ΗΠΑΤΕΚΤΟΜΗ ΚΑΙ ΜΕΤΕΓΧΕΙΡΗΤΙΚΕΣ ΕΠΙΠΛΟΚΕΣ

Μετεγχειρητική Χολόρροια:

Συντηρητική και Χειρουργική Αντιμετώπιση

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ΓΑΟΝΑ «Άγιος Σάββας»

ΕΙΣΑΓΩΓΗ

- Ηπατεκτομή σήμερα:
  Νοσηρότης< 30%
  Θνητότης< 2%

- Η χολόρροια μετά ηπατεκτομή παραμένει συχνή
- 3.1% - 15.6% των ηπατεκτομών χωρίς HJ - 30% με HJ

- ↑↑↑ αριθμού ηπατεκτομών
- ↑↑↑ ογκολογικών ενδείξεων
- MIS - ERAS
- Staged Hepatectomy
- ALPPS
- Πολύπλοκες ηπατεκτομές με αποκαταστάσεις αγγείων/χολαγγείων

Wang HQ, et al. World J Gastroenterol 2013

ΕΙΣΑΓΩΓΗ

- Χολή – Νεκρωτικό υλικό – Αίμα στον κενό χώρο της εκτομής
- Ανάπτυξη μικροβιακών πληθυσμών
- Έκπτωση host defense μηχανισμών = ΣΗΨΗ
- Απόστημα - Περιτονίτις - Ηπατική ανεπάρκεια - Θνητότης 30%

- Παράταση νοσηλείας σε ΜΕΘ
- Παραμονή ενδοκοιλιακών παροχετεύσεων
- Μακρά παραμονή στο νοσοκομείο
- Διαγνωστικές - ενδοσκοπικές παρεμβάσεις (20-70%)
- Χειρουργική επανεπέμβαση
- QoL
- Κόστος
- RFS – OS???

Shaible A, et al. Surg Endosc 2016

Bile leakage after hepatobiliary and pancreatic surgery: A definition and grading of severity by the International Study Group of Liver Surgery

Consensus proposal of the ISGLS for a definition and grading of bile leakage after hepatobiliary and pancreatic surgery	
Definition	Bile leakage is defined as fluid with an increased bilirubin concentration in the abdominal drain or in the intra-abdominal fluid on or after postoperative day 3, or as the need for radiologic intervention (ie, interventional drainage) because of biliary collections or relaparotomy resulting from bile peritonitis. Increased bilirubin concentration in the drain or intra-abdominal fluid is defined as a bilirubin concentration at least 3 times greater than the serum bilirubin concentration measured at the same time.
Grade	
A	Bile leakage requiring no or little change in patients' clinical management
B	Bile leakage requiring a change in patients clinical management (eg, additional diagnostic or interventional procedures) but manageable without relaparotomy, *or* a Grade A bile leakage lasting for >1 week
C	Bile leakage requiring relaparotomy

Koch M, et al. Surgery 2011

ΠΡΟΔΙΑΘΕΣΙΚΟΙ ΠΑΡΑΓΟΝΤΕΣ

- Ασθενής
  - Ηλικία
  - Φύλο
  - Νοσηρότητες (ΑΥ, ΣΔ, ↓Hg, ↑WBCs, albumin<3.5, Ασκίτης, ΧΜΘ)
  - PVE - TACE

- Ηπατική Παθολογία

Tanaka et al,[103] 2002	HCC (316)	23 (7.3%)
	CCC (9)	3 (33.3%)
	Metastatic (33)	0 (0%)
	Other (5)	0 (0%)
Nagano et al,[82] 2003	HCC (126)	9 (7.1%)
	Metastatic (187)	17 (5.4%)
Sadamori et al,[10] 2013	HCC (359)	46 (12.8%)

Russell M. Surg Clin N Am 2015

ΠΡΟΔΙΑΘΕΣΙΚΟΙ ΠΑΡΑΓΟΝΤΕΣ

Εκτομή S1, S4, S5, S8

R Anterior

L Medial

Central bisectionectomy

L + L extended hepatectomy

Extended R

OR time >300

EBL >500

Pringle>45min

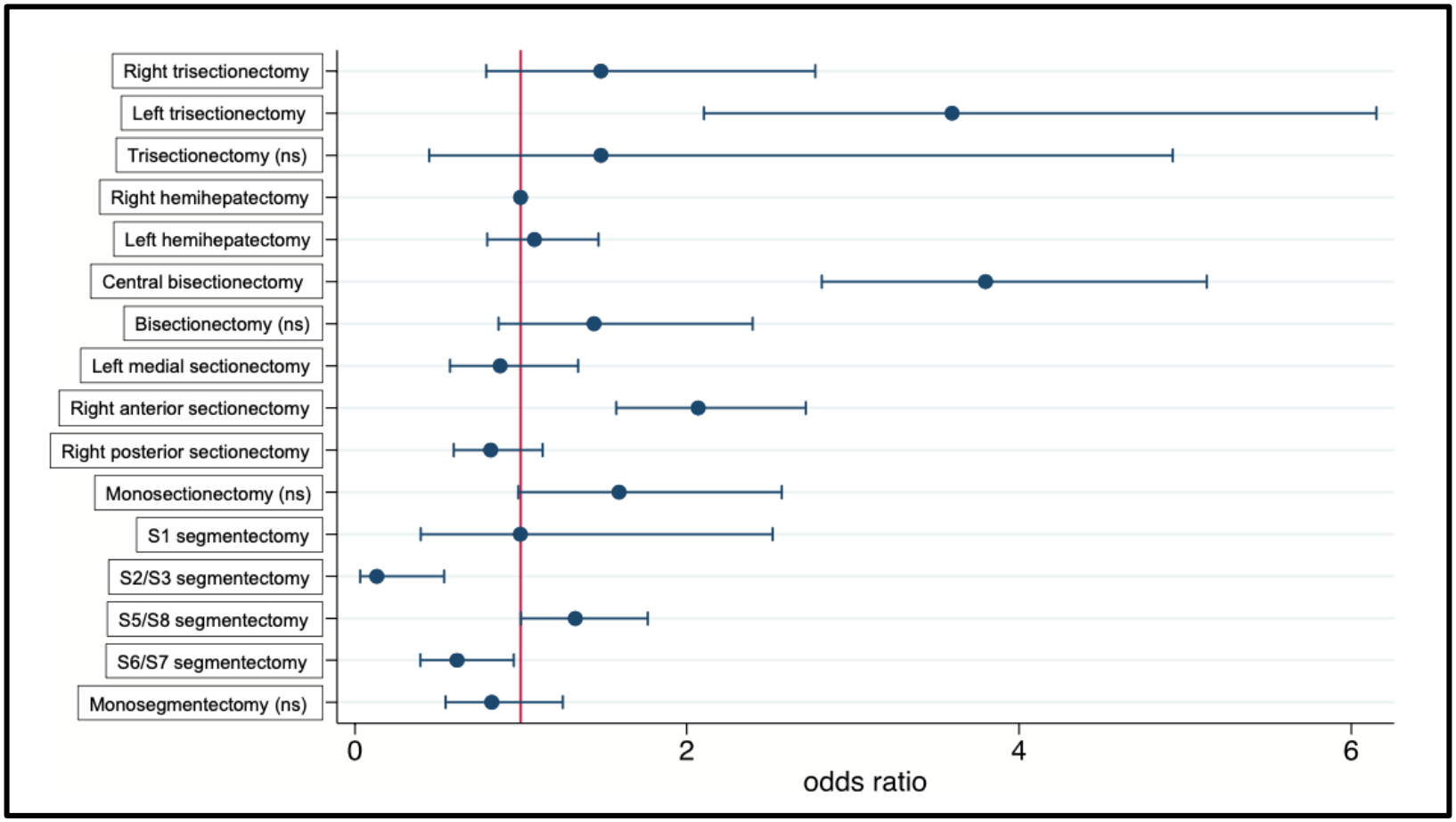
↑ Cut surface area

Glisson's exposure

HJ – Oddi's dysfunction

Study Author	% Leak	Significant Factors	
Lo et al[76]	8.1	Age Non-HCC Mean hemoglobin Estimated blood loss Platelets Noncirrhotic livers Logistic Regression: Advanced age Preoperative leukocytosis	Childs B and C Major hepatectomy Caudate resection T-tube drainage Concomitant bilioenteric or bowel anastomosis Mean operative time Left hepatectomy Prolonged operative time
Sadamori et al[10] (all HCC)	12.9	Trisegmentectomy Repeat hepatectomy MVA OR time >300 min	OR time >300 min Blood transfusion
Zimmitti et al[12]	4.8	Preoperative jaundice Portal vein embolization Biliary tumors Repeat hepatectomy Two-stage resection Extended resection Caudate resection En bloc diaphragm resection MVA Repeat hepatectomy Bile duct resection Intraoperative transfusion	Bile duct resection/reconstruction Liver-associated procedures OR time >180 min EBL >1000 mL Tumor diameter >30 mm Portal node dissection Intraoperative transfusion En bloc diaphragm resection Extended hepatectomy
Benzoni et al[9]	6	Major hepatectomy Left hepatectomy Trisegmentectomy Bisegmentectomy/left lobectomy	Segmentectomy/wedge Pringle >20 min Transfusion >600 mL Abscess Liver dysfunction Pleural effusion
Sadamori et al[83]	12.8	Repeat hepatectomy OR time >300 min EBL >2000 mL MVA Repeat hepatectomy OR time >300 min	Blood transfusion Duration of parenchymal transection
Nagano et al[82]	5.4	Age Cut surface area High-risk operation	
Okumura et al[85]	6.5	Fibrosis or cirrhosis OR time >5 h Major hepatic resection MVA OR time Resection of segment 4	Hepatectomy including Couinaud segment 4 or segment 5

Risk factors for bile leakage: Latest analysis of 10 102 hepatectomies for hepatocellular carcinoma from the Japanese national clinical database



Yamashita et al. J Hepatobiliary Pancreat Sci 2020

Bile Leak Reduction with Laparoscopic Versus Open Liver Resection: A Multi-institutional Propensity Score-Adjusted Multivariable Regression Analysis

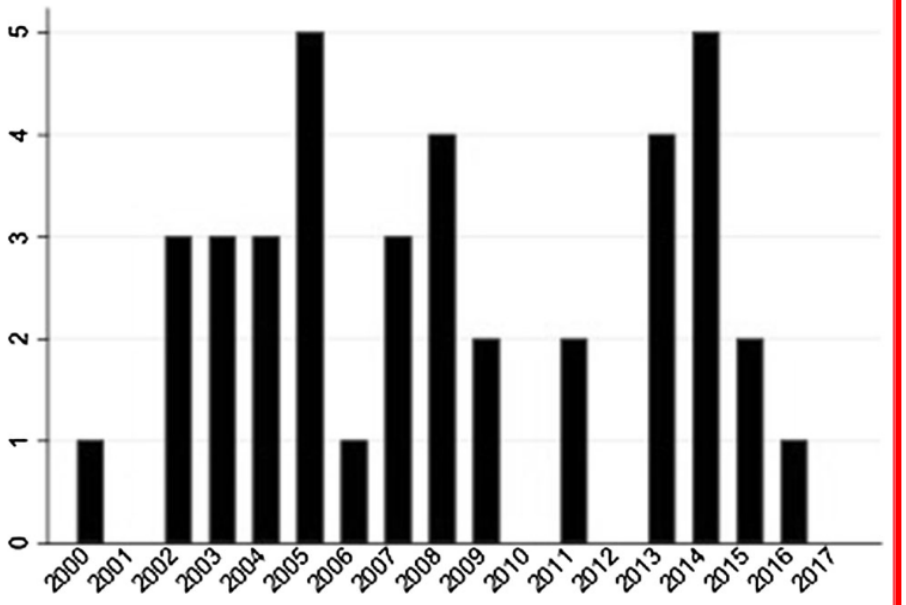


Fig. 1 Bile duct leak incidence per year, 2000–2017 (N = 1388)

