Evaluation de la Fonction Hépatique

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Evaluation de la fonction hépatique: **Généralité**

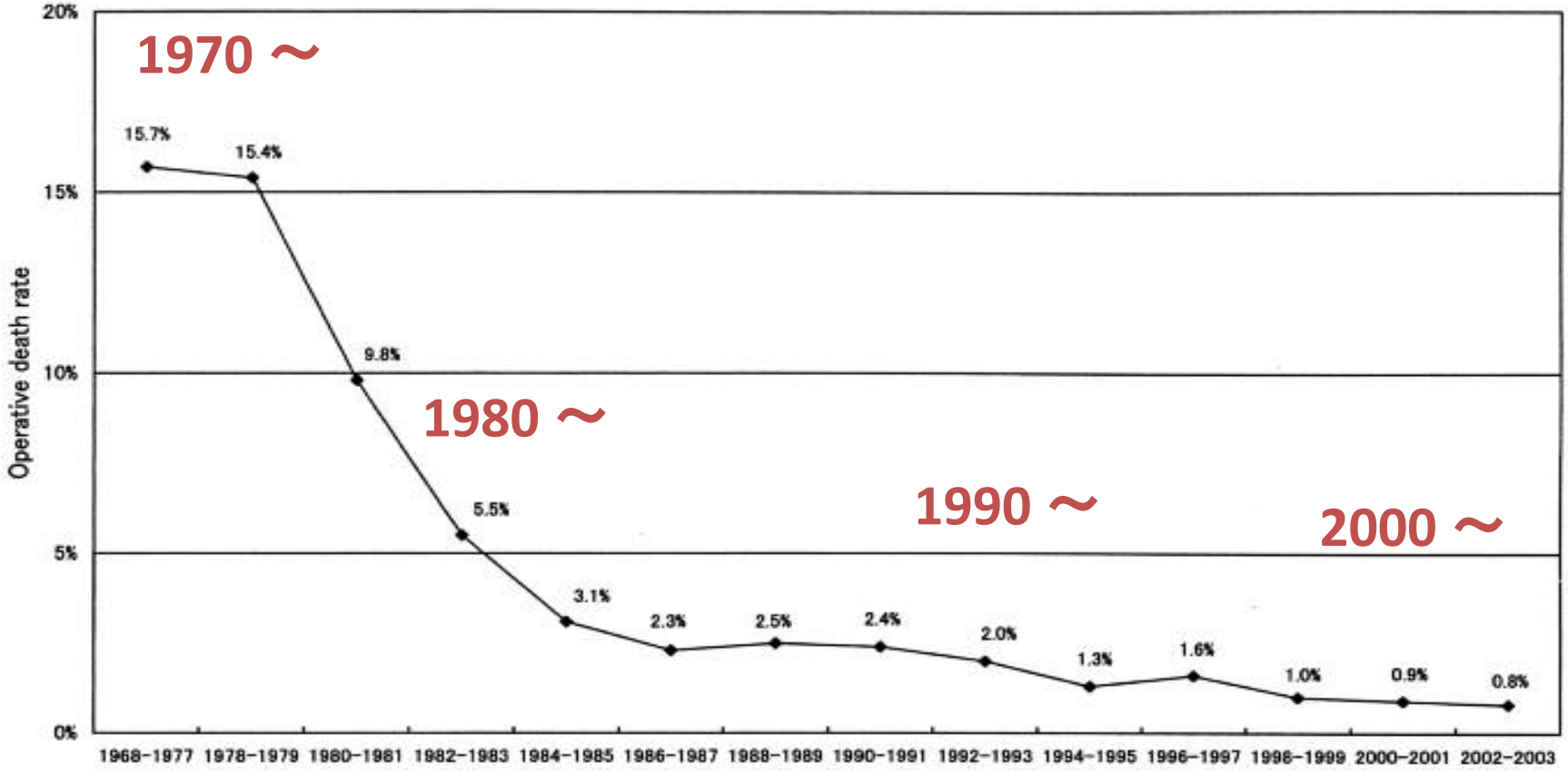
Mortalité après Résection Hépatique

Authors	Year	Patients	Mortality (%)	PHLF (%)	PHLF/ Major Hepatectomy
Poon et al.	2002	206	5.3	4.3	6.7
Imamura et al	2003	915 (445)	0[c]	0.02	-
Capussotti et al	2006	217	7.8[b]	10.6	-
Kesmodel et al	2008	125	1.6[a]	1.6	2.6
Schiesser et al	2008	197	2.5	1	1.6
Hsu et al	2009	1017	1.9[c]	2.1	-
Choi et al	2011	100	4[c]	-	-
Herbert et al	2015	1528	3.2[a]	3.1	6.2
Nagino et al	2018	1639	1.5	-	-

a= 90-day mortality / b= 60-day mortality / c= 30-day mortality

Evaluation de la fonction hépatique: **Généralité**

Mortality of liver surgery in Japan



Mortalité en 2010 = 0.7% !

Kamiyama J Am Coll Surg 2010

Evaluation de la fonction hépatique: **Généralité**

2012 Liver resections in the 21st century: we are far from zero mortality

Safi Dokmak,[1,2] Fadhel Samir Ftériche,[1,2] René Borscheid,[1,2] François Cauchy,[1,2] Olivier Farges,[1,2] and Jacques Belghiti[1,2]

HPB 2013

Postoperative outcomes

	Benign disease group (n = 559)	Malignant disease group (n = 1453)	CLM (n = 546)	HCC (n = 450)	Biliary tumours (n = 194)
Mortality, n (%)	39 (50.7%)[a]	65 (4.5%)	9 (1.7%)[b]	29 (6.4%)	16 (8.2%)[d]
Overall morbidity, n (%)	267 (47.7%)[a]	870 (59.9%)	286 (52.3%)[b]	927 (63.8%)[c]	146 (75.3%)[d]
Clavien–Dindo class ≥3, n (%)	97 (17.4%)[a]	392 (27%)	124 (22.7%)	121 (26.8%)[c]	81 (41.8%)[d]
Liver-specific complications, n (%)					
Pulmonary	96 (17.1%)[a]	120 (21.5%)	100 (18.4%)	98 (21.8%)	54 (27.8%)[d]
Liver failure	22 (0.4%)[a]	39 (2.7%)	13 (2.4%)	9 (2.0%)[c]	10 (5.2%)[d]
Ascites	69 (12.4%)[a]	135 (24.1%)	98 (18%)[b]	131 (29.1%)	67 (34.5%)[d]
Biliary fistula	39 (7.0%)	113 (7.8%)	112 (7.7%)	28 (6.2%)[c]	27 (13.9%)[d]
Reoperation, n (%)	16 (2.9%)	84 (5.8%)	51 (3.5%)[b]	31 (6.9%)	16 (8.2%)[d]
Intensive care unit stay, days, mean (range)	3.9 (1–52)[a]	6.1 (1–67)	5.5 (1–62)	6.4 (1–57)	7.4 (1–67)[d]
Hospital stay, days, mean (range)	11.3 (1–90)[a]	14.6 (1–96)	13.4 (1–82)	14.2 (3–84)[c]	19.5 (2–81)[d]

Mortalité en 2013 = 3.1%

Evaluation de la fonction hépatique: **Généralité**

Complications des hépatectomies pour don intrafamilial rapportées dans la littérature.

D'après Living Donor Liver Transplantation, ST Fan, Takungpao Publishing Co, 09/2007

Morbidités après résection: 23-70%

Accidents peropératoires
- Pneumothorax
- Thrombose / plicature portale
- Plaie biliaire
- Plaie vasculaire
- Embolie gazeuse

Cardio-pulmonaires
- pleurésie purulente
- insuffisance cardiaque
- infarctus du myocarde
- oedème pulmo
- trouble d
- inh
- it pleural
- tasie

tobiliaires
- thrombose portale
- ictère / cholestase
- ascite
- insuffisance hépatocellulaire

Gastro-intestinales
- ulcère duodénal (hém., perf.)
- pancréatite
- perforation gastrique
- gastroparésie
- hernie diaphra
- hémopé
- a
- ale
- d ascite
- abcès de paroi
- éventration
- chéloïde

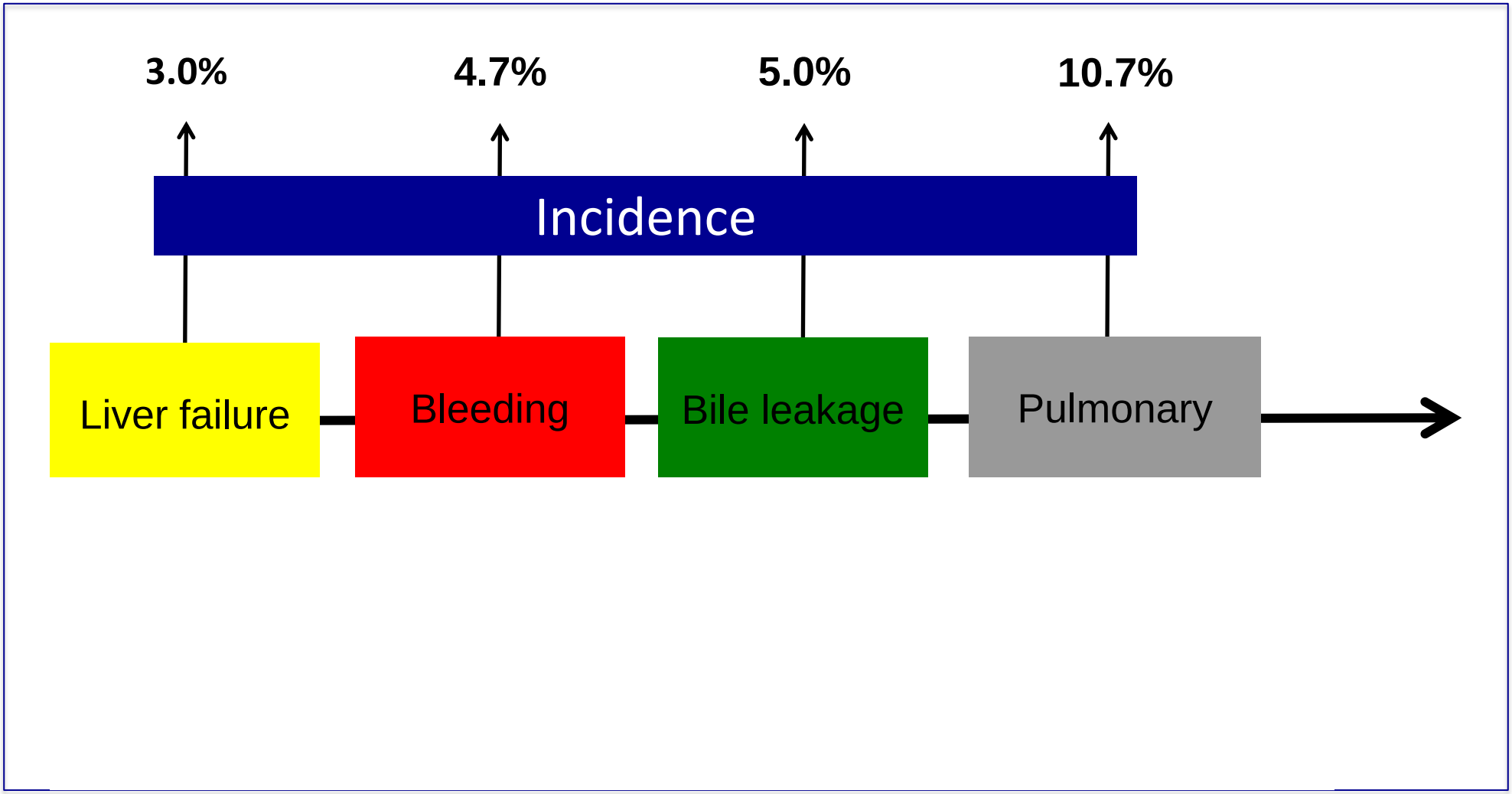
Neurologiques
- hémiparésies
- troubles de la vision
- épilepsie
- laryngite spasmodique
- plexus brachial
- nerf péronier

Autres complications
- insuffisance ré
- thromb
- profon
- ations /
- s
- choc vagal
- septicémie
- péridurale
- réactions médicamenteuses
- rétention de drain
- accident transfusionnel

Psychiatriques
- suicide
- toxicomanie
- dépression
- anxiété
- troubles compulsifs
- comportement bipolaire

Mortality related to principal postoperative complications

Beaujon Hospital(2000-2009) 2012 LRS



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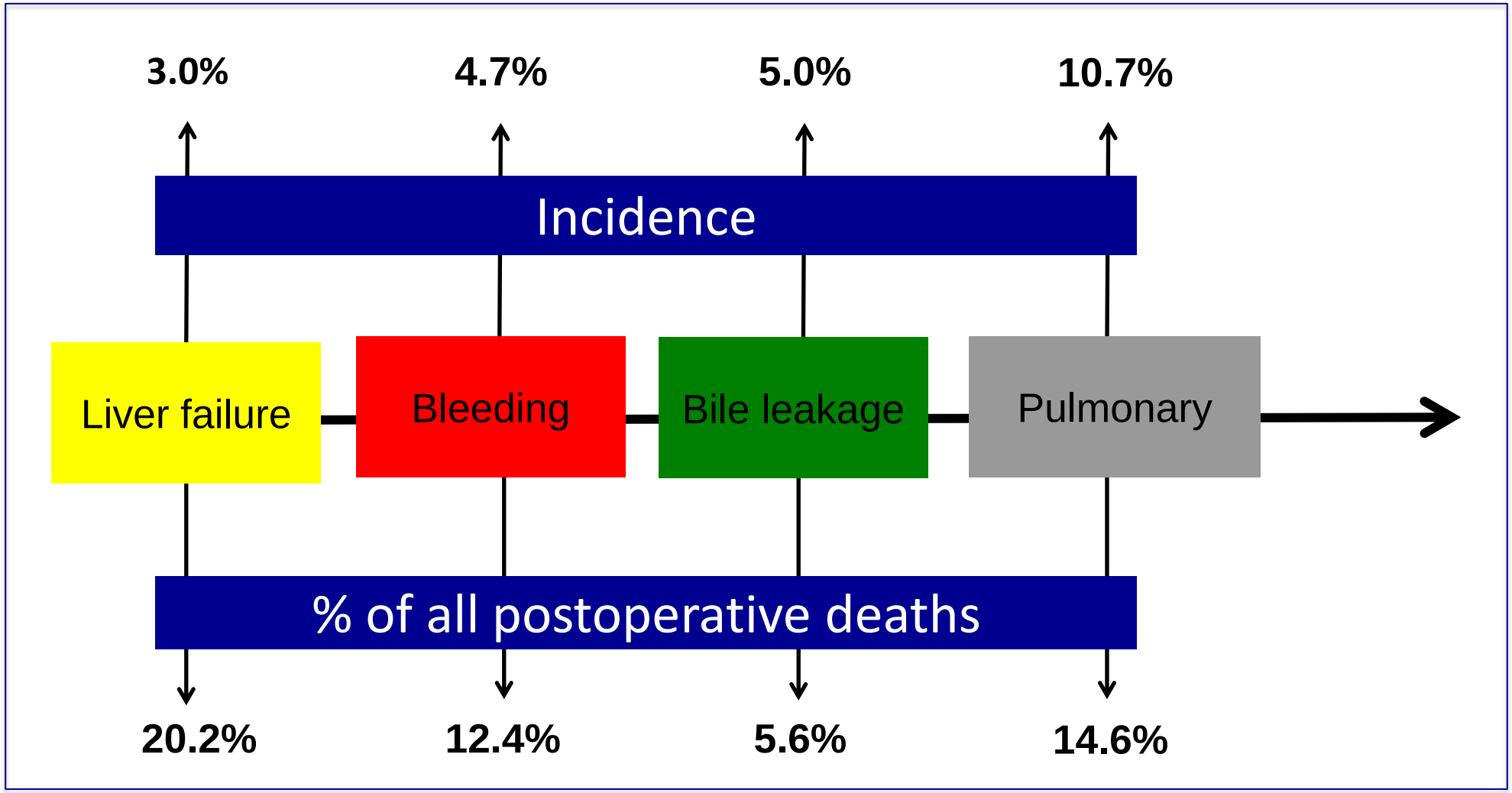


Evaluation de la fonction hépatique: **Généralité**

Surgeons intuition versus prognostic models: predicting the risk of liver resections.
Farges et al. Ann Surg 2014

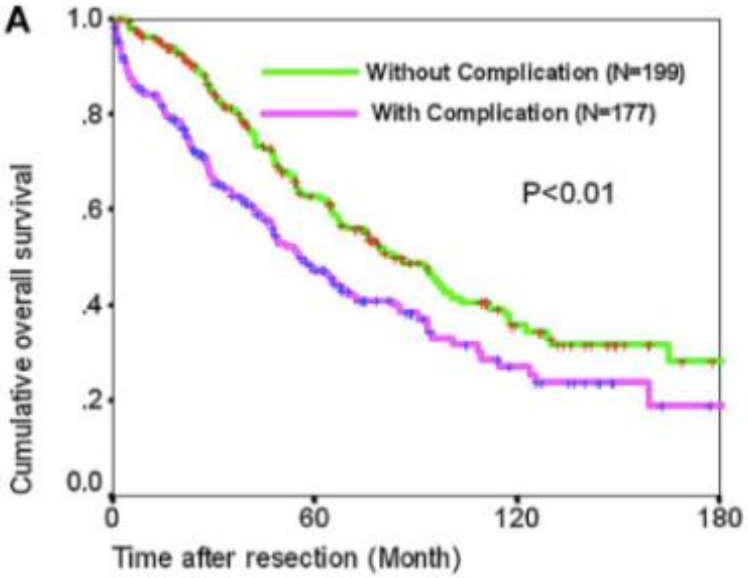
Preoperative surgeon's intuition			
	accurately	understimated	P<0.05
Difficulty	=	=	0.0001
Morditidy	38.8%	38.2%	0.0006
LOS*	30.0%	47.1%	0.04

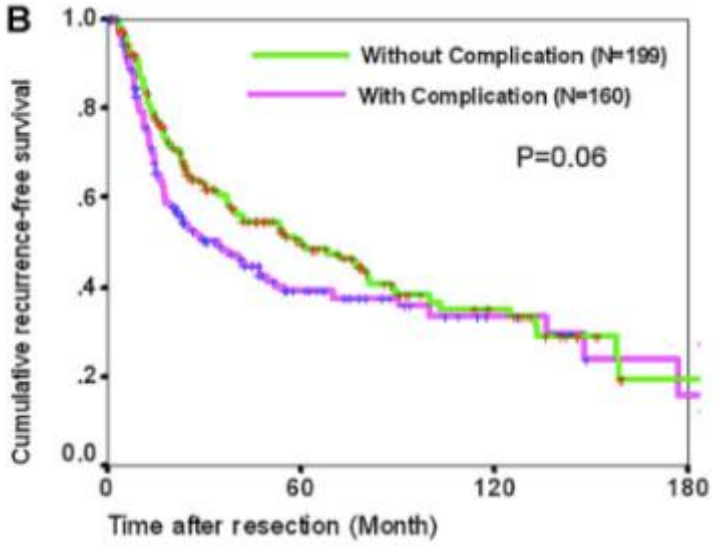
**LOS : length of stay*

Evaluation de la fonction hépatique: **Généralité**

Prognostic Significance of Postoperative Complications after Hepatectomy for Hepatocellular Carcinoma.

Okamura et al. Journal Surgical Oncol 2011





Evaluation de la fonction hépatique: **Généralité**

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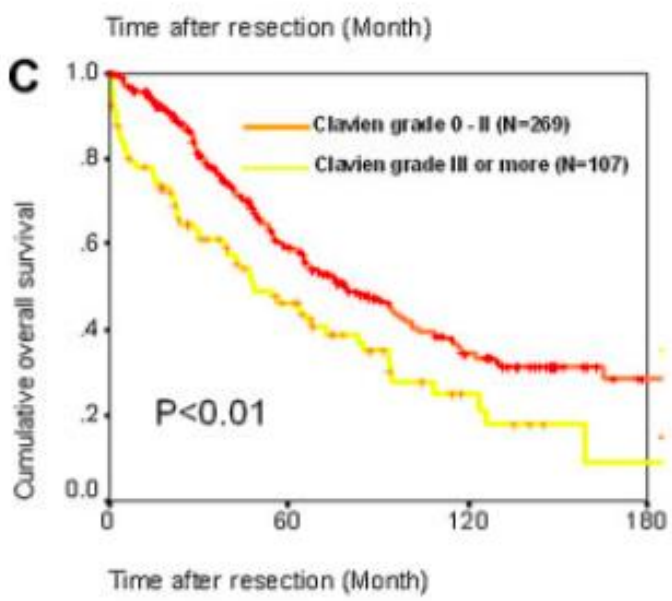
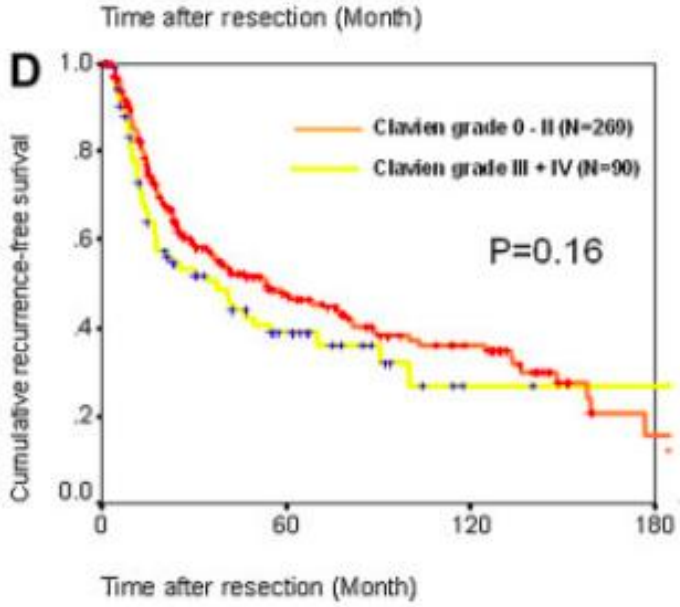
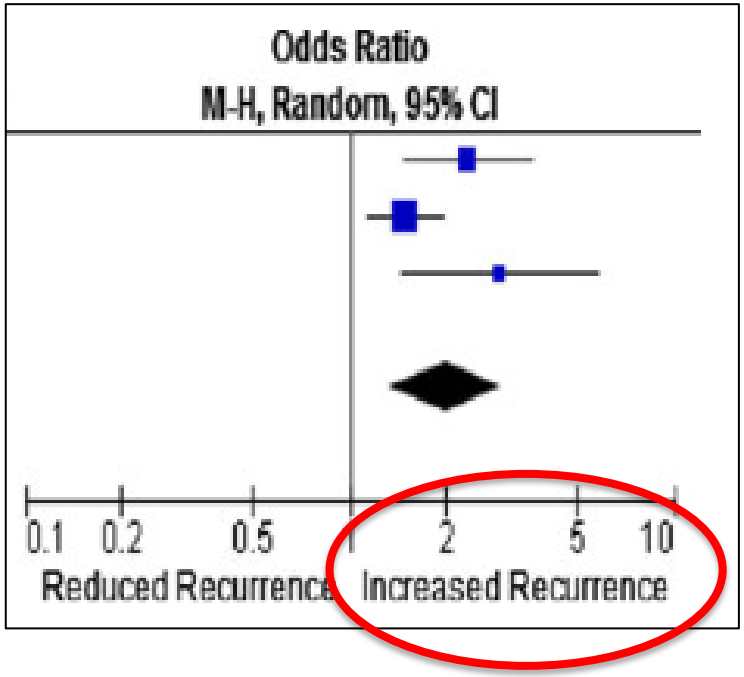


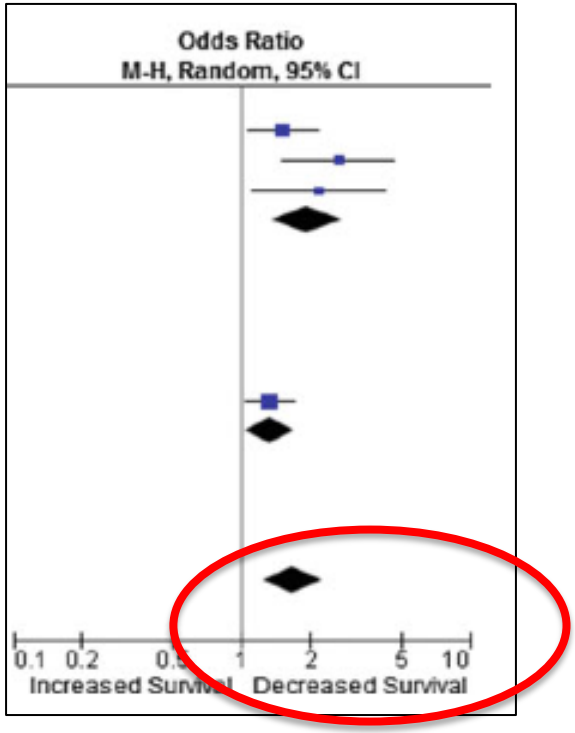


Evaluation de la fonction hépatique: **Généralité**

Does postoperative complication have a negative Impact on Long-Term Outcome following hepatic Resection for colorectal Liver metastasis?: A meta-analysis.

