



The dark side of the guidelines

1st Interventional Radiologist under 40 Meeting

Emergencies in Interventional Radiology



21-23 Novembre 2016

Bologna

Società Medica Chirurgica - Palazzo dell'Archiginnasio

Trattamento delle complicanze post-LT

Marco Calandri, Andrea Doriguzzi Breatta



UNIVERSITÀ DEGLI STUDI DI TORINO
Scuola di Medicina
Dipartimento di Scienze Chirurgiche



A.O.U Città della Salute e della Scienza di Torino
Dipartimento di Diagnostica per Immagini e Radioterapia
Radiologia 1 Universitaria



UNIVERSITA' DEGLI STUDI DI TORINO
Dipartimento di Scienze Chirurgiche



Vascolari

Arteriose

Precoci

Emorragiche

Stenotiche

Venose

Tardive

Trombotiche

Aneurismatiche



Biliari

Fistole

Precoci

Intraepatiche

Stenosi

Tardive

Extraepatiche

**Problema eterogeneo a bassa
incidenza in termini assoluti!**

1090 Trapianti nel 2015 in Italia in 21 Centri

Fonte: Ministero della Salute, Registro Nazionale Trapianti, 20.01.2016





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- le indicazioni alle procedure secondo linee guida e raccomandazioni internazionali basate sulle evidenze più forti della letteratura
- i protocolli esecutivi consolidati e pubblicati
- i risultati delle metodiche supportati dai più recenti dati di letteratura.



“Penso che ci sia un 40% di probabilità di pioggia e un 10% di probabilità di sapere quello che stiamo dicendo”



Non esistono linee guida delle società di Radiologia interventistica americana ed europea

Top Screenshot: Search results for 'interventional radiology guidelines liver transplantation'

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transplantation liver complication interventional radiology



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The role of endoscopy in biliary complications after liver transplantation

Topic Outline

[SUMMARY & RECOMMENDATIONS](#)

[INTRODUCTION](#)

[TYPES OF COMPLICATIONS](#)

[RISK FACTORS](#)

[DIAGNOSTIC APPROACH](#)

The role of endoscopy in biliary complications after liver transplantation

Authors: [Andrés Cárdenas, MD, MMSc, AGAF](#), [Karen L Krok, MD](#), [Paul J Thuluvath, MBBS, MD, FRCP](#)

Section Editor: [Douglas A Howell, MD, FASGE, FACP](#)

Deputy Editor: [Anne C Travis, MD, MSc, FACP, AGAF](#)

[Contributor Disclosures](#)

All topics are updated as new evidence becomes available and our [peer review process](#) is complete.

~~Literature review current through:~~ Oct 2016. ~~This topic last updated:~~ Apr 21, 2016

The role of endoscopy in biliary complications after liver transplantation

Authors: [Andrés Cárdenas, MD, MMSc, AGAF](#), [Karen L Krok, MD](#), [Paul J Thuluvath, MBBS, MD, FRCP](#)

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Long-Term Management of the Successful Adult Liver Transplant: **2012** Practice Guideline by AASLD and the American Society of Transplantation

Clinical Practice Guidelines

EASL JOURNAL OF HEPATOLOGY

EASL Clinical Practice Guidelines: Liver transplantation*

European Association for the Study of the Liver*

2015

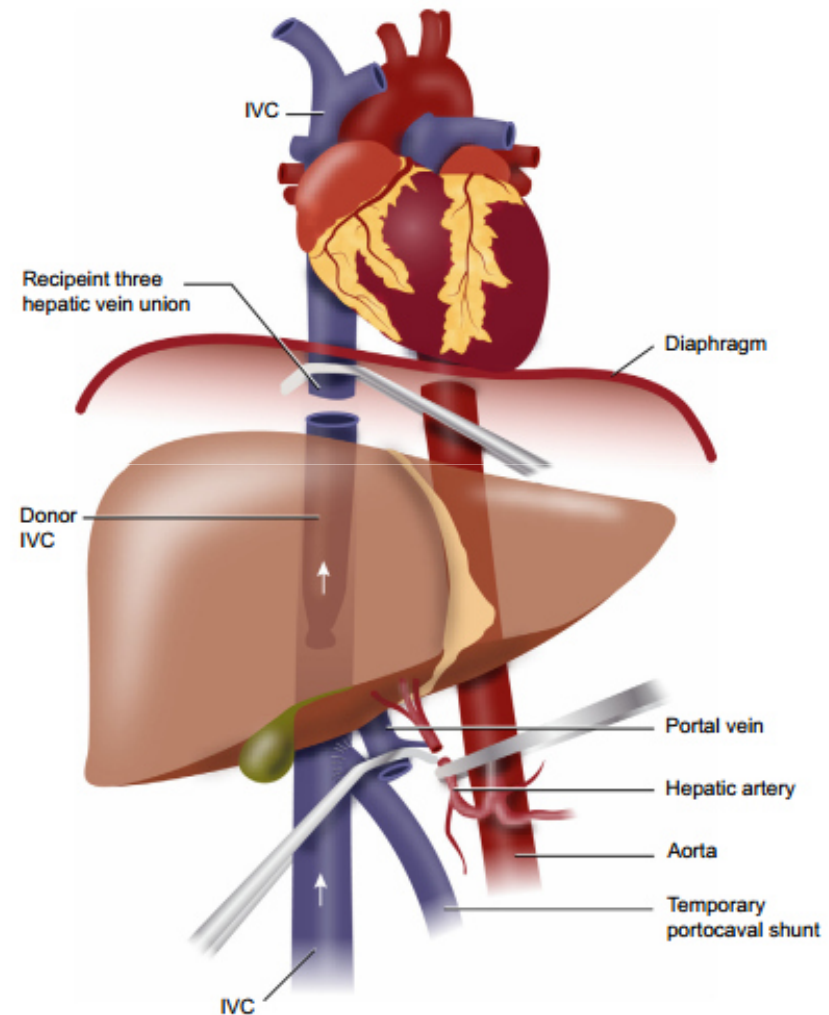


A.I.S.F.
ASSOCIAZIONE ITALIANA PER LO STUDIO DEL FEGATO

2008

IL TRAPIANTO DI FEGATO

Raccomandazioni dell'Associazione Italiana per lo Studio del Fegato





Delle 93 raccomandazioni specifiche solo 2 riguardano e citano (timidamente) la radiologia (interventistica)

RECOMMENDATION 4

Bilomas and biliary cast syndrome should be managed in a center with expertise in LT medicine, radiology, and biliary endoscopy (grade 1, level A).

RATIONALE 4

Biliary cast syndrome refers to a severe form of intrahepatic bile duct ischemic injury unique to post-LT patients,⁸ and it is associated with hepatic artery thrombosis and the use of a split liver, including partial grafts derived from living donors and, more commonly, from donation after cardiac death donors. Biliary cast syndrome may resolve with repeated clearance of bile duct debris either percutaneously or endoscopically.

VASCULAR THROMBOSIS

Hepatic artery thrombosis (HAT) or stenosis may present clinically after 3 months, as:

- intrahepatic non-anastomotic strictures and/or sterile or infected fluid collections within the liver, sometimes referred to as bilomas,
- ischemic cholangiopathy or
- biliary cast syndrome.

