

Pre-operative Portal vein embolization: Indications and patient selection

Dr HOCQUELET Arnaud, *MD-PHD*,
CHUV Lausanne, Suisse.

Disclosure

Speaker name: HOCQUELET Arnaud

I have the following potential conflicts of interest to report:

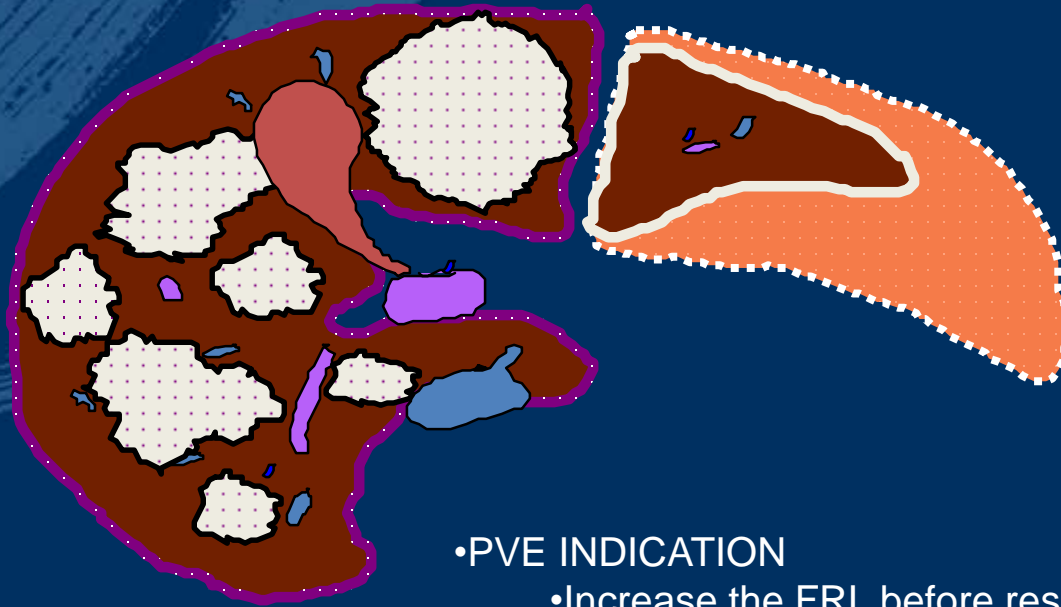
- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest

Introduction

- Surgical resection of hepatic tumors is often the only curative option
- in primary and secondary liver tumors
- the disease of many patients is considered unresectable because of an insufficient future remnant liver (FRL)

INDICATION- WHY PVE?



•PVE INDICATION

- Increase the FRL before resection
- Increase surgical margins
- Improve post-operative liver function

Quality improvement for PVE Denys A CVIR 2010 33(3):452-456

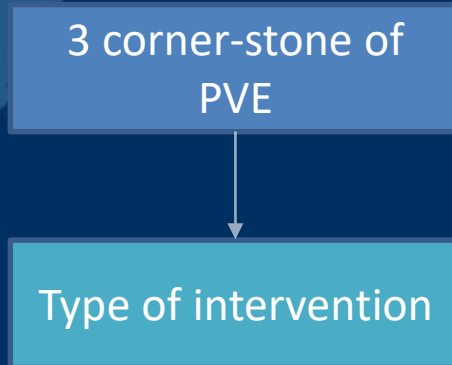
Patient Selection

3 corner-stone of
PVE



Type of intervention

Patient Selection



- Tumor board-talk with your surgeon
- Depend on the planning of the surgery:
 - Amount of liver to be resected /Function of the parenchyma (**cirrhosis, chemotherapy...**)
 - **Margin requires (cholangiocarcinoma, metastasis)**
 - **Complexity** of surgery (prolonged liver ischemia period by vessel clamping)

