperative left liver volume (pre & post-PVE)
  - ✓ FLR volume(%): preoperative left liver volume/total liver volume (pre & post-PVE)

- **Outcomes**
  - ✓ Proportions of patients undergoing surgical resection
  - ✓ Postoperative morbidity and mortality after PVE and surgery
  - ✓ Factors associated with FLR volume increase after PVE

Study population



Complications of PVE

Variable	Patients (n=49)
Complications	5 (10.2%)
Errative embolization*	1 (2.0%)
Peritonitis**	1 (2.0%)
Hypotension	1 (2.0%)
Focal ischemic change	1 (2.0%)
Hematoma	1 (2.0%)
Mortality	0

*Retrograde flow during the procedure caused migration of glue mixture in right posterior portal vein into left portal vein. Immediate fluoroscopy-guided thrombectomy was performed and follow-up CT showed patent left portal vein.

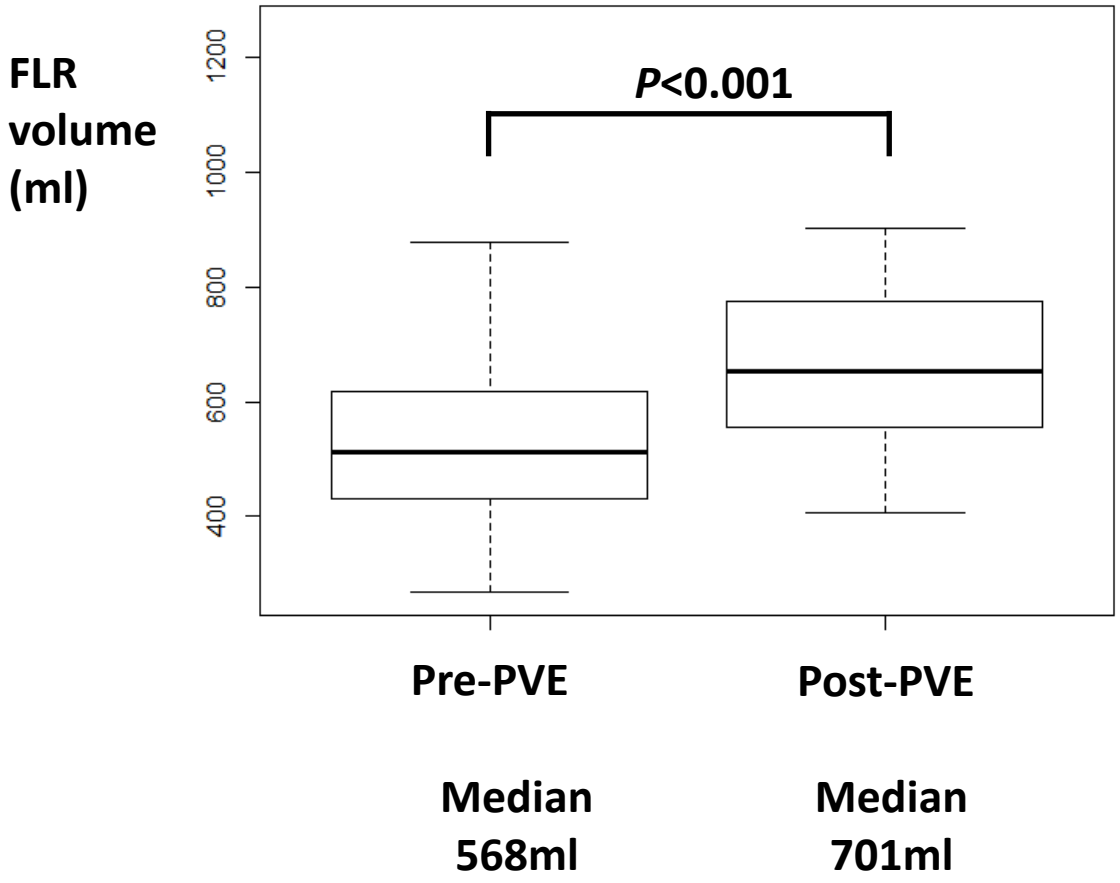
**Peritonitis was developed five days after the procedure, requiring percutaneous catheter drainage.