Fig. 3 Cumulative distribution of bile duct leaks by laparoscopy, 2000–2017 (N = 1388)

Μεγέθυνση Ιστών
Διαρκής Διεγχειρητική χρήση IOUS
Σύγχρονη τεχνολογία *(Ligaclip, Harmonic, Cavitron)*

Smith AA, et al. World J Surg 2020

ΠΡΟΛΗΨΗ

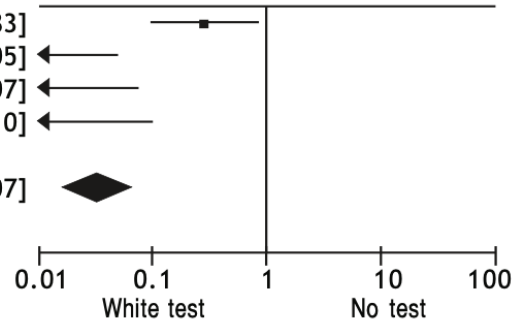
- Εγχειρητική Τεχνική
- White - test
- Bile - leakage test - ICG fluorescence
- C-tube / T-tube decompression
- Fibrin sealers
- Συστηματική Παροχέτευση

The White-test helps to reduce biliary leakage in liver resection: a systematic review and meta-analysis

Intra- Op Bile Leak

Study or subgroup	No test Events	Total	White test Events	Total	Weight	Odds Ratio M-H, fixed, 95% CI
Leelawat, 2012	9	30	18	30	10.4%	0.29 [0.10, 0.83]
Li, 2009	0	71	45	63	39.5%	0.00 [0.00, 0.05]
Linke, 2014	0	93	18	32	22.5%	0.00 [0.00, 0.07]
Liu, 2012	0	54	33	53	27.6%	0.01 [0.00, 0.10]
Total (95% CI)		248		178	100.0%	0.30 [0.02, 0.07]
Total events	9		114			

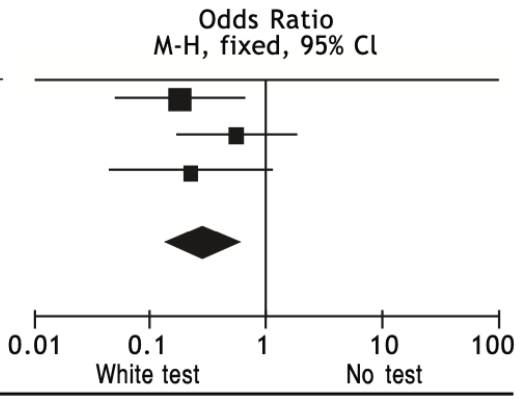
Heterogeneity: $\chi^2 = 21.94$, df = 3 ($P < 0.0001$); $I^2 = 86\%$
Test for overall effect: $Z = 9.21$ ($P < 0.00001$)



Post-Op Bile Leak

Study or subgroup	White-test Events	Total	No test Events	Total	Weight	Odds Ratio M-H, fixed, 95% CI
Li, 2009	3	63	16	74	46.5%	0.18 [0.05, 0.66]
Linke, 2014	4	32	19	93	28.2%	0.56 [0.17, 1.78]
Liu, 2012	2	53	8	54	25.3%	0.23 [0.05, 1.12]
Total (95% CI)		148		221	100.0%	0.30 [0.14, 0.63]
Total events	9		43			

Heterogeneity: $\chi^2 = 1.80$, df = 2 ($P = 0.41$); $I^2 = 0\%$
Test for overall effect: $Z = 3.15$ ($P = 0.002$)

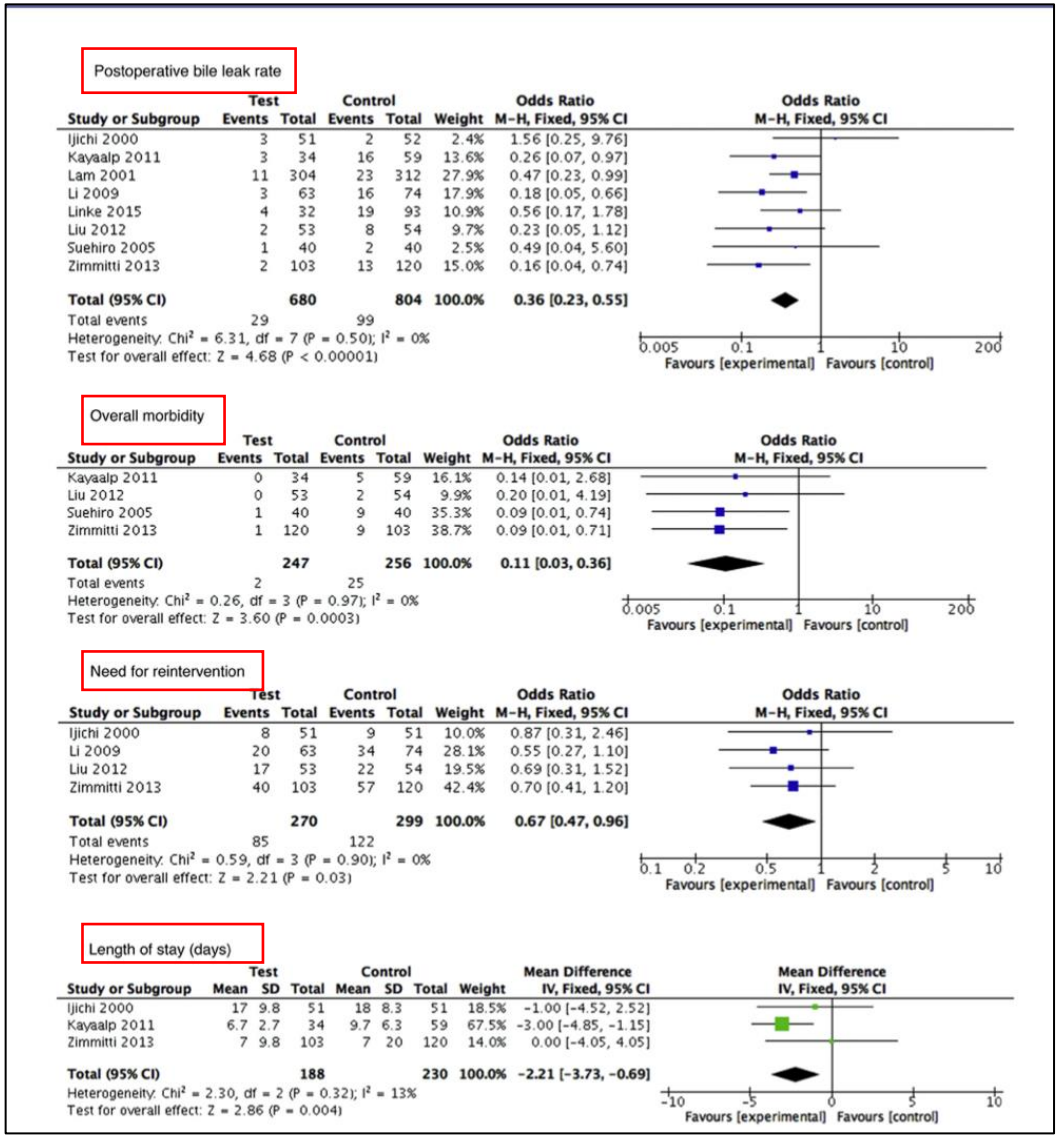


Linke R, et al. Ann Hepatol 2015

REVIEW ARTICLE

The role of bile leak testing in liver resection: a systematic review and meta-analysis

Ashish I. Vaska[1] & Saleh Abbas[1,2]



Normal saline

Betadine

Methylene blue dye

Fat emulsion (white test)

Indocyanine green ICG

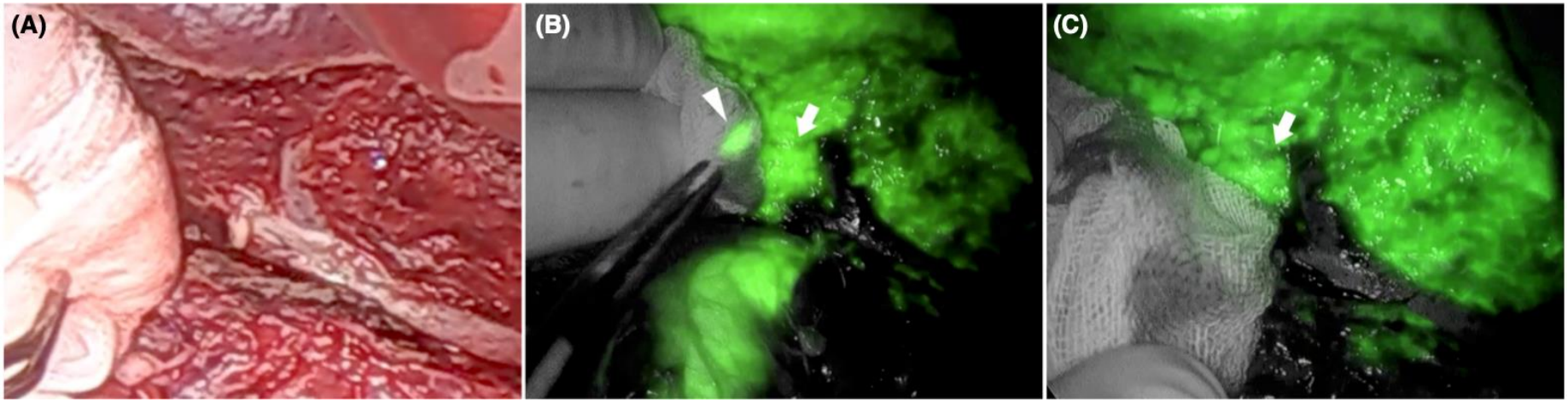
Propofol

Air

HPB 2019

Hepatectomy guided by indocyanine green fluorescent imaging for visualizing bile leakage (with video)

Takehiko Hanaki | Naruo Tokuyasu | Teruhisa Sakamoto | Yoshiyuki Fujiwara



IV ICG infusion (10mg/body)
ICG is taken up by the hepatocytes and gradually excreted in bile
Identification of bile duct system with ICG camera
Bile leakage as an ICG fluorescence contamination of the gauge
Prevents BLs
Beneficial for Peripheral type bile leakage!

