

SAFETY OF LIVER RESECTION IN THE ELDERLY: A SINGLE-INSTITUTION EXPERIENCE

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Background

✓ In recent years, liver resection has been performed for elderly patients in Japan with the development of surgical operations.

Mori S. Surg Endosc. 2023;37:5205-5214.

✓ However, it is generally considered that the risk of perioperative adverse events is higher in elderly patients.

van Tuil T. Dig Surg. 2019;36:111-123.

Purpose

In this study, we investigated the safety of liver resection for the elderly in our institution.

Patients

Liver resection for primary liver cancer
(from 2000 to 2020)
n = 2025

Hepatocellular carcinoma 1858 (91.7%)
Intrahepatic cholangiocarcinoma 106 (5.2%)
Combined hepatocellular and cholangiocarcinoma 26 (1.2%)

75 years old ≥ age

75 years old < age

Elderly patients
n = 482 (23.8%)

Non-elderly patients
n = 1543 (76.2%)

Liver fibrosis prediction score

● FIB-4 index =

$$\frac{[\text{Age (years)} \times \text{AST (IU/L)}]}{[\text{Plt (10}^9\text{/L)} \times \text{ALT}^{1/2} \text{ (IU/L)}]}$$

● NAFLD fibrosis score =

$$-1.675 + 0.037 \times \text{Age (years)} + 0.094 \times \text{BMI (kg/m}^2\text{)}$$

+ 1.13 × Impaired Fasting Glucose/Diabetes (yes = 1, no = 0)

$$+ 0.99 \times \text{AST/ALT ratio}$$

$$- 0.013 \times \text{Plt (} \times 10^9\text{/L)}$$

$$- 0.66 \times \text{Albumin (g/dL)}$$

Methods

✓ Comparisons were made between two groups.

✓ Preoperative risk factors for postoperative complications in the elderly group were identified.

✓ Receiver operating characteristic (ROC) curves were drawn as indicators of liver function for postoperative complications C-D Grade IIIb or more.

● Predictive scores such as FIB-4 index and NAFLD fibrosis score were used to assess liver fibrosis.

● The Clavien-Dindo (C-D) classification was used to classify postoperative complications.

Preoperative characteristics

	Elderly patients n = 482	Non-elderly patients n = 1543	P
Age, years [#]	78 (75-86)	66 (15-74)	< 0.001
Gender (male), No. (%)	336 (69.7)	1219 (79.0)	< 0.001
Body mass index, kg m ^{2#}	22.9 (14.3-33.1)	23.5 (13.6-37.3)	< 0.001
Medical history			
Diabetes, No. (%)	172 (35.7)	446 (30.2)	0.024
Hypertension, No. (%)	311 (64.5)	757 (49.1)	< 0.001
Smoker, No. (%)	213 (44.2)	914 (59.2)	< 0.001
Liver function			
Albumin, g/dL [#]	3.9 (2.6-5.2)	4.0 (2.2-5.4)	< 0.001
Prothrombin time, % [#]	100 (30-109)	97 (9-100)	< 0.001
Total bilirubin, mg/dL [#]	0.5 (0.2-3.4)	0.6 (0.1-3.5)	< 0.001
Platelets, × 10 ⁴ /μL [#]	15.5 (3.2-44.3)	14.9 (3.2-66.6)	0.195
ICG-R15, % [#]	13.2 (2.0-77.7)	12.0 (1.0-135.0)	0.003
ALBI score	-2.6 (-3.7--1.3)	-2.7 (-4.9--1.0)	< 0.001
FIB-4 index	3.57 (0.90-49.8)	2.78 (0.38-32.33)	< 0.001
NAFLD fibrosis score	2.43 (0.87-24.9)	1.74 (-1.29-13.3)	< 0.001

Surgical and histopathological characteristics

	Elderly patients n = 482	Non-elderly patients n = 1543	P
Characteristics of surgery			
Operation time, min [#]	301 (90-803)	324 (75-1004)	< 0.001
Pringle maneuver time, min [#]	59 (0-202)	65 (0-304)	< 0.001
Blood loss, ml [#]	258 (5-4491)	285 (5-11002)	0.040
RBC transfusion, No. (%)	38 (7.9)	93 (6.0)	0.167
Systematic resection, No. (%)	130 (27.0)	491 (31.8)	0.047
Major hepatectomy, No. (%)	39 (8.1)	130 (8.3)	0.851
Re-hepatectomy, No. (%)	117 (24.3)	323 (20.9)	0.129
Resected specimen			
Tumor size, mm [#]	29 (7-17)	28 (3-28)	0.133
Multiple tumors, No. (%)	112 (23.2)	423 (27.4)	0.075
Resected number, No. (%)	64 (13.3)	262 (17.0)	0.055
Hepatocellular carcinoma, No. (%)	440 (91.3)	1418 (91.9)	0.704
Intrahepatic cholangiocarcinoma, No. (%)	29 (6.0)	77 (5.0)	0.412