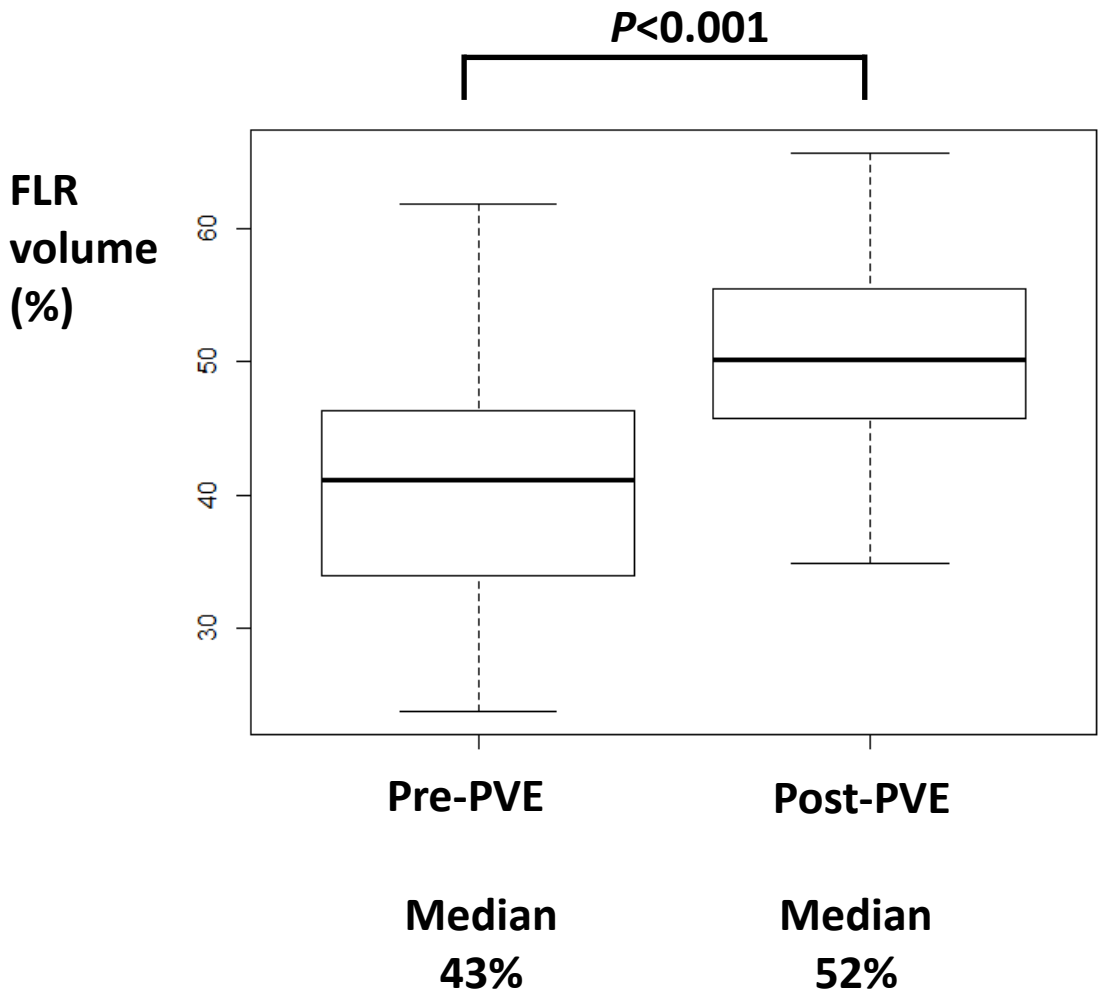
Characteristics in resected patients

Variables	Patients (N=38)
Age	65.3 ± 10.3
Sex – male	26 (68.4%)
Total bilirubin	2.8 (1.2, 5.0)
Prothrombine time (INR)	1.1 ± 0.1
CA 19-9	136 (18, 611)
PVE to surgery interval	30.9 ± 10.2
Bismuth type – IV	20 (52.7%)
Op type - Extended Rt. hemihepatectomy	36 (94.7%)
Portal vein resection	7 (18.4%)
Size – median (IQR) (cm)	3.7 (2.6, 4.5)
Differentiation – well	9 (23.7%)
T stage – pT1/pT2	32 (84.2%)
N stage – pN0	20 (52.6%)
Resection margin – free of tumor (R0)	26 (68.4%)
Major postoperative complications (Clavien-Dindo ≥ III)	
90-day mortality*	**6 (15.8%)**
Length of hospital stay	20 (15, 35)

***Cause of death: liver failure (n=5), pulmonary edema (n=1)**

Volumetric analysis*





*Because of software issue, volumetric analysis was performed in 33 patients, who were treated after 2011

Volumetric analysis*

Variables	Patients (N=33)		
	Insufficient hypertrophy (FLR increase ≤25%) (N=17)	Sufficient hypertrophy (FLR increase >25%) (N=16)	*P* value
Age – mean ± SD	65.5 ± 9.2	60.9 ± 12.5	0.238
Sex (male)	10 (58.8%)	12 (75.0%)	0.538
Total bilirubin >2mg/dL	11 (64.7%)	7 (43.8%)	0.391
Prothrombine Time >90%	8 (47.1%)	11 (68.8%)	0.364
Albumin >3.5g/dL	7 (41.2%)	8 (50.0%)	0.874
Platelet count > 250 x $10^3/\mu\ell$	11 (64.7%)	7 (43.8%)	0.391
CA 19-9 >200U/mL	11 (64.7%)	9 (56.2%)	0.888
Initial left liver volume (ml) – median (IQR)	**551 (496, 648)**	**463 (387, 569)**	**0.041**
Initial FLR volume (%) – mean ± SD	**45.9 ± 7.3**	**35.1 ± 5.6**	**<0.001**
Initial FLR volume >40%	**14 (82.4%)**	**4 (25.0%)**	**0.003**
PVE to CT Interval (day) – median (IQR)	24 (16, 26)	18 (14, 22)	0.295

*Because of software issue, volumetric analysis was performed in 33 patients, who were treated after 2011

Conclusion

- In patients with hilar cholangiocarcinoma who underwent preoperative right PVE, a quarter of patients failed to receive curative resection.

- PVE was performed with acceptable morbidity, but postoperative morbidity and mortality rates following surgery was high.

- Careful patient selection is important in determining preoperative PVE before major hepatectomy in hilar cholangiocarcinoma.