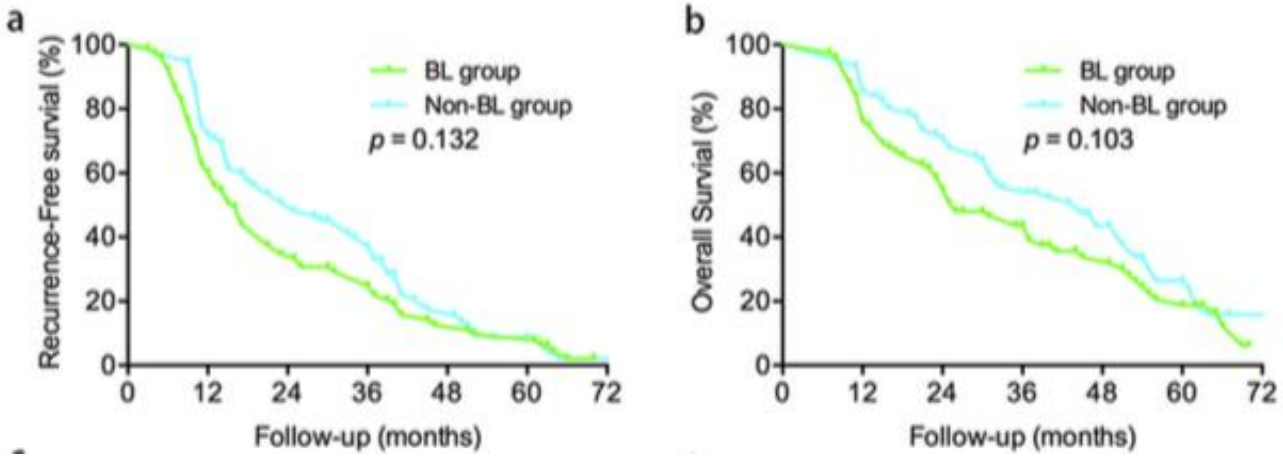
Akihisa Matsuda et al. Ann Surg Oncol 2013

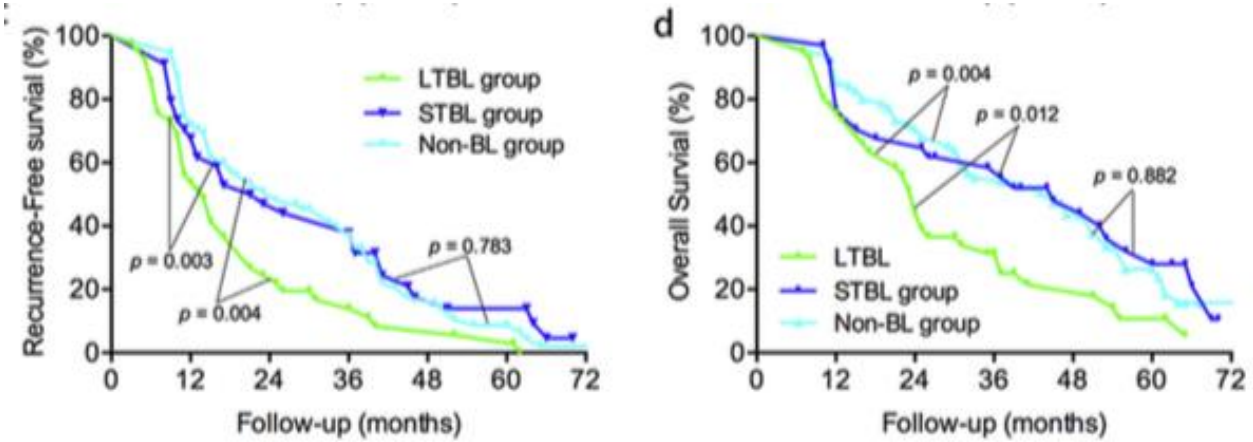




Evaluation de la fonction hépatique: **Généralité**

Fistule biliaire postopératoire: impact la survie?



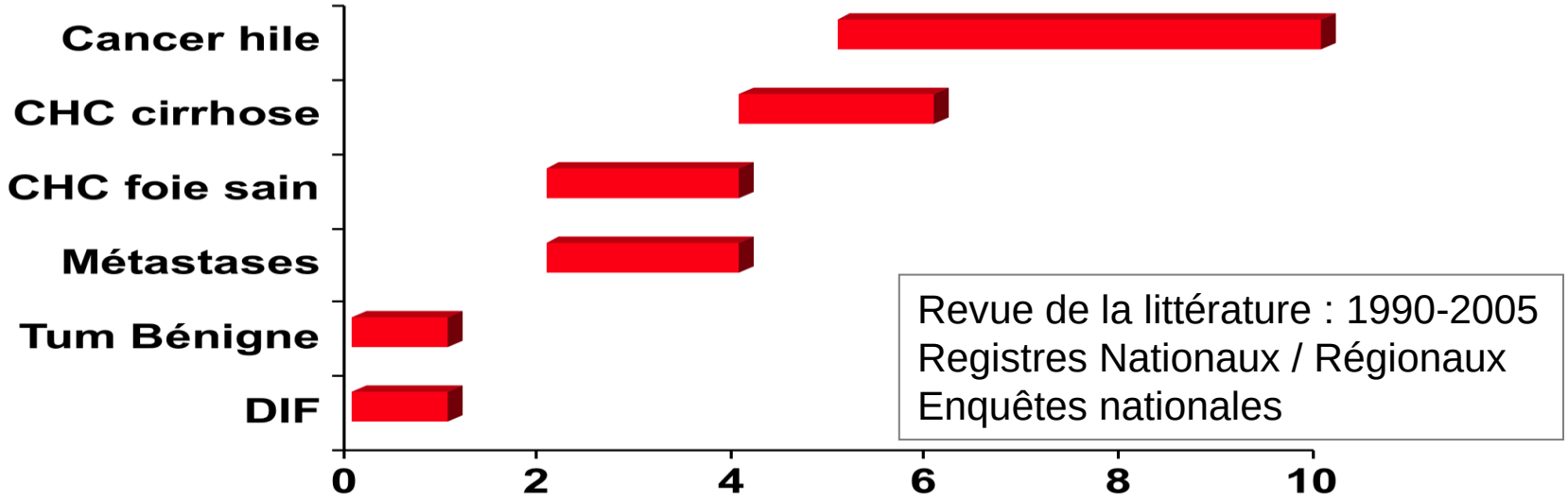


LTBL= long time biliary leakage > 30 days

Wang, 2019

Critères à « savoir » avant résection hépatique

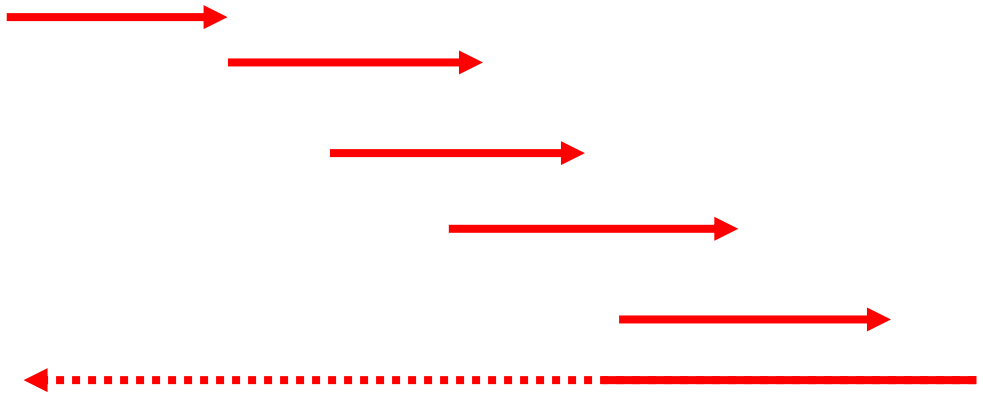
Risque des hépatectomies



Hépatectomie pour cancer
Terrain

Hépatopathie sous jacente
Etendue de l'exérèse

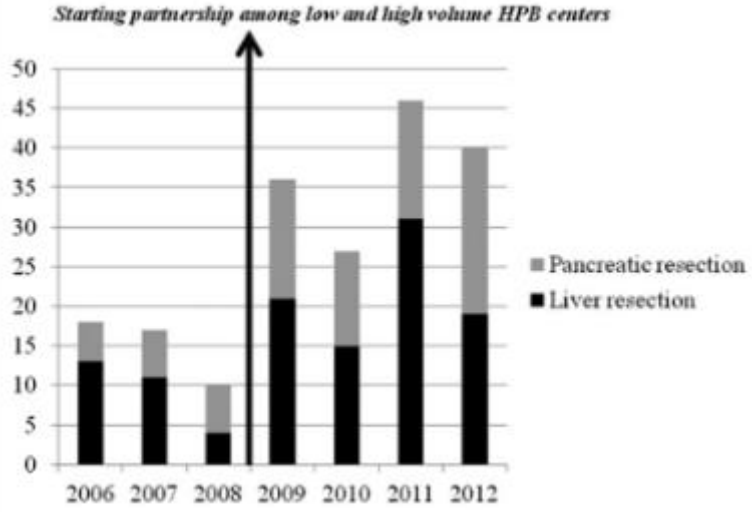
Sepsis / difficulté du geste
Centre « spécialisé »



A Partnership Model Between High- and Low-Volume Hospitals to Improve Results in Hepatobiliary Pancreatic Surgery

Matteo Ravaioli, MD, PhD, Antonio Daniele Pinna, MD, PhD,* Gianfranco Francioni, MD,† Marco Montorsi, MD, PhD,‡ Luigi Veneroni, MD,† Gian Luca Grazi, MD, PhD,§ Gian Marco Palini, MD, PhD,† Francesca Gavazzi, MD,‡ Giacomo Stacchini, MD,* Cristina Ridolfi, MD,‡ Matteo Serenari, MD,* and Alessandro Zerbi, MD‡*

(*Ann Surg* 2014;260:871–877)



	Mortality at 6 mo	Hospital Mortality	Reoperation
Liver			
2006–2008: 29 patients	3 (10.3%)	1 (3.5%)	3 (10.3%)
2009–2010: 35 patients	2 (5.7%)	1 (2.9%)	2 (5.7%)
2011–2012: 50 patients	2 (4%)	—	1 (2%)
Pancreas			
2006–2008: 17 patients	5 (29.4 %)	3 (17.6%)	2 (11.8%)
2009–2010: 27 patients	4 (14.8%)	3 (11.1%)	6 (22.2%)
2011–2012: 36 patients	1 (2.8 %)	1 (2.8%)	3 (8.3%)

Critères à évaluer avant résection hépatique

1) Evaluer présence d'une hépatopathie :

- Type (stéatose..)
- Gravité (MELD….)

2) Evaluer le volume du future foie restant (FFR)

3) Evaluer autres facteurs de risques :

- Insuff. rénale
- Dénutrition
- Age

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- Dénutrition

Foie et Stéatose

Metabolic syndrome and non-alcoholic fatty liver disease in Liver surgery: the news scourges?

Chauchy et al. World J Hepatol. 2014

Table 1 Diagnostic criteria of the metabolic syndrome

Criteria	Consensual criteria definition[1]	Other non-consensual criteria
Central obesity	Abdominal waist[2] > 102 cm (United States) or 94 cm (Europe) in men > 88 cm (United States) or 80 cm (Europe) in women	Different cutoff values of BMI ⩾ 28 or ⩾ 28.8 or ⩾ 30 kg/m^2
Dyslipidemia	Triglycerides ⩾ 150 mg/dL (1.7 mmol/L) HDL cholesterol < 40 mg/dL (1.03 mmol/L) in men < 50 mg/dL (1.29 mmol/L) in women	Statin or fenofibrate medication[3]
Hypertension	Blood pressure > 135/85 mmHg	Any antihypertensive therapy[3]
Glucose intolerance	Hyperglycemia Fasting glucose ⩾ 110 mg/dL, or type II diabetes	Any diabetes Any antidiabetic therapy (oral or insulin)

Diagnosis of metabolic syndrome (MS) requires at least 3 out of 5 criteria

Foie et Stéatose

Metabolic syndrome and non-alcoholic fatty liver disease in Liver surgery: the news scourges?

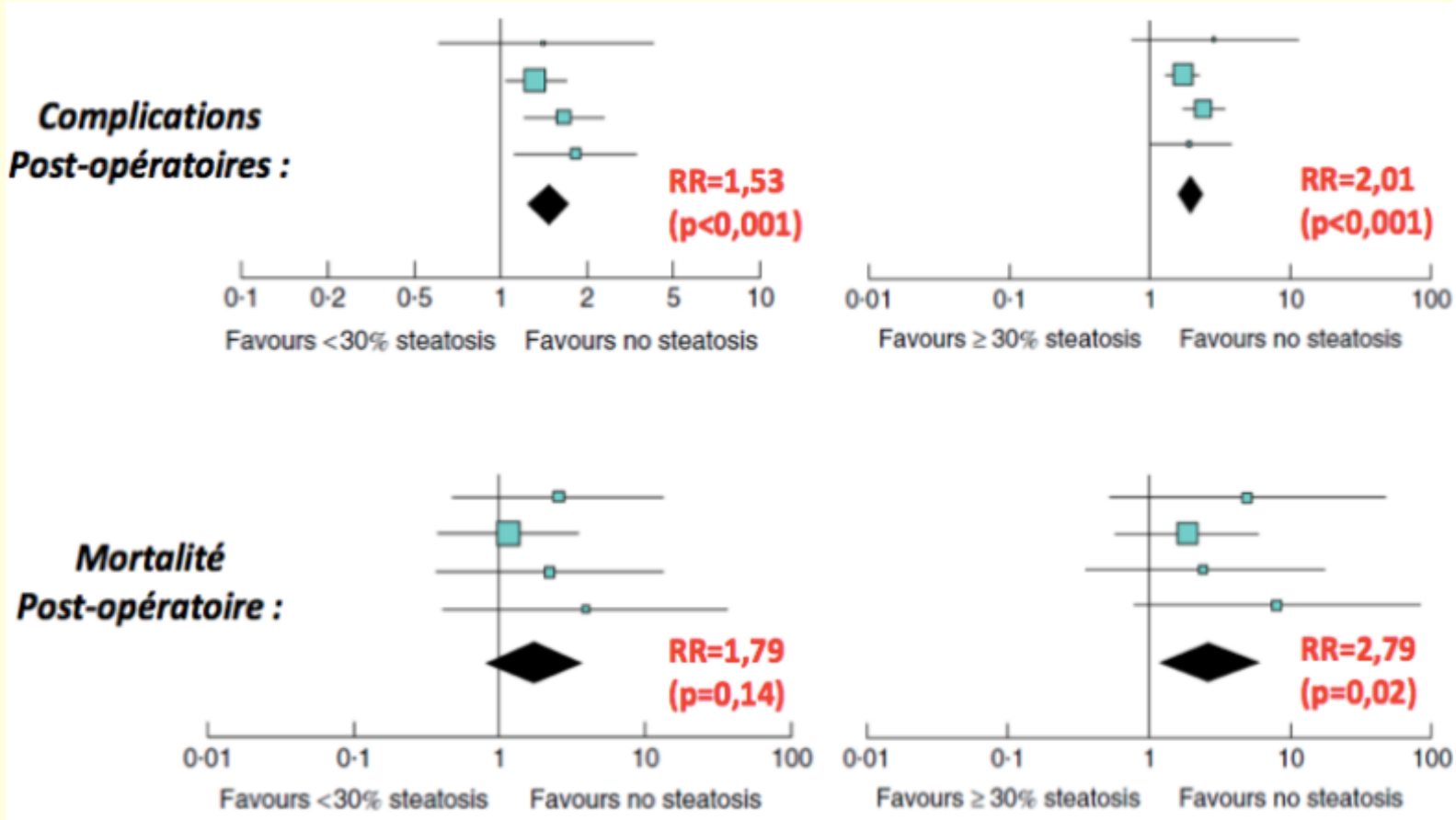
Chauchy et al. World J Hepatol. 2014

Table 2 Studies focusing on liver resection in a context of metabolic syndrome, non-alcoholic fatty liver disease and non-alcoholic steatohepatitis

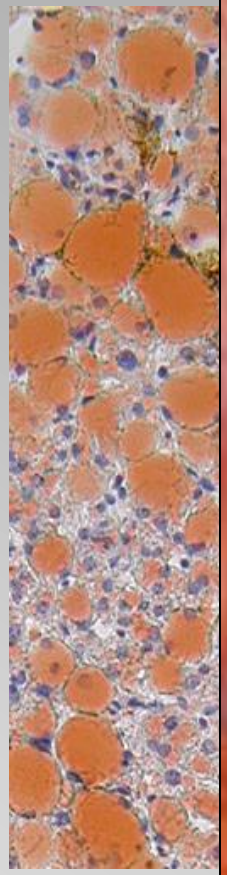
Ref.	Endpoint	Underlying parenchyma	Assessment of metabolic factors	Morbidity			Mortality
				Overall	Liver related	CV and respiratory	
Wakai *et al*[9]	Influence of the underlying liver on liver resection	NAFLD (n = 17)	BMI	59%	47%	6%	12%
Neal *et al*[10]	Influence of the underlying liver on right trisectionectomy	NASH (n = 9)	All factors	NA	NA	NA	22%
Reddy *et al*[11]	Influence of the underlying liver on liver resection	Simple steatosis (n = 72)	All factors	35%	19%	28%	4%
		NASH (n = 102)		57%	28%	13%	4%
Bhayani *et al*[12]	Influence of the MS on liver resection	NA	MS (n = 256)	29%	NA	22%	6%
			No MS (n = 3.717)	23%		15%	2%
Zarzavadjian Le Bian *et al*[13]	Influence of the MS on right trisectionectomy	NAFLD (n = 27)	> 2 MS factors (n = 30)	60%	53%	NA	30%
			≥ 3 MS factors (n = 13)	NA	NA	NA	54%
Cauchy *et al*[8]	Influence of the MS on liver resection	NASH (n = 16)	MS (n = 62)	58%	21%[1]	17%[1]	11%

[1]Major complications: Clavien Ⅲ-Ⅴ. MS: Metabolic syndrome; NAFLD: Non-alcoholic fatty liver disease; NASH: Non-alcoholic steatohepatitis; CV: Cardiovascular; NA: Not applicable.

Foie et Stéatose



Foie et Chimiothérapie



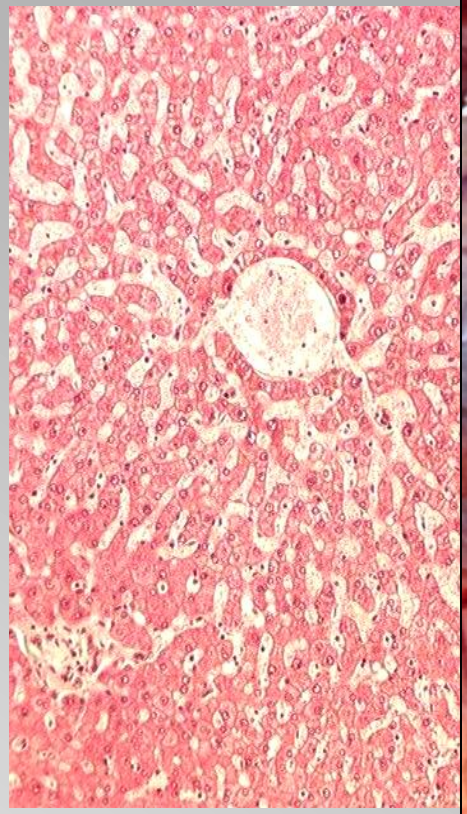
“Yellow Liver”
Stéatose ou Stéato-hépatite

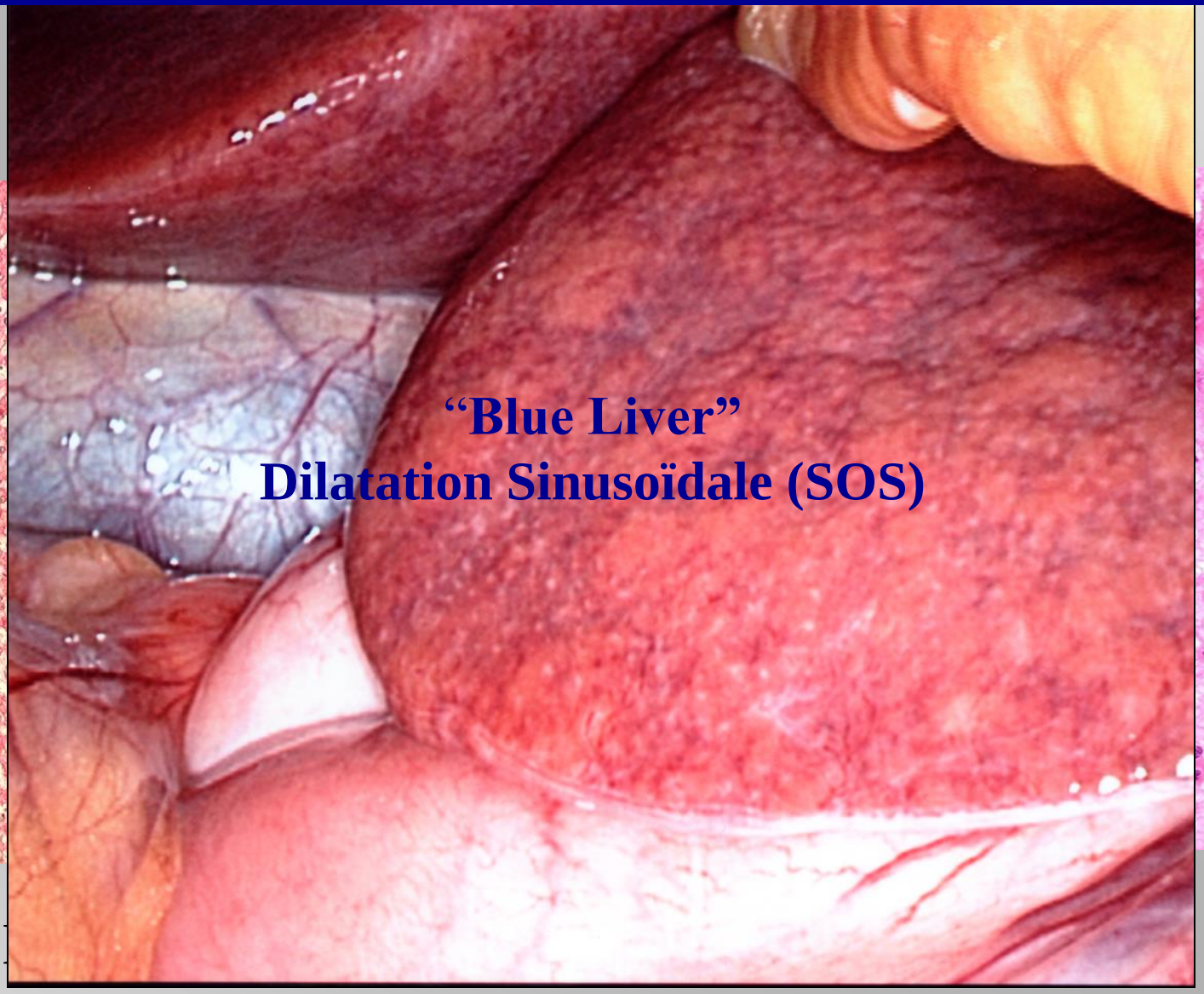
Principal

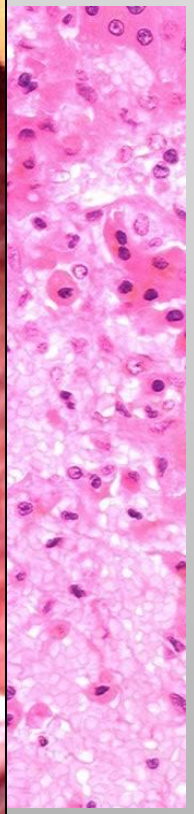
Rubia-Brandt, Ann Oncol 2004
Fernandez, J Am Coll Surg, 2005

Kooby, J Gastrointest, 2003
Vauthey, J Clin Oncol, 2006

Foie et Chimiothérapie

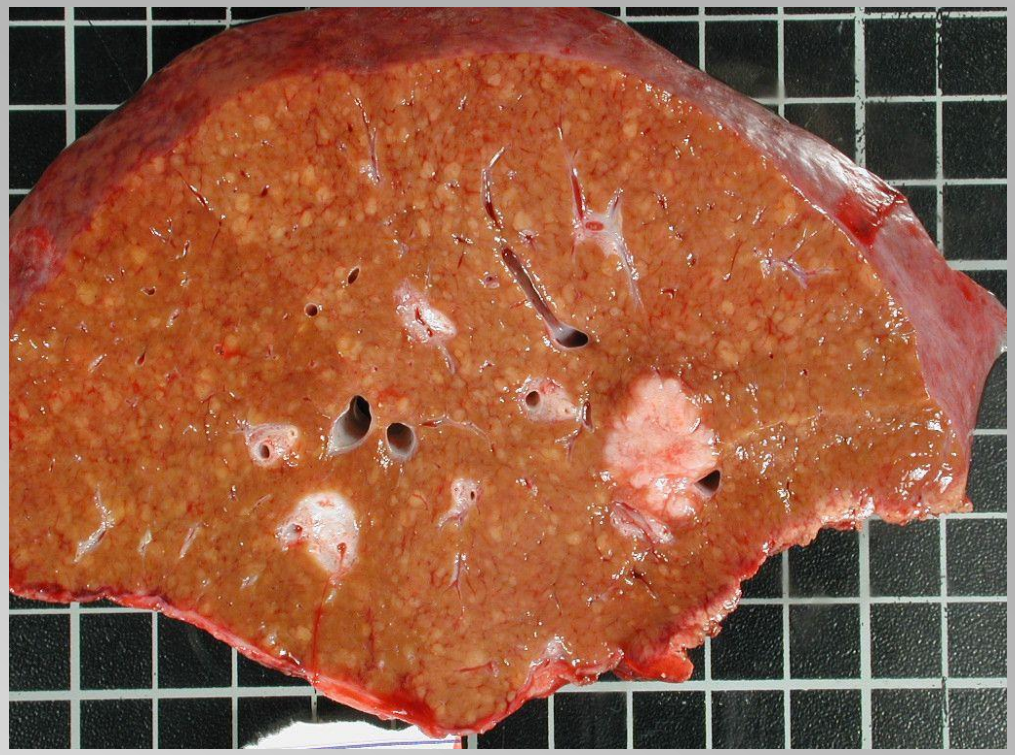


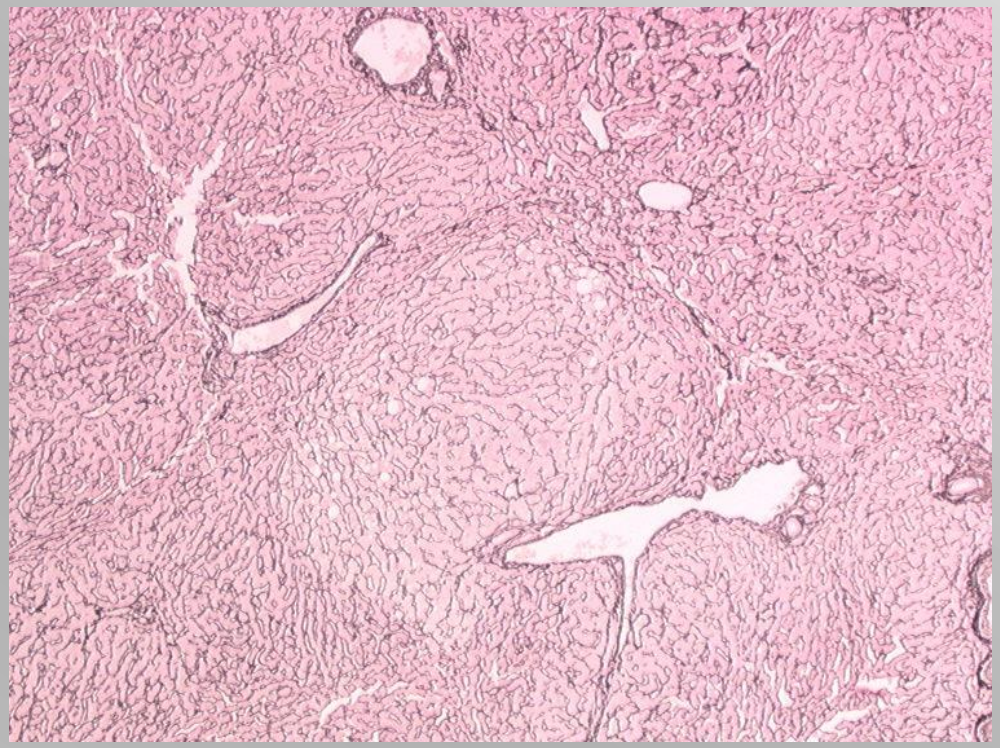




Surtout observées avec l’oxaliplatine (associé au 5FU = Folfox)

Lésions vasculaires





Hyperplasie nodulaire régénérative

Surtout observées avec l'oxaliplatine (associé au 5FU = Folfox)

Foie et Chimiothérapie

	Prevalence	Risk	Mortality
Steatosis	+++	+	-
Stéatohepatitis	4-20%	++	+
Venous congestion	10-52%	+	-
Sinusoidal hemor.	++	+	-
H.N.R	5-10%	++	-

Rubbia-Brandt et al. Annals of Oncology 2004; Fernandez et al. J Am Coll Surg. 2005

Foie et Cholestase Ictérique

Auteurs	N° patients	mortalité
Redding (1991)	47	16%
Nimura (1998)	91	10%
Miyazaki (1998)	65	15%
Beaujon (1999)	31	13%
Jargin (2001)	80	11%
Farges (2013)	366	10%
Wiggers (2016)	287	14%

- Augmentation des pertes sanguines per-opératoires
- Mauvaise tolérance à l'ischémie
- Augmentation des fuites biliaires ⇒ Abcès
- Risque d'IHC
- Absence ou diminution de la régénération

Foie et Cholestase Ictérique

Journal of *Clinical Medicine*

MDPI

5 April 2019

Article

Relevance of Preoperative Hyperbilirubinemia in Patients Undergoing Hepatobiliary Resection for Hilar Cholangiocarcinoma

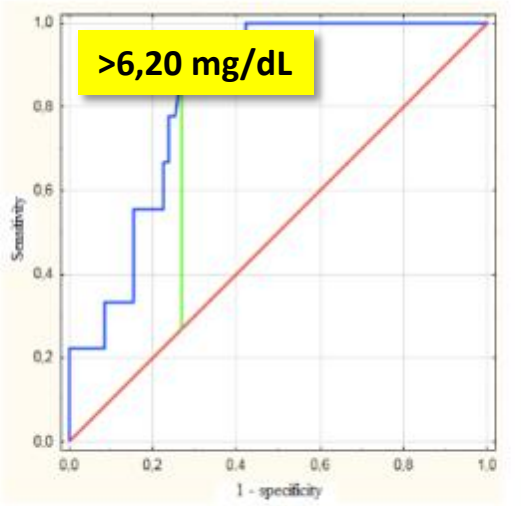


Figure 1. Receiver operating characteristics curves for prediction of postoperative mortality based on preoperative bilirubin concentration.