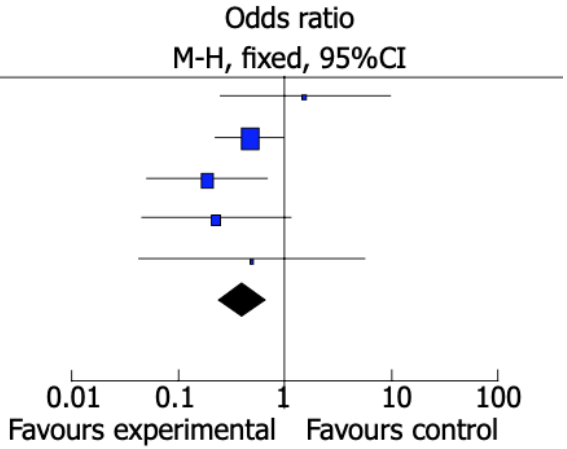
Clin Case Reports 2022

Bile leakage test in liver resection: A systematic review and meta-analysis

Study or subject	BL test group Events	Total	N-BL test group Events	Total	Weight	Odds ratio M-H, fixed, 95%CI
Ijichi 2000	3	51	2	51	4.0%	1.53 [0.24, 9.57]
Lam 2001	11	304	23	312	46.6%	0.47 [0.23, 0.99]
Li 2008	3	57	16	70	29.0%	0.19 [0.05, 0.68]
Liu 2012	2	53	8	54	16.2%	0.23 [0.05, 1.12]
Suehiro 2005	1	40	2	40	4.2%	0.49 [0.04, 5.60]
Total (95%CI)		505		527	100.0%	0.39 [0.23, 0.67]
Total events	20		51			

Heterogeneity: $\chi^2 = 4.11$, $df = 4$ ($P = 0.39$); $I^2 = 3\%$

Test for overall effect: $Z = 3.44$ ($P = 0.0006$)



Intraoperative positive bile leakage and postoperative bile leakage treatment

Study	Intraoperative bile leakage	Postoperative bile leakage	Conservative treatment (*n*)	Puncture drainage (*n*)	ENBD (*n*)	Reoperation (*n*)
Ijichi *et al*[11], 2000	41.2% (21/51)	5.9% (3/51)	5	0	0	0
Liu *et al*[13], 2012	62.3% (33/53)	3.8% (2/53)	7	0	2	1
Li *et al*[12], 2009	71.4% (45/63)	5.3% (3/57)	No description	No description	1	2
Suehiro *et al*[24], 2005	No description	2.5% (1/40)	No description	No description	No description	No description
Lam *et al*[2], 2001	19.7% (60/304)	3.6% (11/304)	7	11	6	10
Leelawat *et al*[26], 201	63.3% (19/30)	No description	2	0	0	0
Sakaguchi *et al*[27], 201	29.6% (8/27)	0% (0/27)	2	0	0	0
Kaibori *et al*[25], 2011	80.8% (42/52)	0% (0/52)	2	1	2	0
Total	39.3% (228/580)	3.42% (20/584)	25 (41.0%)	12 (19.8%)	11 (18.0%)	13 (21.2%)

Wang HQ, et al. World J Gastroenterol 2013

ORIGINAL ARTICLE

Does the placement of a cystic duct tube after a hepatic resection help reduce the incidence of post-operative bile leak?

Variables	Post-operative bile leak	
	Risk ratio (95%CI)	*P*-value
Use of a C tube		
Yes	1.071 (0.397–2.885)	0.893
No	1	

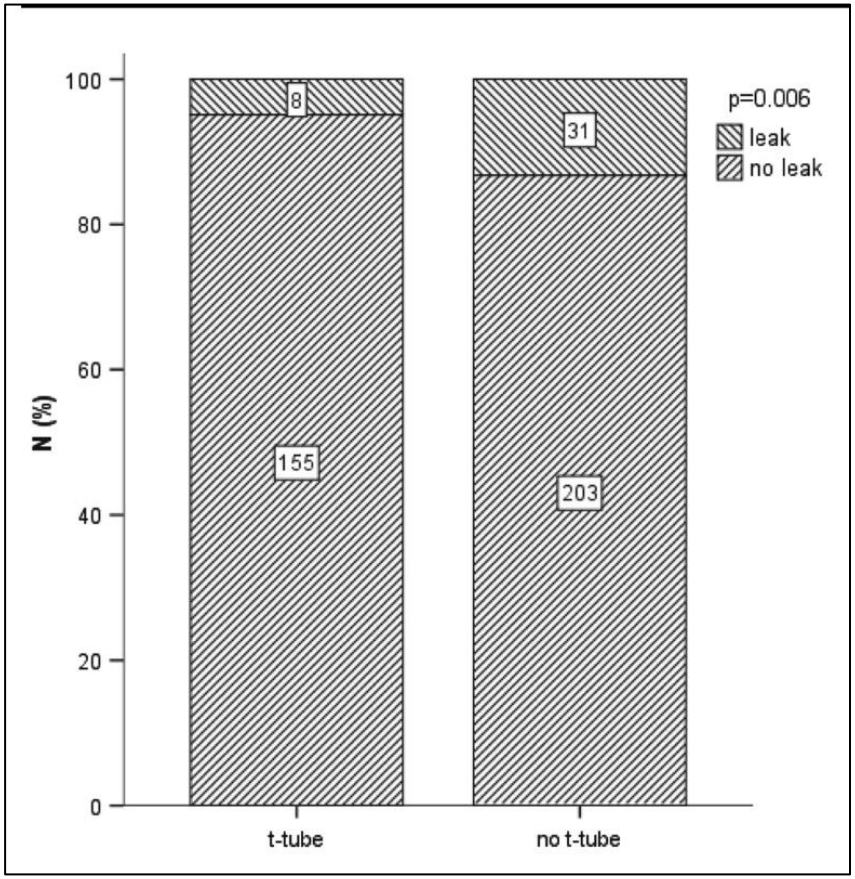
	C tube (-) [*n* = 467]	C tube (+) [*n* = 83]	*P*-value
Age	66 (17–83)	68 (37–87)	0.554
Gender			0.579
Males	327 (86%)	55 (83%)	
Females	140 (14%)	28 (17%)	
Side of hepatectomy			0.0891
Right	262 (56%)	54 (65%)	
Left	205 (44%)	29 (35%)	
Partial hepatectomy			
Bile leak negative	173	9	1.000
Bile leak positive	4	0	
Group A/ B/ C[a]	2/2/0	0/0/0	0.744
Segmentectomy or sectionectomy			
Bile leak negative	123	32	0.448
Bile leak positive	10	5	
Group A/ B/ C[a]	2/8/0	2/3/0	0.560
Hemi-hepatectomy and more hepatectomy			
Bile leak negative	134	35	0.175
Bile leak positive	23	2	
Group A/ B/ C[a]	4/18/5	2/0/0	0.016

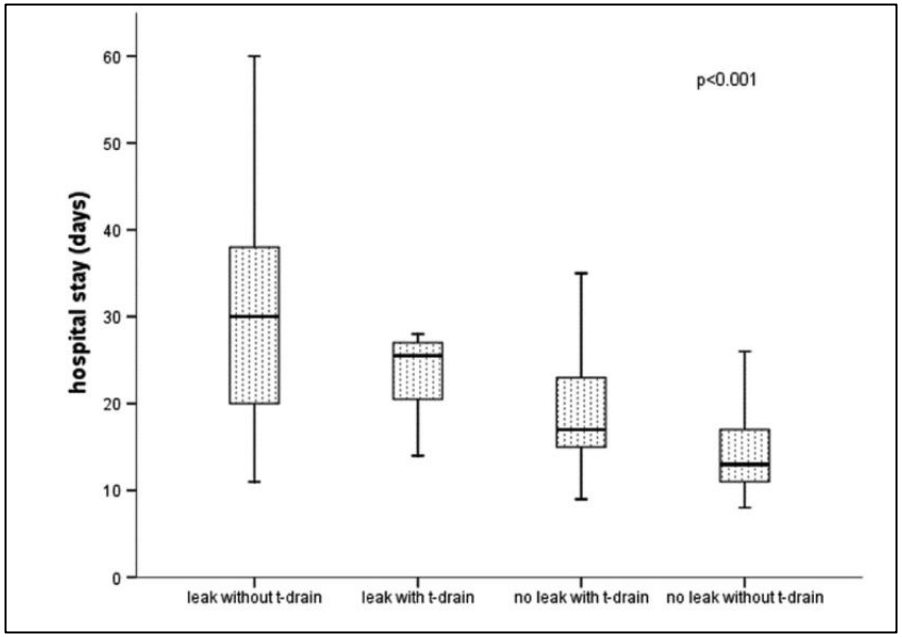
	C tube (-)	C tube (+)	*P* value
Hospital stay after a hepatectomy			0.454
<30 days	4	1	
30–60 days	26	6	
60–90 days	4	0	
>90 days	3 (113, 116, 152 days)	0	

C – Tube
Cannot prevent “isolated” bile leakage!!!

Nanashima A, et al. HPB 2013

T-drain reduces the incidence of biliary leakage after liver resection





No inspection of Peripheral leaks!!!
Attention to CHD Damage!!!

Eurich D. Updates Surg 2016

Application of Fibrin Glue Sealant After Hepatectomy Does Not Seem Justified

Results of a Randomized Study in 300 Patients

Postoperative Outcome of Patients in the Fibrin Glue and Control Groups

	Fibrin Glue (n = 150)	Control (n = 150)	*P*
Postoperative hospital stay (days) (mean ± SD)	13.3 ± 13	12.6 ± 9	0.57
Patients with postoperative transfusion (%)	27 (18)	19 (12)	0.2
Postoperative transfusion PRBCU (mean ± SD)	0.15 ± 0.66	0.17 ± 063	0.72
Overall transfusion (PRBCU) [no. (%) of patients]	40 (27)	29 (19)	0.14
Overall transfusion (mean ± SD)	0.3 ± 0.74	0.31 ± 0.53	0.26
Days of postoperative drainage (mean ± SD)	7.9 ± 5	7.13 ± 47	0.94
Overall drainage volume (mL) (mean ± SD)	1180 ± 2528	960 ± 1253	0.34
Characteristics of fluid from drainage (%)			
Serous	133 (89)	130 (87)	0.64
Hematic	6 (4)	7 (5)	
Bile	11 (7)	13 (8)	

Figueras H, et al. Ann Surg 2007

Abdominal drainage is contraindicated after uncomplicated hepatectomy: Results of a meta-analysis of randomized controlled trials

7 PRTs
1064 pts undergoing hepatectomy
533 with 531 without an abdominal drain

Drainage was associated with higher overall complications (RR: 1.37, *P=.0003*)
and wound-related complications (RR:2.29, *P=.01*)

NO SIGNIFICANT DIFFERENCE in:
- Bile leak
- Intraabdominal collections
- Collections requiring interventions
- LOS