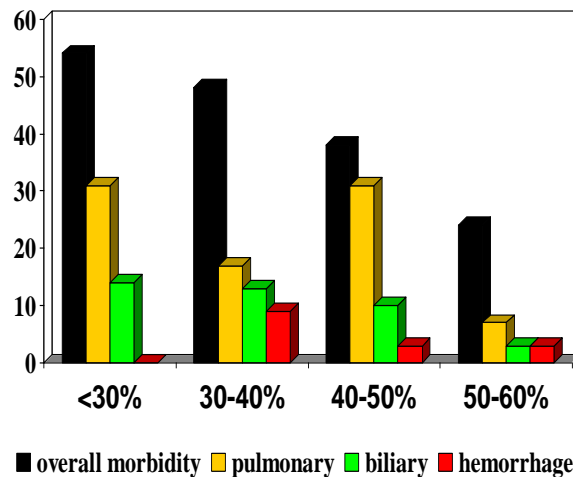
Patient Selection

3 corner-stone of
PVE

Type of intervention

Futur Remnant
Liver%

The small remnant liver after major liver resection. How common and how relevant ?
C. Yigitler et al.
Liver Transplantation 2003



Patient Selection

3 corner-stone of
PVE

Type of intervention

Futur Remnant
Liver%

Table 4 Risk factors associated with posthepatectomy liver failure in non-CSPH patients (n=180)

Variables	Univariable logistic regression		Multivariable logistic regression			
	Odds ratio	P	Child-Pugh model		ALBI model	
			Odds ratio	P	Odds ratio	P
Age (>60 years)	1.83 (0.52-6.43)	0.344	3.93 (0.83-18.59)	0.085	5.37 (1.02-30.36)	0.047
Male sex	1.92 (0.24-15.56)	0.540	1.38 (0.12-15.93)	0.796	1.74 (0.12-26.24)	0.690
ALT, U/L	2.28 (0.69-7.47)	0.175	2.40 (0.54-10.69)	0.251	2.41 (0.53-10.91)	0.254
Prothrombin time, sec	0.65 (0.19-2.25)	0.496	0.64 (0.15-2.76)	0.551	0.82 (0.18-3.84)	0.790
Tumour diameter, cm	1.99 (0.52-7.62)	0.315	0.64 (0.11-3.78)	0.622	0.60 (0.09-3.92)	0.591
Tumour number (≥3)	0.39 (0.05-3.10)	0.371	0.39 (0.04-3.70)	0.410	0.52 (0.05-5.15)	0.574
MELD score	2.10 (0.53-8.34)	0.291	5.08 (0.88-29.33)	0.009	2.33 (0.36-14.89)	0.373
Operating time, min	2.15 (0.62-7.41)	0.226	3.04 (0.57-16.33)	0.193	3.04 (0.48-19.19)	0.236
Inflow occlusion	2.09 (0.55-8.00)	0.281	1.66 (0.33-8.30)	0.540	1.40 (0.25-7.92)	0.705
Liver cirrhosis	1.04 (0.21-5.01)	0.958	1.24 (0.21-7.21)	0.812	0.85 (0.13-5.57)	0.868
Blood loss, ml	1.16 (0.39-3.40)	0.793	0.34 (0.06-1.85)	0.713	0.72 (0.01-3.85)	0.314
sFLR	8.46 (2.19-32.65)	0.002	15.17 (2.64-87.09)	0.002	25.27 (3.56-179.24)	0.001
Child-Pugh score	2.17 (0.67-7.04)	0.197	2.06 (0.48-8.82)	0.330		
ALBI score	5.00 (1.30-18.64)	0.009			8.46 (1.54-46.62)	0.014

Liou SH, 2019 Mar;30(3):494-502. doi: 10.1016/j.1304.2018.07.018
Combining albumin-bilirubin score with future liver remnant predicts post-hepatectomy liver failure in HBV-associated HCC patients.
doi:10.1016/j.1304.2018.07.018

Patient Selection

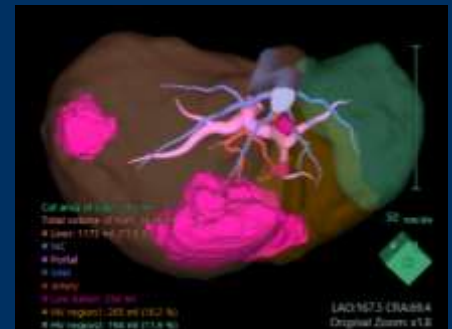


- Major liver resection with insufficient FRL%:
 - $FRL\% = FRL / \text{whole functional liver volume (tumor excluded)}$
 - >30% for healthy liver, 40% for others

Patient Selection



- How to assess FRL%?
- Contrast-enhanced CT-scan (with hepatic vein visible)
- Segmentation (automatic, semi-automatic or hand-free..)