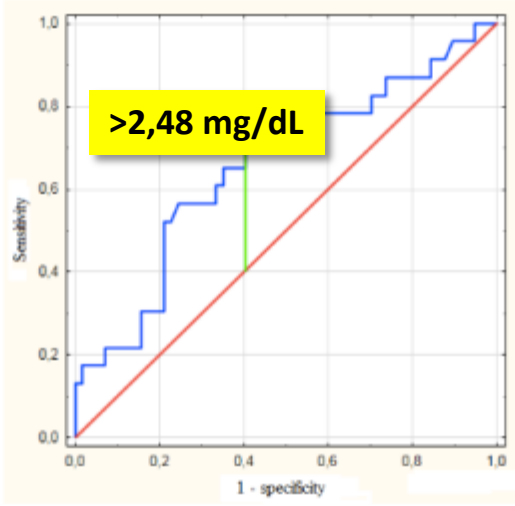


Figure 2. Receiver operating characteristics curves for prediction of occurrence of postoperative severe complications based on preoperative bilirubin concentration.

Foie et Cholestase Ictérique

Rate of bilirubin decrease as a risk predictor in hepato-biliary-pancreatic surgery.
Sano K. et al.
Hepatogastroenterology 1999

Abstract

BACKGROUND/AIMS: Although percutaneous transhepatic biliary drainage is widely performed for jaundice reduction, the clinical significance and mechanism responsible for delayed decrease of the bilirubin level remains unclarified.

METHODOLOGY: The rate of bilirubin decrease was estimated in 104 consecutive patients who underwent drainage. Morbidity and mortality after major and minor operations for hepato-biliary-pancreatic diseases in groups showing slow and rapid bilirubin decrease were estimated. The risk factors for slow bilirubin decrease were also examined by uni- and multivariate analyses.

RESULTS: A statistically significant difference between the slow and rapid bilirubin decrease groups was found only in the morbidity rates of major surgery (73% vs 28%, $p < 0.05$). Univariate analysis showed that the longer interval from onset of jaundice to drainage, the use of multiple catheters for jaundice reduction, and advanced age were significant risk factors for slow bilirubin decrease. These factors were found to be independent by multivariate analysis ($p < 0.05$)

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Foie et Cholestase Ictérique

Multicentre Eureopean study of preoperative biliary drainage for hilar cholangiocarcinoma.
O. Farges et al. - British Journal of Surgery 2013

Table 3 Postoperative mortality in patients undergoing left- and right-sided hepatectomy with or without preoperative biliary drainage

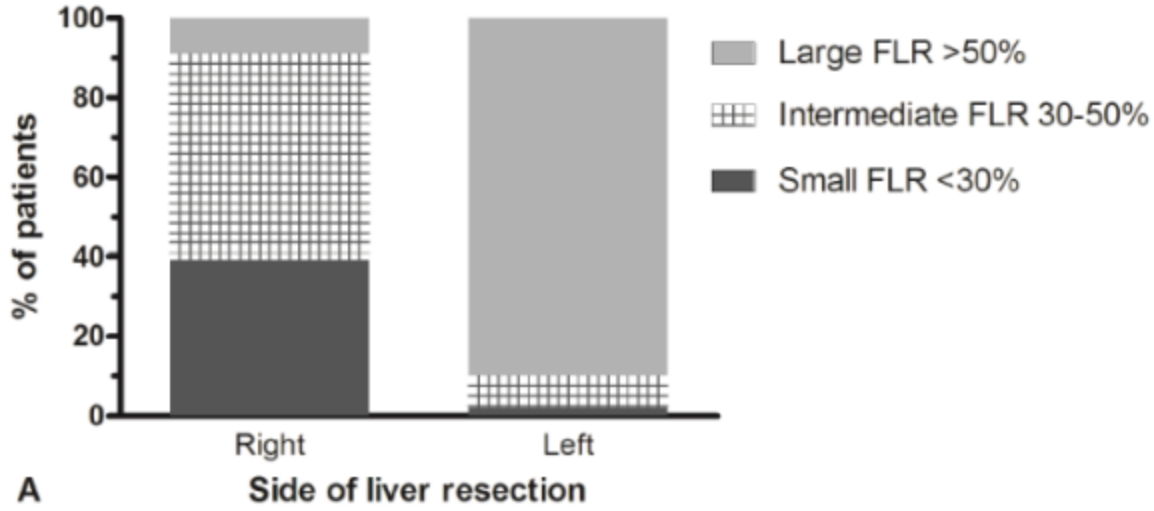
	Mortality					
	Left hepatectomy			Right hepatectomy		
	No PBD = 103)	PBD ($n = 79$)	P^*	No PBD ($n = 83$)	PBD ($n = 101$)	P^*
Liver failure	1 (1·0)	1 (1)	1·000	13 (16)	4 (4·0)	0·009
Sepsis	0 (0)	5 (6)	0·014	1 (1)	1 (1·0)	1·000
Haemorrhage	2 (1·9)	1 (1)	1·000	2 (2)	2 (2·0)	1·000
Other	1 (1·0)	1 (1)	1·000	2 (2)	2 (2·0)	1·000
Overall	4 (3·9)	8 (10)	0·060	18 (22)	9 (8·9)	0·026

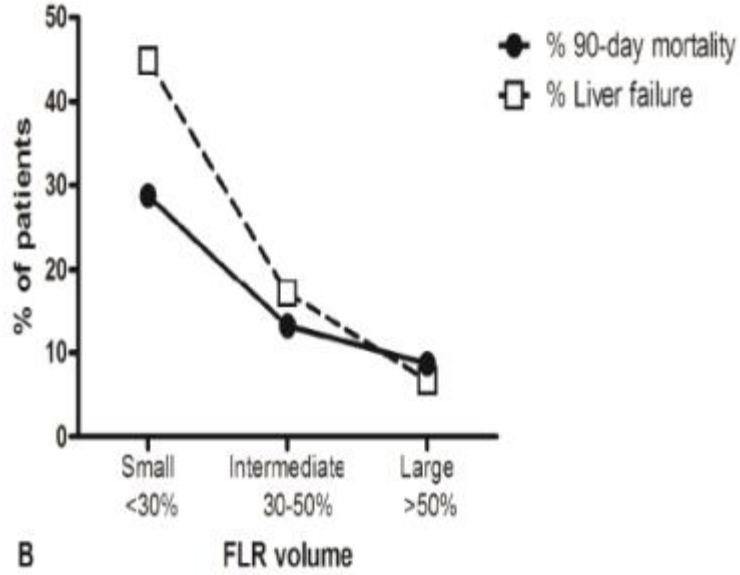
Values in parentheses are percentages. PBD, preoperative biliary drainage. *Fisher's exact test.

Foie et Cholestase Ictérique

Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma: Development of a Risk Score and Importance of Biliary Drainage of the Future Liver Remnant

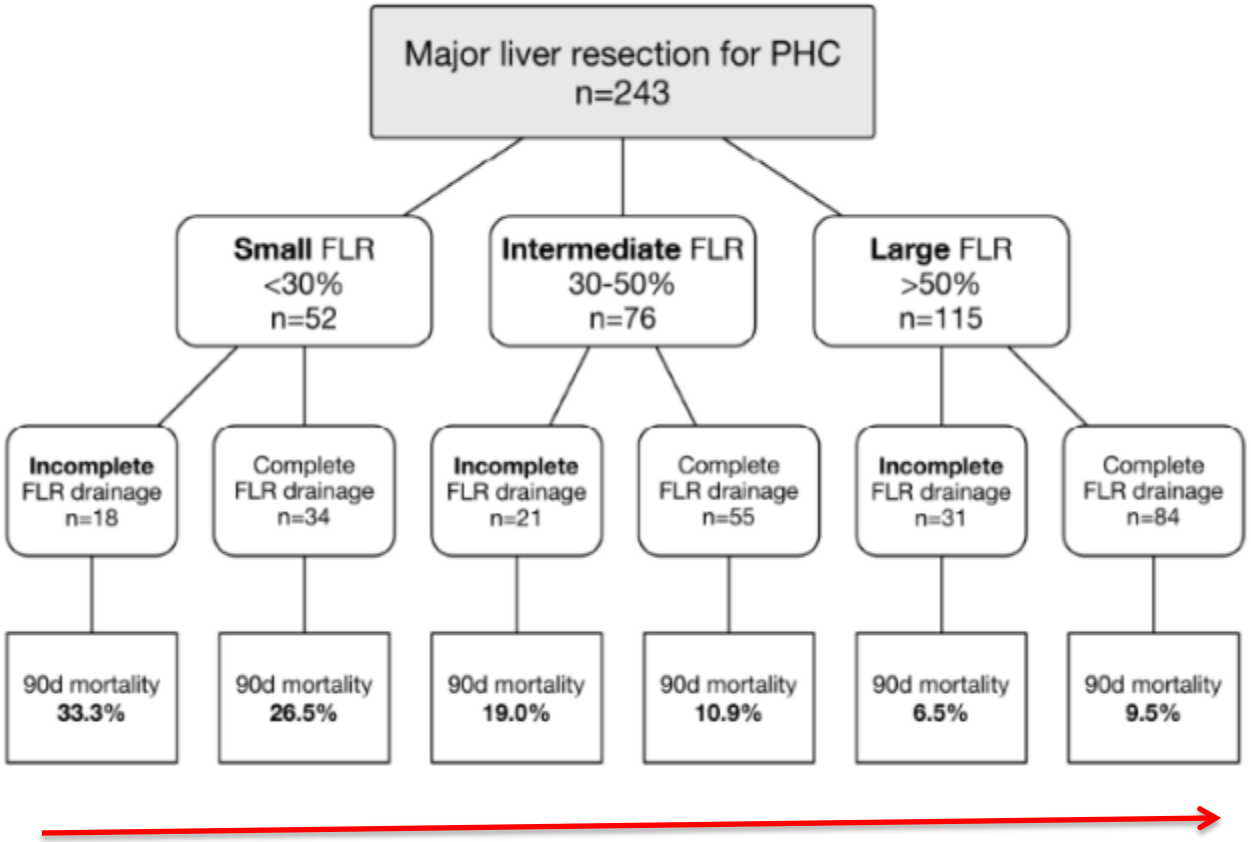
J Wiggers et al j Am Coll Sur 2016





Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma: Development of a Risk Score and Importance of Biliary Drainage of the Future Liver Remnant

J Wiggers et al j Am Coll Sur 2016



Foie et Cholestase Ictérique

Preoperative Cholangitis and Future Liver Remnant Volume Determine the Risk of Liver Failure in Patients Undergoing Resection for Hilar Cholangiocarcinoma

D. Riberio et al. J Am coll Surg 2016

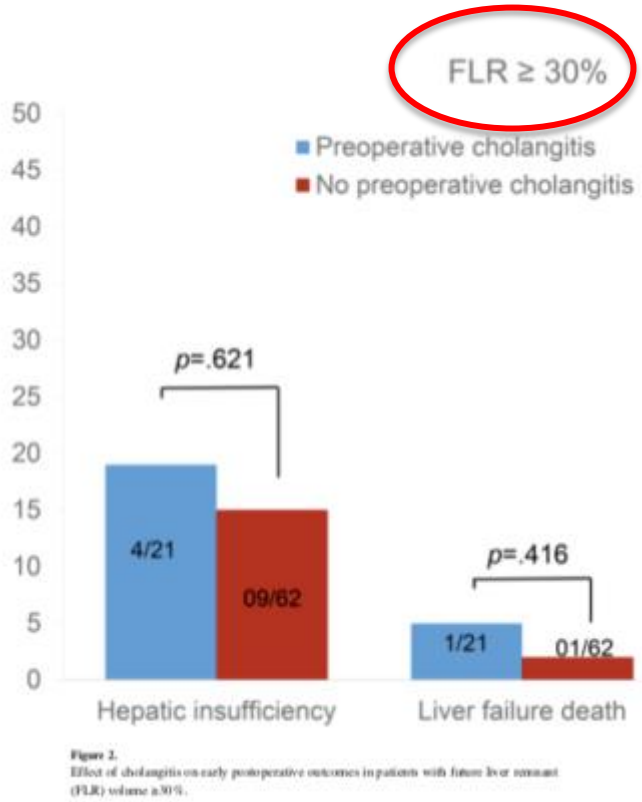


Figure 2.
Effect of cholangitis on early postoperative outcomes in patients with future liver remnant (FLR) volume ≥30%.

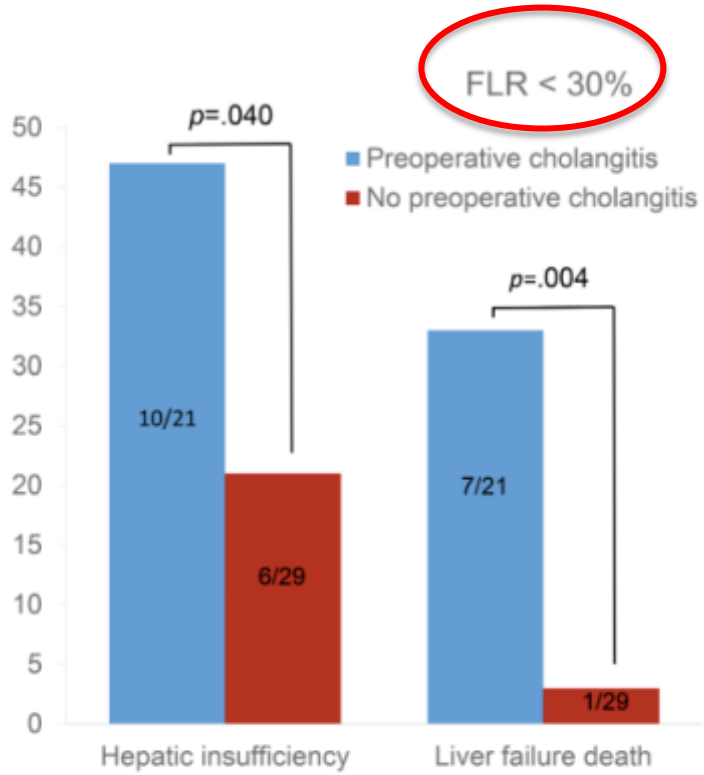


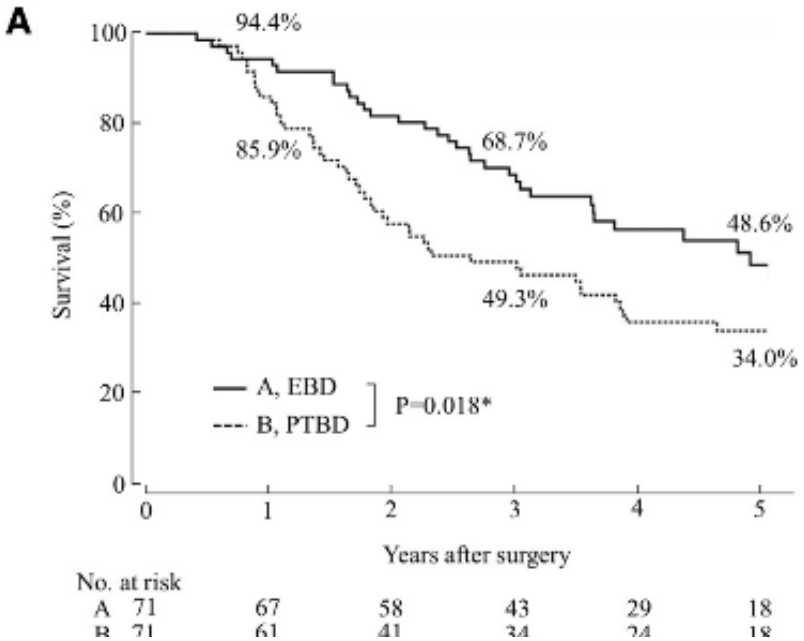
Figure 1.
Effect of cholangitis on early postoperative outcomes in patients with future liver remnant (FLR) volume < 30%.

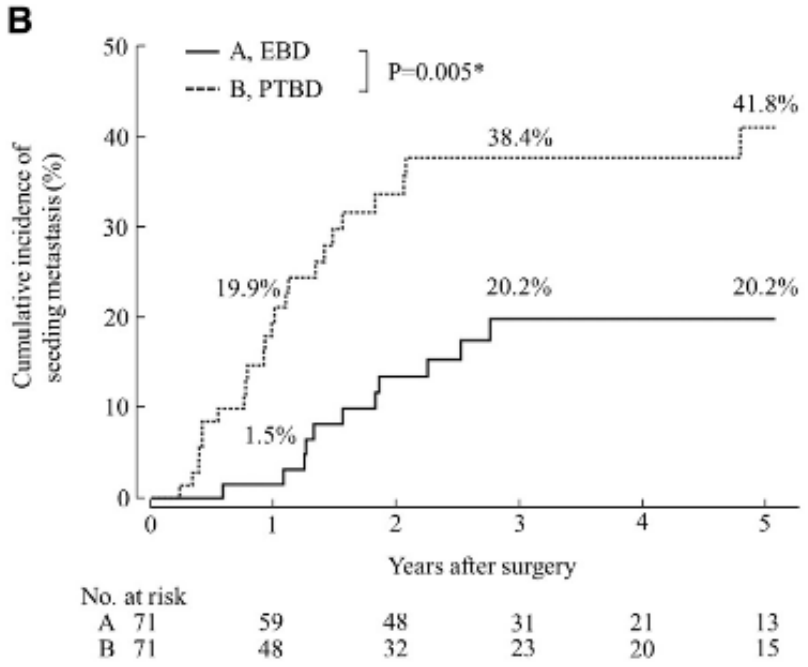
Foie et Cholestase Ictérique

Verification of the oncologic inferiority of percutaneous biliary drainage to endoscopic drainage: A propensity score matching analysis of resectable perihilar cholangiocarcinoma

Kenichi Komaya, MD, Tomoki Ebata, MD, Yukihiro Yokoyama, MD, Tsuyoshi Igami, MD, Gen Sugawara, MD, Takashi Mizuno, MD, Junpei Yamaguchi, MD, *and* Masato Nagino, MD, *Nagoya, Japan*

Surgery 2017





Foie et Cirrhose

- **Augmente la difficulté opératoire:**

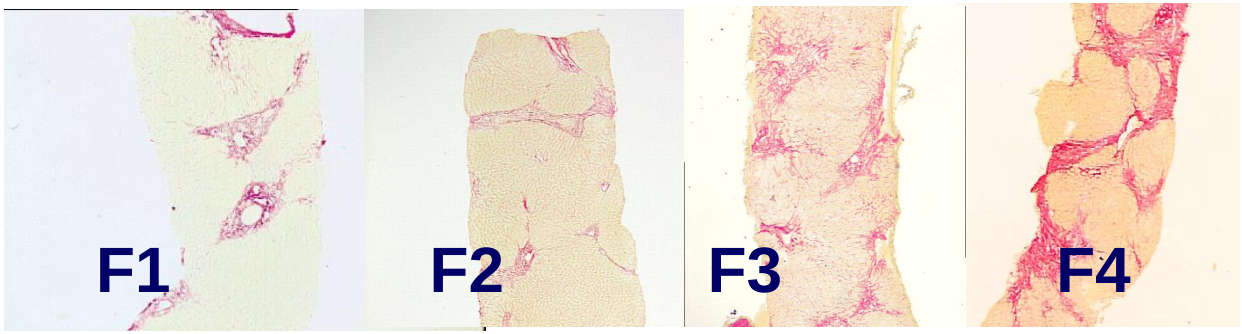
  Troubles de l'hémostase

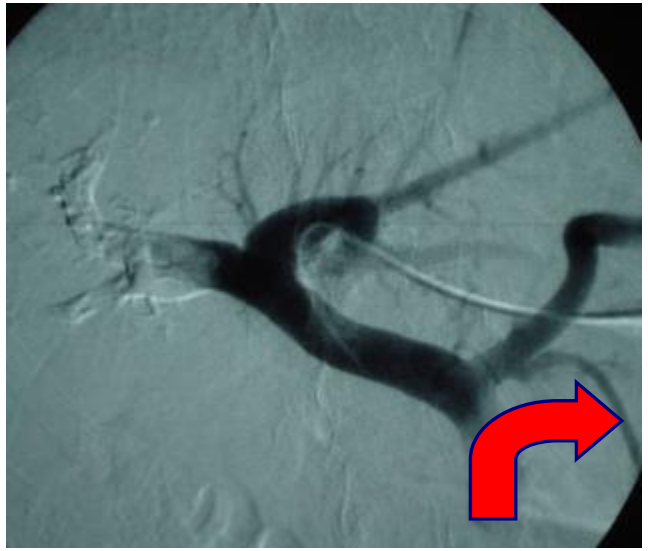
  Hypertension portale → Collatérales → Vx fragiles

- **Expose au risque d'I.H.C postopératoire**

- **Diminue le potentiel de régénération:**

  Masse cellulaire diminuée





Liver Stiffness Measurement by Transient Elastography as a Predictor on Posthepatectomy Outcomes

Wong et al Ann Surg 2013

TABLE 8. Subgroup Analysis for Patients With Hepatocellular Carcinoma

	LSM > 12 kPa (n = 30)	LSM ≤ 12 kPa (n = 48)	*P*
Major complication, n (%)	9 (30.0)	1 (2.1)	<0.001*
Overall complication, n (%)	10 (33.3)	6 (12.5)	0.027*
Blood loss per transection area, median (range) mL/cm^2	11.0 (2.1–40.8)	7.3 (1.1–64.5)	0.048*
Transfusion rate, n (%)	8 (26.7)	2 (4.3)	0.011*

*$P < 0.05$.

Rajakannu M, 2017

Foie et Cirrhose

2012 Liver resections in the 21st century: we are far from zero mortality

Safi Dokmak,[1,2] Fadhel Samir Ftériche,[1,2] René Borscheid,[1,2] François Cauchy,[1,2] Olivier Farges,[1,2] and Jacques Belghiti[1,2]

HPB 2013

Table 5 Univariate and multivariable analysis for mortality in patients with malignant disease

	Malignant disease group				
	n (%)	*P*-value (UV)	OR	95% CI	*P*-value (MV)
Male	52 (5.7%)	0.008	–	–	NS
Age >60 years	40 (5.4%)	0.096	1.530	1.123–2.534	0.036
ASA class ≥3	11 (9.7%)	<0.001	3.003	1.515–5.952	0.017
BMI > 30 kg/m^2	14 (6.5%)	0.069	–	–	NS
Blood loss >1000 ml	26 (10.6%)	<0.001	3.963	2.315–6.783	<0.001
Transfusion	44 (13.3%)	<0.001	7.692	4.538–13.043	<0.001
Major resection	53 (6.8%)	<0.001	3.664	1.979–6.781	0.008
Vascular procedure	24 (15.6%)	<0.001	5.559	3.262–9.746	<0.001
Bile duct resection	15 (11.7%)	<0.001	–	–	NS
Fibrosis F3–F4	35 (9.6%)	<0.001	3.511	2.131–5.785	<0.001
Steatosis >30%	16 (8.5%)	0.005	2.273	1.257–4.111	<0.001
Vascular occlusion	57 (6.1%)	<0.001	3.697	1.815–7.530	<0.001

UV, univariate analysis; OR, odds ratio; 95% CI, 95% confidence interval; MV, multivariate analysis; NS, not significant; ASA, American Society of Anesthesiologists; BMI, body mass index.

Critères à évaluer avant résection hépatique

1) Evaluer présence d'une hépatopathie :

-Type (stéatose..)

- Gravité (MELD….)