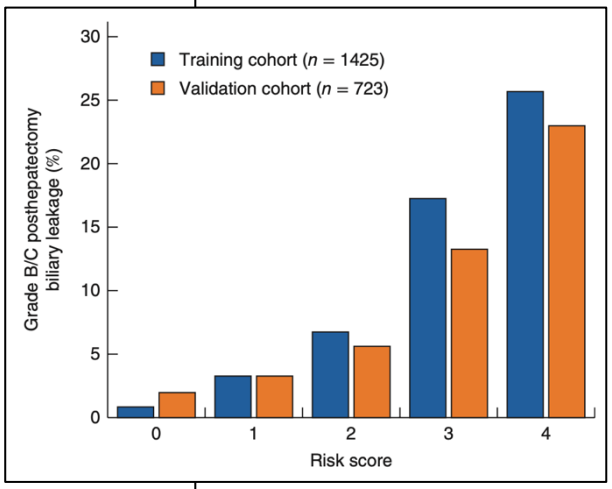
Broook-Smith M, et al. HPB 2015

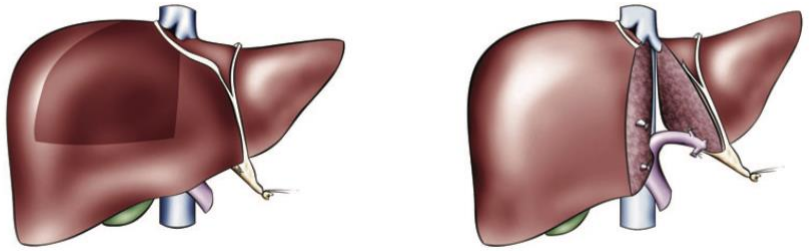
Haishbandah S. Surgery 2023

Risk score to predict biliary leakage after elective liver resection

K. Mohkam[1], O. Farges[3], E. Vibert[4], O. Soubrane[3], R. Adam[4], F.-R. Pruvot[5], J.-M. Regimbeau[6], M. Adham[2], E. Boleslawski[5] and J.-Y. Mabrut[1], on behalf of the Association de Chirurgie Hépato-Biliaire et de Transplantation (ACHBT) French Hepatectomy Study Group*

2393 LRs
No HJ
2012-2015





Operative factors	No factor	One factor	Two factors
Blood loss ≥ 500 ml Remnant ischaemia ≥ 45 min ALPPS	No factor	Non-anatomical resection Unisegmentectomy: I, II, III, V, VI or VII Bisegmentectomy: II–III, III–IV, V–VI or VI–VII Left hemihepatectomy	Unisegmentectomy: IV or VIII Bisegmentectomy: IV–V, V–VIII or VII–VIII Right hemihepatectomy Left trisectionectomy	Bisegmentectomy: IV–VIII Central hepatectomy Right trisectionectomy
	One factor	Low risk score 0	Low risk score 1	Intermediate risk score 2
	Two factors	Low risk score 1	Intermediate risk score 2	High risk score 3
	Three factors	Intermediate risk score 2	High risk score 3	High risk score 4
		High risk score 3	High risk score 4	High risk score 5

BJS 2017

ΑΝΤΙΜΕΤΩΠΙΣΗ

- Συντηρητική
    1. Παροχέτευση - Αντιβίωση
    2. Wait-and-see strategy (success rate 75%)

- Επεμβατική
    1. Συριγγογραφία – MRCP - scintigraphy
    2. ERCP $\pm$ stent or ENBD
    3. PTC $\pm$ PTBD
    4. Rendezvoux technique
    5. Alcohol-ablation / Fibrin glue sealing
    6. PVE - TAE

- Χειρουργική Επανεπέμβαση

Tanaka S, et al. J Am Coll Surg 2002

Clinical Surgery-International

Bile leak after hepatectomy: Predictive factors of spontaneous healing

Drainage Output on Day 10 >100ml

Vigano L, et al. The Am J Surg 2008

Incidence and Management of Bile Leakage after Hepatic Resection for Malignant Hepatic Tumors

"Central" type bile leaks
Drainage >2 wks
Poor QoL

Tanaka S, et al. J Am Coll Surg 2002

Endoscopic management is the treatment of choice for bile leaks after liver resection

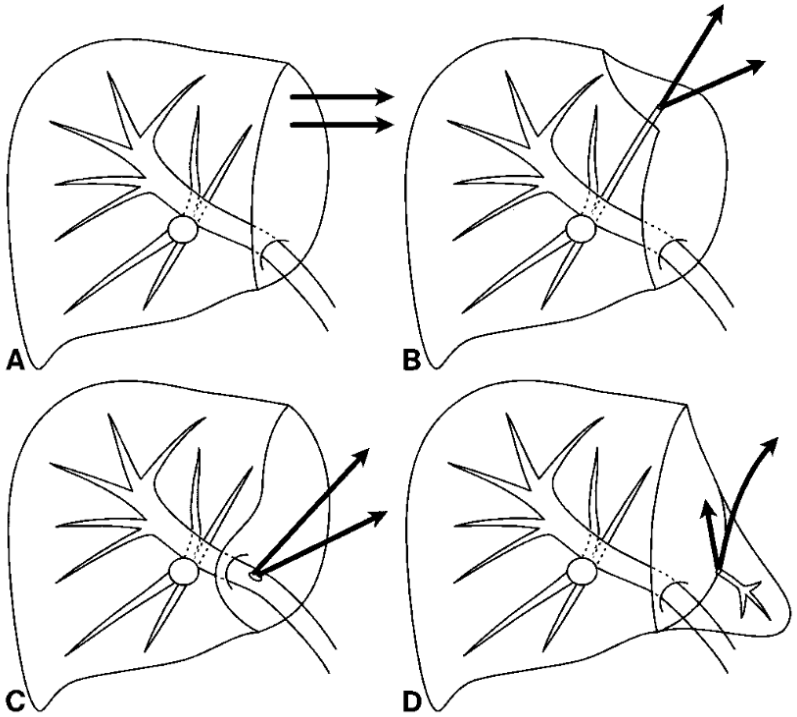
Alexander Dechêne, MD,[1] Christoph Jochum, MD,[1] Christian Fingas, MD,[1,2] Andreas Paul, MD, Prof.,[2] Dominik Heider, PhD,[3] Wing-Kin Syn, MBChB, Prof.,[4] Guido Gerken, MD, Prof.,[1] Ali Canbay, MD, Prof.,*[,1] Thomas Zöpf, MD*[,1,5]

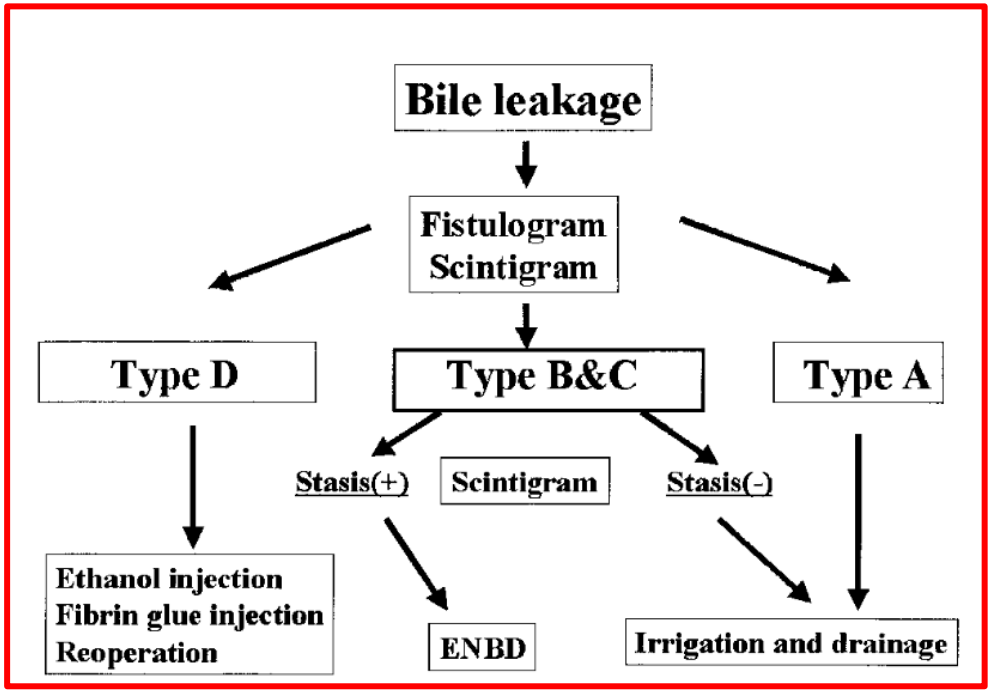
Essen, Karlsruhe, Germany; London, United Kingdom

ERCP + stent *ALWAYS!!!*
7-10 days

Gastrointest Endosc 2015

Risk Factors and Management of Bile Leakage after Hepatic Resection





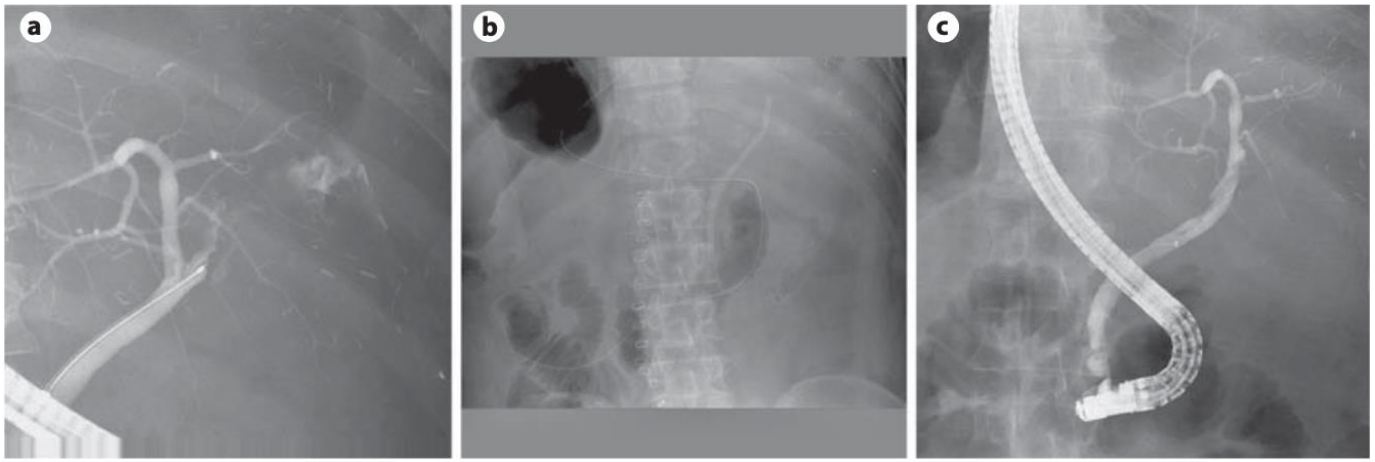
Fistulographic findings and outcome.