The combination of hepatic artery thrombosis and biliary complications usually requires retransplantation.⁹

RECOMMENDATIONS:

4. **Bilomas and biliary cast syndrome should be managed in a center with expertise in LT medicine, radiology, and biliary endoscopy (grade 1, level A).**
5. **Hepatic artery thrombosis or stenosis is most readily assessed initially by Doppler ultrasound, but angiography is usually required to confirm the diagnosis and plan therapy (grade 1, level B).**

Grade evidence	
I	Randomized, controlled trials
II-1	Controlled trials without randomization
II-2	Cohort or case-control analytic studies
II-3	Multiple time series, dramatic uncontrolled experiments
III	Opinions of respected authorities, descriptive epidemiology

greater hemodynamic stability during surgery (**Grade II-3**)

- The domino transplant can be used for patients with familial amyloid polyneuropathy, as long as recipients are older than 55 years in order to reduce the risk of developing the disease (**Grade II-3**)
- Auxiliary transplantation may be indicated in patients with acute liver failure or functional, congenital or metabolic disorders affecting a normal liver. The advantage of this type of transplantation would be the possibility of removing the graft and withdrawing the immunosuppression once the native liver returns to its normal function (**Grade II-3**)
- Because of the low number of available organs in paediatric LT, the use of split LT is an acceptable option, as long as the liver graft volume is sufficient. In this case the child receives a graft that includes segments II and III (**Grade II-2**)
- In adult LT, the use of the split LT may be an alternative giving the organ shortage, but the left liver graft recipients must have a low weight. The use of the left lobe of the graft is associated with worse outcomes (**Grade II-2**)
- Giving the organ shortage, adult LDLT is recommended in the case in which there is an available donor, as long as the estimated volume of the graft is at least 0.8% of the weight of the recipient (**Grade III**)

y piggy-
whenever it
ociated with

- It is necessary to prevent hepatic artery thrombosis during LT and post-operative period. The occurrence of this complication requires retransplantation in 50% of cases (**Grade III**)
- Portal vein thrombosis prior to LT usually does not represent an absolute contraindication. In cases of extensive thrombosis a non-anatomical portal revascularization technique such as a renoportal anastomosis can be performed (**Grade II-3**)
- If a biliary anastomosis leakage in the post-transplantation period is diagnosed, initial ERCP with sphincterotomy is recommended. If the leakage persists, a temporary biliary stent can be used (**Grade II-3**)
- In patients with impaired coagulation, a temporary packing of 48 hours may be necessary (**Grade III**)
- In advanced cases of ischaemic cholangiopathy, the final treatment is retransplantation (**Grade II-3**)
- In cases of stenosis of the biliary anastomosis without improvement after conservative treatment, it is recommended to perform a hepatico-jejunostomy (**Grade II-3**)
- In partial grafts recipients with bile duct anastomosis stenosis or leakage, interventional radiology plays an important role (dilatation, stent insertion), but 50% of patients eventually require a hepatico-jejunostomy (**Grade III**)

Clinical Practice Guidelines

 **EASL** | JOURNAL OF HEPATOLOGY

EASL Clinical Practice Guidelines: Liver transplantation[☆]

European Association for the Study of the Liver*

In partial grafts recipients with bile duct anastomosis stenosis or leakage, interventional radiology plays an important role (dilatation, stent insertion), but 50% of patients eventually require a hepatico-jejunostomy (**Grade III**)

Opinion of respected authorities, descriptive epidemiology

“Negli split liver con stenosi o fistole biliari, la radiologia interventistica gioca un ruolo importante ma il 50% dei pazienti possono non richiedere un riconfezionamento dell'anastomosi epatico-digiunale”

In advanced cases of ischaemic cholangiopathy, the final treatment is retransplantation (**Grade II-3**)

“Nei casi di colangiopatia ischemica il trattamento finale è il trapianto”



Ma prima? Gestione percutanea della biliary cast syndrome?

It is necessary to prevent hepatic artery thrombosis during LT and post-operative period. The occurrence of this complication requires retransplantation in 50% of cases (**Grade III**)

E' necessario prevenire la trombosi dell'arteria epatica durante il trapianto e il periodo post-operatorio. L'occorrenza di questa complicanza richiede il ritrapianto nel 50% dei casi

If a biliary anastomosis leakage in the post-transplantation period is diagnosed, initial ERCP with sphincterotomy is recommended. If the leakage persists, a temporary biliary stent can be used (**Grade II-3**)

Se viene diagnosticata una fistola biliare perianastomotica nel postoperatorio, un ERCP iniziale con sfinterotomia è consigliato. Se la fistola persiste uno stent biliare temporaneo può essere usato.



Trattamento
endovascolare?



Trattamento
Percutaneo
transepatico?

splenectomia, nell'età pediatrica e nel portatore di disordini trombofilici. **L'approccio terapeutico raccomandato non si discosta da quello delle complicanze arteriose con la possibilità di trattamento interventistico (trombolisi, angioplastica con o senza posizionamento di stent) ovvero chirurgico (trombectomia o riconfezionamento dell'anastomosi), ma anche in questo caso la progressione verso l'insufficienza epatica potrà richiedere il trapianto (D).**

La terapia può essere interventistica, endoscopica o percutanea, oppure chirurgica. La tendenza attuale è quella di un approccio iniziale non chirurgico. Nel trattamento della stenosi biliare (anastomosi duct-to-duct), l'intervento di tipo endoscopico con posizionamento reiterato di un numero crescente di endostent da mantenere in sede per un tempo sufficiente a consolidare l'allargamento raggiunto è molto efficace. L'intervento chirurgico correttivo viene oggi richiesto da un quinto dei pazienti, ma rimane l'unica reale opzione di fronte ad una stenosi dell'anastomosi bilio-digestiva (86, 87, 88, 89, 90) (IV).