2) Evaluer le volume du future foie restant (FFR)

3) Evaluer autres facteurs de risques :

- Insuff. rénale

- Dénutrition

- Age

Score Child-Pugh

	1 point	2 points	3 points
Encéphalopathie	Absente	Confus	Coma
Ascite	Absente	Discrète	Modérée
Bilirubine µmol/L	< 35	35-50	> 50
Albumine g/L	> 35	28-35	< 28
TP (%)	> 60	35-60	[illegible]

… à 2 ans

Child A … -6. 85%

Cl… ore 7-9. 57%

… C : score 10-15. 35%

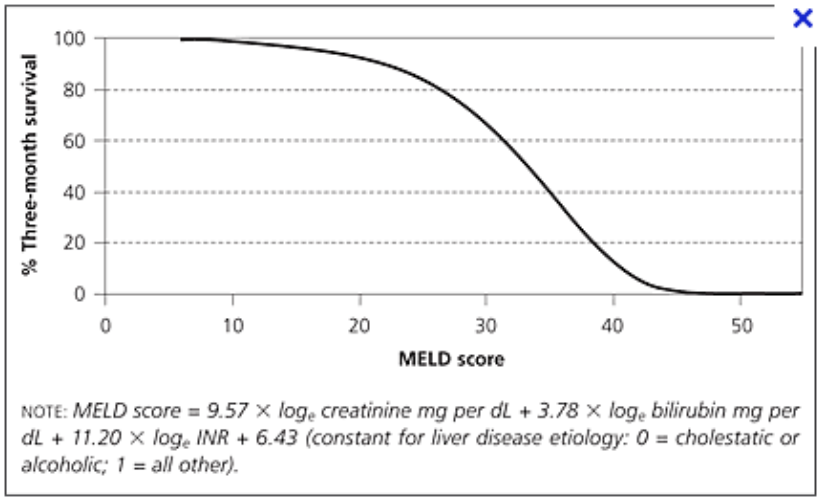
Pas de résection sur cirrhose si CHILD > A

Stades CTP	[illegible]	B	C
Scores CTP	…6 points	7-9 points	10-15 points
M… j.	10%	30%	76-82%

Ta… 1 - Mortalité postopératoire des patients cirrhotiques après 30j. selon CTP.

MELD : model end-stage liver disease

MELD score = 9.6 * $\log_e$ (créatinine mg/dL) + 3.8 * $\log_e$(bilirubine mg/dL) + 11.2 * $\log_e$ (INR) + 6.4



NOTE: *MELD score = 9.57 × $\log_e$ creatinine mg per dL + 3.78 × $\log_e$ bilirubin mg per dL + 11.20 × $\log_e$ INR + 6.43 (constant for liver disease etiology: 0 = cholestatic or alcoholic; 1 = all other).*

MELD (score 0-40)

Plus sensible dans le temps que Child-Pugh pour prédire la mortalité (ne prend pas en compte l'ascite!)

Impact of Model for End-Stage Liver Disease (MELD) Score on Prognosis After Hepatectomy for Hepatocellular Carcinoma on Cirrhosis

Alessandro Cucchetti, Giorgio Ercolani, Marco Vivarelli, Matteo Cescon, Matteo Ravaioli, Giuliano La Barba, Matteo Zanello, Gian Luca Grazi, and Antonio Daniele Pinna

Liver Transplantation 2006

Pas de résection sur cirrhose si MELD ≥ 10

Variables	MELD score <9 (n = 7…)	MEL… and 10 (n = 56)	MELD score ≥11 (n = 24)
Postoperative liver failure		2 (3.6%)	9 (37.5%)
Postoperative complications	…(8.1%)	20 (35.7%)	20 (83.3%)
Refractory ascites	5 (6.8%)	15 (26.8%)	20 (83.3%)
Jaundice	2 (2.7%)	10 (17.9%)	19 (79.2%)
Alteration of …tors	3 (4.1%)	12 (21.4%)	19 (79.2%)
Renal i…	0 (0%)	4 (7.1%)	6 (25%)
Hos…ys)	8 (5-38)	9 (6-33)	25 (6-166)
1-yea…ival	100%	94%	74%

Evaluation de la Fonction Hépatique

Test Dynamique

Clearance au vert d'indocyanine

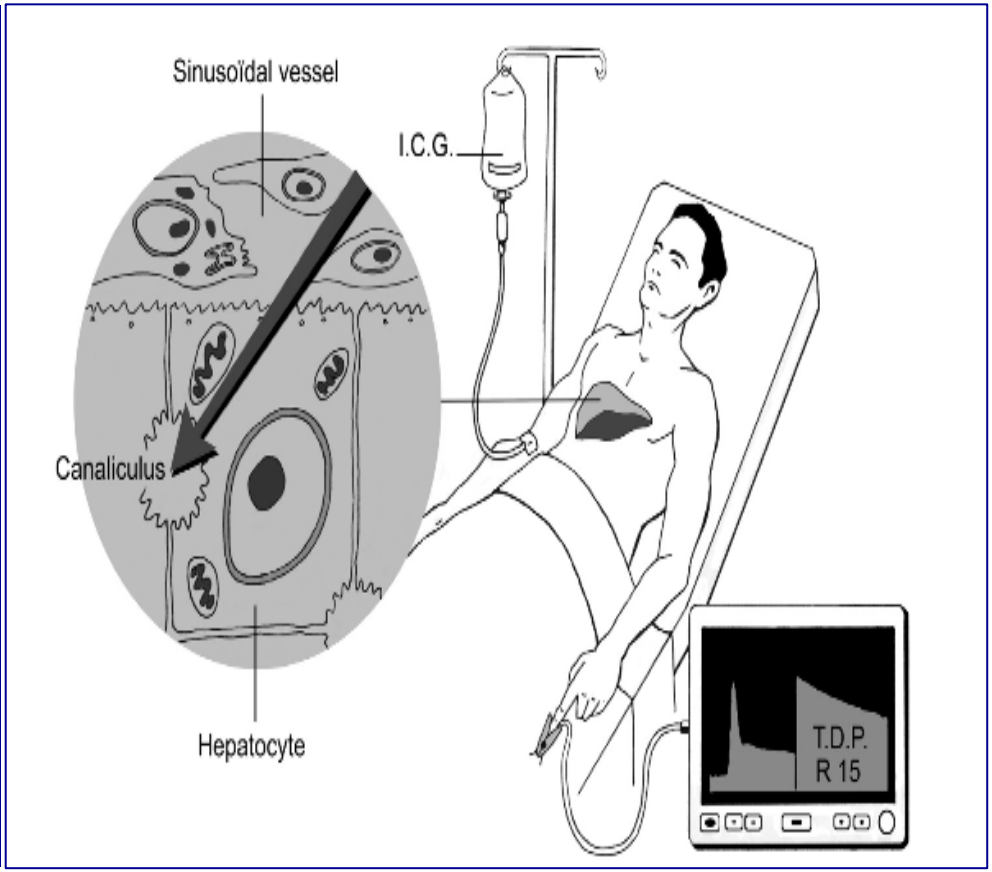
- Colorant élimination hépatique exclusive

- 0,2 - 0,5 mg/Kg IV

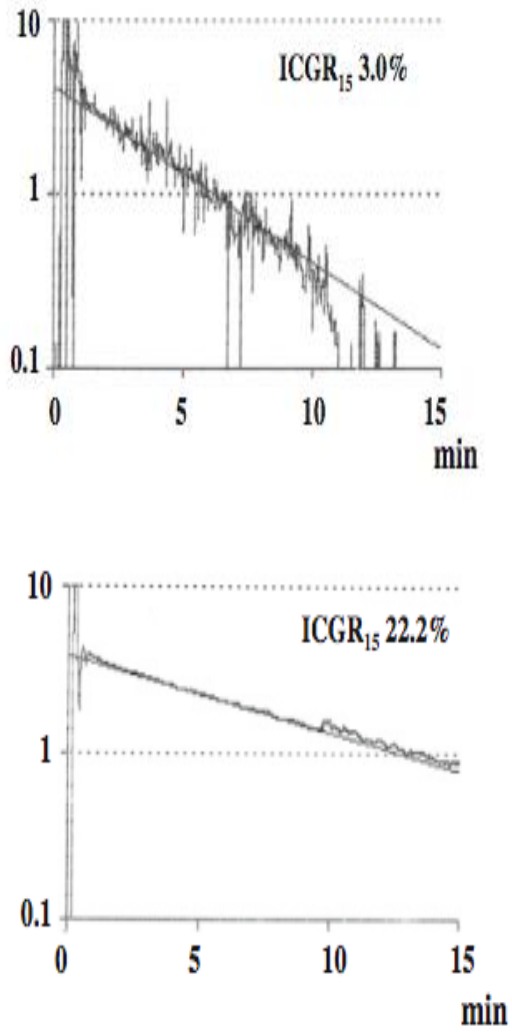
- **ICG_{R15}: retention rate after 15 min (%)**

- **ICG clearance**: ml/min

- **PDR** (Plasma disappearance rate of ICG); %/min



Evaluation de la Fonction Hépatique



Parameter	Normal range	Units
ICGR15*	0 - 10	%
ICG clearance: ml/min	500 - 750	mL/min
ICG-PDR**	18 -25	%/min

*ICG R15: Indocyanine green retention ratio at 15 min
**Plasma disappearance rate of ICG: ml/min

Mizuguchi T, 2014

Levesque E 2016

Evaluation de la Fonction Hépatique

Parameters	Liver damage grades		
	A grade	B grade	C grade
Albumin (mg/dl)	>3.5	3.5–3.0	<3.0
Bilirubin (mg/dl)	<2	2–3	>3
PT (%)	>80	50–80	<50
Ascites	None	Small or controlled	Tense
$ICGR_{15}$ (%)	<15	15–40	>40

If the liver damage final grade meets more than one grade, then the worst grade should be adopted.

PT prothrombin green time, *INR* international ratio, $ICGR_{15}$ indocyanine green retention rate at 15 min

Mizuguchi T, Surg Today 2014

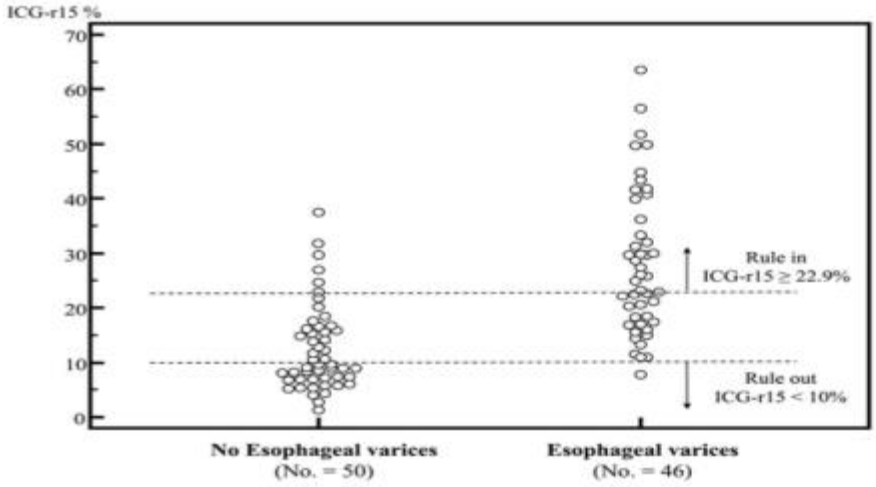
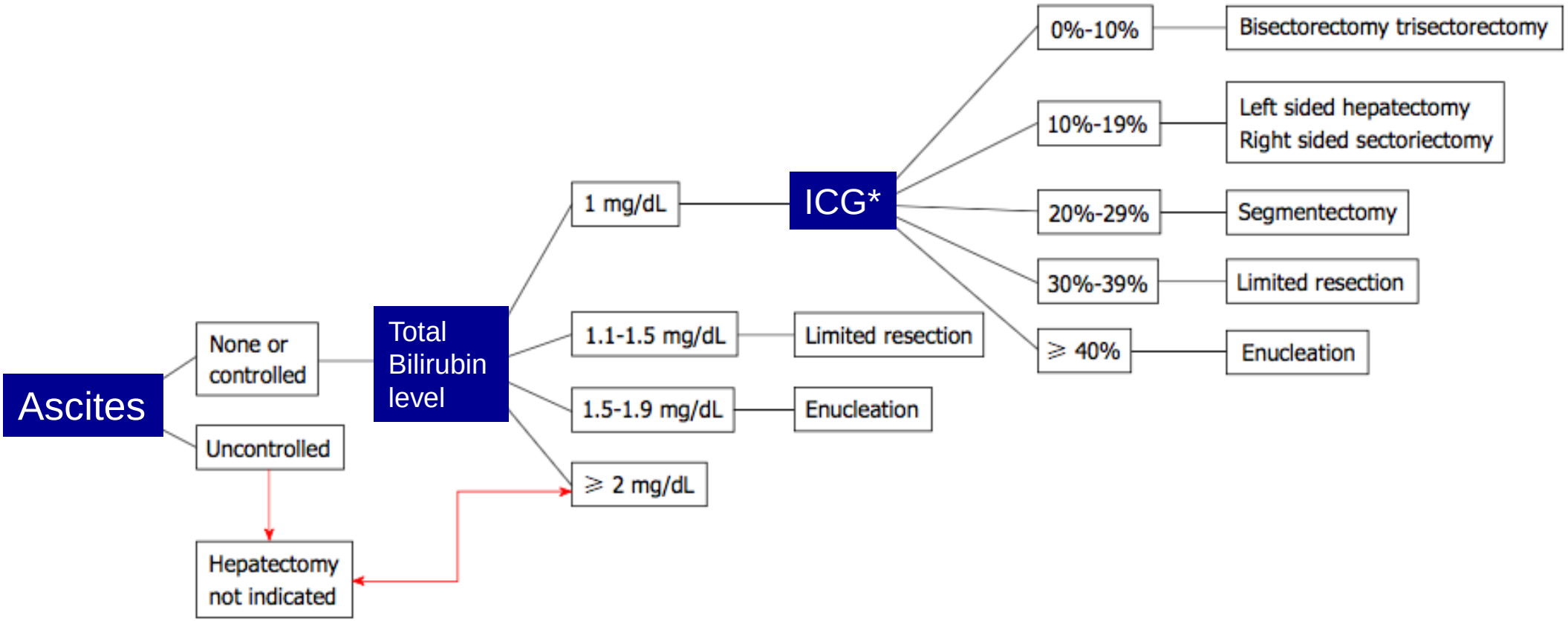


Fig. 2. ICG-r15 individual data points among patients with and without EV.

Lisotti A, Hepatology 2013

Evaluation de la Fonction Hépatique

"Makuuchi Criteria"



*ICG R15: Indocyanine green retention ratio at 15 min

Inamura H 2005 – Miyagawa S 1995

Évaluation post- opératoire de la Fonction Hépatique

Table 5. Clinical Outcome Parameters.

	LD (%)	P-value	Severe morbidity (%)	P-value	Hospitalisation (days)	P-value
PRE OP						
PDR > 17%/min.	4.8	**0.011**	14.4	**0.012**	8	**0.028**
PDR < 17%/min.	18.8		34.4		10	
R15 <8%	5.5	**0.032**	13.9	**0.002**	8	**0.041**
R15 > 8%	17.9		39.3		10	
POD 1						
PDR > 10%/min.	4.3	**0.001**	16.5	**0.020**	8	**0.022**
PDR < 10%/min.	45.5		45.5		12	
R15 < 20%	3.6	**0.001**	16.1	**0.016**	7	**0.019**
R15 >20%	42.9		42.9		11	

LD, liver dysfunction; PDR, plasma diffusion rate; POD, postoperative days; Pre OP, preoperative; R15, retention rate at 15 minutes

Haegele S 2016

Evaluation de la Fonction Hépatique

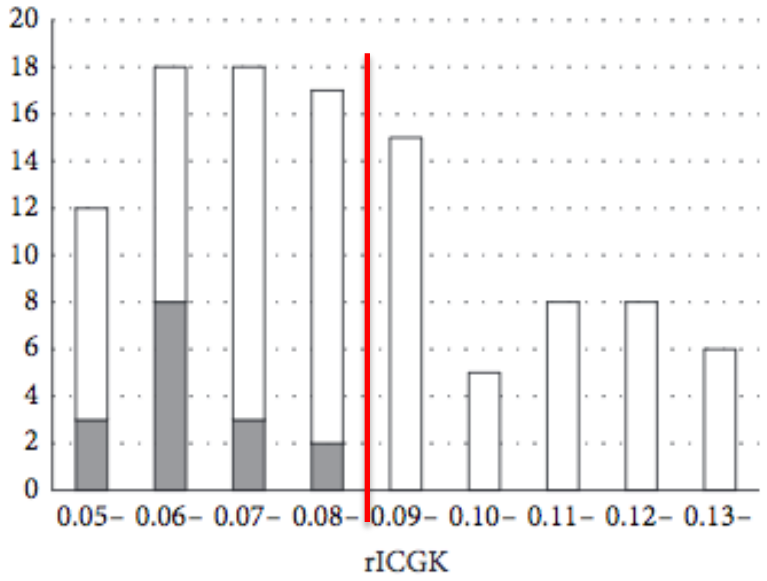
Value of indocyanine green clearance of the future liver remnant in predicting outcome after resection for biliary cancer.

Y. Yokoyama et al.Br. J Surg 2010

	No. of patients	No. of deaths*	Univariable‡ Odds ratio†	Univariable‡ P	Multivariable§ Odds ratio†	Multivariable§ P
ICGK						
≥0·125	238	11 (4·6)	1·00	0·002		
<0·125	36	7 (19)	4·98 (1·79, 13·86)			
ICGK-F						
≥0·05	229	8 (3·5)	1·00	<0·001	1·00	<0·001
<0·05	45	10 (22)	7·89 (2·92, 21·36)		8·06 (2·64, 24·65)	
Preoperative PVE						
Yes	234	12 (5·1)	1·00	0·026	1·00	0·021
No	40	6 (15)	3·27 (1·15, 9·28)		4·33 (1·25, 15·01)	

Conclusion: An ICGK-F of 0·05 is a useful cut-off value for predicting mortality and morbidity.

Evaluation de la Fonction Hépatique



Y. Uchida et al. HBP Surgery 2016

rICGK > 0.09 = No PHLF Grade B

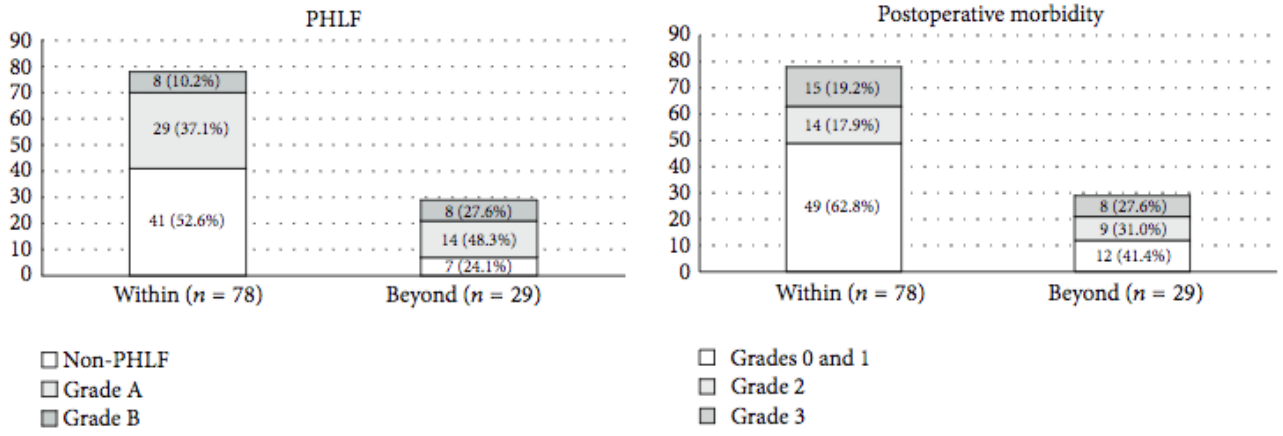


FIGURE 4: Postoperative morbidity according to Makuuchi's criterion. Patients who met Makuuchi's criterion had lower incidences of severe PHLF and postoperative morbidity than those who did not, although not significant.

Evaluation de la Fonction Hépatique

World J Surg. 2018 Aug;42(8):2570-2578. doi: 10.1007/s00268-018-4464-6.

Indocyanine Green Retention Rates at 15 min Predicted Hepatic Decompensation in a Western Population.

Le Roy B[1,2], Grégoire E[3], Cossé C[4], Serji B[4], Golse N[4,5], Adam R[4], Cherqui D[4], Mabrut JY[5], Le Treut YP[3], Vibert E[4].

⊕ Author information

Abstract

BACKGROUND: ICGR15 is widely used in Asia to evaluate the liver reserve before hepatectomy, but not in Western countries where patients are selected using the MELD score and/or platelet count. Postoperative liver failure is rare nowadays, but hepatic decompensation (HD), defined by 3-month postoperative ascites, impairs quality of life and survival. The aim of this study was to evaluate the relevance of indocyanine green retention rate at 15 min (ICGR15) before liver resection in Western countries, in order to predict HD.

METHODS: This prospectively designed study included consecutive adult patients undergoing hepatectomy for hepatocellular carcinoma (HCC) and intrahepatic cholangiocarcinoma (ICC) in three French HPB centres.

RESULTS: Between 2012 and 2014, 147 patients were included (80% of HCC and 20% of ICC). The Child-Pugh status was grade A for all patients. In the overall population and in F3/F4 patients (n = 83), ICGR15 (P = 0.02) and platelet counts (P = 0.02) were predictive of HD under multivariate analysis. Among F3/F4 patients undergoing minor hepatectomy with preoperative ICGR15 > 15%, the rate of HD was 36%. In the overall population, ICGR15 was predictive of HD (P = 0.02) and postoperative ascites (P = 0.03). The ROC curve identified a cut-

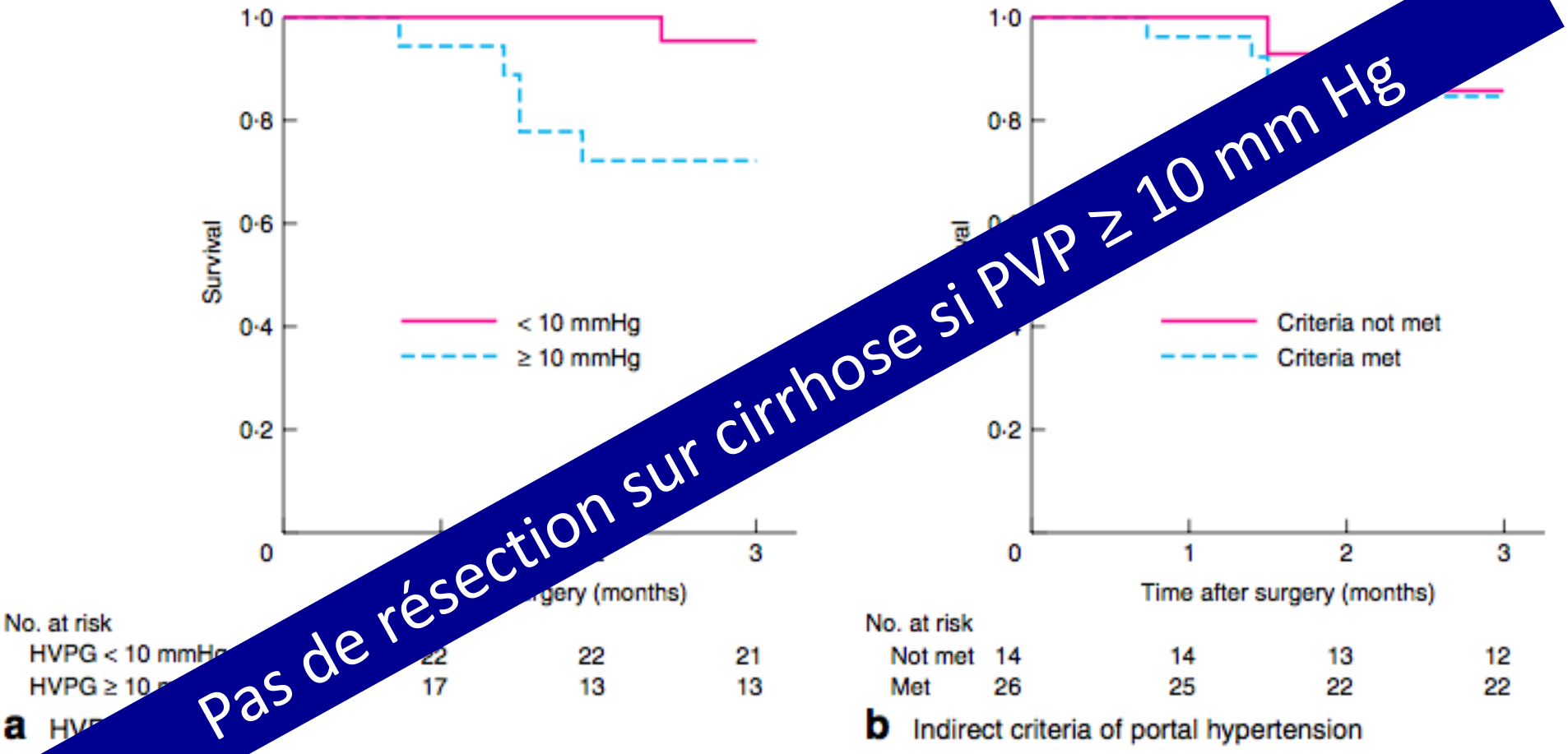
CONCLUSIONS: In patients with HCC and ICC selected using the MELD score and platelet rate, an ICGR15 > 15% is a relevant, non-invasive and clearly accurate method to predict HD specially before minor hepatectomy.