Presence of bile duct	No. (n = 11)	Duration of treatment after hepatectomy (days)
Negative	5	37.8
Positive	6	91.3
Proximal bile duct	5	102.6
Bile drainage (+)	2	30.0
Bile drainage (-)	3	179.2
Distal bile duct (+)	1	80.0 (Operation)

Nagano Y, et al. World J Surg 2003

Posthepatectomy Bile Leakage: How to Manage

Hoekstra L, et al. Dig Surg 2012

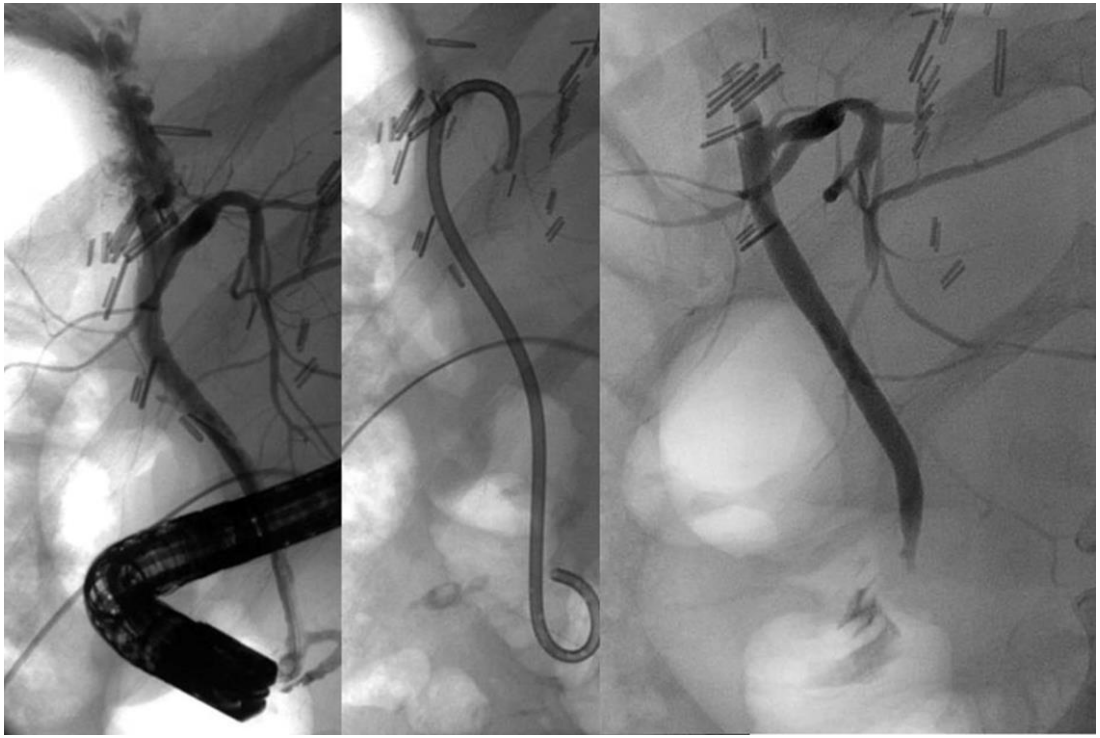


R Hepatectomy
Stent
6 wks

Treatment bile leakage	Without HJ (n = 10)	With HJ (n = 9)
Percutaneous radiological drainage	6 (60%)	9 (100%)
Endoscopic drainage	3 (30%)	0
Conservative treatment	0	0
Sutured	1 (10%)	0

Diagnosis	Initial treatment	Complication	Relaparotomy
Colorectal metastases	Percutaneous drainage	Subphrenic abscess	Drainage
Focal nodular hyperplasia	ERCP	Persistent bile leakage	HJ
Choledochal cyst	ERCP	Persistent bile leakage	Right hemihepatectomy
Traumatic laceration	Suture	Persistent bile leakage	Left hemihepatectomy

Location of a biliary leak after liver resection determines success of endoscopic treatment



”Central” type bile leaks: Success rate 70-80%

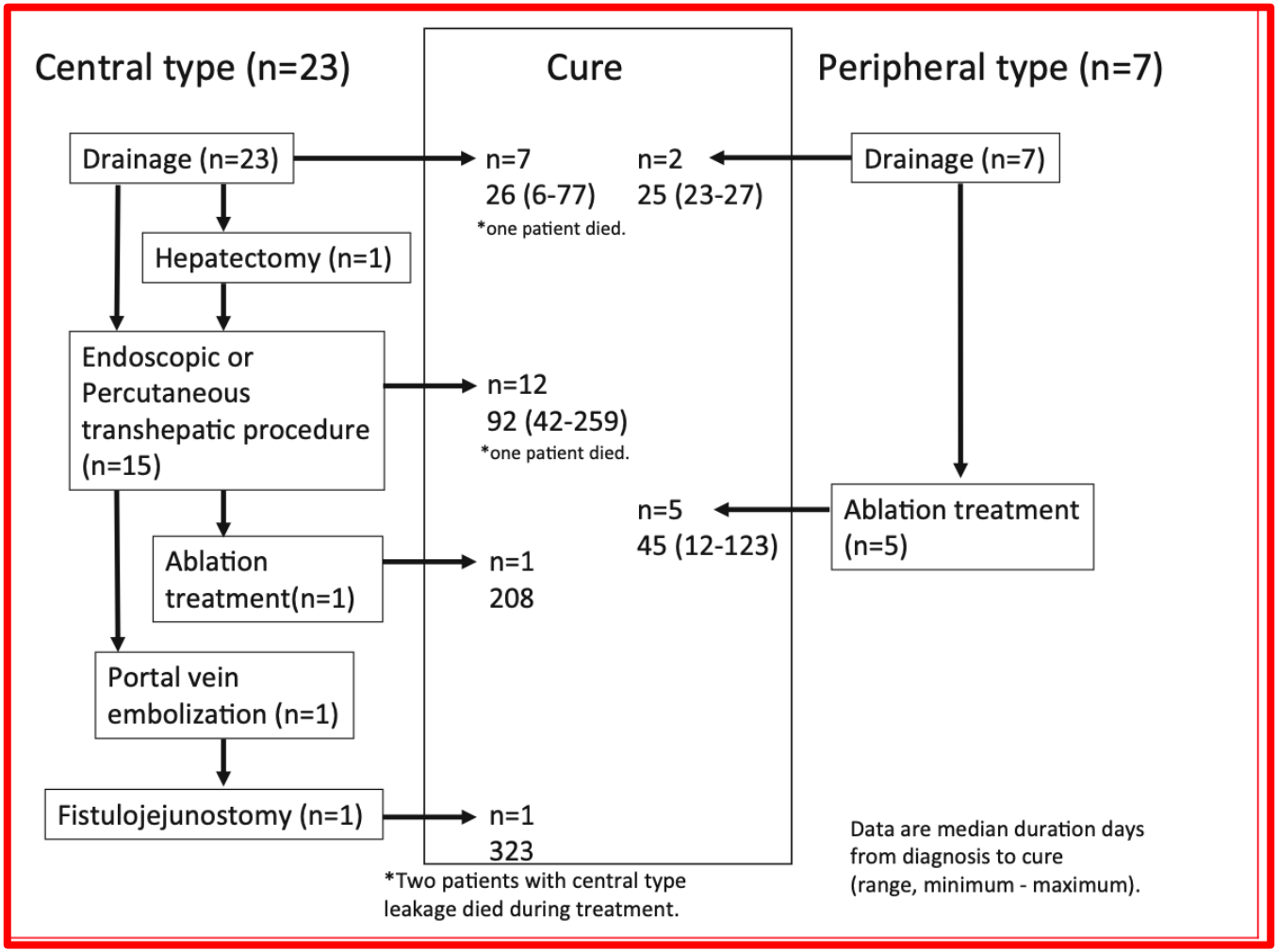
Schaible A, et al. Surg Endosc 2016

Location of a biliary leak after liver resection determines success of endoscopic treatment

”Peripheral” type bile leaks: Success rate <50%

Schaible A, et al. Surg Endosc 2016

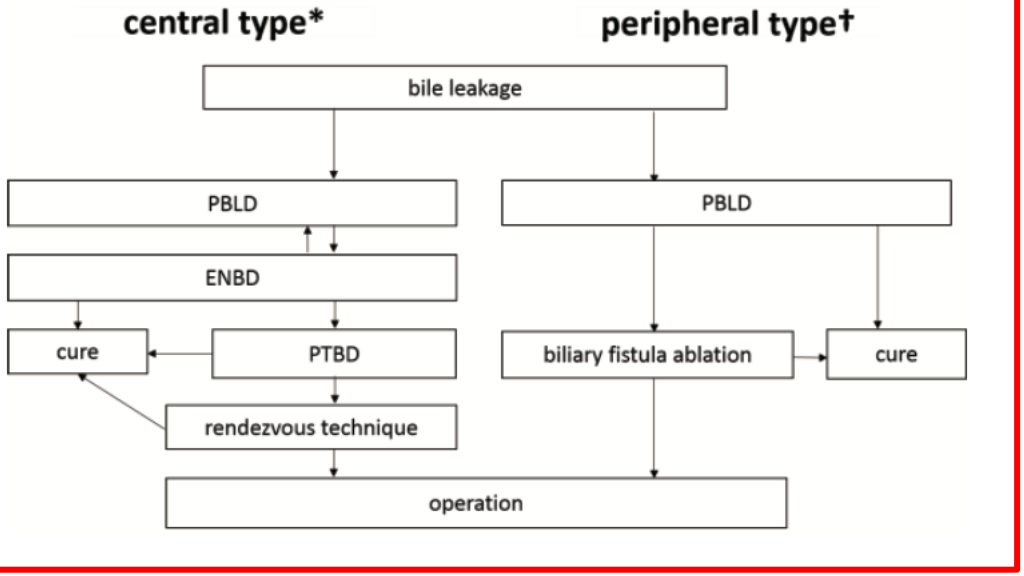
Risk Factors and Managements of Bile Leakage After Hepatectomy