3 di 273 pagine



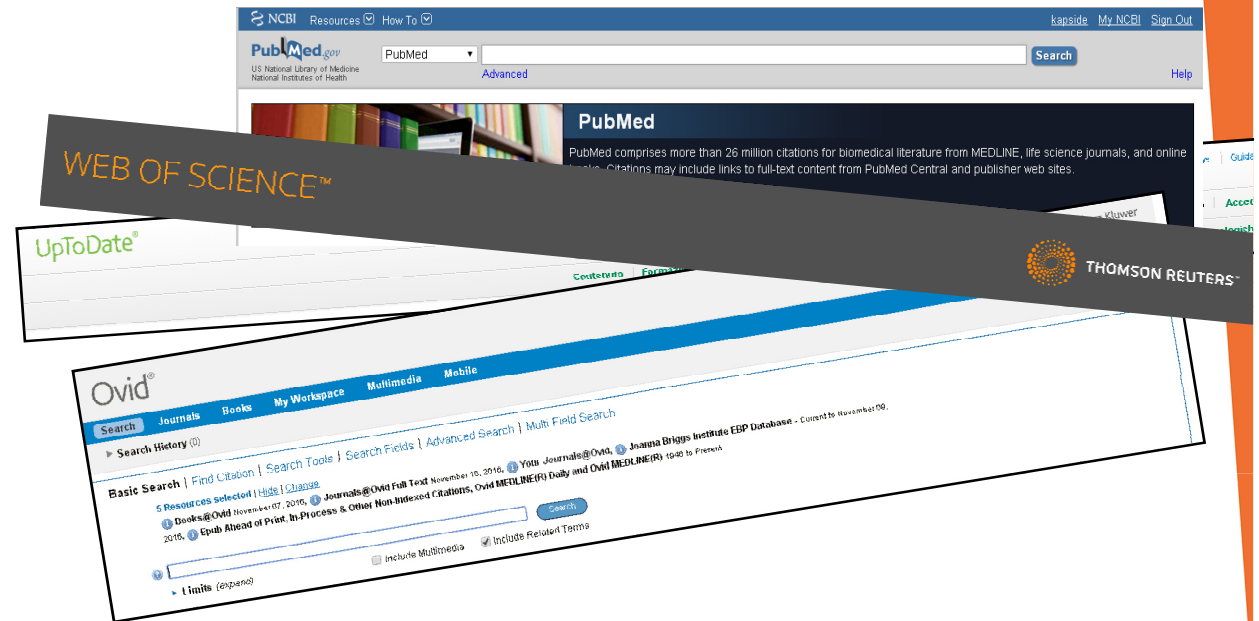
- Le linee guida non citano quasi mai la radiologia interventistica
- Chiamano genericamente con “conservativo” entrambi i trattamenti endoscopico e percutaneo
- Se si sbilanciano si sbilanciano a favore del trattamento endoscopico
- La radiologia è una sorta di convitato di pietra...



➤ I protocolli esecutivi consolidati e pubblicati e i risultati delle metodiche

Banche dati utilizzate

- PubMed
- ISI-Thomson Reuters
- Ovid
- UpToDate
- Google Scholar



Livelli di evidenza e gradi di raccomandazione con GRADE

Algoritmi terapeutici del Centro Trapianti Fegato E.Curtoni- Città della Salute e della Scienza - Torino

complicanze vascolari

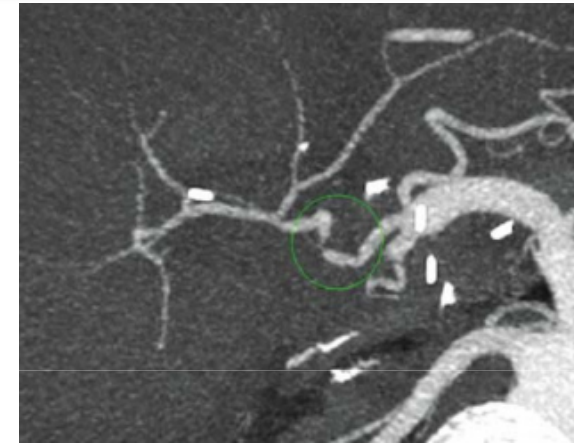
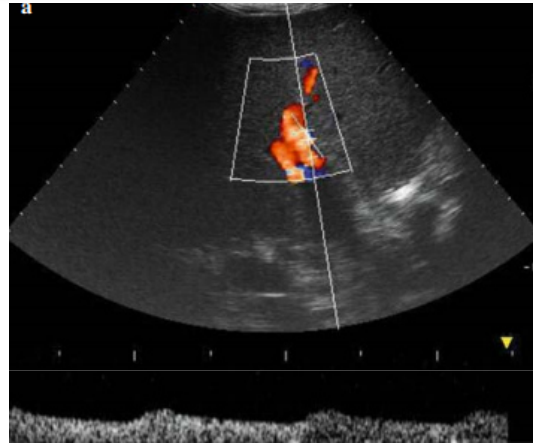
- Arteriose: 4,8-16,6%
- Portali: 1,2-12,3%
- Cavali: 0,8-1,2%

Precoci: sotto i 30 giorni

Tardive: oltre i 30 giorni

Stenosi anastomotiche
Trombosi

Pseudoaneurismi



Principale causa di perdita del graft (fattori emodinamici, immunologici ed infettivi ma prevalentemente di ordine tecnico)

[Transplant Proc.](#) 2016 May;48(4):1142-8. doi: 10.1016/j.transproceed.2015.12.092.

Technical Feasibility and Clinical Outcomes of Interventional Endovascular Treatment for Hepatic Artery Thrombosis After Living-donor Liver Transplantation.

[Murata Y¹](#), [Mizuno S²](#), [Kato H¹](#), [Tanemura A¹](#), [Kuriyama N¹](#), [Azumi Y¹](#), [Kishiwada M¹](#), [Usui M¹](#), [Sakurai H¹](#), [Fujimori M²](#), [Yamanaka T³](#), [Nakatsuka A³](#), [Yamakado K⁴](#), [Isaji S¹](#).

[Clin Transplant.](#) 2014 Dec;28(12):1305-12. doi: 10.1111/ctr.12431. Epub 2014 Aug 22.

Surgical and endovascular treatment of hepatic arterial complications following liver transplant.

[Chen J¹](#), [Weinstein J](#), [Black S](#), [Spain J](#), [Brady PS](#), [Dowell JD](#).

[Transpl Int.](#) 2010 Mar 1;23(3):245-56. doi: 10.1111/j.1432-2277.2009.01037.x. Epub 2009 Dec 22.

Endovascular treatment of hepatic artery thrombosis following liver transplantation.

[Singhal A¹](#), [Stokes K](#), [Sebastian A](#), [Wright HI](#), [Kohli V](#).

Author (year)	n	Timing from transplant	Management (n)	Immediate technical success	Required reintervention, retransplantation or revascularization
Frangillo (2013) (15)	10	10 m/1–24 m	PTA + Stent (10)	100%	Not reported
Hamby (2013) (33)	23	92.5 d/12–236 d	PTA (10), Stent (13)	97.1%	43.5%
Pérez-Saborido (2011) (5)	3	Not reported	Surgical treatment (3)	100%	0%
Laštovicková (2010) (34)	19	2.7 m/3 d–6 m	PTA + Stent (15), PTA (4)	100%	15.8%
Maruzzelli (2010) (35)	24	15.8 m/5–58 m	PTA (13), Stent (11)	96%	29.2%
da Silva (2008) (20)	8	14.2 m/9–68 m	Stent (6), PTA (2)	88.9%	50%
Huang (2006) (36)	14	3–225 d	Stent (14)	85.7%	7.1%
Abbasoglu (1997) (18)	41	100/1–1220 d	Reanastomosis (17), aortohepatic iliac artery graft (11), interposition vein graft (4), vein patch angioplasty (2), interposition artery graft (1), PTA (6)	78% in total, 100% in PTA	17.9%

d, days; m, months; PTA, percutaneous transluminal angioplasty.

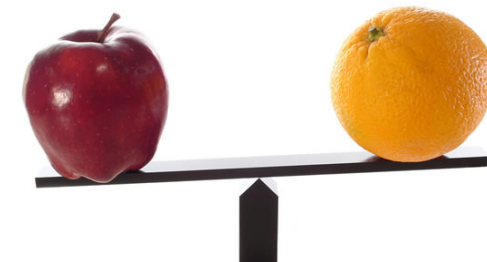
[Clin Transplant](#). 2014 Dec;28(12):1305–12. doi: 10.1111/ctr.12431. Epub 2014 Aug 22.