Hypertension Portale

Hepatic venous pressur gradient in the assessement of portal hypertenson before liver resection in patients with cirrhosis.
E. Boleslaski et al.
British Journal of Surgery 2012

	Direct Criteria	Transjugular Hepatic Venous Pressure Gradient (HVPG)
Portal Hypertension (PHT) (Patient N= 43)		
	Indirect Criteria	- Oesophageal varices *or* - Splenomegaly (diameter > 10 cm) - Thrombocytopenia (platelet < 100.000 mm^3)

Evaluation de la Fonction Hépatique: Hypertension Portale



Pas de résection sur cirrhose si PVP ≥ 10 mm Hg

Evaluation de la Fonction Hépatique: Hypertension Portale

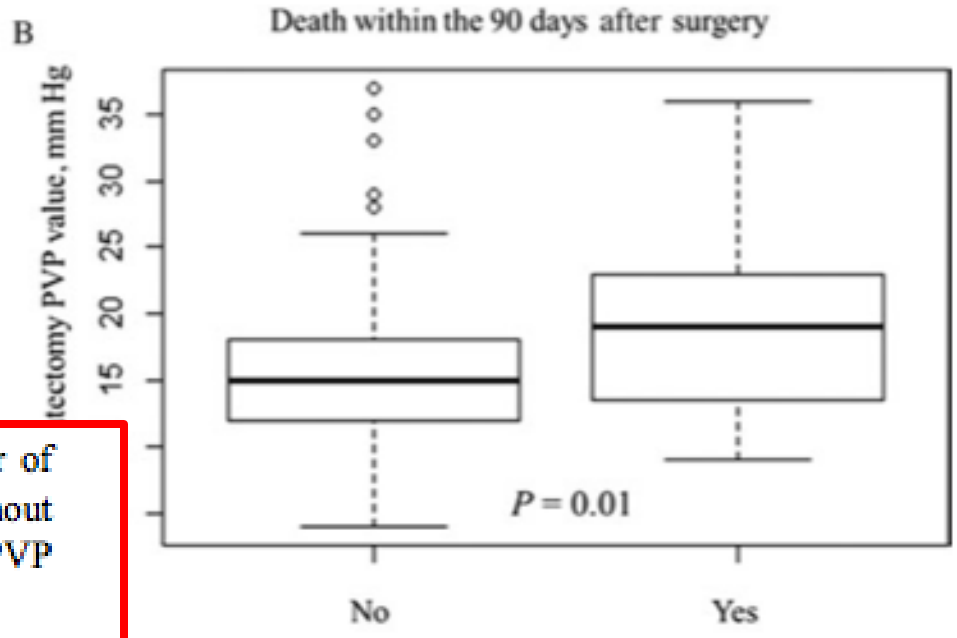
Posthepatectomy Portal Vein Pressure Predicts Liver Failure and Mortality after Major Liver Resection on Noncirrhotic Liver

Marc-Antoine Allard, MD,† René Adam, MD, PhD,*†§ Pétru-Octav Bucur, MD,*†‡ Salah Termos, MD,*† Antonio Sa Cunha, MD,*†‡ Henri Bismuth, MD, PhD, Denis Castaing, MD,*†‡ and Eric Vibert, MD, PhD*†‡*

Annals of Surgery • Volume 258, Number 5, November 2013

Results: The study population consisted of 277 patients. Posthepatectomy PVP was gradually correlated with the PLF risk. Probability for PLF was nil when PVP was 10 mm Hg or less, ranges from 13% to 16%, depending on PLF definitions, when PVP was 20 mm Hg, and from 24% to 33% when PVP was 30 mm Hg. The optimal value of posthepatectomy PVP to predict PLF was 22 mm Hg when considering the "50-50" criteria and grade C PLF (proposed by the International Study Group of Liver Surgery). A value of 21 mm Hg best predicted PLF defined by peak of serum bilirubin greater than 120 μmol/L and 90-day mortality. At multivariate analysis, posthepatectomy PVP remained an independent predictor of PLF as well as the extent of resection, intraoperative transfusion, and the presence of diabetes. The

Conclusions: Posthepatectomy PVP is an independent predictive factor of PLF and of 90-day mortality after major liver resection in patients without cirrhosis. Intraoperative modulation of PVP would be advisable when PVP exceeds 20 mm Hg.

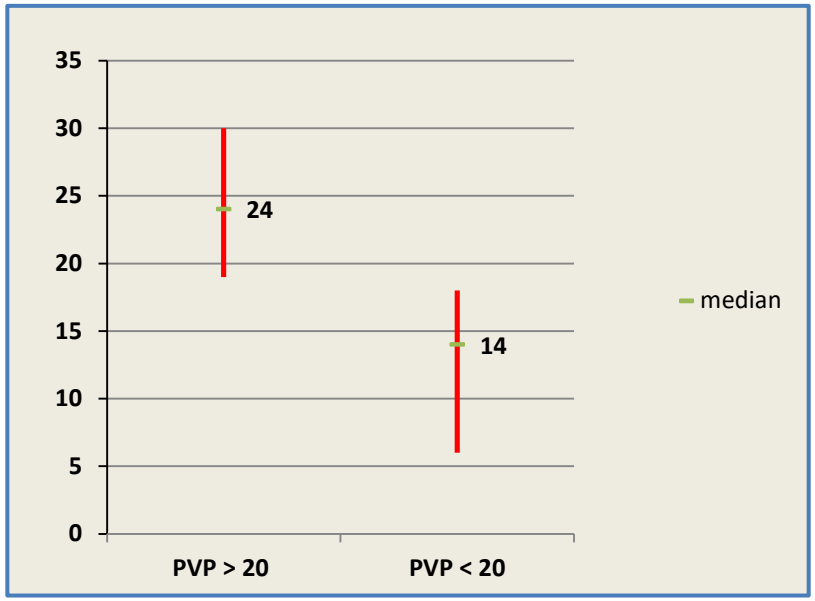


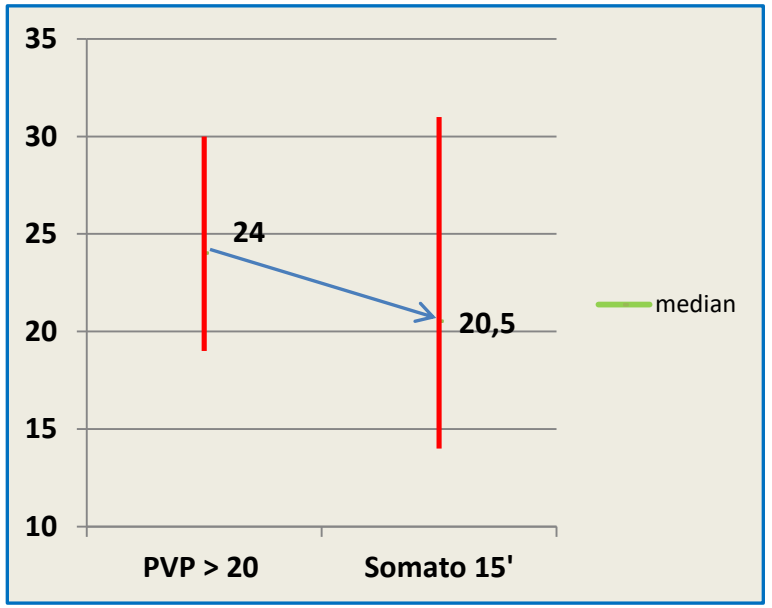
Evaluation de la Fonction Hépatique: Hypertension Portale

Portal Inflow Modulation by Somatostatin After Major Liver Resection: A Pilot Study.

Rhaiem R[1,2], Piardi T[1,2], Chetboun M[1,2], Pessaux P[3], Lestra T[2,4], Memeo R[3], Kianmanesh R[1,2], Sommacale D[1,2].

2018

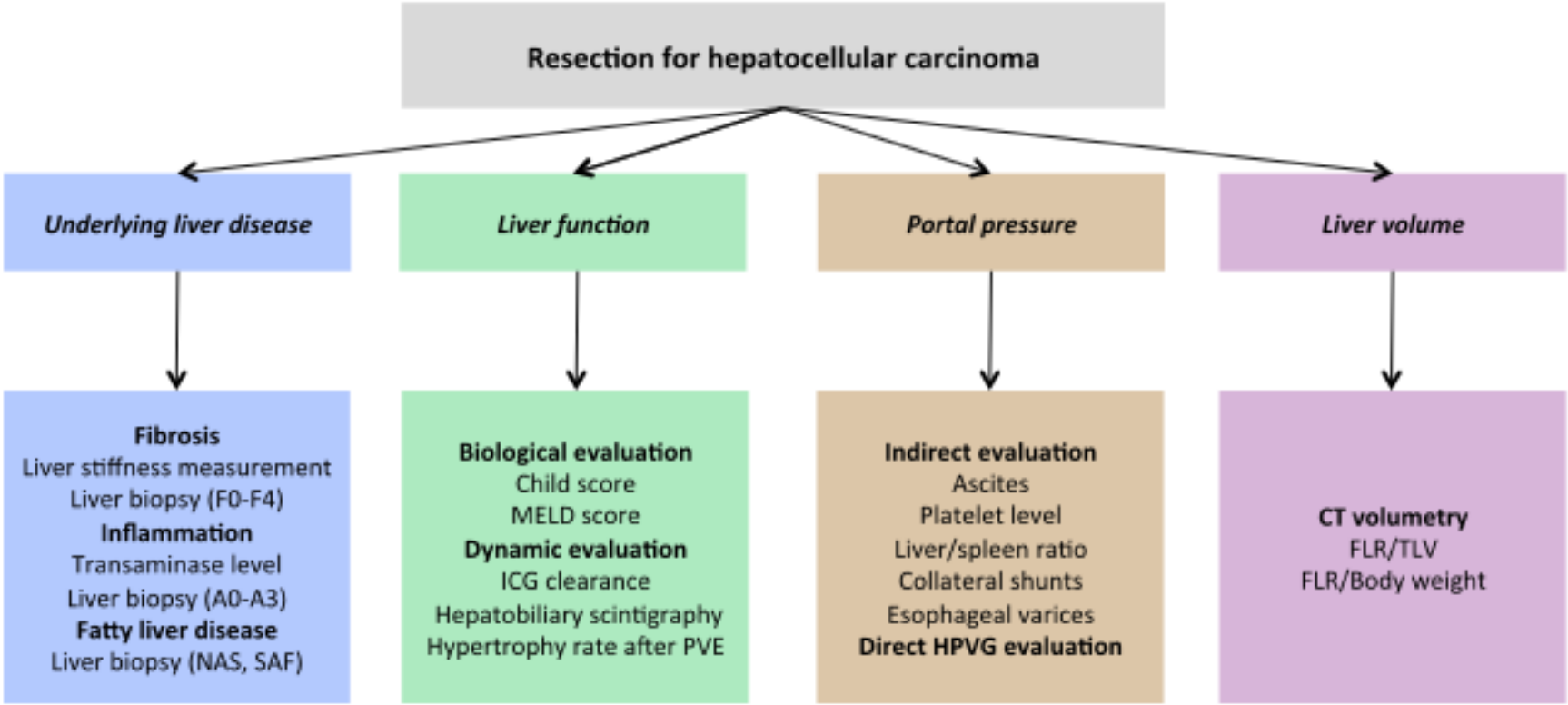




PVP > 20	PVP < 20	p
4/18 (22%)	1/28 (3.6%)	**0.03**

	ΔPP < 2.5 mmHg	ΔPP > 2.5 mmHg	p
N	7	11	
Incidence of POLF	2	0	0.04

Evaluation de la Fonction Hépatique: schéma décisionnel



Belghiti J, Best Practice & Research Clinical Gastroenterology 2014

Critères à évaluer avant résection hépatique

1) Evaluer présence d'une hépatopathie :

- Type (stéatose..)
- Gravité (MELD....)

2) Evaluer le volume du future foie restant (FFR)

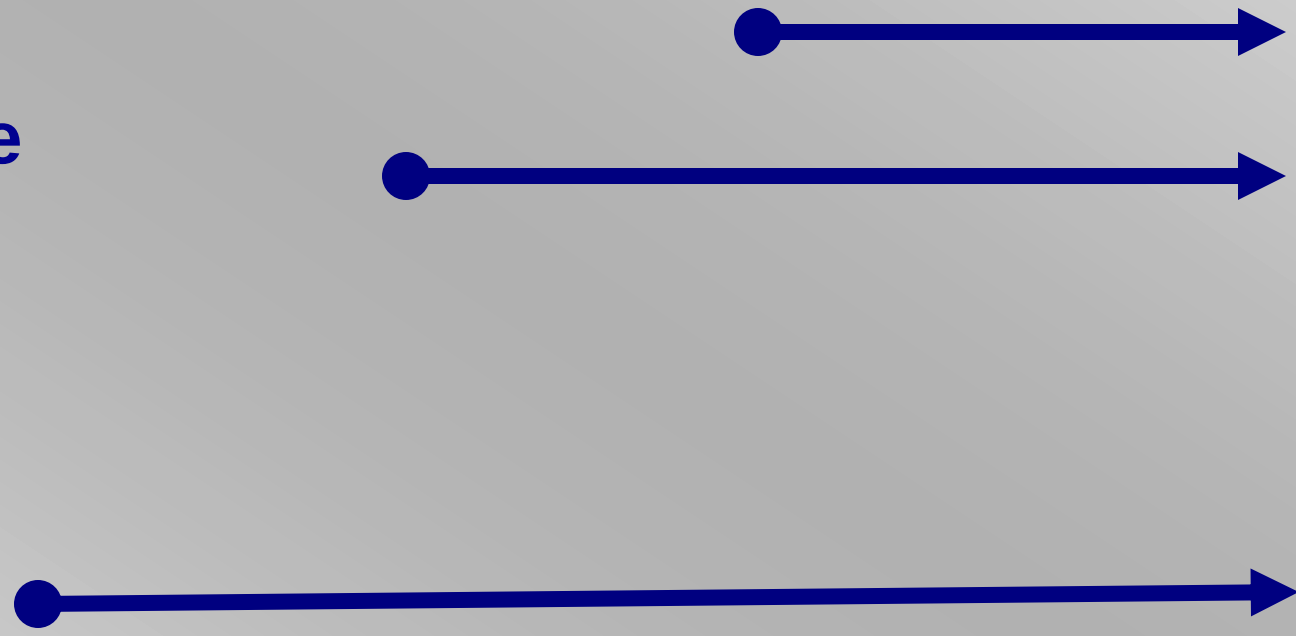
3) Evaluer autres facteurs de risques :

- Insuff. rénale
- Dénutrition
- Age

Evaluer le volume du futur foie restant (FFR)

2% Poids Corps	1%	0.8%	0.6%	0.4%
100% Volume Foie	50%	40%	30%	20%

- **Foie sain**
- **Foie pathologique**
  - Chimio
  - Stéatose
  - Cholestase
- **Cirrhose**

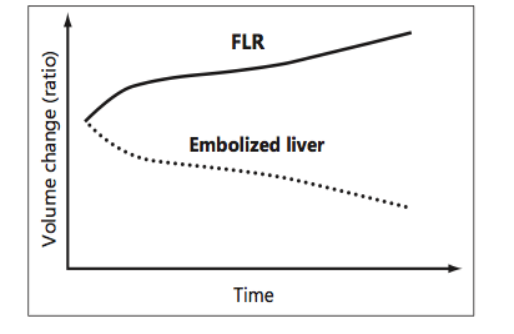


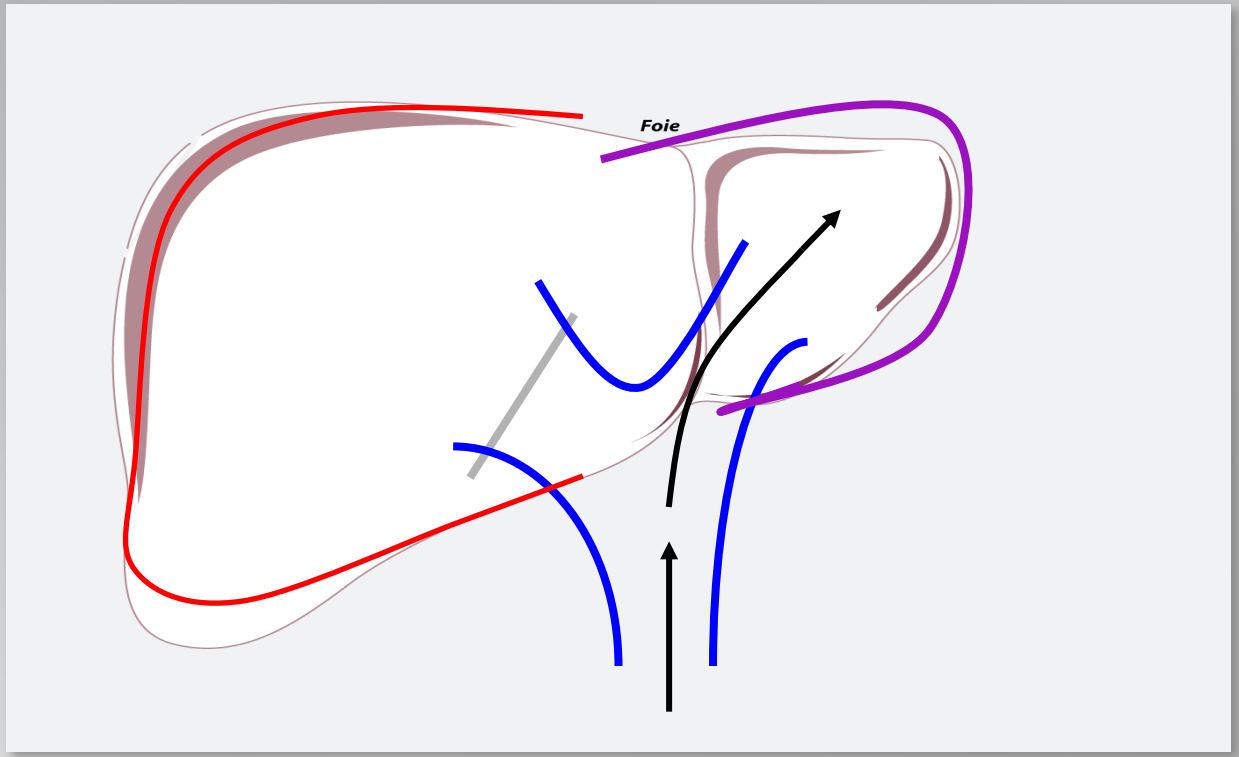
Farges et al. BJS 2003. Abdalla et, al. Ann Surg Oncol 2006.

Le Principe de l'embolisation portale

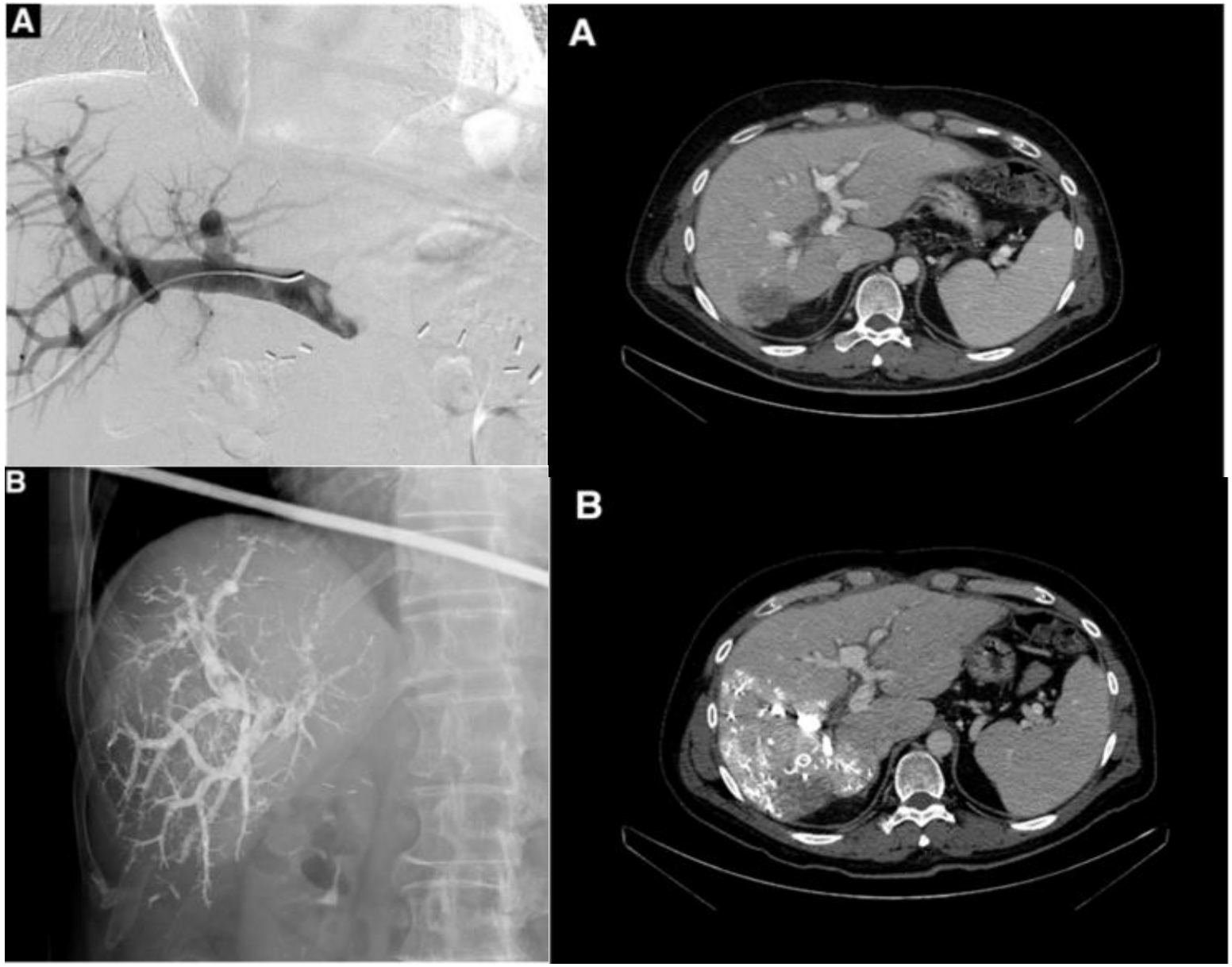
✓ <u>Occlusion</u> d'une branche de la Veine Porte

- **HYPER**trophie Controlatérale
- **HYPO**trophie Homolatérale





Technique Embolisation Portale



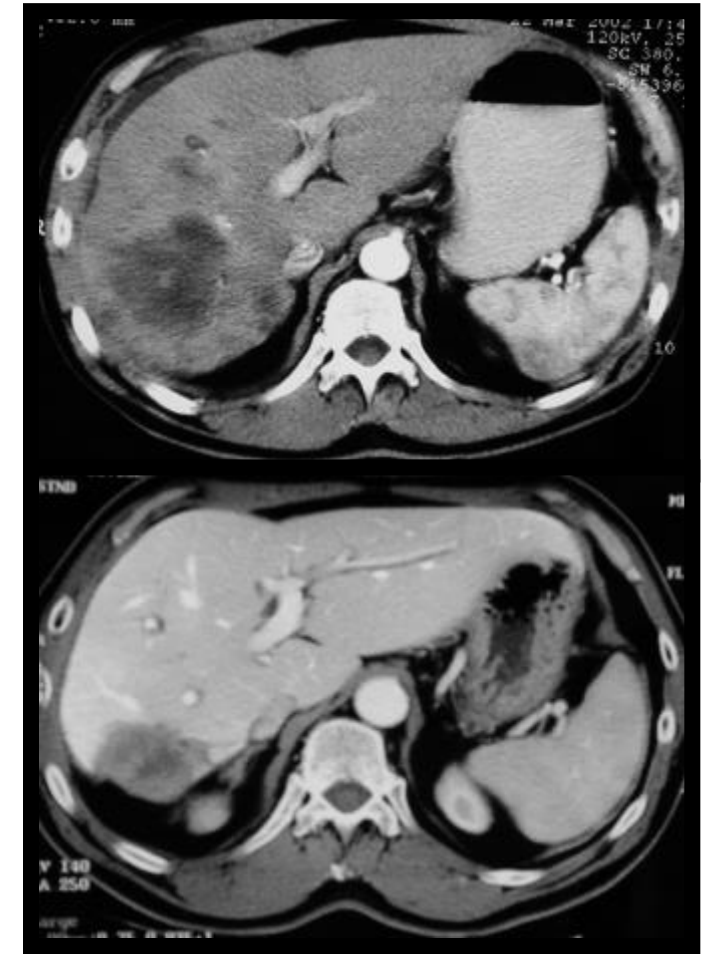
Hemi-Liver Portal Occlusion *Induces* Contralateral Hypertrophy of the FRL

- **PV Occlusion**

Induces Hypertrophy 80% patients

Shifts resection 8 to 27%

Reduces morbidity 83 to 39%*



KGR***(week)*	< 2%	> 2%	P value
PHLF	21.6%	0%	0.0001
Mortality	8.1%	0%	0.04

** Hypertrophy > 5% **KGR=Kinetic grow factor*

Shindoh J Am Coll Surg 2013

Embolisation Portale percutanée: Expérience Beaujon : n = 202

- Succès: n=200 (99%)
  - 2 migrations du matériel d'embolisation à gauche, conduisant à l'arrêt de la procédure

Complications	n =15 (7.5%)
Mortalité - insuffisance Hépatique	n = 1 (0.5%)
Durée de sejour	2.8 jours (1 – 18)
Complications à long terme	n = 8 (4%)

Embolisation Portale percutanée: Expérience Beaujon : n = 202

Hépatectomie après EP

Résultats			
Opération	n = 164 (82%)	Patients inopérable	n =40 (20%)
		Patients incurable	n = 16 (8%)
Hépatectomie réalisée	**n = 144 (72%)**	**Totale patients non opérés:**	**n = 56 (28%)**
		-Progression tumorale: n=30 -Hypertrophie insuffisante: n=19 -Thrombose controlaterale: n=1 -Etat général ou refus: n=6	

Embolisation Portale percutanée: résultats

Natural history of portal vein embolization before liver resection: a 23-year analysis of intention-to-treat results

Fernando A. Alvarez[a], Denis Castaing[a,b,c], Rodrigo Figueroa[a], Marc Antoine Allard[a,b,d], Nicolas Golse[a,b,c], Gabriella Pittau[a], Oriana Ciacio[a], Antonio Sa Cunha[a,b,d], Daniel Cherqui[a,b,c], Daniel Azoulay[e], René Adam[a,b,d], Eric Vibert[a,b,c,*]

2018

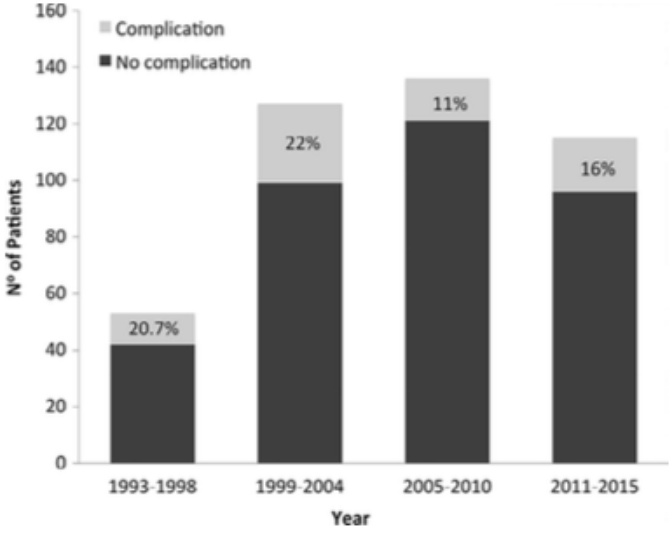
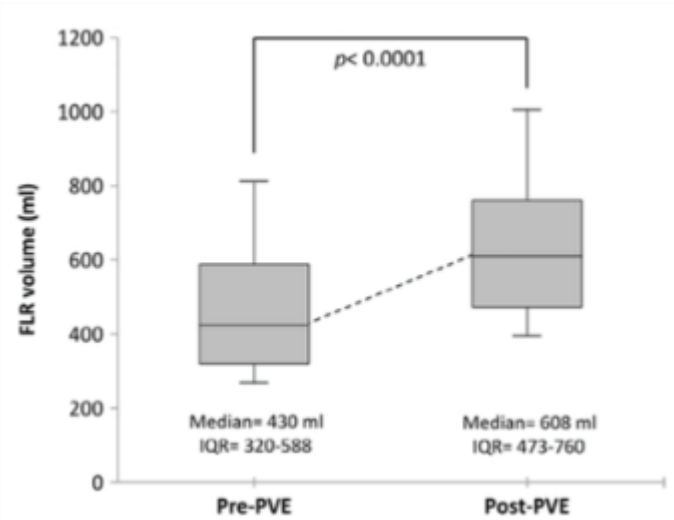


Fig. 1. Proportion of patients who had complications of PVE per study period over time. Even though there was a tendency toward higher complications during the first 2 study periods, no statistically significant differences were found between study periods ($P = .098$).