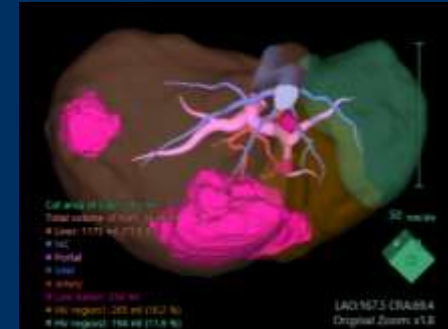


Patient Selection

3 corner-stone of
PVE

Type of intervention

Futur Remnant
Liver%

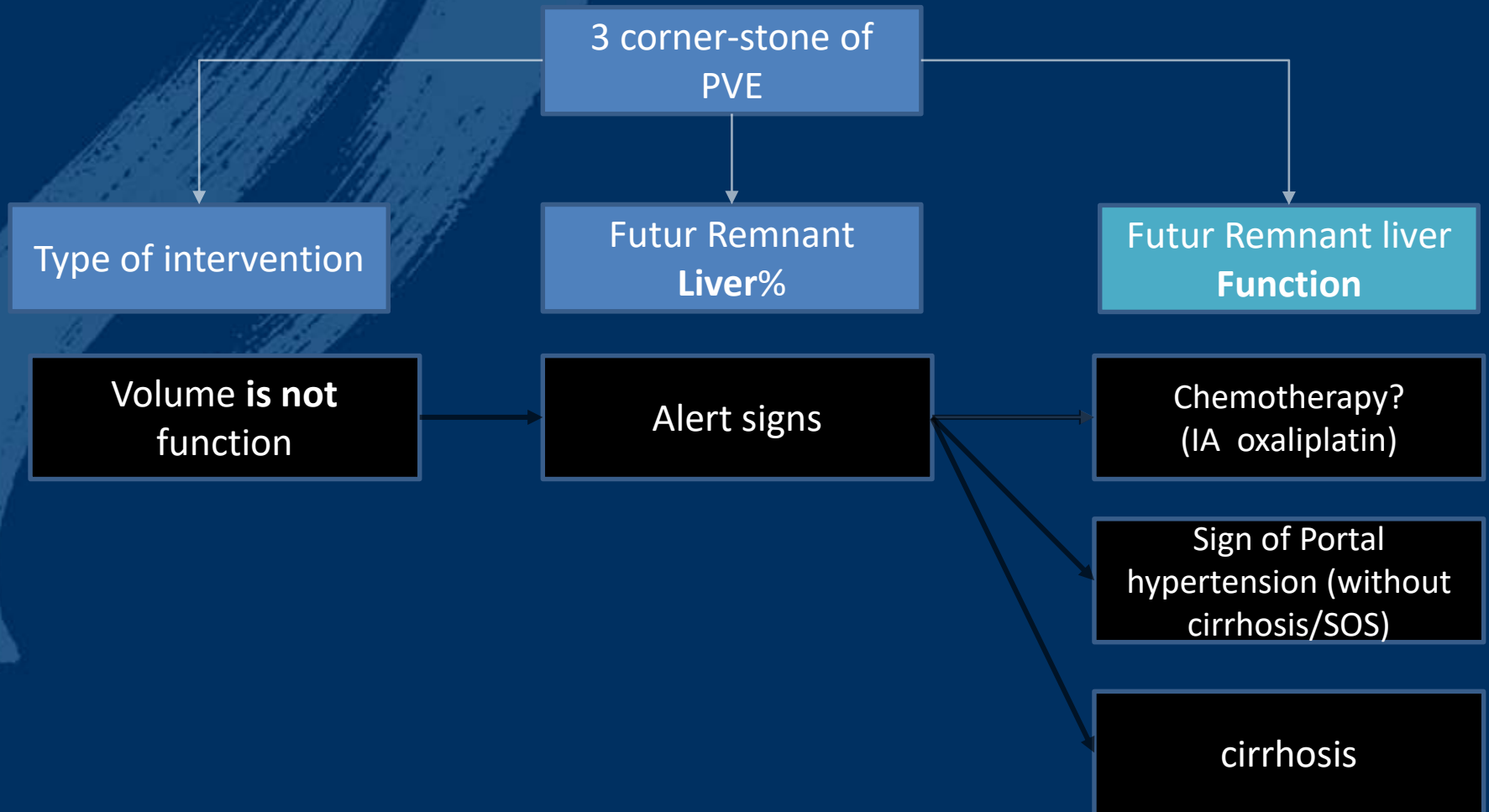


- A very small left lobe (under 10%) should not be considered a contraindication
- There is a correlation between small initial size of the FLR and high degree of hypertrophy [Denys et al 2004, Hocquelet et al 2018].