Surgical and endovascular treatment of hepatic arterial complications following liver transplant.

Chen J¹, Weinstein J, Black S, Spain J, Brady PS, Dowell JD.

Revisione chirurgica: Pervietà post intervento del 78%, sopravvivenza del paziente 65%, graft 56% a 4 anni.

**Trattamento endovascolare: pervietà 92-70% a 1 mese
85-60% a 3 mesi
72-53% a 1 anno**



Conclusions. MDCTA and accurate postprocessing enable confident depiction of the arterial anatomy and detection of stenosis after OLT. PTA is safe and allows allograft saving, at least until another suitable donor becomes available.

2004

[Transplant Proc.](#), 2004 Nov;36(9):2771-3.

Diagnosis and treatment of hepatic artery stenosis after orthotopic liver transplantation.

[Vignali C](#)¹, [Bargellini J](#), [Cioni R](#), [Petruzzi P](#), [Cicorelli A](#), [Lazzereschi M](#), [Urbani L](#), [Filipponi F](#), [Bartolozzi C](#).



2014

[Clin Transplant](#), 2014 Sep;28(9):1025-30. doi: 10.1111/ctr.12412. Epub 2014 Jul 16.

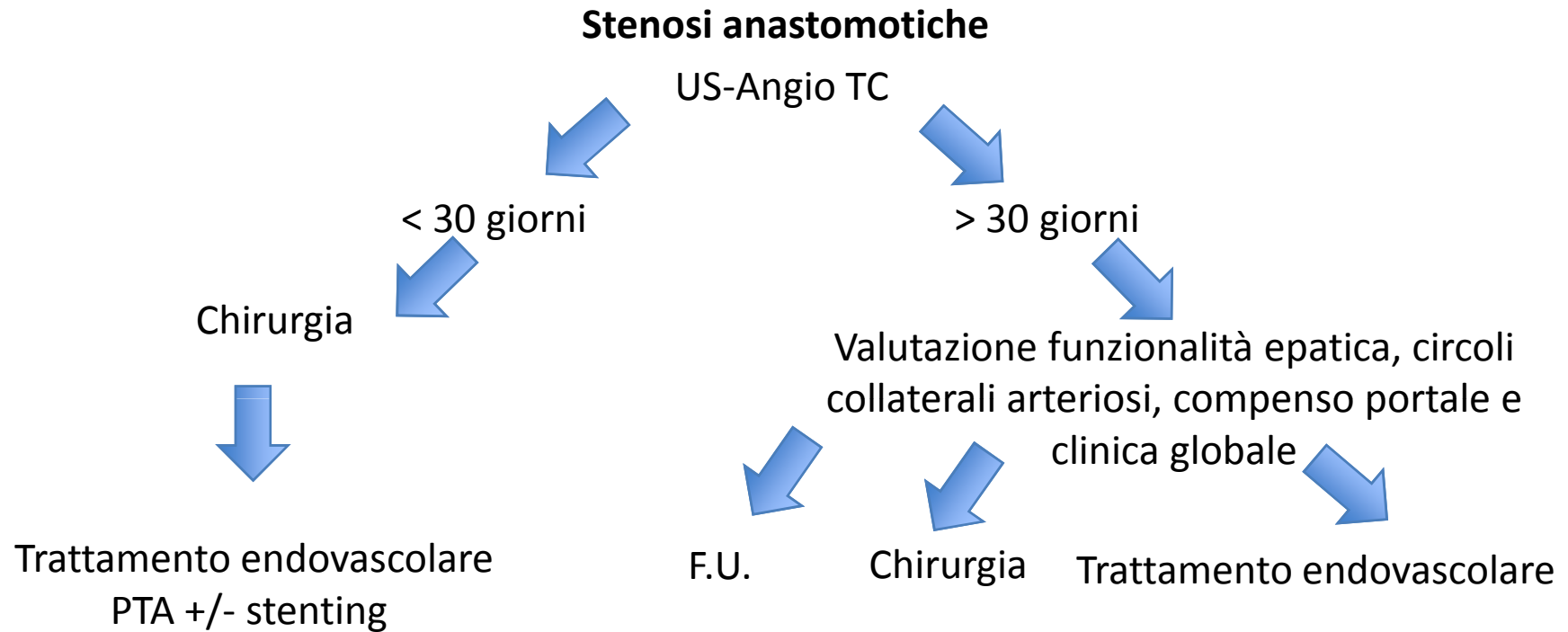
Hepatic arterial complications in adult living donor liver transplant recipients: a single-center experience of 673 cases.

[Iida T](#)¹, [Kaido T](#), [Yagi S](#), [Hori T](#), [Uchida Y](#), [Jobara K](#), [Tanaka H](#), [Sakamoto S](#), [Kasahara M](#), [Ogawa K](#), [Ogura Y](#), [Mori A](#), [Uemoto S](#).

⊕ **Author information**

RESULTS: Hepatic arterial complications occurred in 43 of 673 adult recipients (6.4%) within a median of 13 post-transplant days (range, 1-63). These included hepatic artery thrombosis (including anastomotic stenosis) in 33 cases, anastomotic bleeding in seven cases, and rupture of anastomotic aneurysm in three cases. To treat these complications, surgical re-anastomosis was performed in 26 cases, while the other 17 cases underwent conservative therapies, including four angioplasties by interventional radiology. Biliary complications after hepatic arterial complications occurred in 17 cases. The overall survival rate after LDLT was significantly lower in the hepatic arterial complication group compared with that in the non-complication group (60.7% vs. 80.1% at one yr, 44.3% vs. 74.2% at five yr, respectively; $p < 0.001$). Multivariate analysis showed that the extra-anatomical anastomosis ($p = 0.011$) was the only independent risk factor for hepatic arterial complications.

Nessuna Review sistematica né randomizzati chirurgia vs endovascolare. GRADE II-3



Trombosi precoce

- forma più grave, e può determinare un'ischemia con danno epatico acuto
- il flusso portale compensatorio crea un fenomeno di tamponamento "arterial buffer response"

Author (year)	n	Timing from transplant	Intervention (n)
Mali (2012) (8)	4	0 d–1 m	Retransplant (3), Thrombectomy (1)
Grodzicki (2011) (31)	23	Not reported	Retransplant (17), Endovascular (6)
Pérez-Saborido (2011) (5)	7	Not reported	Retransplant (6), Surgical aortic graft (1)
Wu (2011) (17)	14	10/1–41 d	Rearterialization (3), rearterialization and IA thrombolysis (3), IA thrombolysis (2), Retransplant (6)
Singhal (2010) (48)	1	1 d	IA thrombolysis (1)
Vrochides (2010) (46)	24	Not reported	Thrombectomy and arterial reanastomosis at the same site (n = 10), at a different site (n = 14)
Kim (2006) (49)	2	6 and 4 hr	IA thrombolysis (2)
Pinna (1996) (50)	17	11 d	Revascularization (10), Revascularization followed by IA thrombolysis (7)

h, hours; d, days; m, month; IA, intra-arterial.