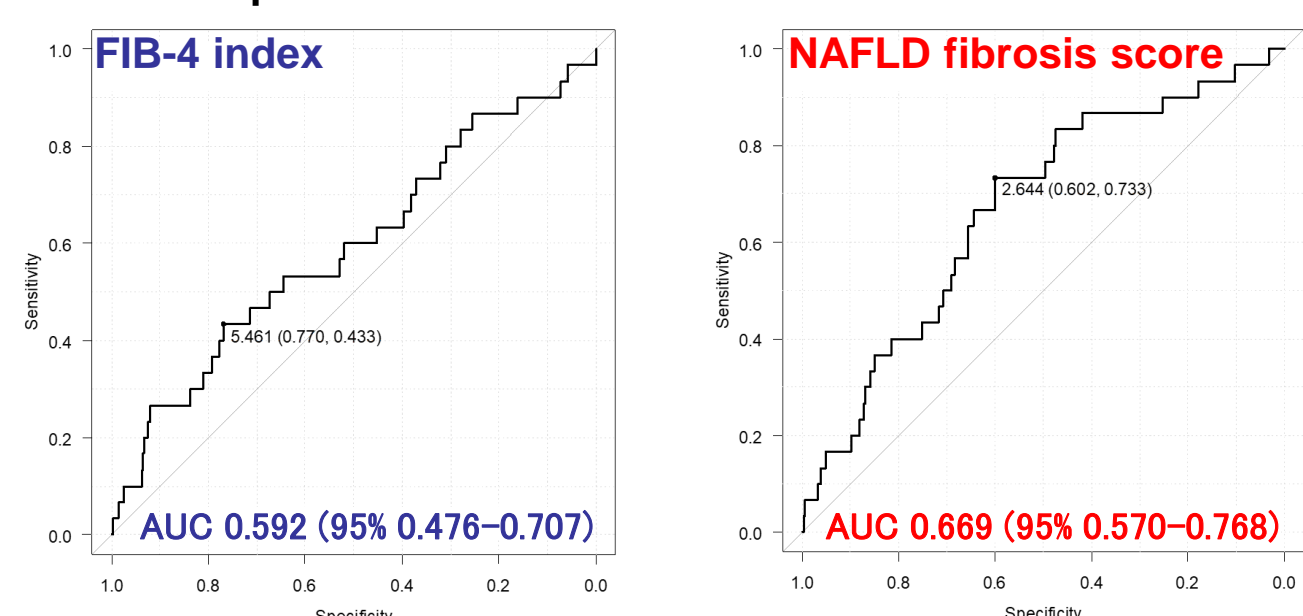
Postoperative complications

	Elderly patients n = 482	Non-elderly patients n = 1543	P
Postoperative complications			
C-D Grade IIIa or more	140 (29.0)	398 (25.8)	0.174
C-D Grade IIIb or more	30 (6.2)	53 (3.4)	0.011
C-D Grade IV or more	7 (1.5)	5 (0.3)	0.010
Bile leak, No. (%)	31 (6.4)	110 (7.1)	0.682
Abscess, No. (%)	10 (2.1)	21 (1.4)	0.288
Wound infection, No. (%)	32 (6.6)	102 (6.6)	1.000
Postoperative bleeding, No. (%)	10 (2.1)	20 (1.3)	0.278
Ascites, No. (%)	33 (6.5)	61 (2.9)	0.012
Pneumonia, No. (%)	14 (1.6)	19 (0.6)	0.020
Pleural effusion, No. (%)	73 (15.1)	206 (13.4)	0.325
C-D Grade IIIb or more			
Open hemostasis, No. (%)	8 (1.7)	17 (1.1)	0.346
Open drainage, No. (%)	10 (2.1)	17 (1.1)	0.113
Cardiovascular disease, No. (%)	6 (3.5)	4 (2.2)	0.015
Pneumonia, No. (%)	6 (1.2)	2 (0.1)	0.003
Liver failure, No. (%)	1 (0.2)	5 (0.3)	1.000
Renal failure, No. (%)	2 (0.4)	4 (0.3)	0.633
Post-operative hospital stay (day)	13 (3-100)	12 (3-190)	0.028

Multivariate analysis

Variables (N=482)	No.	%	Univariate		Multivariate	
			Odds ratio (95% Confidence interval)	P	Odds ratio (95% Confidence interval)	P
Gender (males)	336	69.7	0.82 (0.35-1.90)	0.656		
Body mass index (>22.5 kg/m ²)	265	55.0	0.70 (0.33-1.47)	0.347		
ALBI score (Grade 2b or 3)	77	16.0	1.66 (0.68-4.02)	0.260		
Platelets (< 11.6 × 10 ⁴ /μL)	121	25.1	1.80 (0.83-3.90)	0.136		
Prothrombin time (< 97 %)	160	33.2	1.59 (0.75-3.35)	0.227		
ICG-R15 (≥ 13%)	243	50.4	1.31 (0.62-2.76)	0.481		
Liver damage (B or C)	68	14.1	1.23 (0.45-3.34)	0.678		
FIB-4 index (> 5.46)	116	24.1	2.23 (1.04-4.78)	0.039	2.35 (1.08-5.13)	0.031
NAFLD fibrosis score (> 2.64)	202	41.9	4.16 (1.81-9.54)	< 0.001	4.26 (1.85-9.86)	< 0.001
Creatinine clearance (< 48.3)	104	21.6	1.90 (0.86-4.21)	0.111		
Major hepatectomy	39	8.1	1.25 (0.28-5.45)	0.768		
Systematic resection	130	27.0	1.91 (0.71-5.10)	0.196		
Tumor size (>2.8 cm)	243	50.4	1.17 (0.55-2.44)	0.681		

ROC as indicators of liver function for postoperative complications C-D Grade IIIb or more



Conclusion

- ✓ Our results suggest that open liver resection for the elderly was associated with a high risk of serious postoperative complications.
- ✓ High value of liver fibrosis prediction scores could be risk factors for postoperative severe complications.