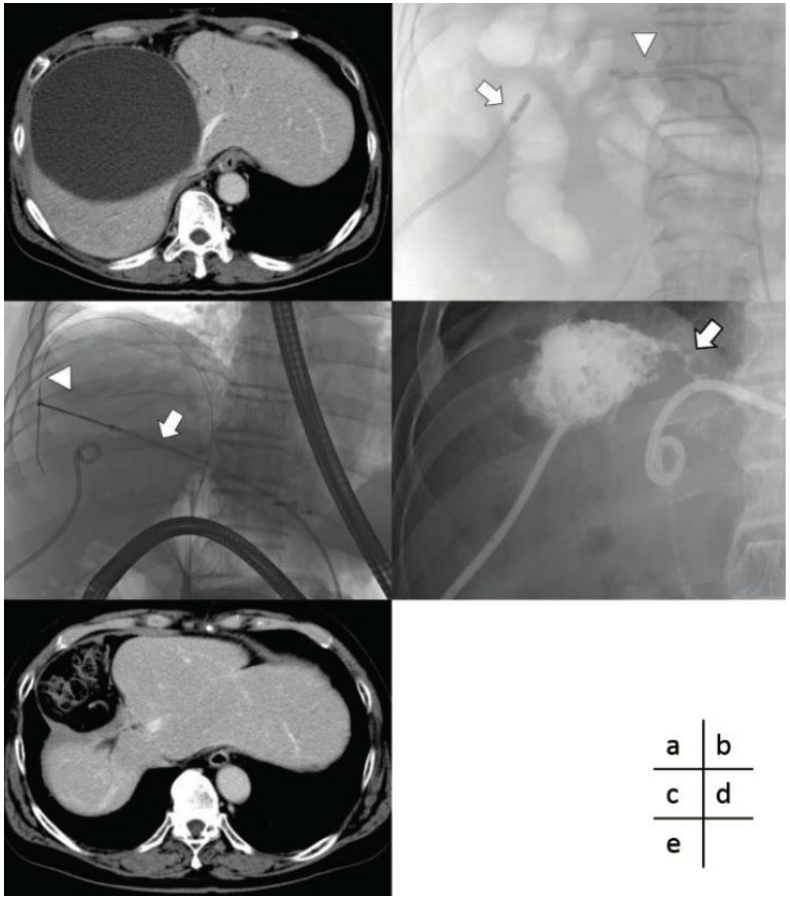


Sakamoto K, et al. World J Surg 2016

Yonago Acta Medica 2018;61:213–219 *Original Article*

Non-Surgical Management of Bile Leakage After Hepatectomy: A Single-Center Study

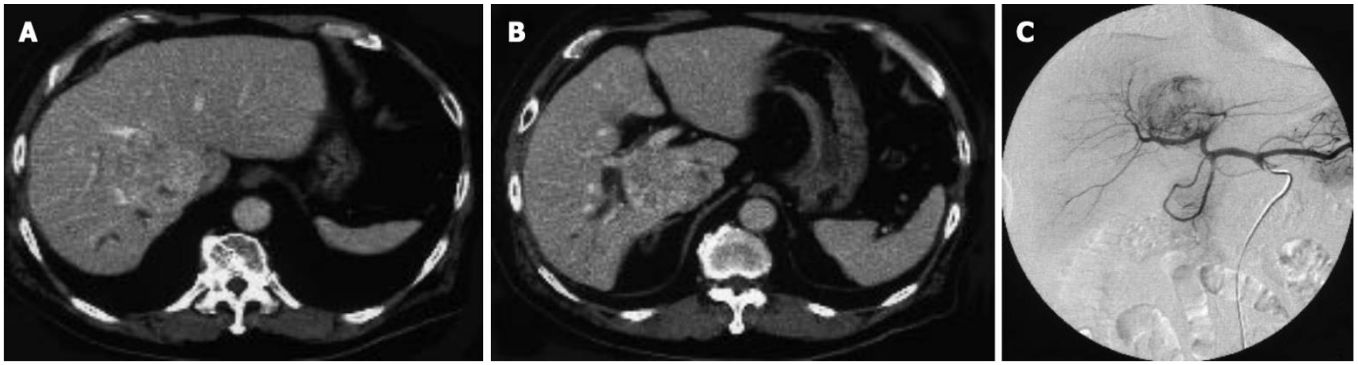




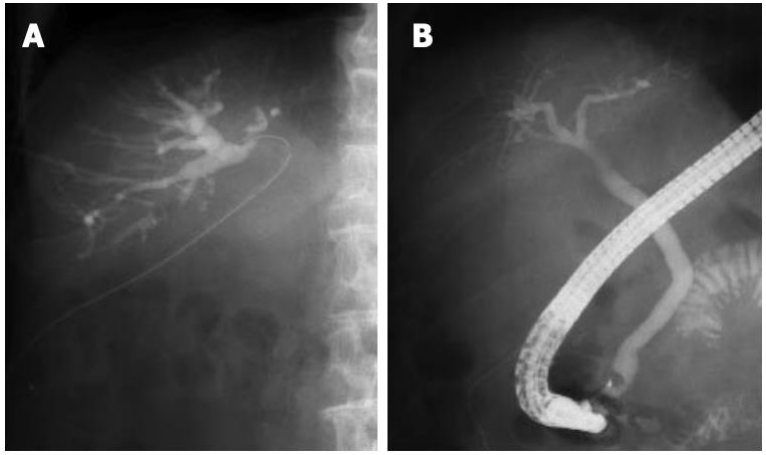
Central type: 315 days
Peripheral type: 156 days

Postoperative bile leakage managed successfully by intrahepatic biliary ablation with ethanol

HCC
6.3×5.9cm
S1, S5-S7



R Ant Bile duct

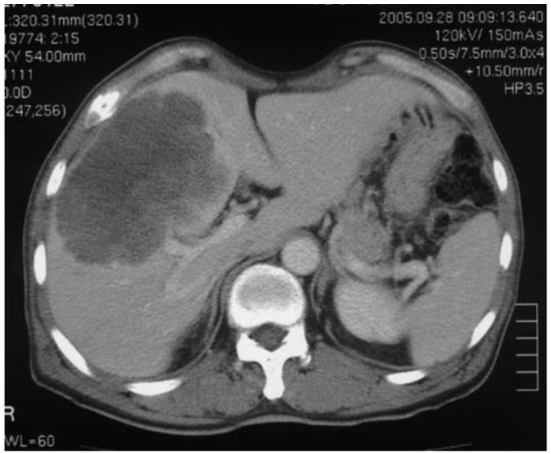


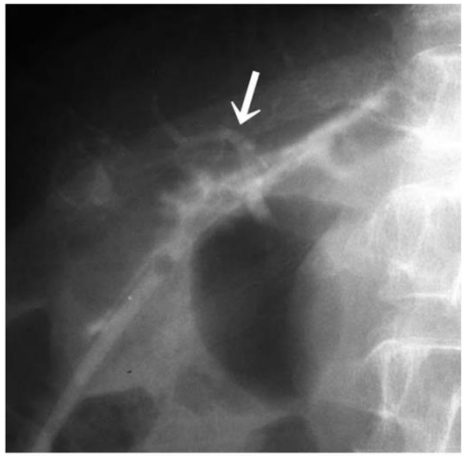
5-Fr balloon occlusion cath
4-ml pure alcohol injection 5 times/ wk
Sealing after 25 sessions / 9 months after surgery

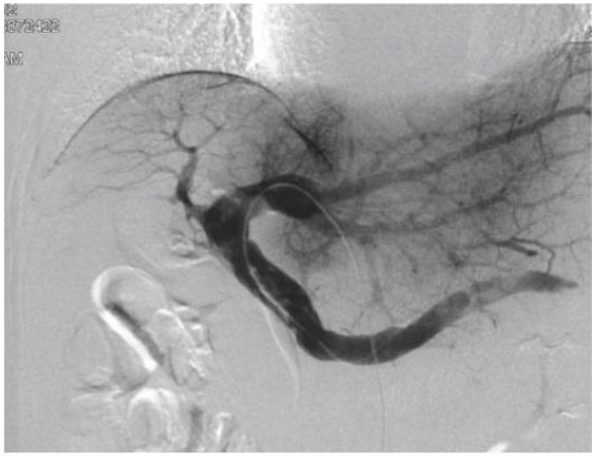
World J Gastroenterol 2008

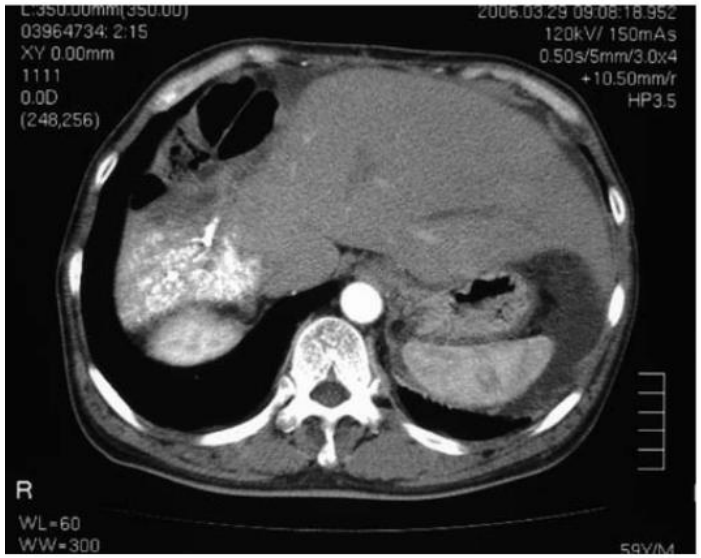
Percutaneous Transhepatic Portal Embolization for Persistent Bile Leakage After Hepatic Resection: Report of a Case

Yoshihiko Sadakari[1], Atsushi Miyoshi[1], Takao Ohtsuka[1], Naohiko Kohya[1], Tomohide Takahashi[1], Koichi Matsumoto[2], and Kohji Miyazaki[1]









Surg Today 2008

Successful treatment of isolated bile leakage after hepatectomy combination therapy with percutaneous transhepatic portal embolization and bile duct ablation with ethanol: a case report

Surg Case Reports 2018

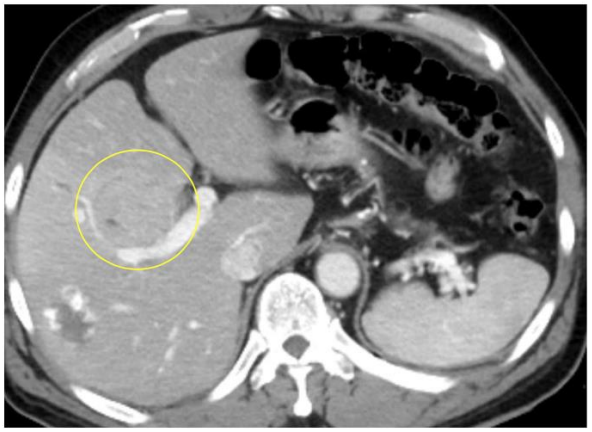
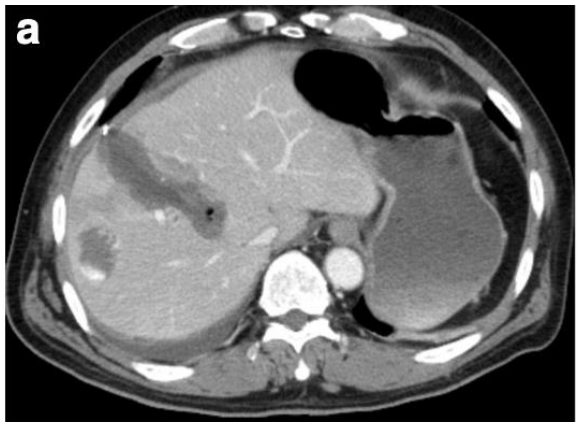
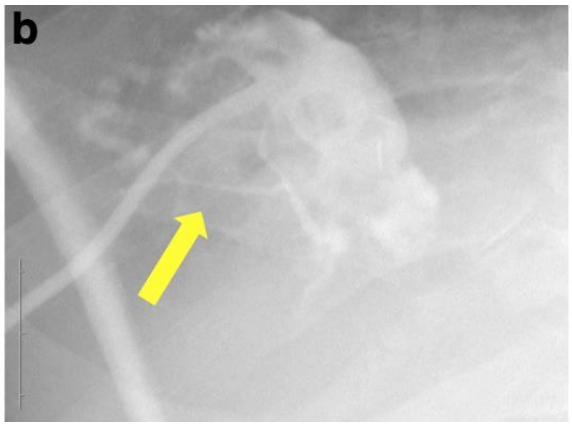
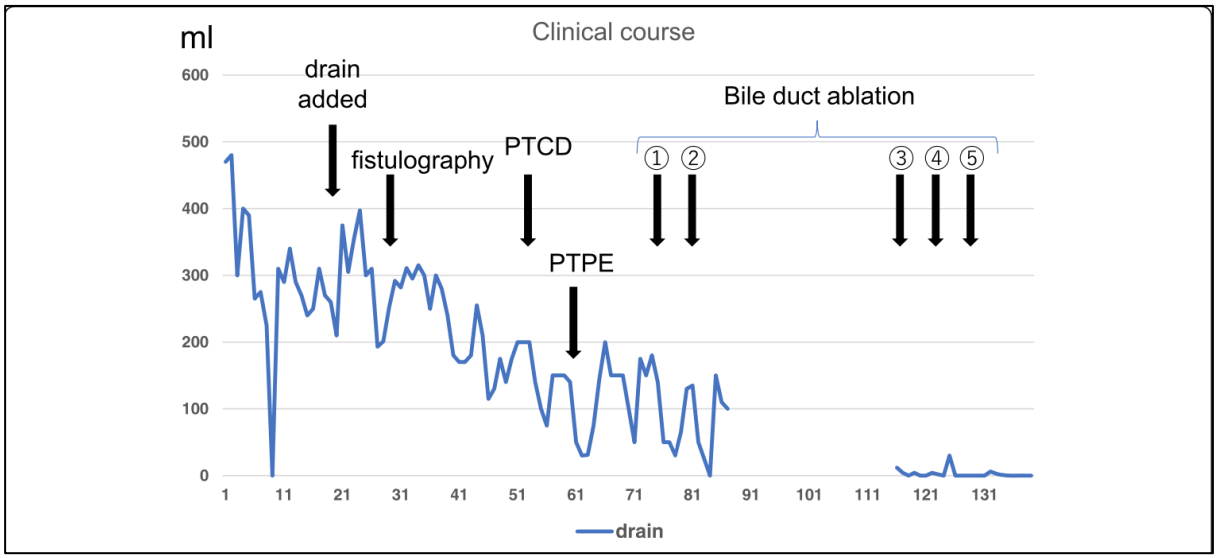