Trombosi tardiva

- legata a fattori immunologici, stati di ipercoagulabilità, episodi infettivi (CMV in primis) e spandimenti biliari.
- sintomatologia è prevalentemente dovuta alla sofferenza dell'albero biliare.

Trombosi arteria epatica

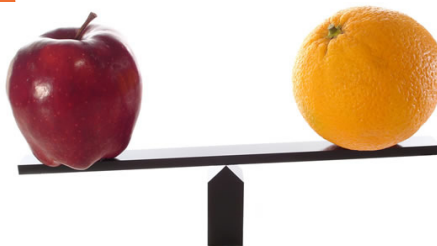
Mortalità circa 50%



Chirurgia/ritrapianto



Trattamento endovascolare



Clin Transplant. 2014 Dec;28(12):1305-12. doi: 10.1111/ctr.12431. Epub 2014 Aug 22.

Surgical and endovascular treatment of hepatic arterial complications following liver transplant.

Chen J¹, Weinstein J, Black S, Spain J, Brady PS, Dowell JD.

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¹Division of Interventional Radiology, Department of Radiology, Wexner Medical Center, The Ohio State University, Columbus, OH, USA.

REVIEW

Endovascular treatment of hepatic artery thrombosis following liver transplantationAshish Singhal,¹ Kenneth Stokes,² Anthony Sebastian,¹ Harlan I Wright¹ and Vivek Kohli¹¹ Nazih Zuhdi Transplant Institute, INTEGRIS Baptist Medical Center, Oklahoma City, OK, USA² Department of Interventional Radiology, INTEGRIS Baptist Medical C

Successo trombolisi
47/69, 68%
3 sanguinamenti
mortalì
29 casi: PTA + stenting



Chirurgia/ritrapianto

Trombosi arteria epaticaTrattamento
endovascolare

- Trombolisi intrarteriosa (Urokinasi)
- Angioplastica
- Angioplastica + stenting

Author	n	Day of presentation	Thrombolytic therapy				
			Drug	Dose and mode of delivery	Duration	Complication	Outcome
Zajko <i>et al.</i> (1985) [30]	1	NA	SK	NA	NA	Hemorrhage	D
Hidalgo <i>et al.</i> (1989) [19]	2	80, 94 days	UK	3000 IU/kg (B) 3000–4400 IU/kg/h (I)	3 h–24 h	None	S (2)
Figueroa <i>et al.</i> (1995) [20]	1	3 days	UK	300 000 IU (B)	NA	None	S
Bjerkvik <i>et al.</i> (1995) [31]	1	21 days	SK	NA	72 h	None	S
Cotroneo <i>et al.</i> (2002) [29]	2	120 days, NA	UK	NA	48 h	NA	S (2)
Zhou <i>et al.</i> (2005) [21]	8	2–19 days	UK	100 000–250 000 IU (B) 50 000–100 000 IU/h (I)	12–24 h	Re-thrombosis (3), Hemorrhage (5)	S (8)
Wang <i>et al.</i> (2005) [28]	9	16 h–10 days	UK	NA	12 h–9 days	Hemorrhage (1)	S (7), F (2)
Kim <i>et al.</i> (2006) [22] LDLT	2	6 h, 4 h	UK	100 000 x 10 min 150 000 x 15 min (B)	NA	Hemorrhage (1)	S (2)
Li <i>et al.</i> (2007) [23]	9	NA	UK	250 000 IU (I)	3–6 days	Hemorrhage (2)	S (6), F (3)
Saad <i>et al.</i> (2007) [5]	5	7–71 days	UK/t-PA	120 000 IU/h (UK) or 0.5 mg/h (t-PA) (I)	16–24 h	Hemorrhage (1)	S (1), F (3), D (1)
Reyes <i>et al.</i> (2007) [33]	3	2–8 days	Abciximab infusion (1)	NA	NA	NA	NA
Bovvat <i>et al.</i> (2008) [27]	9	6 h–10 days	UK/t-PA	50 000–250 000 (UK) or 1–3 mg (t-PA)	NA	NA	S (9)
Yang <i>et al.</i> (2008) [24]	3	NA	UK	NA	NA	Hemorrhage (2)	S (1), D (1), F (1)
Lopez <i>et al.</i> (2008) [26]	1	3 days	UK	4400 U/Kg 6000 U/Kg (Boluses)	NA	None	S (1)
Jeon <i>et al.</i> (2008) [32] LDLT	4	1–13 days	UK	100 000–250 000 IU	NA	Hemorrhage (2)	S (2), F (2)
Duffy <i>et al.</i> (2009) [6]	9	3-Early HAT 6-Late HAT	NA	NA	NA	NA	S (1/3, 0/6)

n, number of patients; NA, not available; LDLT, living donor liver transplant; UK, urokinase; SK, streptokinase; t-PA, alteplase; B, bolus; I, infusion; D, died; S, successful; F, failure; HAT, hepatic artery thrombosis.

Table 2. Hepatic artery pseudoaneurysm treated by endovascular interventions and surgery

Author (year)	n	Timing from transplant	Management (n)	Immediate technical success (%)	Normal hepatic flow by ultrasound (%; follow-up time)
Saad (2013) (37)	12	57 d/1–1098 d	Embolization (4), Stent (8)	83.3%	70% (4.9 m/0–18 m)
Chen (2012) (40)	1	1 d	Embolization (1)	100%	Not reported
Lu (2012) (39)	1	6 m	Stent (1)	100%	100% (5 m)
Ou (2010) (41)	1	45 d	Embolization (1)	100%	100% (6 m)
Ginat (2009) (24)	1	Not reported	Stent (1)	100%	100% (6 m)
Jones (2008) (16)	1	2 wk	Embolization followed by surgical excision (1)	100%	100% (6 wk)
Fistouris (2006) (23)	9	39.5 d/14 d–5 yr	Surgical excision (3), retransplantation (4), ligation (2)	100%	100% in 5 patients from 1996 to 2005 (4.2 yr/7.4 m–6.9 yr)
Banga (2005) (42)	2	7 wk, 15 m	Stent (2)	100%	100% (15 d, 3 yr)
Marshall (2001) (39)	11	30 d/8–132 d	Embolization (6), ligation (3), excision (1), revascularization (1)	100%	Not reported
Lowell (1999) (26)	2	Not reported (1), 4 m (1)	Surgical reconstruction followed by PTA (1), Surgical repair (1)	100%	100% (24 m, 21 m)

d, days; wk, week; m, months; yr, years; PTA, percutaneous transluminal angioplasty.

GRADE II-3, III

**Pseudoaneurismi arteria epatica
(0.2-2%, solitamente extraepatici, entra i 30 giorni)**



Trattamento endovascolare

- Embolizzazione
- Embolizzazione + stenting

Chirurgia/ritrapianto
Mortalità correlata fino al 69%



Clin Transplant. 2014 Dec;28(12):1305-12. doi: 10.1111/ctr.12431. Epub 2014 Aug 22.

Surgical and endovascular treatment of hepatic arterial complications following liver transplant.

Chen J¹, Weinstein J, Black S, Spain J, Brady PS, Dowell JD.