Table 2. Uni- and multivariate linear regression predicting the percentage of future remnant liver volume increase.

Variable	Univariate analysis			Multivariate analysis		
	Coefficient	95% CI	P value	Coefficient	95% CI	P value
Age	0.036	-1.6, 1.8	0.071			
BMI	1.1	-0.6, 2.9	0.212			
Cross-sectional area	-6.5	-22.7, 8.6	0.418			
Male	0.144	-17, 18	0.960			
Chemotherapy: oxaliplatin	23.7	-16, 64	0.233			
Chemotherapy: irinotecan	-13.9	-37, 10	0.237			
Chemotherapy: 5-FU	7.6	-61, 56	0.750			
Shore area volume (cc)	-10.30	-071, -0.8	0.033	-10.2	-06, -04	0.034
FLR_{pre}	-1.5	-2.1, -0.8	< 0.001	-2.336	-2.8, -0.7	< 0.001

Patient Selection



Patient Selection

3 corner-stone of
PVE

Type of intervention

Futur Remnant
Liver%

Futur Remnant liver
Function

**Volume is not
function**

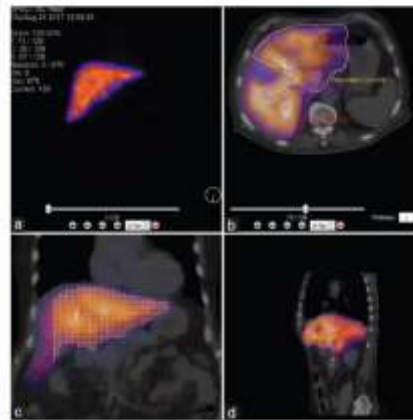
**Hepatobiliary
Scintigraphy**

**Quantitative
assessment of liver
function**

Cheap and fast

Indian J Nucl Med. 2018 Oct-Dec; 33(4): 277-283.
doi: 10.4103/ijnm.IJNM_12_18
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Figure 3



Function >2.69 ml/min/kg for
the FRL

3 corner-stone of PVE

Type of intervention

Futur Remnant Liver%
Liver%

Futur Remnant liver
Function

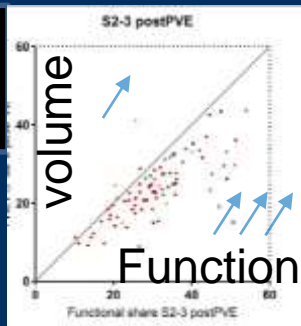
Volume is not function

Pre-intervention

Prospective Assessment of Postoperative Resected Liver Function Using Hepatobiliary Scintigraphy

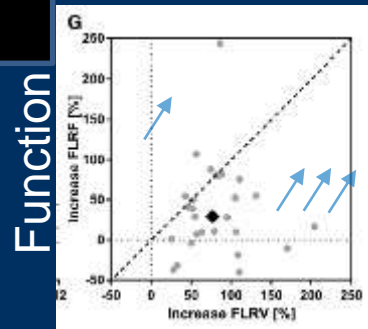
Little or no association ($r = 0.27$) was found between the measured liver volume and function, determined with

Post-PVE



Post-ALPPS

Hepatobiliary scintigraphy to evaluate liver function in associating liver partition and portal vein ligation for staged hepatectomy: Liver volume overestimates liver function



volume

Conclusion

- PVE Indication:
 - Improve surgery quality (margins etc)
 - Improve post-operative outcome (avoid liver failure)
 - Bring to curative treatment unresectable patient

Conclusion

- Patient selection:
 - Talk with your Surgeon
 - CT-Scan=> Liver Volume
 - Hepatobiliary scintigraphy=>Liver Function
 - And... no contraindication... Portal hypertension (blocked to free hepatic vein pressure gradient >12 mmHg), PT and platelet count<50

Thank you



Canton de Vaud, Suisse

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