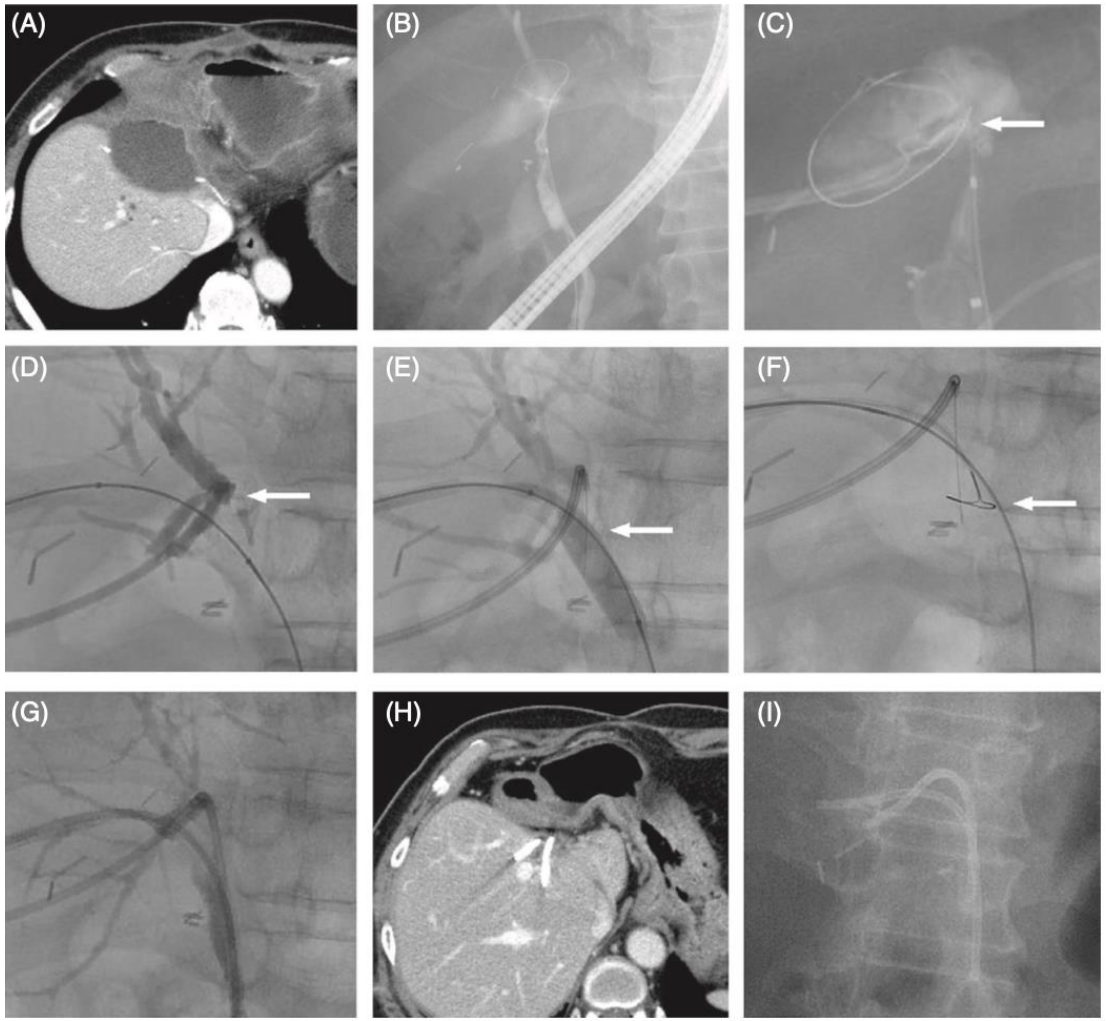
Fig. 1 Preoperative abdominal computed tomography showed a 50 × 48 mm hepatic mass that pressed the anterior Glisson







Sharp recanalization and rendezvous technique for biliary occlusions due to spacious bile leak after hepatectomy

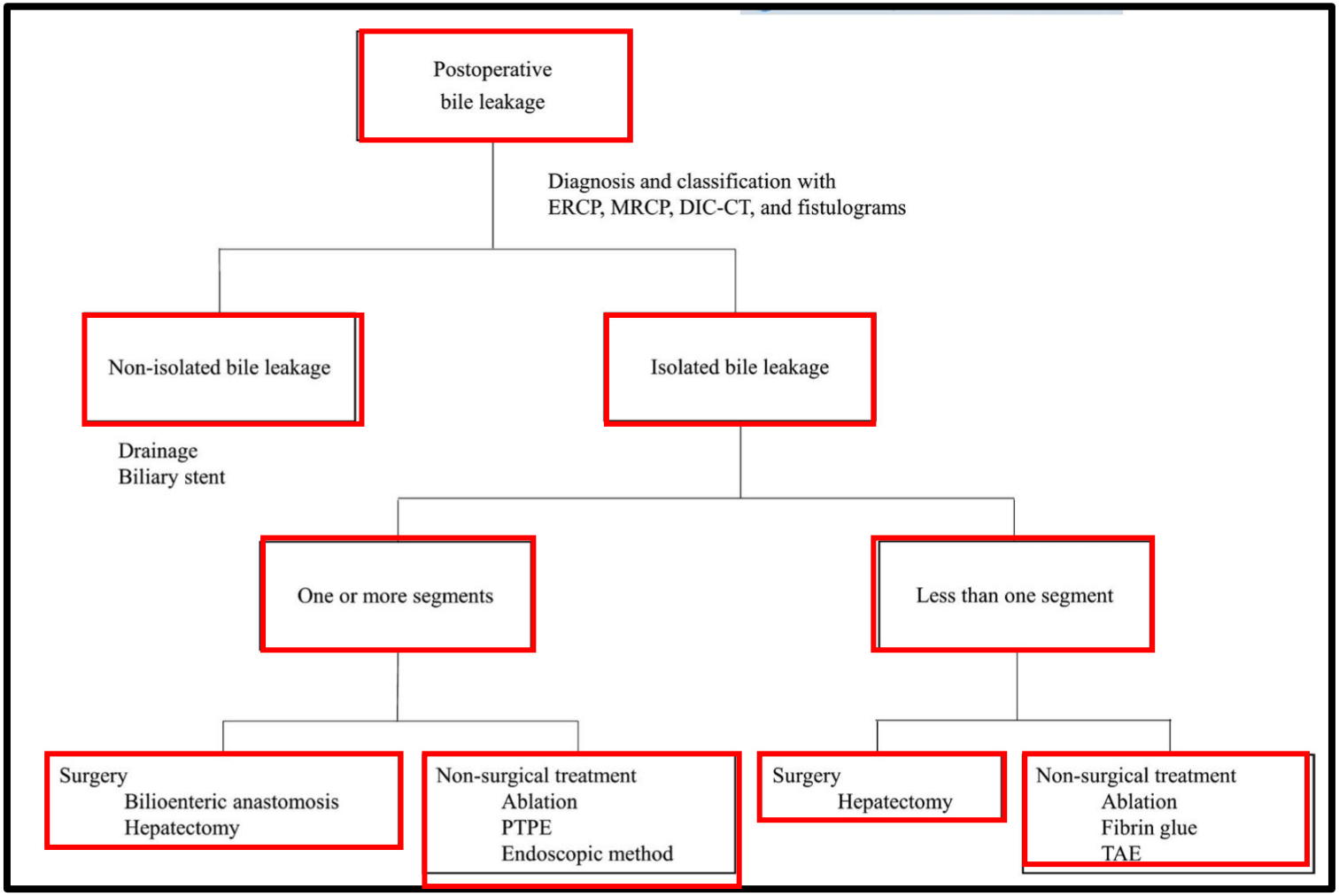


J Hepatobiliary Pancreat Sci 2022

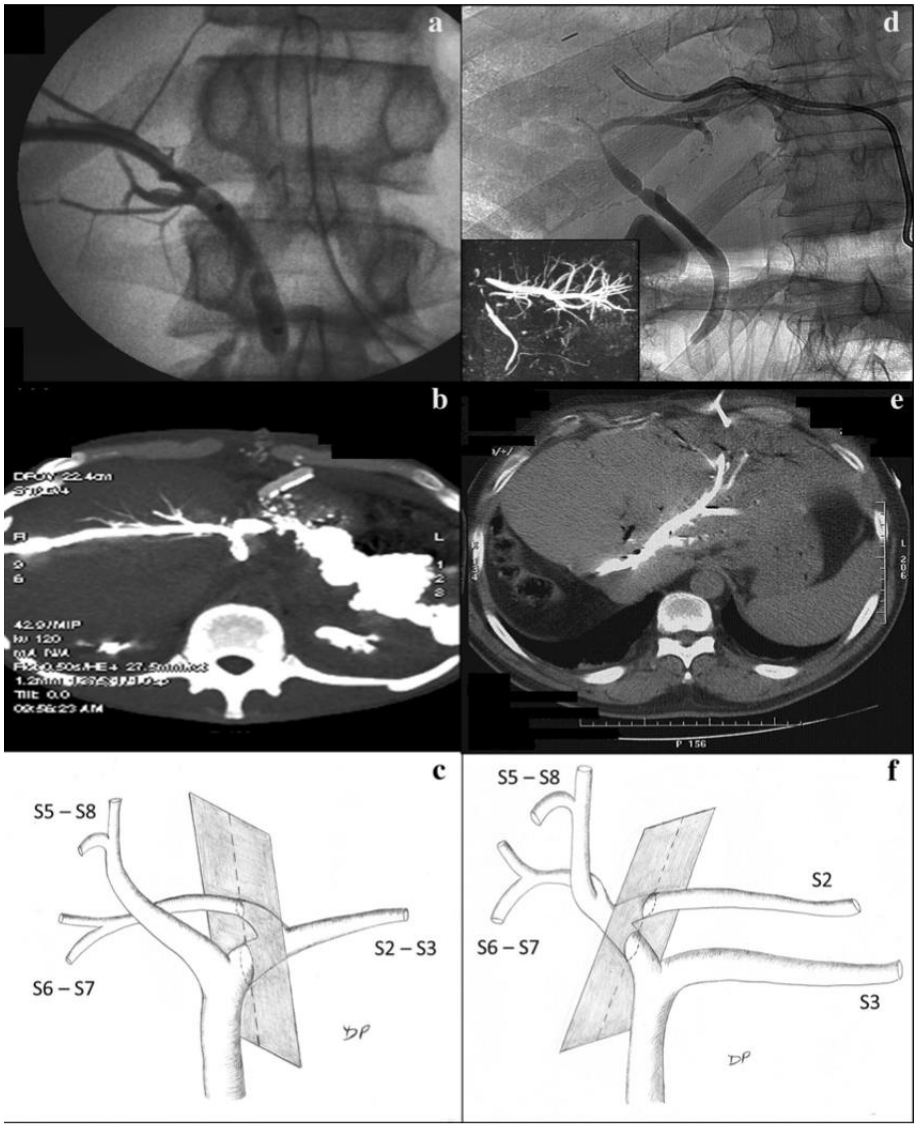
Treatment strategy for isolated bile leakage after hepatectomy: Literature review