Article types

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- ☐ [Successful treatment by balloon angioplasty under portography for late-onset stenosis of portal vein after cadaveric liver transplantation.](#)
Shiba H, Sadaoka S, Wakiyama S, Ishida Y, Misawa T, Yanaga K.
Int Surg. 2013 Oct-Dec;98(4):466-8. doi: 10.9738/INTSURG-D-12-00031.1.
PMID: 24229043 [Free PMC Article](#)
[Similar articles](#)
- ☐ [Hemodynamics of portal venous stenosis before and after treatment in pediatric liver transplantation: evaluation with Doppler ultrasound.](#)
Huang TL, Chen TY, Tsang LL, Ou HY, Yu CY, Wang CC, Wang SH, Lin CC, Liu YW, Yong CC, Chiu KW, Eng HL, Jawan B, Cheng YF, Chen CL.

The dark side of the guidelines

Trapianto pediatrico

Late onset

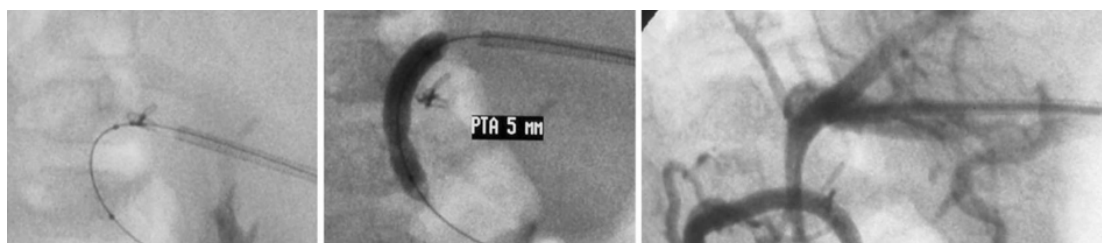
Angioplastica

Dubbio utilizzo dello stent

Stenosi portale

Chirurgia/ritrapianto

Trattamento
endovascolare



regardless of the location of steno-occlusion (stent group) and their matched controls (non-stented LDLT recipients, n=131).

RESULTS: The incidence of BAS was higher in patients in the stent group than that in the control group (43.2% vs 17.6%, $P=0.001$). Cumulative 6-month and 1-, 2- and 5-year BAS rates were 31.8%, 34.1%, 41.4% and 43.2%, respectively, in the stent group and 13.0%, 13.8%, 16.1% and 17.8%, respectively, in the control group ($P=0.001$). Multivariate analysis revealed that PV stenting was an independent risk factor for BAS.

Hepatobiliary Pancreat Dis Int. 2016 Oct;15(5):480-486.

Portal vein stenting as a significant risk factor for biliary stricture in adult living donor liver transplantation.

Shin MH¹, Moon DB, Lee SG, Hwang S, Kim KH, Ahn CS, Ha TY, Song GW, Jung DH, Park GC, Yun YI, Kim WJ, Kang WH, Kim SH, Ko GY.

⊕ Author information

Complicanze biliari

Stenosi: 5-15%,
Fistole: 2-10%

Precoci: sotto i 3 mesi
Tardive: oltre i 3 mesi

Biliary complications after LDLT are considered to be the technical Achilles' heel of liver transplantation because of their high frequency, the need for long-term and repeated treatment, and the potential detrimental effects on graft and patient survival.

HPB (Oxford). 2014 Apr;16(4):312-9. doi: 10.1111/hpb.12151. Epub 2013 Aug 26.

Interventional treatment of a biliary stricture after adult right-lobe living-donor liver transplantation with duct-to-duct anastomosis.

Na GH¹, Kim DG, Choi HJ, Han JH, Hong TH, You YK.

PubMed.gov

US National Library of Medicine
National Institutes of Health

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biliary strictures treatment liver transplantation

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☐ [Predicting Efficacy of Plastic Stents for Posttransplantation Biliary Strictures.](#)

1. Santo E, Itshak A, Mlynarsky L, Leshno M, Gluck N.
J Clin Gastroenterol. 2016 Oct 21. [Epub ahead of print]
PMID: 27775958

☐ [Endoscopic Management of Anastomotic Strictures after Liver Transplantation.](#)

2. Lee DW, Jo HH, Abdullah J, Kahaleh M.
Clin Endosc. 2016 Sep;49(5):457-461. Review.

Stenosi anastomosi T-T

Non indicazione a eventuale chirurgia di salvataggio e elevata possibilità di risoluzione con trattamento conservativo?

SI



Trattamento endoscopico
Sfinterotomia, plastica e stenting



Radiologia
interventistica/
Chirurgia

Guarigione

NO



Drenaggio biliare
percutaneo e bilioplastica



Chirurgia

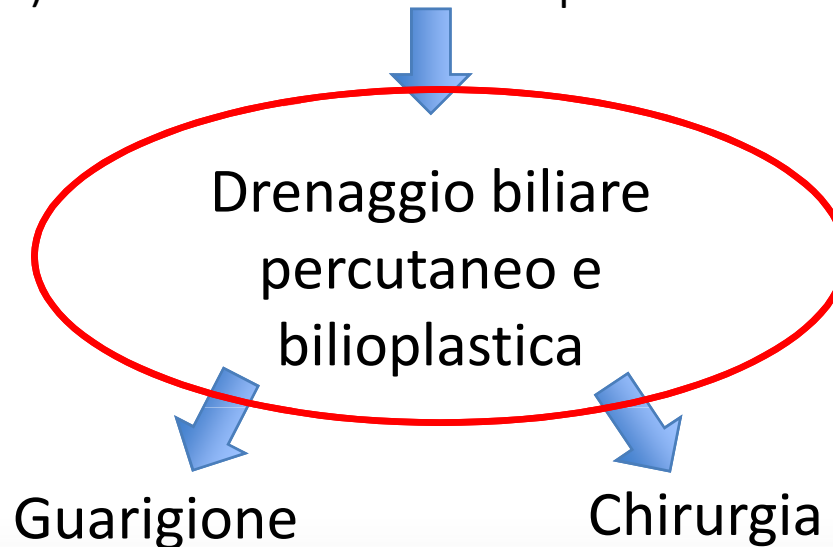


GRADE II-2, II-3



Stenosi ABD

Precoci, tardive, anche già trattate (previo mantenimento funzionalità del graft) e intervallo tra recidive superiore ai 6-9 mesi



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The role of endoscopy in biliary complications after liver transplantation

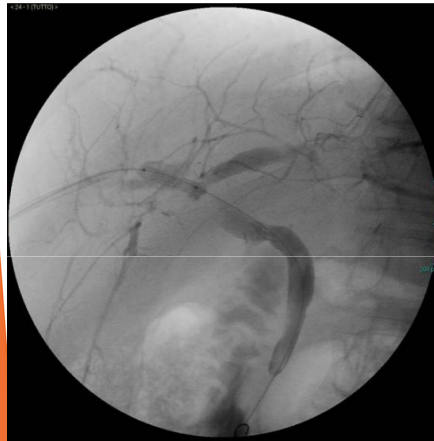
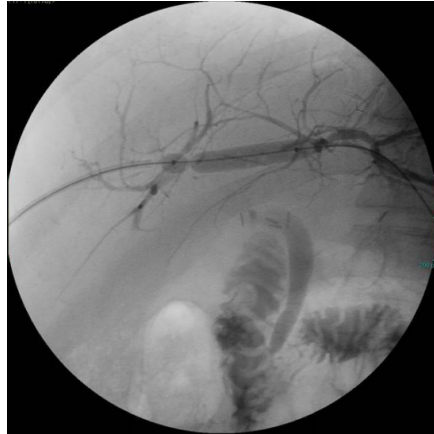
Authors: Andrés Cárdenas, MD, MMSc, AGAF, Karen L Krok, MD, Paul J Thuluvath, MBBS, MD, FRCP