FLR volume >35%

Embolisation Portale percutanée: résultats

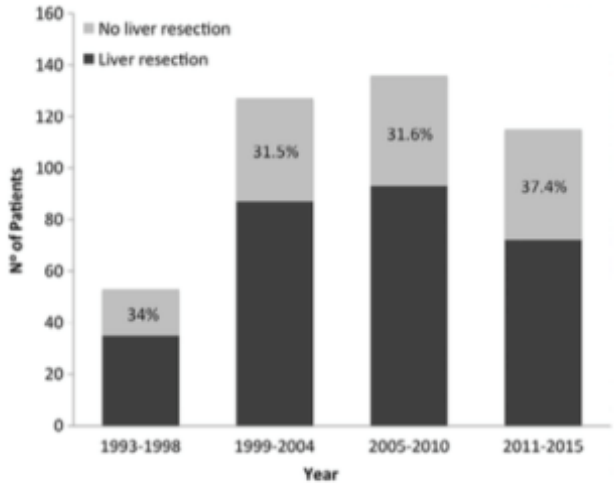


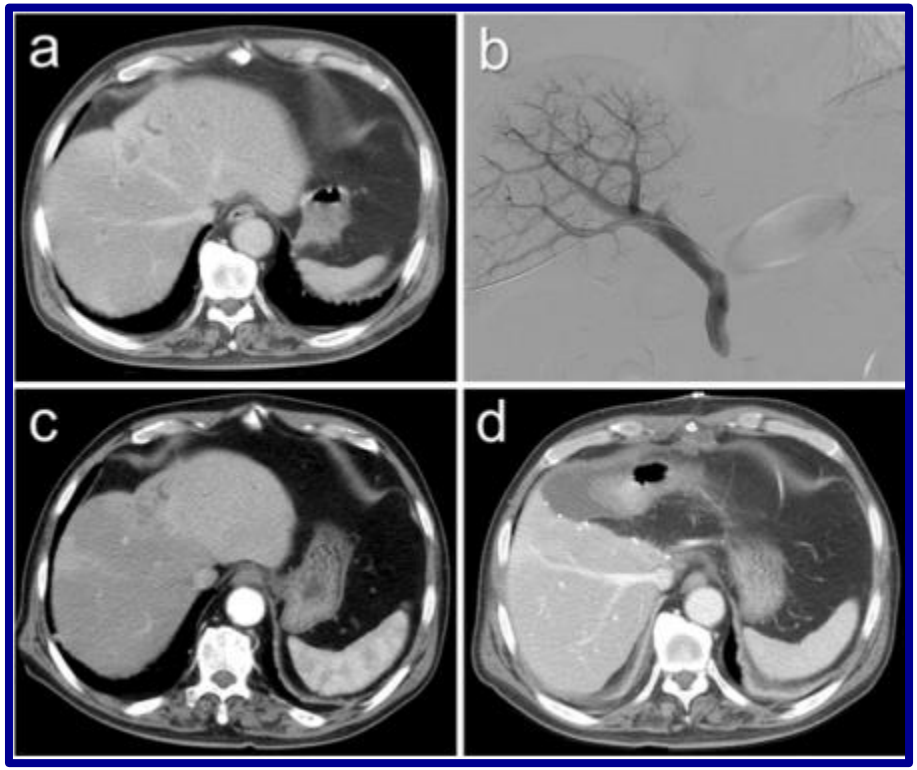
Fig. 4. Proportion of patients who could not proceed to resection after portal vein embolization per study period over time. No statistically significant differences were found between study periods ($P = .74$).

Table 4
Drop-out rates and causes for unresectability according to the type of liver malignancy.

	CRLM ($n = 179$)	HCC ($n = 92$)	Klatskin ($n = 68$)	IHCC ($n = 36$)	NELM ($n = 15$)	GBC ($n = 14$)
Drop-out rate, n (%)	56 (31)	26 (28)	30 (44)	13 (36)	6 (40)	7 (50)
Causes						
Disease progression, n (%)	43 (24)	11 (12)	20 (29.4)	13 (36)	4 (26.7)	4 (28.6)
Intrahepatic progression, n	18	9	8	9	4	2
Extrahepatic progression, n	17	2	11	4	0	2
Combined progression, n	8	0	1	0	0	0
Insufficient hypertrophy, n (%)	9 (5)	3 (3.2)	3 (4.4)	0	0	2 (14.3)

Alvarez 2018

Left portal vein embolization : When?



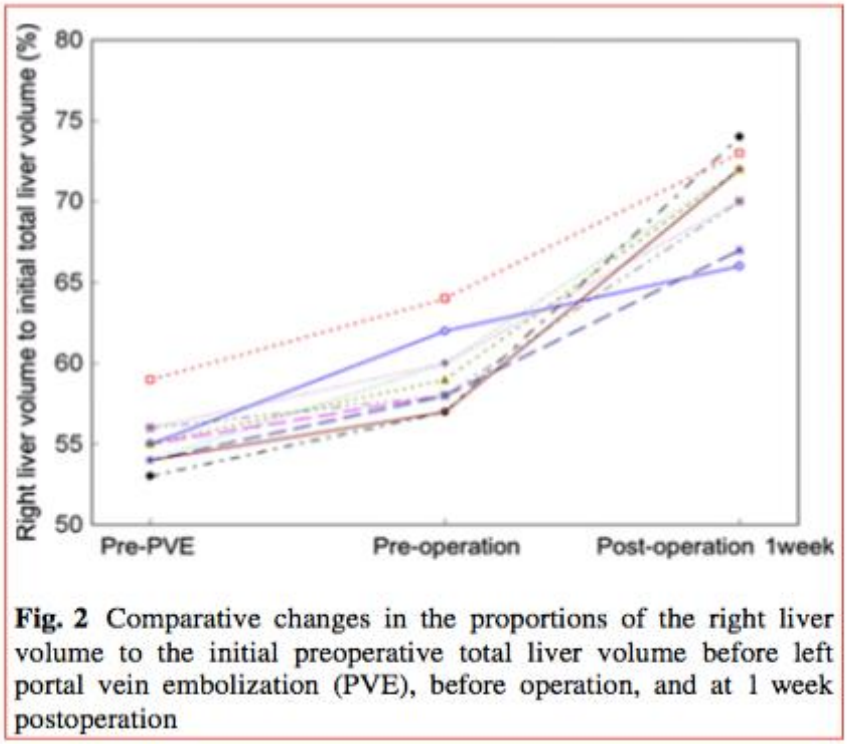


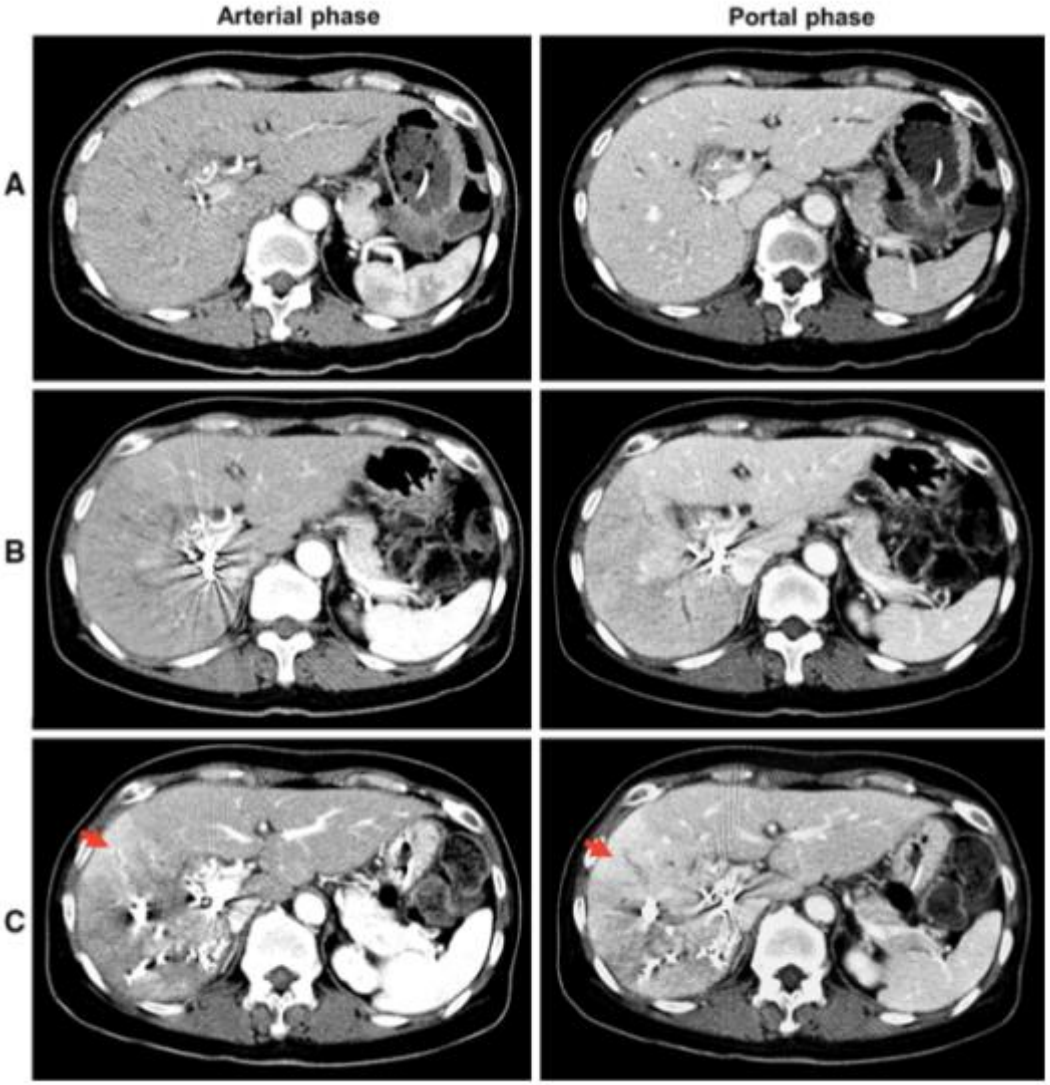
Fig. 2 Comparative changes in the proportions of the right liver volume to the initial preoperative total liver volume before left portal vein embolization (PVE), before operation, and at 1 week postoperation

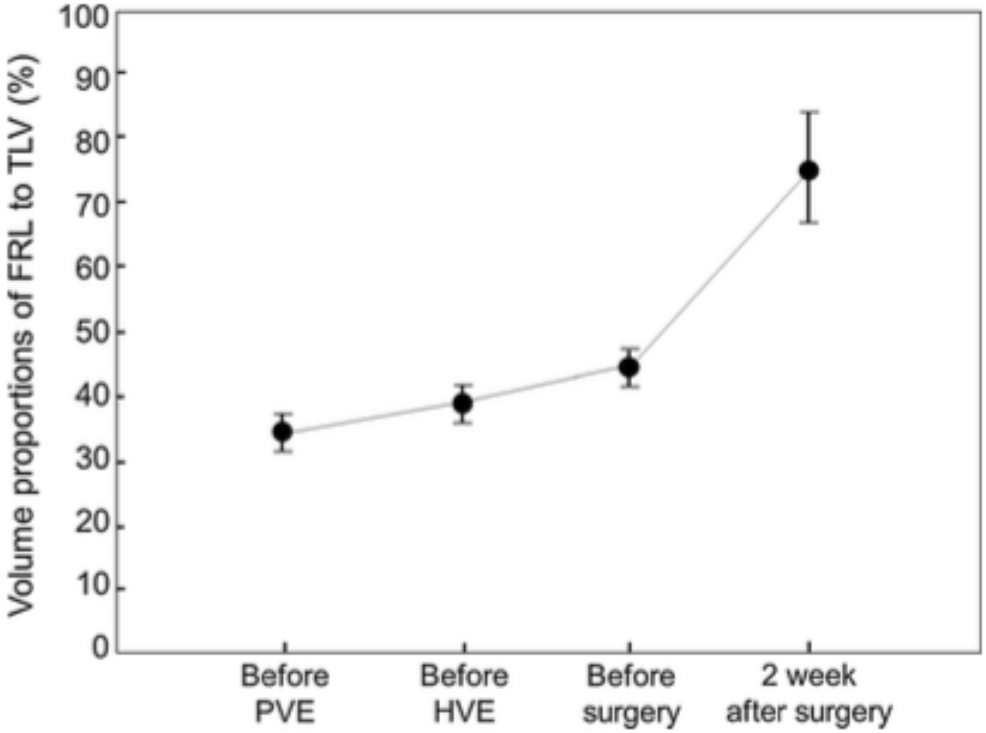
- *LLV/TLV > 40%
- Ederly and high-risk patients

*LLV= left liver volume/total liver volume

Hwang World J Surg 2016

Hepatic Vein Embolization : When?





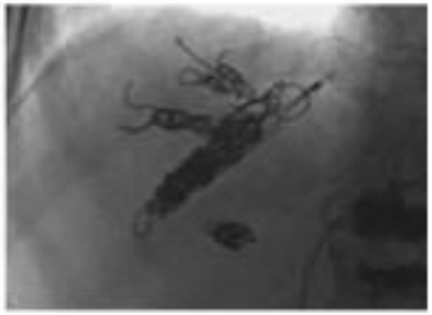
S. Hwang, World J Surg 2015

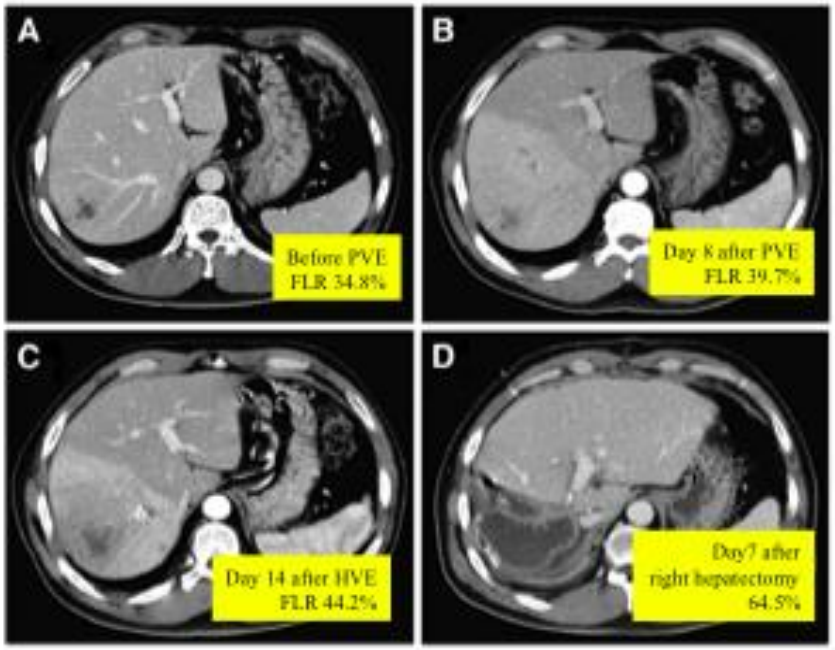
Hepatic Vein Embolization: When?

ORIGINAL ARTICLES Annals of Surgery 2009

Sequential Preoperative Ipsilateral Hepatic Vein Embolization After Portal Vein Embolization to Induce Further Liver Regeneration in Patients With Hepatobiliary Malignancy

Shin Hwang, MD, Sung-Gyu Lee, MD,* Gi-Young Ko, MD,† Bum-Soo Kim, MD,* Kyu-Bo Sung, MD,† Myung-Hwan Kim, MD,‡ Sung-Koo Lee, MD,‡ and Hea-Nam Hong, PhD§*





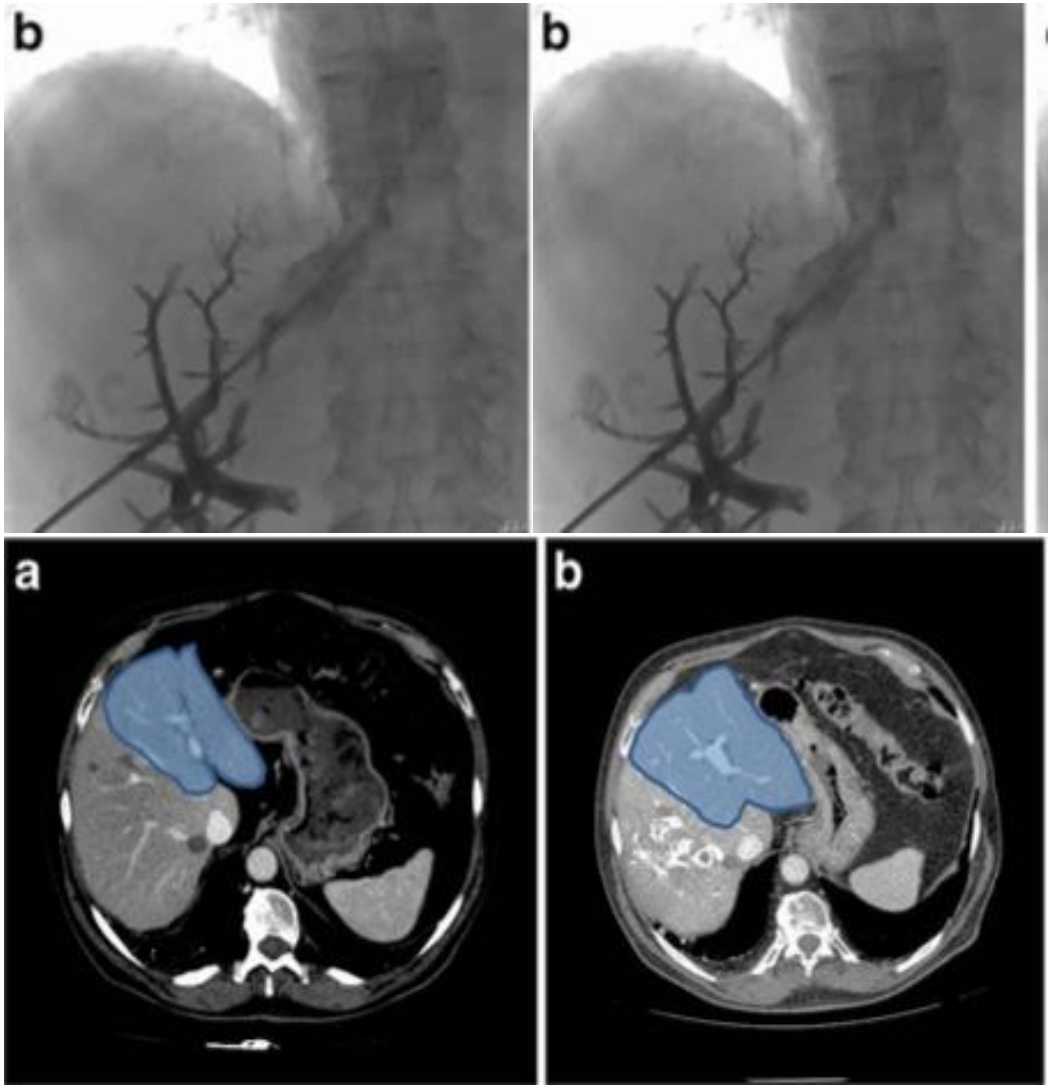
In 12 patients
No procedure-related complication

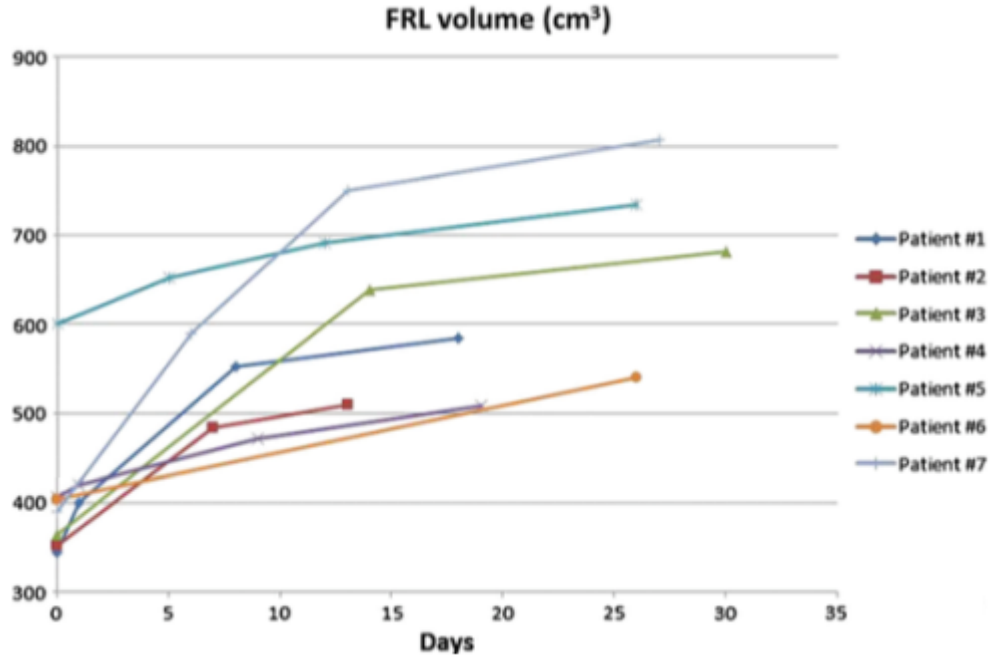
Embolization of wrong hepatic vein trunk
In one patient

Hepatectomy 9 patients

S. Hwang, World J Surg 2015

Simultaneous Hepatic *and* Portal Vein embolization

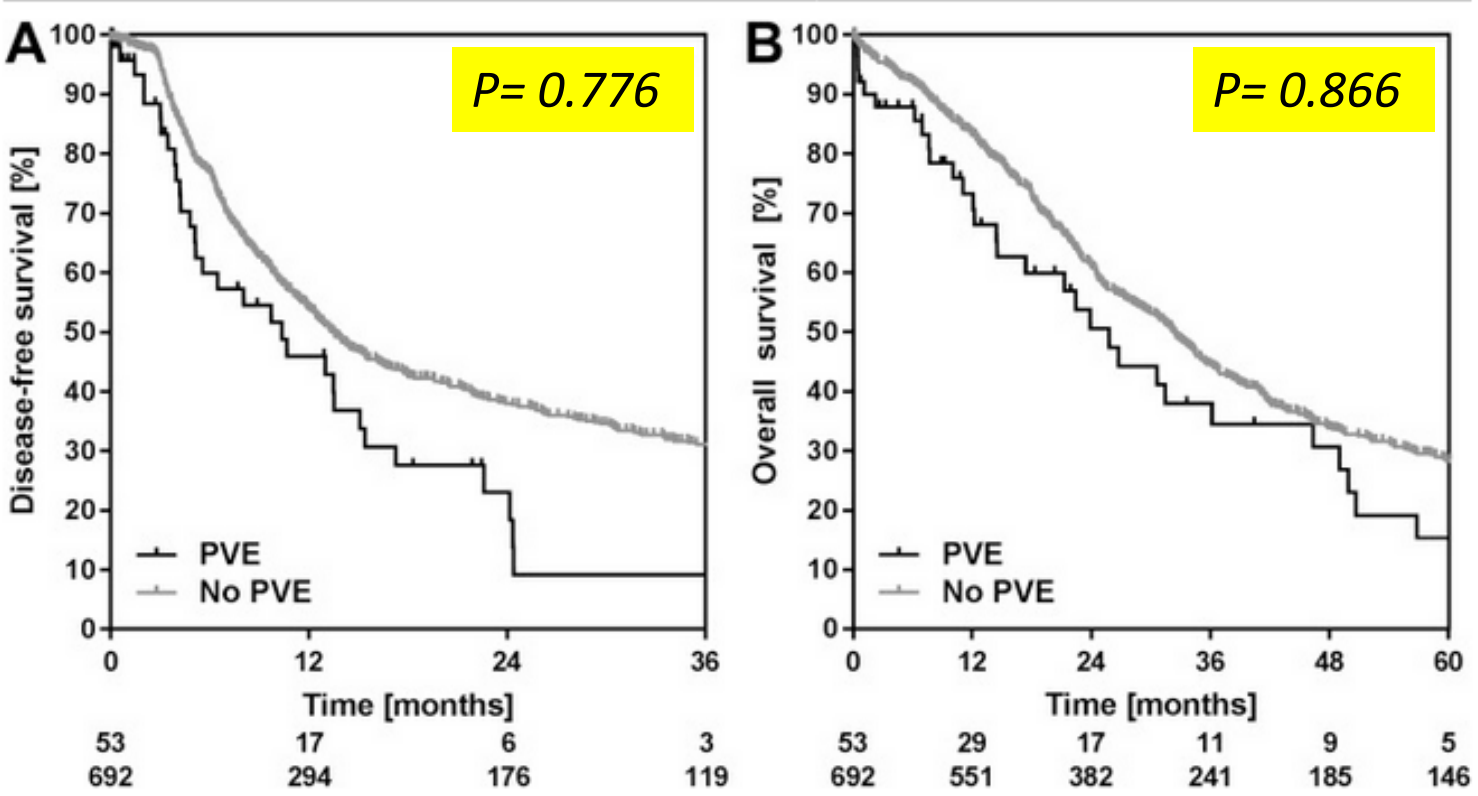




B. Guiu, Eur Radiol 2016

Does portal vein embolization prior to liver resection influence
The oncological outcomes – A propensity score matched comparison.