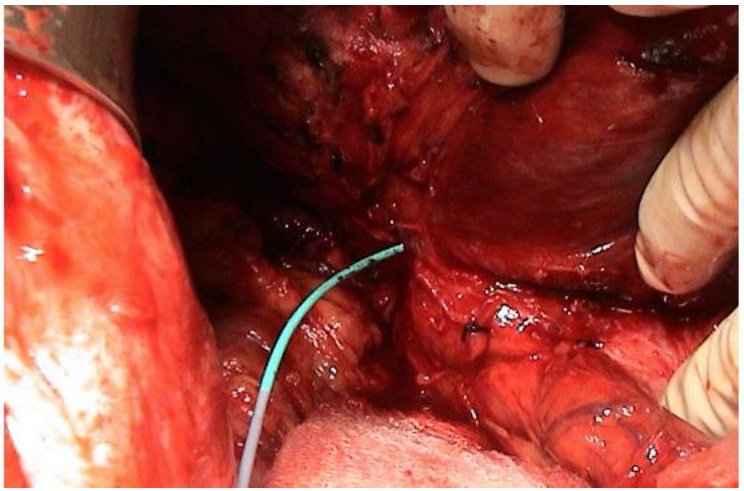
Norio Kubo | Ken Shirabe

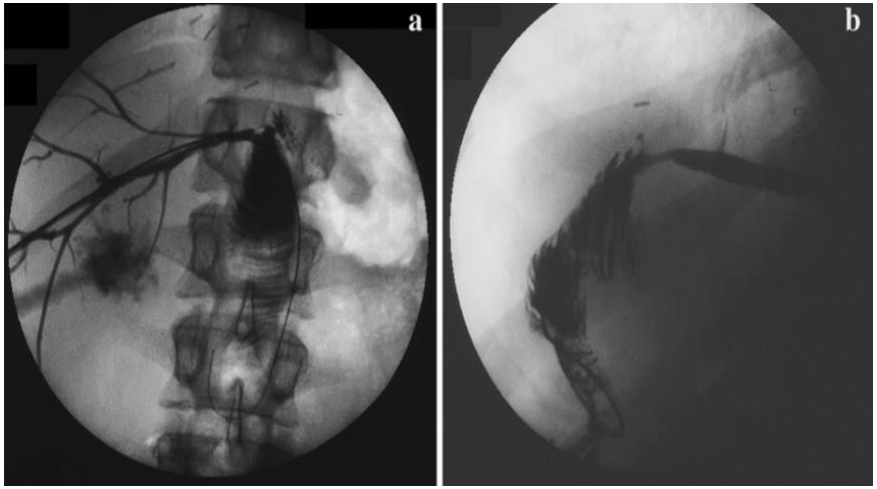
Ann Gastroenterol Surg 2020



Excluded segmental duct bile leakage: the case for bilio-enteric anastomosis

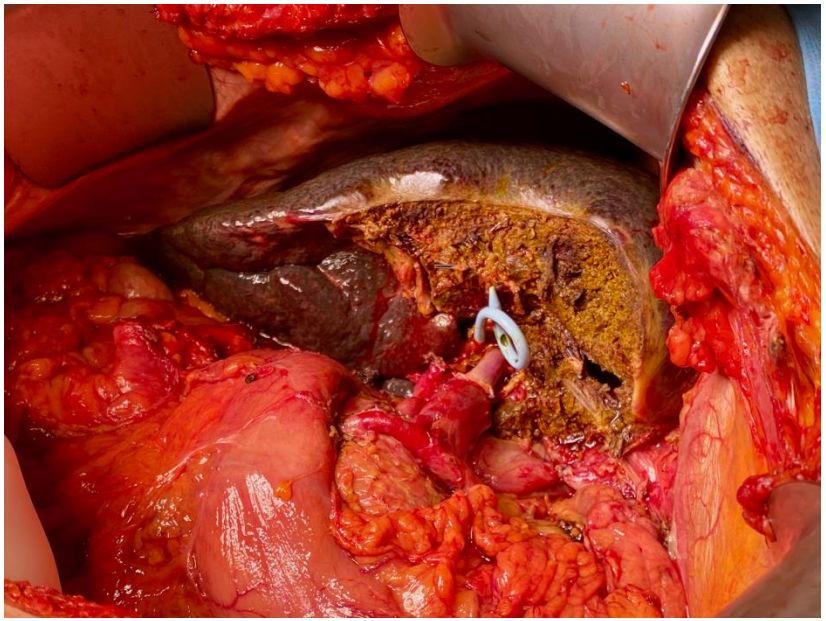


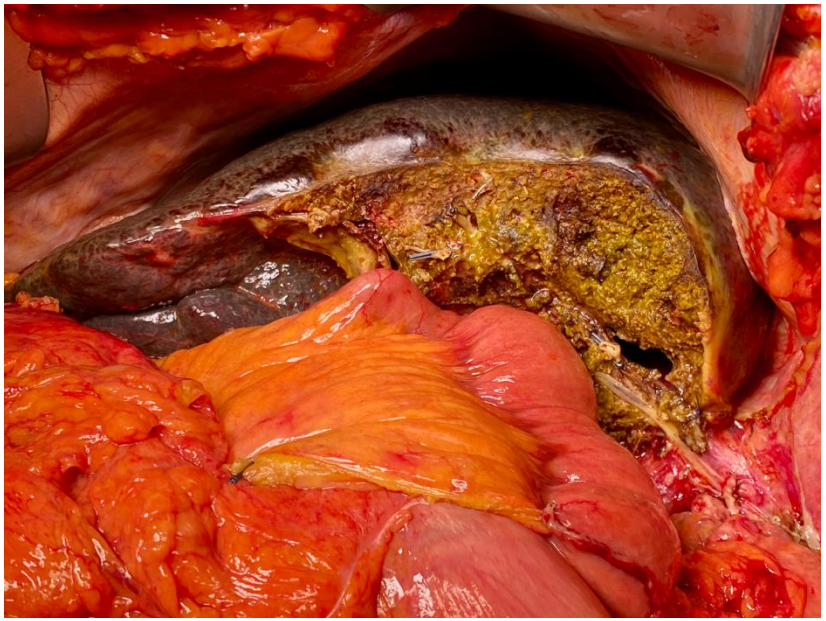




Patrono D, et al. Updates Surg 2014

Surgical Treatment of IBL





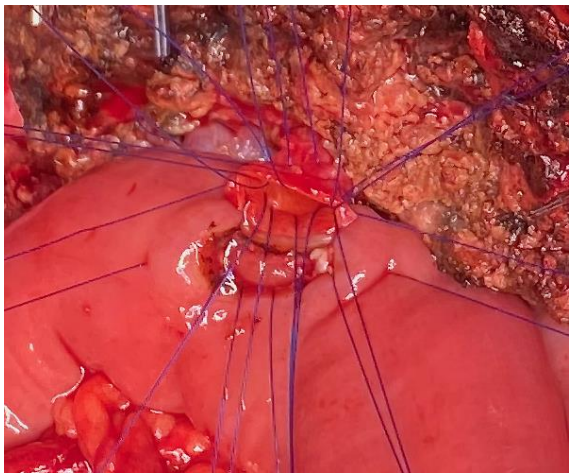
D. KORKOLIS, MD

Incidence and risk factors for anastomotic bile leakage in hepatic resection with bilioenteric reconstruction – A international multicenter study

HPB 2023

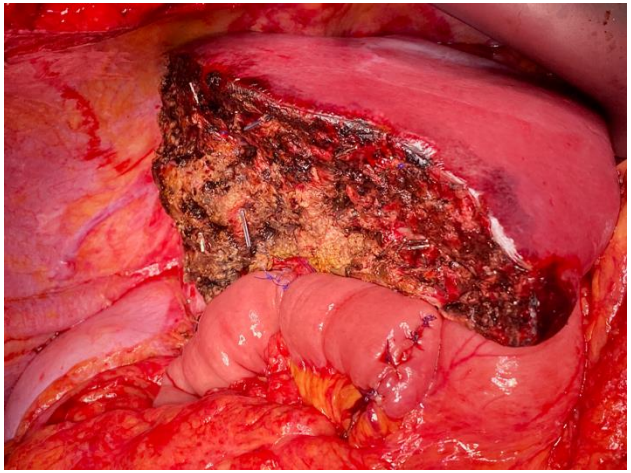
11 Academic Institutions in Europe
921 pts

AL 5.4%
30d mortality 9.6%



-Risk factors for B/C bile leak:
- Pringle
- Postop external biliary drainage
- Abdominal drainage

-Protective factors and TREATMENT
- PTC-PTBD



AL + ENBD	76.5%
AL + PTBD	17.6%
AL + PTBD + stent	5.9% (*p<.001*)

AL → liver failure, cholangitis, hemorrhage, sepsis

D. KORKOLIS, MD

Incidence and risk factors for anastomotic bile leakage in hepatic resection with bilioenteric reconstruction - A international multicenter study

D. KORKOLIS, MD

ΣΥΜΠΕΡΑΣΜΑ

- Η χολόρροια μετά ηπατεκτομή παραμένει συχνή επιπλοκή
- Σήψη, ηπατική ανεπάρκεια, θνητότης
- Προγνωστικά μοντέλα
- Πρόληψη
- Αυτόματη επούλωση
- Συντηρητική αντιμετώπιση: Πρώτη Επιλογή!!!
- Ενδοσκοπική Παροχέτευση
- Διαδερμική Διηπατική προσέγγιση
- Έγχυση αλκοόλης – Fibrin sealant – PVE
- Χειρουργική επέμβαση