Section Editor: Douglas A Howell, MD, FASGE, FACG

Deputy Editor: Anne C Travis, MD, MSc, FACG, AGAF

requirements during surgery are risk factors for initial ERC failure in LT recipients with AS. The majority of these patients will need surgery for definitive therapy [66]. In patients with Roux-en-Y choledochojejunostomy, ERC is often unsuccessful. In such patients, we suggest management with ERC with small bowel enteroscopy in centers with experience or percutaneous transhepatic cholangiography (PTC) and dilation, followed by placement of a percutaneous transhepatic catheter [67]. (See '[Diagnostic approach](#)' above and '[ERC in patients with Roux-en-Y anatomy](#)'.)





- **Numero drenaggi:** dipende dalla sede del confezionamento dell'ABD e dal coinvolgimento o meno della confluenza (e conseguentemente la necessità di kissing balloon)
- **Tempo medio del mantenimento del drenaggio:** Più sessioni, 20 giorni
- **Utilizzo del Cutting Balloon?** SI! In associazione a bilioplastica con catetere a palloncino convenzionale.



GRADE III

EPOSTM
Electronic Presentation Online System

ESRF
European Society of Radiology

Cutting balloon as a novel approach for intrahepatic biliary strictures refractory to conventional bilioplasty in liver transplanted patients

Poster No.: C-1542

Congress: ECR 2015

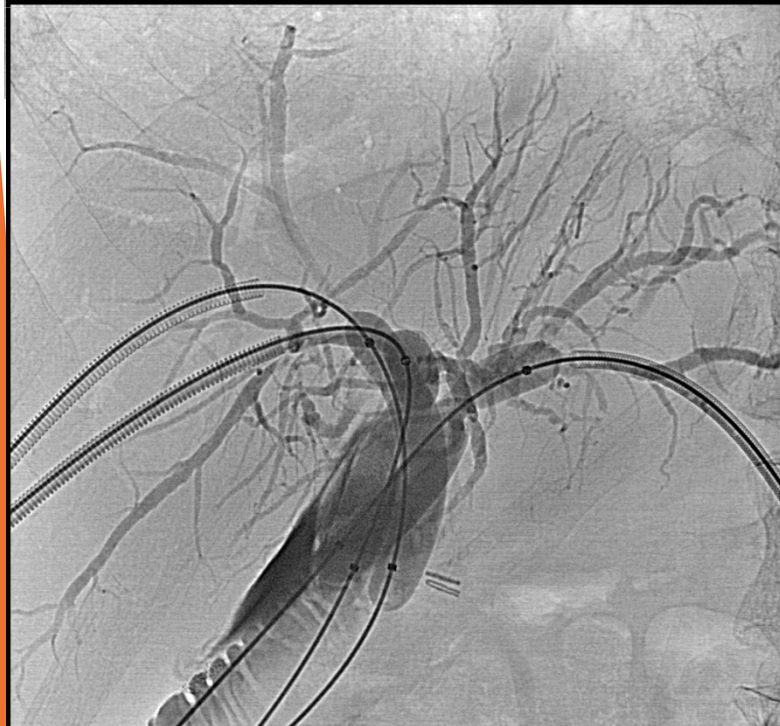
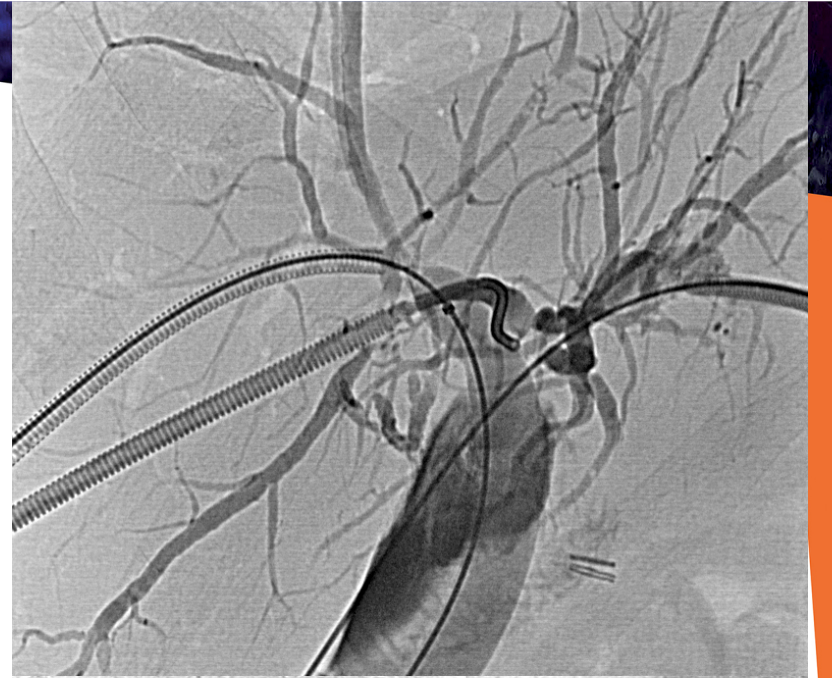
Type: Scientific Exhibit

Authors: M. Calandri, A. Doriguzzi Breatta, D. Righi, P. Fonio, G. Gandini, Torino/IT

[J Vasc Interv Radiol. 2006 May;17\(5\):837-43.](#)

Transhepatic dilation of anastomotic biliary strictures in liver transplant recipients with use of a combined cutting and conventional balloon protocol: technical safety and efficacy.

[Saad WE¹](#), [Davies MG](#), [Saad NE](#), [Waldman DL](#), [Sahler LG](#), [Lee DE](#), [Kitanosono T](#), [Sasson T](#), [Patel NC](#).



Stenosi intraepatiche



**Drenaggio biliare
percutaneo e
bilioplastica**



Guarigione



Ritrapianto

dilation and the placement of multiple plastic stents is considered the first-line treatment for biliary strictures. Percutaneous and surgical treatments are now reserved for patients for whom endoscopic management fails and for those with multiple, inaccessible intrahepatic strictures or Roux-en-Y anastomoses. Recent advances in enteroscopy enable treatment, even in these latter cases. Direct cholangioscopy,

[World J Gastroenterol](#). 2016 Jan 28;22(4):1593-606. doi: 10.3748/wjg.v22.i4.1593.