J Huiskens et al, European Journal of Surgical Oncology 2017



HPB (Oxford). 2019 Feb 20. pii: S1365-182X(19)30012-7. doi: 10.1016/j.hpb.2018.12.009. [Epub ahead of print]

Effect of portal vein embolization on treatment plan prior to major hepatectomy for hepatocellular carcinoma.

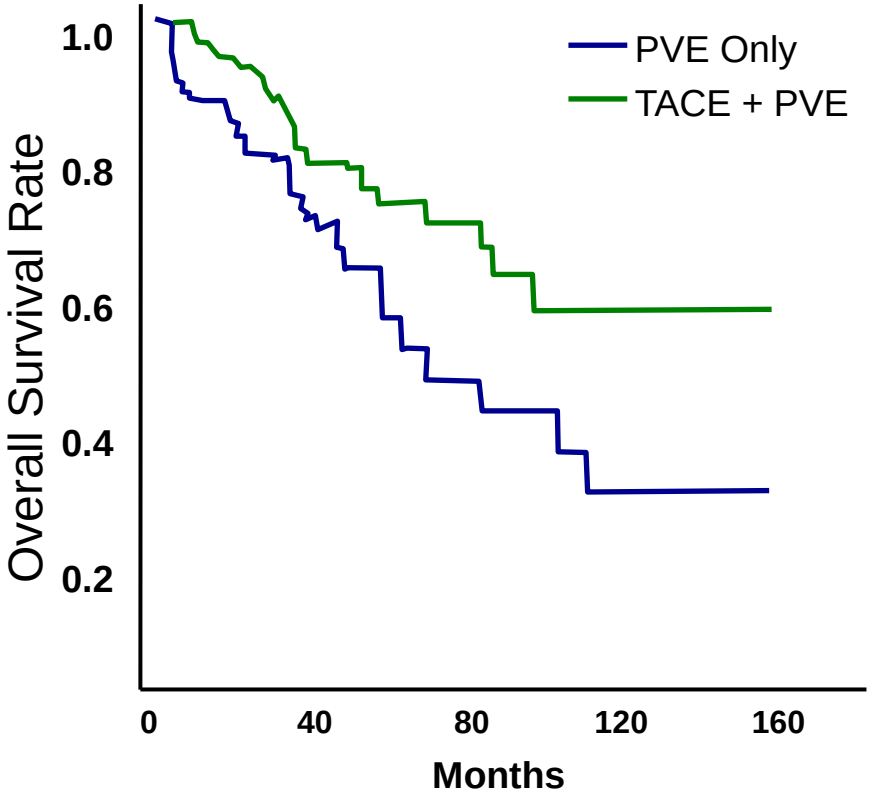
Loveday BPT[1], Jaberi A[2], Moulton CA[1], Wei AC[1], Gallinger S[1], Beecroft R[2], Fischer S[3], Ghanekar A[1], McGilvray I[1], Sapisochin G[1], Greig PD[1], Tan K[2], Cleary SP[4]

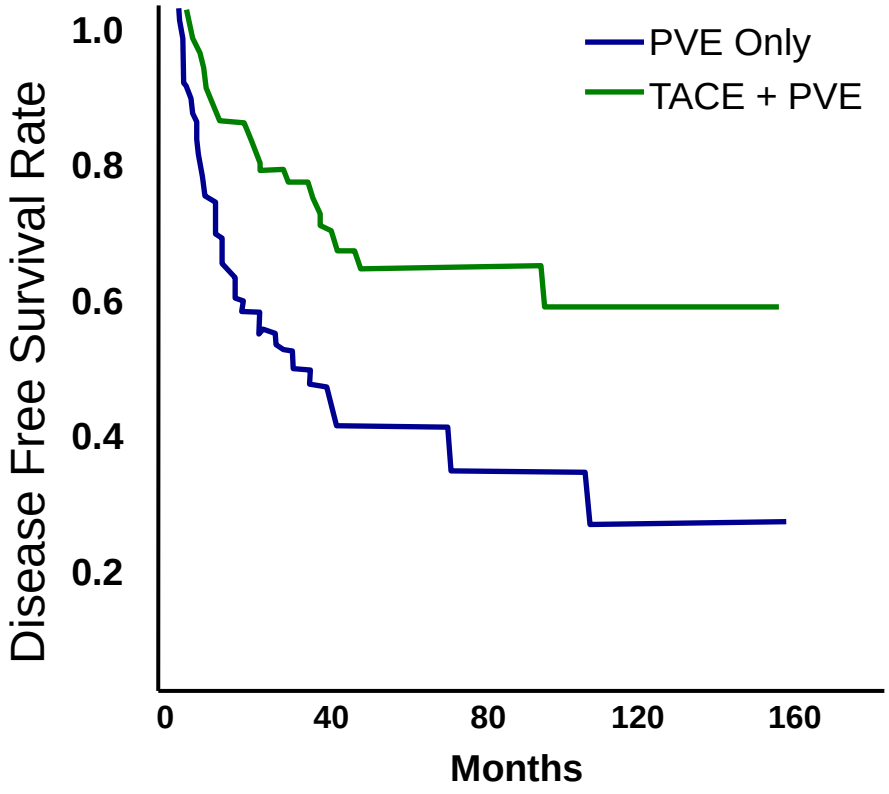
Patients = 31	Pre-embolization	Post-embolization	P < 005
Non tumour LTV*	1440 cm^3	1390 cm^3	P< 0.001
Tumour Volume	161 cm^3	240 cm^3	P< 0.001
FLR** Volume	430 cm^3	574 cm^3	P< 0.001

Change treatment plan	No resection
15/31 (48%)	8/31 (26%)

* LTV= liver total volume, FLR = future liver remnant

Chimio-embolisation (CE) et EP



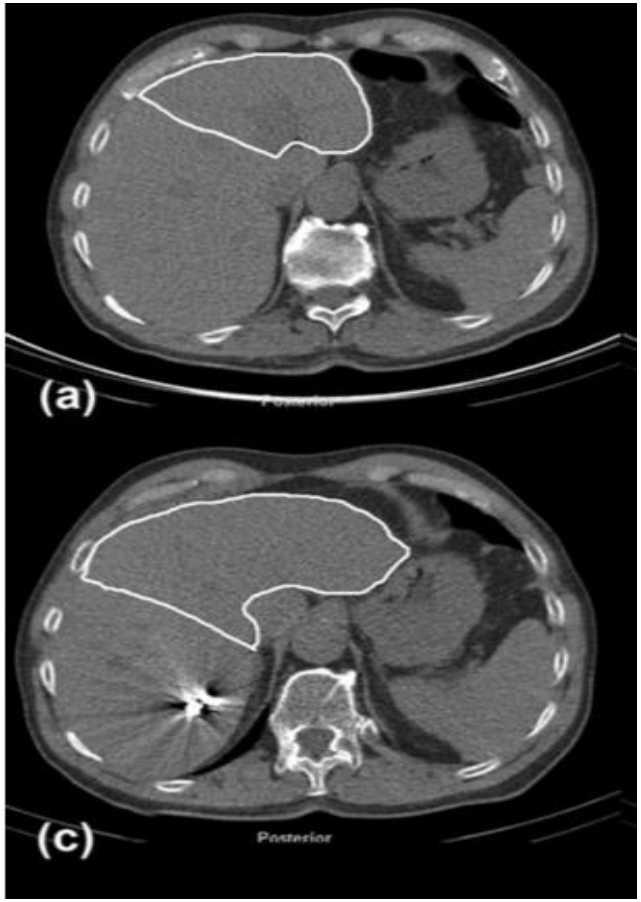


Yoo H *Ann Surg Oncol* 2010

Choi JB Annals HBP Surgery 2015

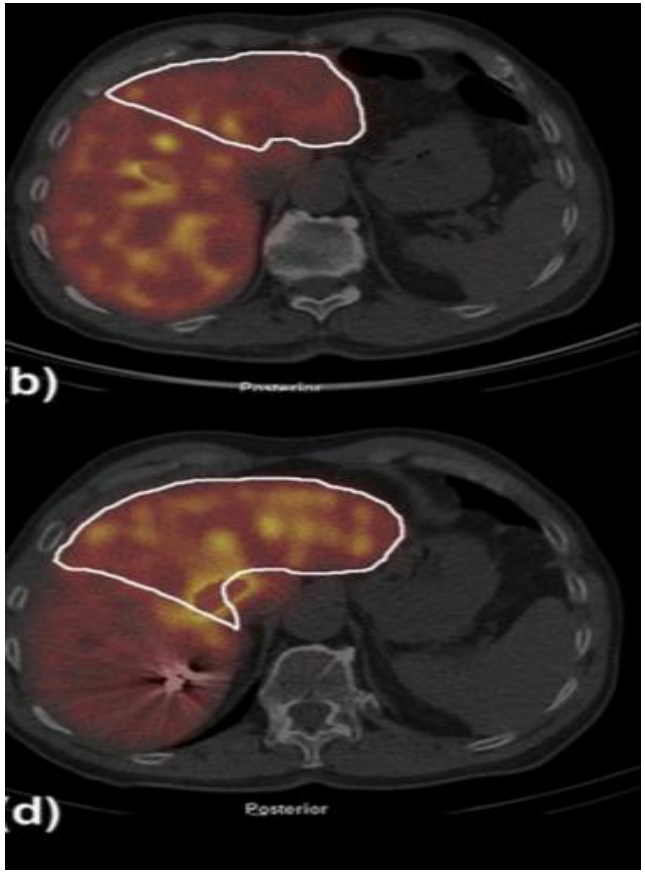
Evaluation fonction hépatique par Scintigraphie Hépatobiliaire

Measurement of liver function using hepatobiliary scintigraphy improves risk assessment in patients undergoing major liver resection.
Cieslak K et al, HBP 2016



Avant embolisation

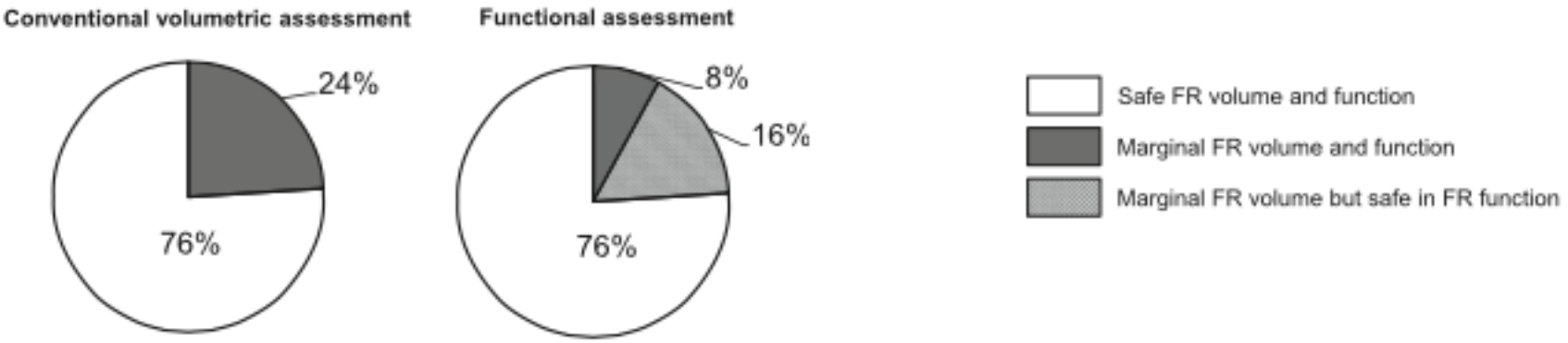
Après embolisation



Evaluation fonction hépatique par Scintigraphie Hépatobiliaire

	Conventional FR volume			*FR function*		
Operative outcomes, n *(%)*	*Safe* (n = *101*)	*Marginal* (n = *32*)	P *value*	*Safe* (n = *122*)	*Marginal* (n = *11*)	P *value*
Morbidity	28 (27.7%)	12 (37.5%)	.293	32 (26.2%)	8 (73%)	.001
Liver-related morbidity	6 (5.9%)	4 (12.5%)	.252	6 (4.9%)	4 (36.4%)	<.001
Mortality	5 (5.0%)	3 (9.4%)	.359	5 (4.1%)	3 (27.3%)	.002

The Pearson chi-square test was used.
FR function, Future remnant liver function; *FR volume*, future remnant liver volume.



H Hayashi , Surgery 2015

Critères à évaluer avant résection hépatique

1) Evaluer présence d'une hépatopathie :

- Type (stéatose..)
- Gravité (MELD....)

2) Evaluer le volume du future foie restant (FFR)

3) Evaluer autres facteurs de risques :

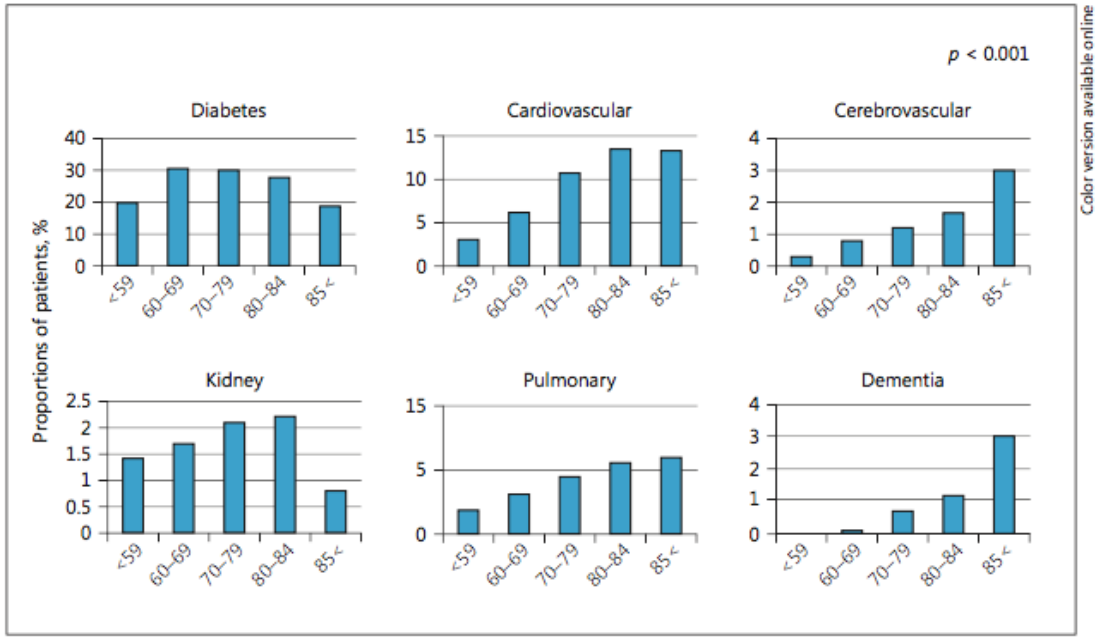
- Insuff. rénale
- Dénutrition
- Age

Critères à évaluer avant résection hépatique: âge

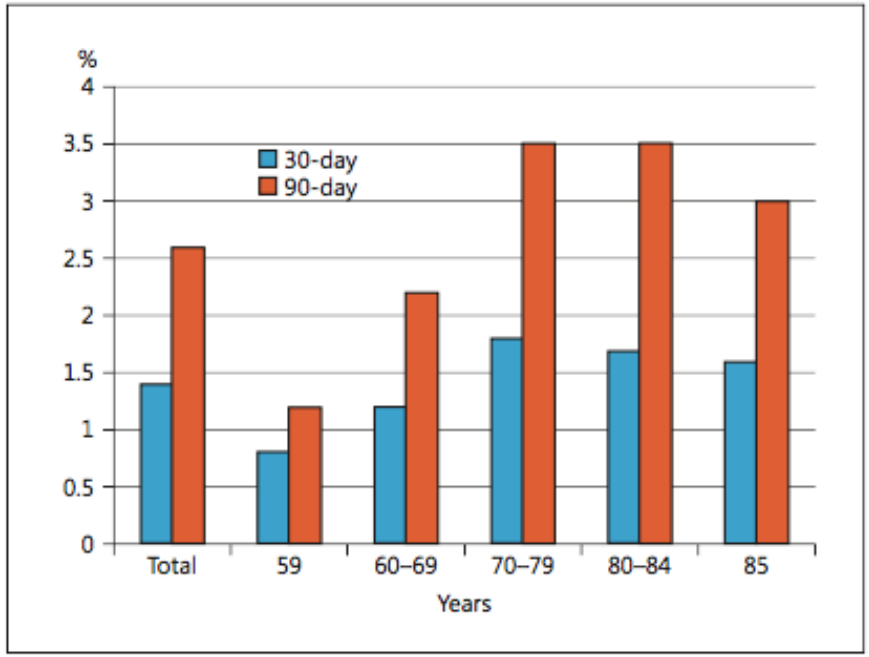
Short-Term Outcomes following Hepatectomy in Elderly Patients with Hepatocellular Carcinoma: An Analysis of 10,805 Septuagenarians and 2,381 Octo- and Nonagenarians in Japan

Hiroko Okinaga[a] Hideo Yasunaga[b] Kiyoshi Hasegawa[a] Kiyohide Fushimi[c] Norihiro Kokudo[d]

Liver Cancer 2018



Preoperative comorbidities



Postoperative mortality

Critères à évaluer avant résection hépatique: insuffisance rénale

The effect of preoperative renal insufficiency on postoperative outcomes after major hepatectomy: a multi-institutional analysis of 1.170 patients

Squires et al. J. AM. Coll surg. 2014

Abstract

BACKGROUND: Renal insufficiency adversely affects outcomes after cardiac and vascular surgery. The effect of preoperative renal insufficiency on outcomes after major hepatectomy is unknown.

STUDY DESIGN: All patients who underwent major hepatectomy (≥3 segments) at 3 institutions from 2000 to 2012 were identified. Resections were performed using low central venous pressure anesthesia. Renal function was analyzed by preoperative serum creatinine (sCr) level. Primary outcomes were major complications (Clavien grade III to V), respiratory failure, renal failure requiring hemodialysis, and 90-day mortality.

RESULTS: One thousand one hundred and seventy patients had preoperative sCr levels available. Renal function was analyzed usi sCr dichotomized at 1.8 mg/dL, 1 SD higher than the mean value (0.97 ± 0.79 mg/dL) for the cohort. Twenty-two patients had sCr ≥1 mg/dL. Major complications occurred in 279 patients (23.8%), respiratory failure in 62 (5.3%), and renal failure in 31 (2.6%).

CONCLUSIONS: Preoperative serum creatinine ≥1.8 mg/dL identifies patients at significantly increased risk of postoperative major complications, respiratory failure, and renal failure requiring dialysis. Patients are well selected for major hepatectomy, and few patients with substantial renal insufficiency are deemed operative candidates.

complications, respiratory failure, and renal failure requiring dialysis. Patients are well selected for major hepatectomy, and few patients with substantial renal insufficiency are deemed operative candidates.

Critères à évaluer avant résection hépatique: insuffisance rénale

World J Surg. 2018 Jun 8. doi: 10.1007/s00268-018-4698-3. [Epub ahead of print]

Liver Resection for Hepatocellular Carcinoma in Patients with Renal Dysfunction.

Shirata C[1], Hasegawa K[1], Kokudo T[1], Yamashita S[1], Yamamoto S[1], Arita J[1], Akamatsu N[1], Kaneko J[1], Sakamoto Y[1], Kokudo N[2,3].

Abstract

BACKGROUND: The aim of this study was to evaluate the feasibility of liver resection in hepatocellular carcinoma (HCC) patients with preoperative renal dysfunction (RD).

METHODS: Data from 735 patients undergoing primary liver resection for HCC between 2002 and 2014 were analyzed. Short- and long-term outcomes were compared between the RD group, defined by a preoperative estimated glomerular filtration rate of <45 mL/min/1.73 m^2, and the non-RD group.

RESULTS: Sixty-two patients had RD. The incidence of postoperative pleural effusion (24 vs. 11%; P = 0.007) and major complications (Clavien-Dindo III-V; 31 vs. 15%; P = 0.003) were significantly higher in RD patients. In RD patients with Child-Pugh A, 90-day mortality rate (1.9%) and median survival time (6.11 years) were comparable to that of non-RD patients. In contrast, RD patients with Child-Pugh B had a very high 90-day mortality rate (22.2%), and a significant shorter median survival time compared to non-RD patients (1.19 vs. 4.84 years; P = 0.001).

patients. However, selection of liver resection candidates from Child-Pugh B patients with RD should be stricter.

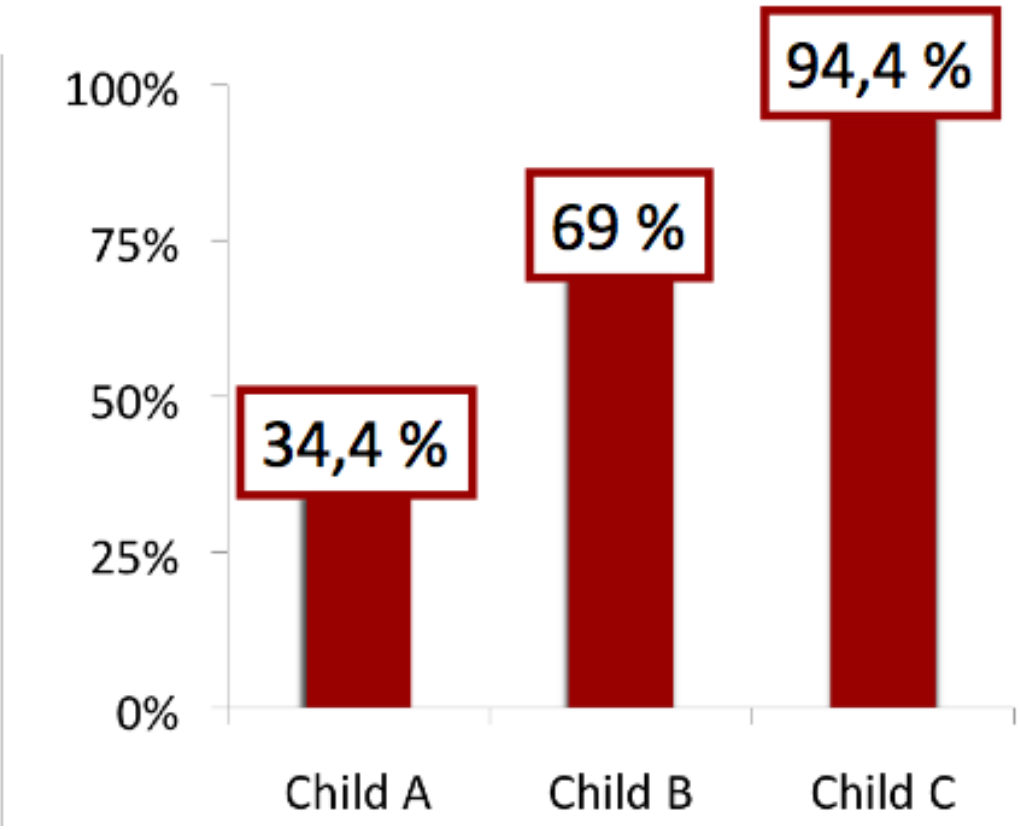
Critères à évaluer avant résection hépatique: dénutrition

- La fréquence de la dénutrition chez le cirrhotique varie de 34 à 65 %

Lautz *et al.* Clin Invest, 1992
Garegaro *et al.* Am J Clin Nutr, 1996
Thuluvath *et al.* Am J Clin Nutr, 1994

- Corrélée à la sévérité de la cirrhose

Figuereido *et al.* J Gastroenterol, 2006



Critères à évaluer avant résection hépatique: dénutrition

Perioperative nutritional support in patient undergoing hepatectomy for hepatocellular carcinoma.

Fan ST. Et al. N Engl. J. Med 1994

Abstract

BACKGROUND: Resection of hepatocellular carcinoma is associated with high rates of morbidity and mortality. Since intensive nutritional support can reduce the catabolic response and improve protein synthesis and liver regeneration, we performed a prospective study to investigate whether perioperative nutritional support could improve outcome in patients undergoing hepatectomy for hepatocellular carcinoma.

METHODS: We studied 124 patients undergoing resection of hepatocellular carcinoma. Sixty-four patients (39 with cirrhosis, 18 with chronic active hepatitis, and 7 with no associated liver disease) were randomly assigned to receive perioperative intravenous nutritional support in addition to their oral diet, and 60 patients (33 with cirrhosis, 12 with chronic active hepatitis, and 15 with no

RESULTS: There was a reduction in the overall postoperative morbidity rate in the perioperative-nutrition group as compared with the control group (34 percent vs. 55 percent; relative risk, 0.66; 95 percent confidence interval, 0.45 to 0.96), predominantly because of fewer septic complications (17 percent vs. 37 percent; relative risk, 0.57; 95 percent confidence interval, 0.34 to 0.96). There were also a reduction in the requirement for diuretic agents to control ascites (25 percent vs. 50 percent; relative risk, 0.57; 95 percent confidence interval, 0.37 to 0.87), less weight loss after hepatectomy (median loss, 0 kg vs. 1.4 kg, P = 0.01), and less deterioration of liver function as measured by the change in the rate of clearance of indocyanine green (-2.8 percent vs. -4.8 percent at 20 minutes, P = 0.05). These benefits were seen predominantly in the patients with underlying cirrhosis who underwent major hepatectomy. There were five deaths during hospitalization in the perioperative-nutrition group, and nine in the control group (P not significant).

were five deaths during hospitalization in the perioperative-nutrition group, and nine in the control group (P not significant).

CONCLUSIONS: Perioperative nutritional support can reduce complications after major hepatectomy for hepatocellular carcinoma associated with cirrhosis.

Critères à évaluer avant résection hépatique: dénutrition

Ann Surg Oncol. 2019 Jan;26(1):264-272. doi: 10.1245/s10434-018-6943-2. Epub 2018 Oct 26.

Clinical Benefit of Preoperative Exercise and Nutritional Therapy for Patients Undergoing Hepato-Pancreato-Biliary Surgeries for Malignancy.

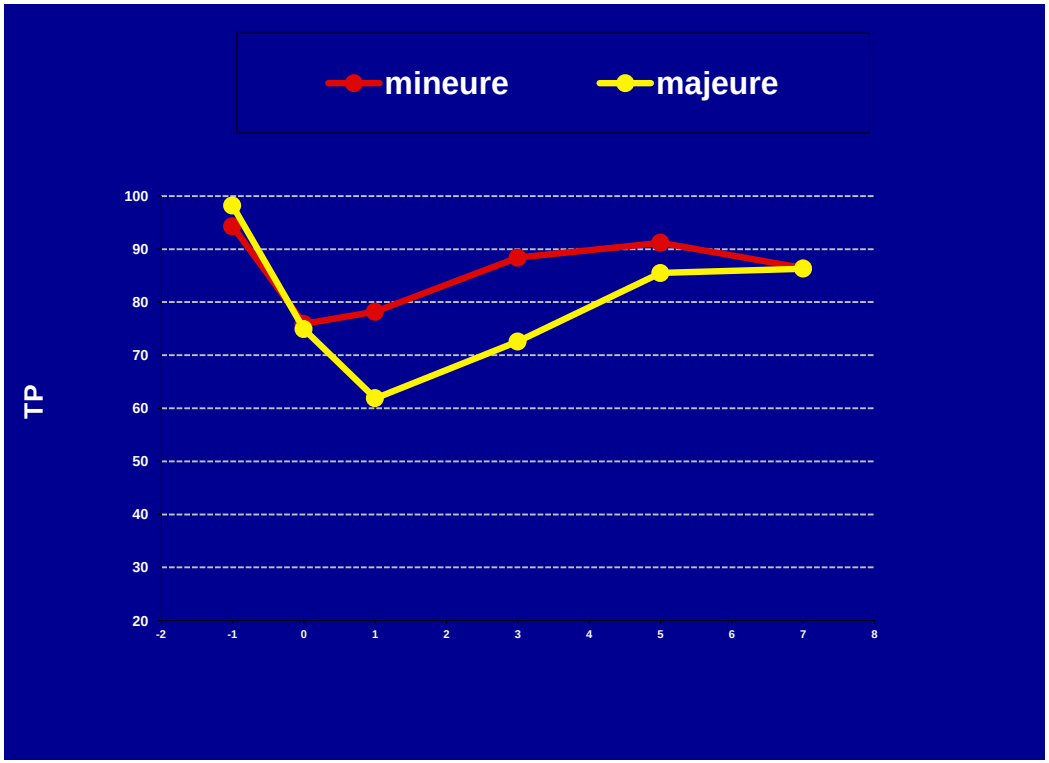
Nakajima H[1], Yokoyama Y[2], Inoue T[1], Nagaya M[1], Mizuno Y[1], Kadono I[1,3], Nishiwaki K[4], Nishida Y[1,3], Nagino M[5].

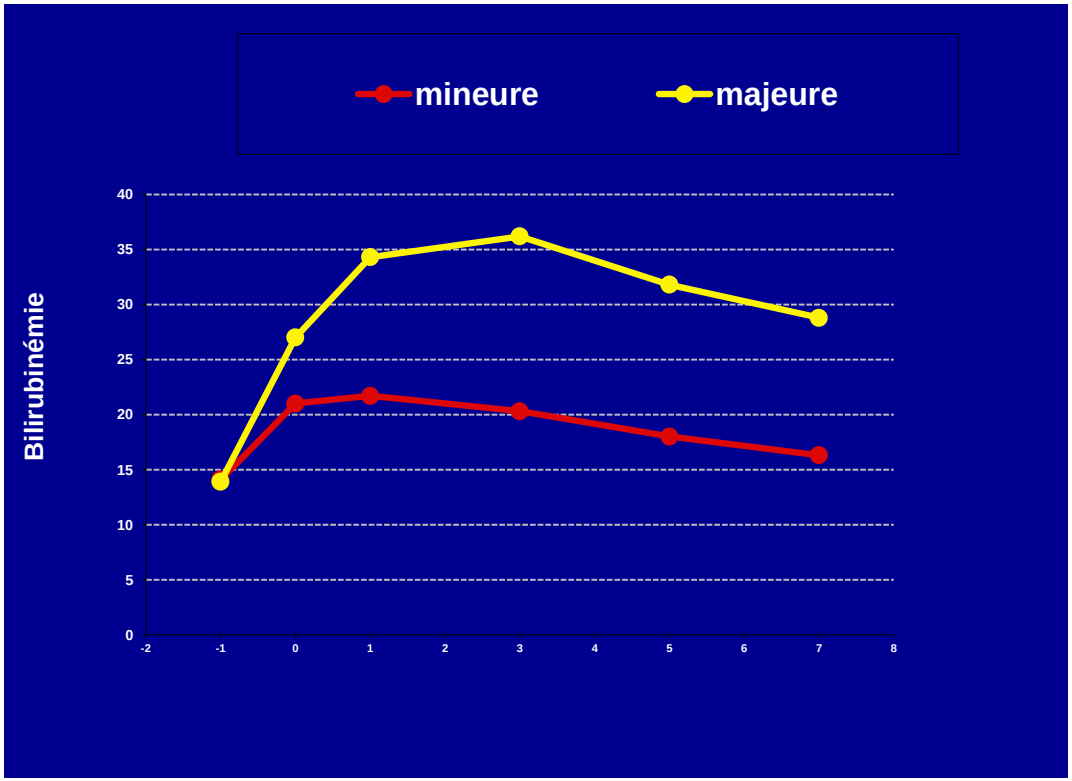
RESULTS: The prehabilitation group consisted of 76 patients scheduled to undergo HPB surgeries for malignancy. An identical number of patients were selected as the no-prehabilitation group after propensity score-matching. During the waiting period, serum albumin levels were significantly deteriorated in the no-prehabilitation group, whereas this index did not deteriorate or even improved in the prehabilitation group. By performing prehabilitation, a 6-min walk distance and total muscle/fat ratio were significantly increased during the waiting period. Although the overall incidence of postoperative complications did not differ between the two groups, the postoperative hospital stay was shorter in the prehabilitation group than in the no-prehabilitation group (median, 23 vs 30 days; p = 0.045).

Fonction Hépatique post-opératoire

Fonction Hépatique post-opératoire

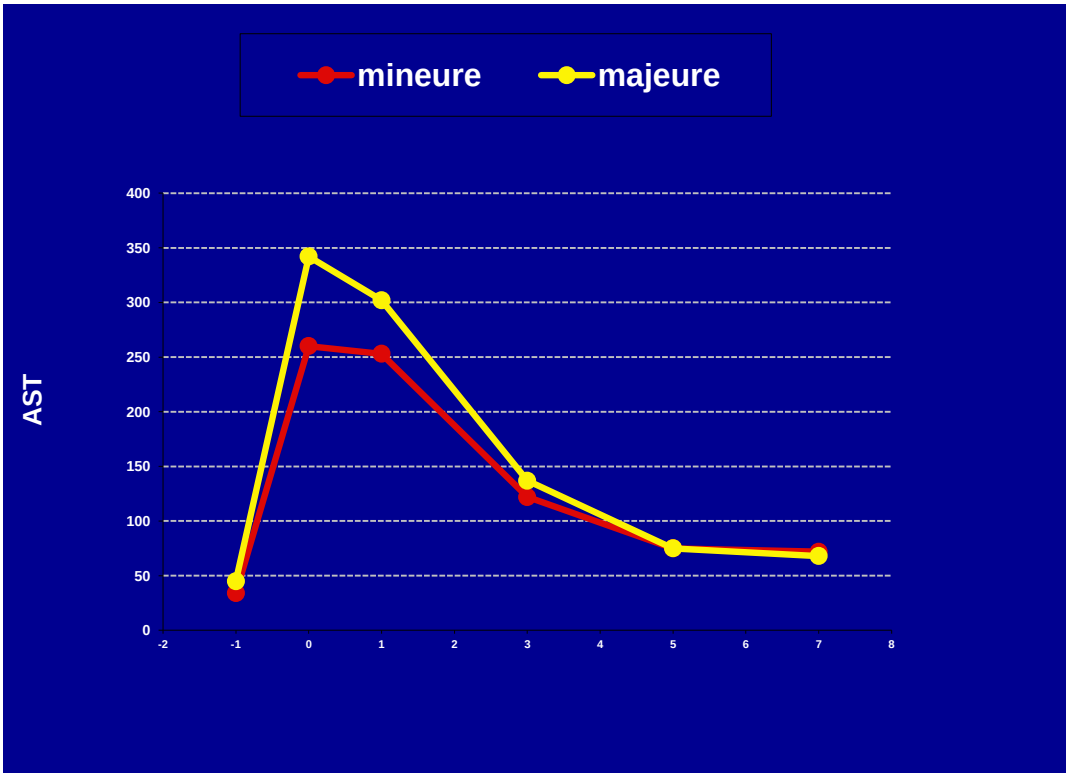
Cinétique « normale » des tests hépatiques post hépatectomie

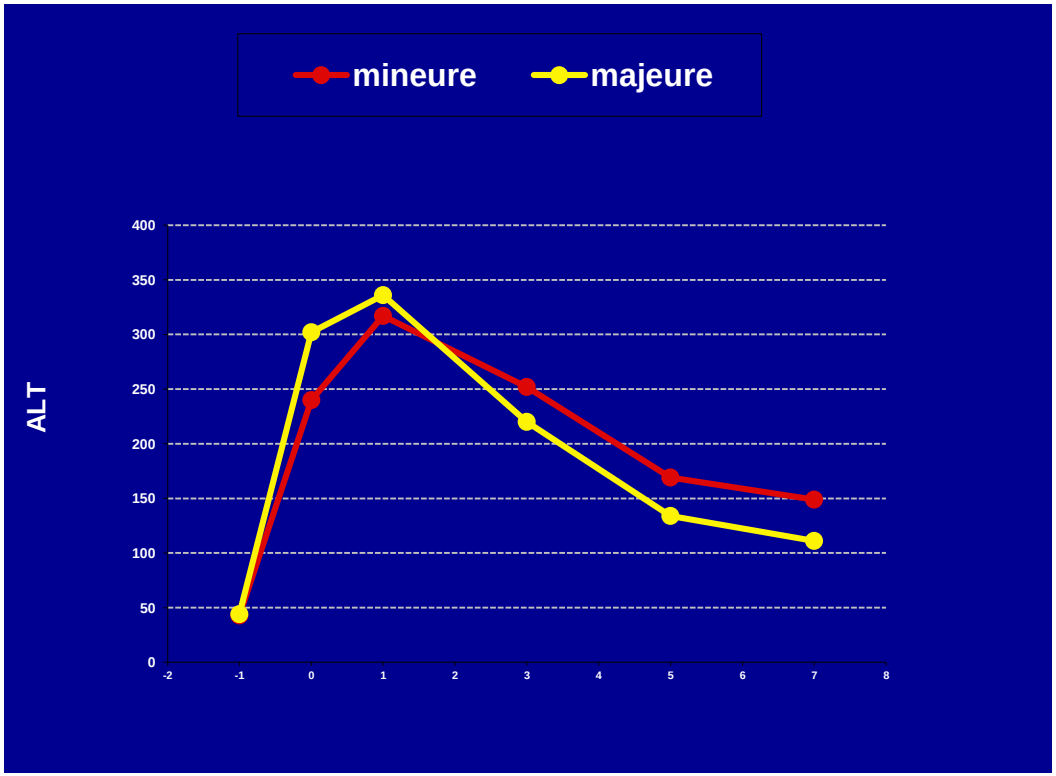




Fonction Hépatique post-opératoire

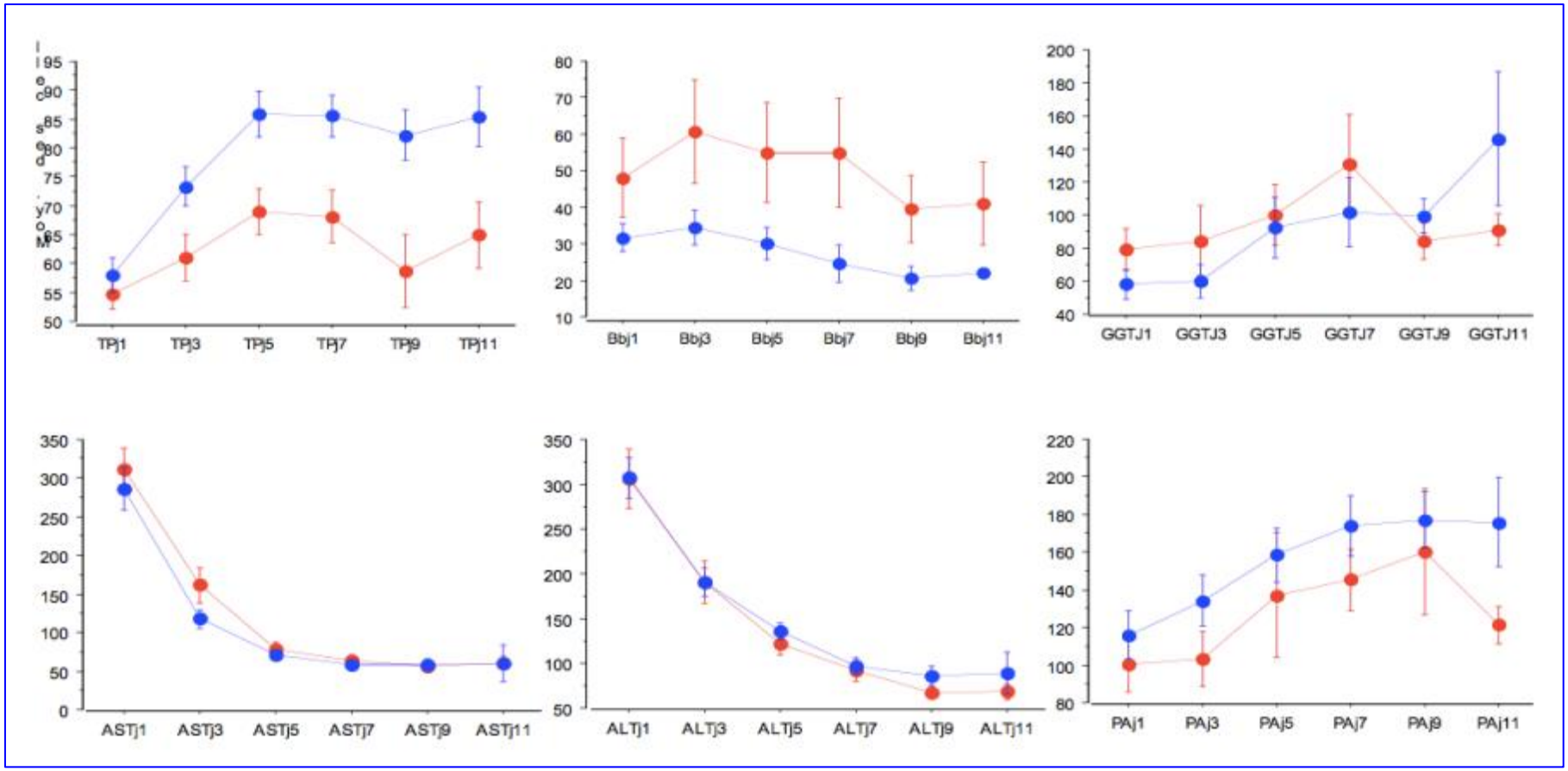
Cinétique « normale » des tests hépatiques post hépatectomie





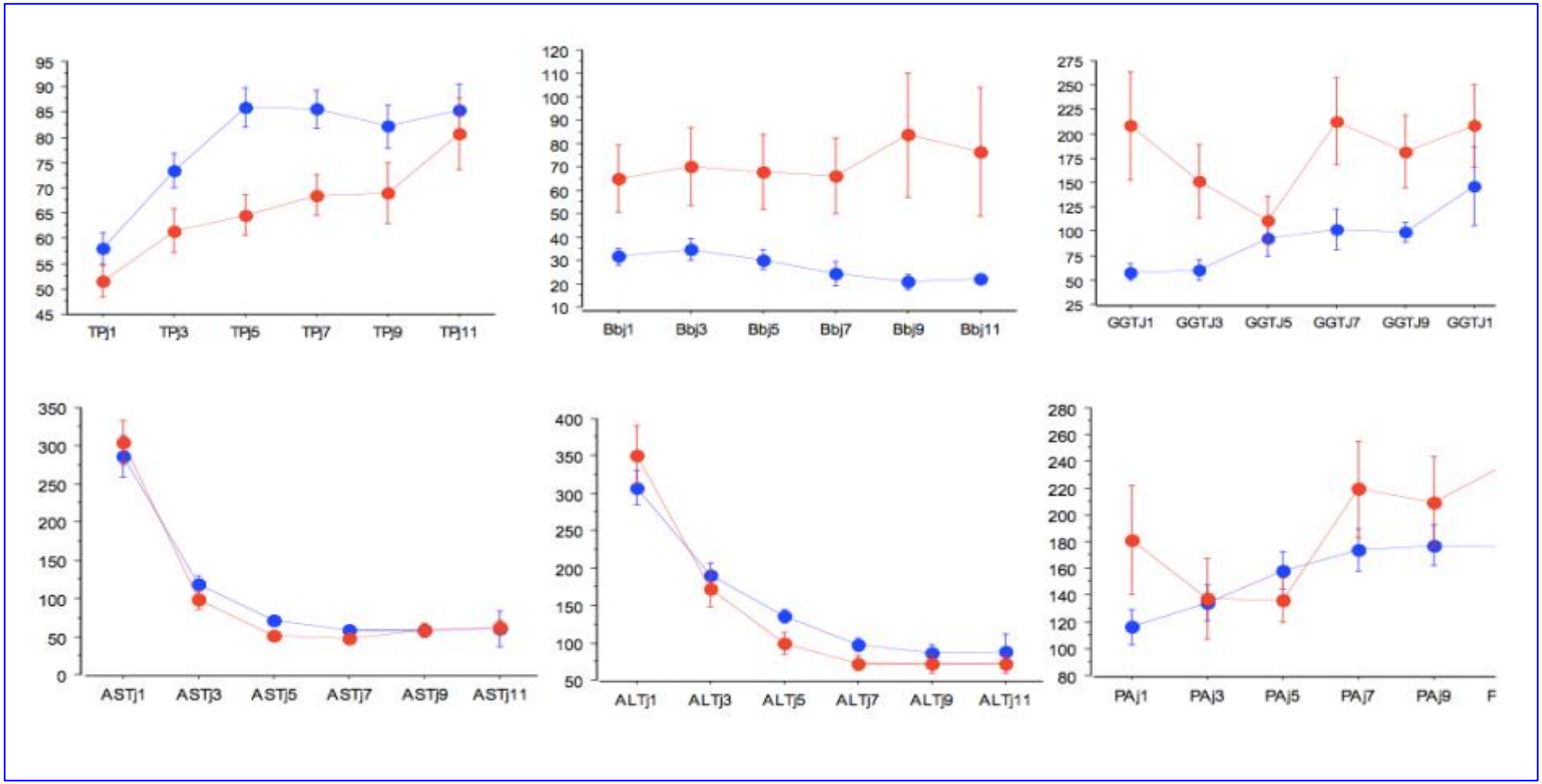
Fonction Hépatique post-opératoire

Gold Standart *versus* cirrhosis



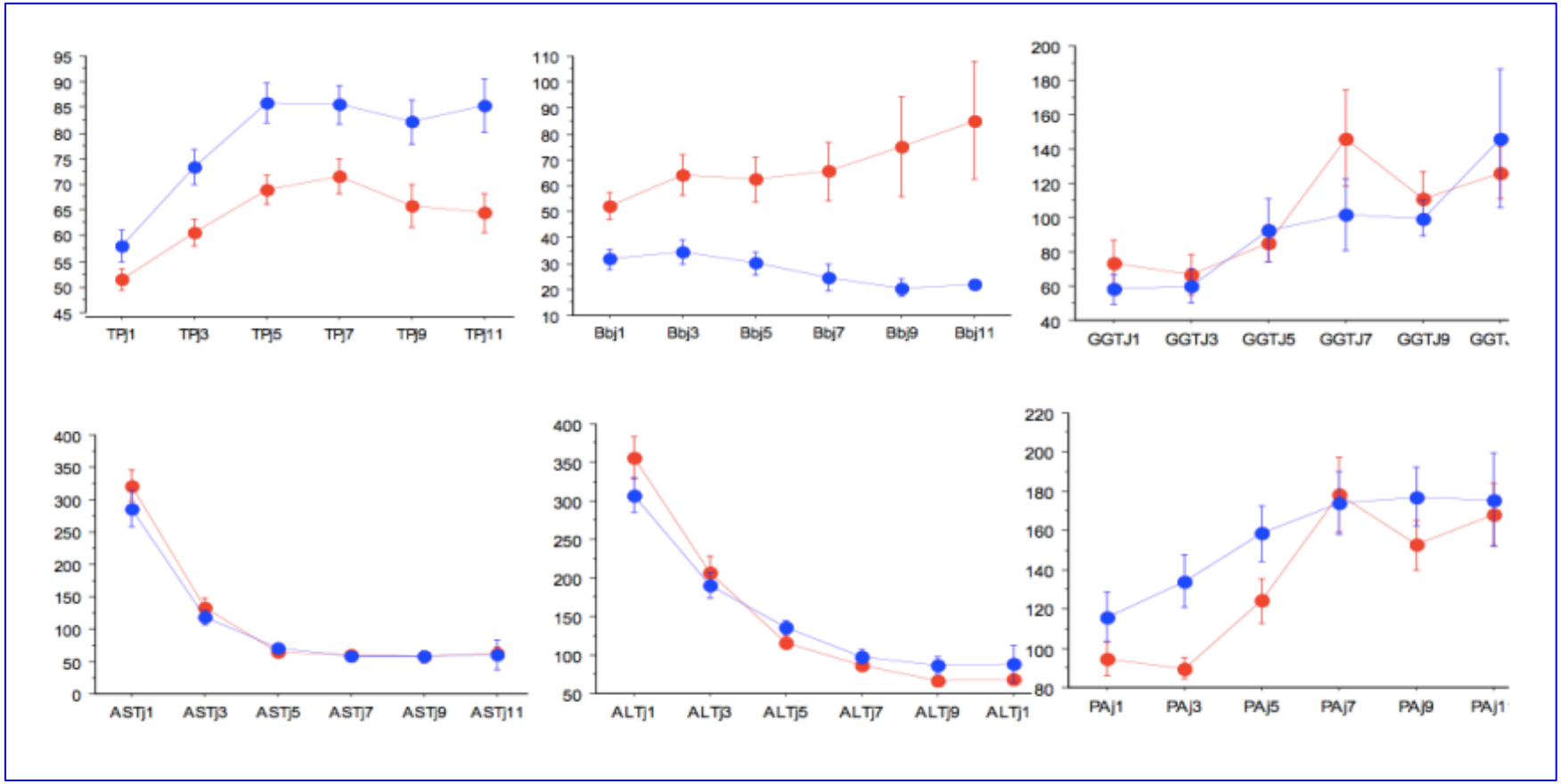
Fonction Hépatique post-opératoire

Gold Standart *versus* Biliary disease



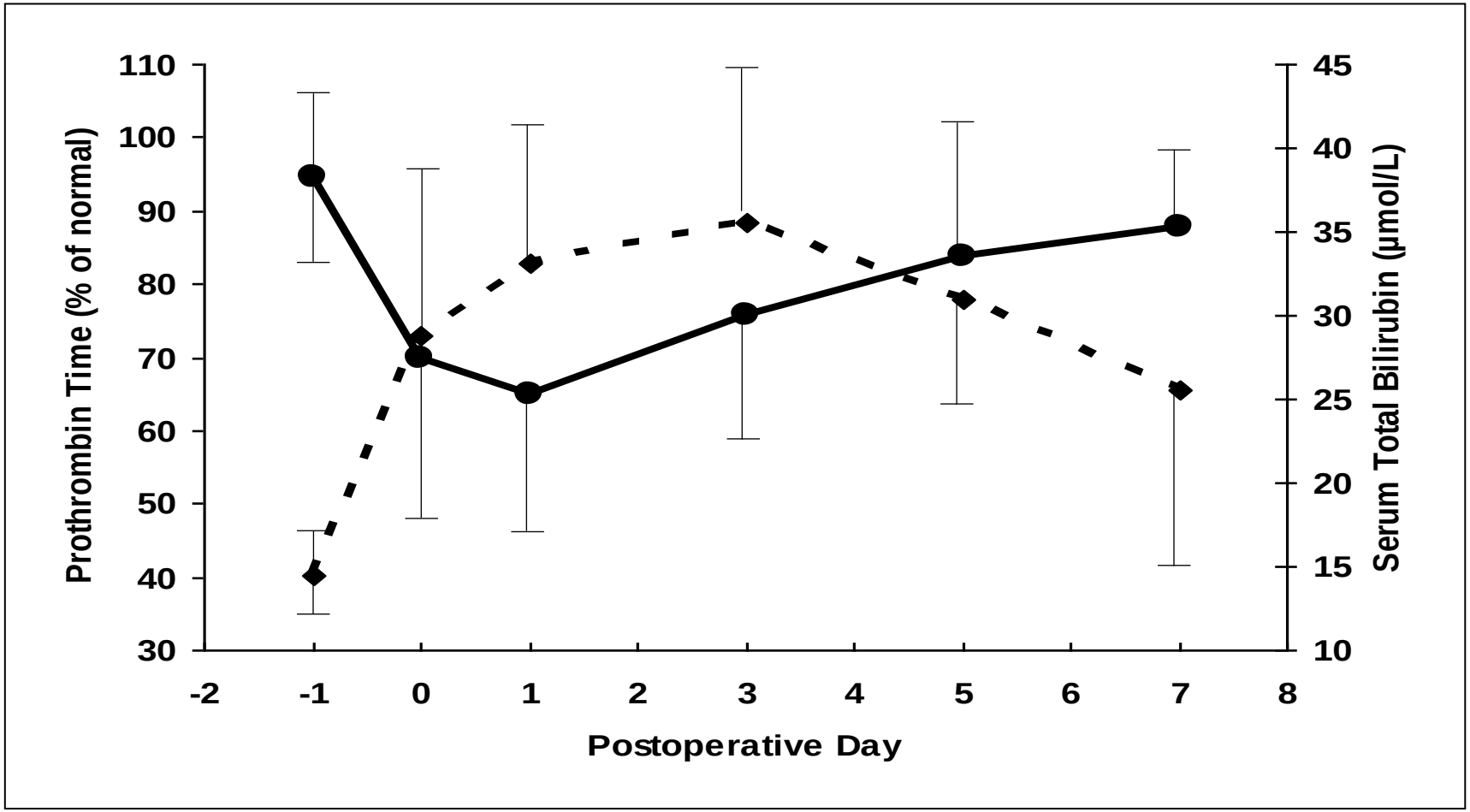
Fonction Hépatique post-opératoire

Gold Standart *versus* complications



Fonction Hépatique post-opératoire

Beaujon expérience: 1998 – 2002: 775 résections hépatiques électives



Balzan S et al. Ann Surg 2005

Fonction Hépatique post-opératoire

La règle de: “50 – 50” à J 5

J 5	PT >50%	PT <50%
Bil < 50 µmol/L	1 %	7 %
Bil > 50 µmol/L	4 %	59 %

Fonction Hépatique post-opératoire

- Dès J5 la présence simultanée d'un TP < 50% et d'une bilirubinémie > 50 µmol/L est un facteur prédictif de > 50% de mortalité.

- Le "50 – 50" peut être utilisé comme un critère définissant une insuffisance hépatique postopératoire.