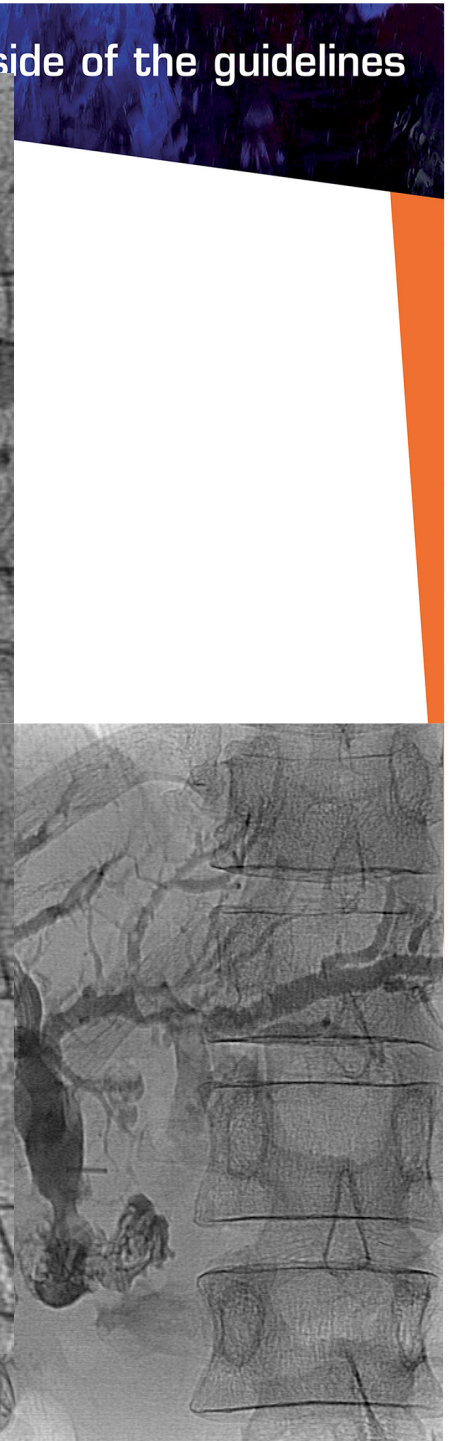
Current diagnosis and treatment of benign biliary strictures after living donor liver transplantation.

[Chang JH](#)¹, [Lee I](#)¹, [Choi MG](#)¹, [Han SW](#)¹.

Author information

GRADE II-2

The dark side of the guidelines



GRADE I

1st Interventional Radiologist under 40 Meeting

Emergencies in Interventional Radiology

Ischemico o non ischemico?

- Peggior outcome delle stenosi associate ad evento ischemico nei primi 3 mesi dal LT
- Maggior frequenza di recidiva
- Pervietà secondaria comparabile alla primaria delle stenosi non ischemiche

Zajko et Al, 1995

Saad et Al, 2005

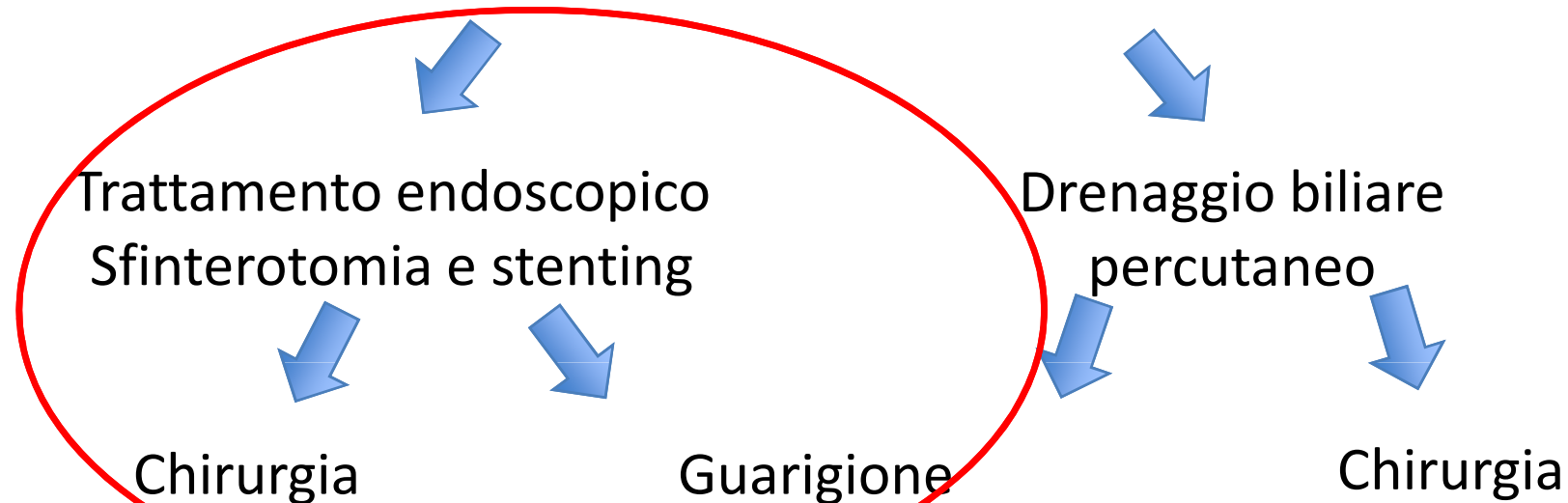
Giampalma et Al, 2012

Liver Transpl. 2012 Feb;18(2):177-87. doi: 10.1002/lt.22450.

Outcome of post-liver transplant ischemic and nonischemic biliary stenoses treated with percutaneous interventions: the Bologna experience.

Giampalma E¹, Renzulli M, Mosconi C, Ercolani G, Pinna AD, Golfieri R.

Fistole anastomosi T-T o trans-kehr



If a biliary anastomosis leakage in the post-transplantation period is diagnosed, initial ERCP with sphincterotomy is recommended. If the leakage persists, a temporary biliary stent can be used (**Grade II-3**)

Clinical Practice Guidelines

 **EASL** | JOURNAL OF
HEPATOLOGY

EASL Clinical Practice Guidelines: Liver transplantation[☆]

European Association for the Study of the Liver^{*}

Se la fistola anastomotica T-T o trans-Kehr è precoce e ad alta portata -> Drenaggio biloma + **Chirurgia**

Tempo mantenimento medio
del drenaggio :32-36 giorni

Stenting con tutore coperto
per fistole ad alta portata

Elevata difficoltà tecnica per
vie biliari non dilatate

Fistole ABD



Drenaggio biliare
percutaneo



Guarigione



Chirurgia
Ritrapianto

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1. [Postoperative biliary adverse events following orthotopic liver transplantation: assessment with magnetic resonance cholangiography.](#)
Boraschi P, Donati F.
World J Gastroenterol. 2014 Aug 28;20(32):11080-94. doi: 10.3748/wjg.v20.i32.11080. Review.
PMID: 25170197 Free PMC Article
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2. [Section 11. Radiological intervention approaches to biliary complications after living donor liver transplantation.](#)
Ko GY, Sung KB.
Transplantation. 2014 Apr 27;97 Suppl 8:S43-6. doi: 10.1097/01.tp.0000446275.51428.65.
PMID: 24849833
[Similar articles](#)

3. [Interventional radiology in the management of benign biliary stenoses, biliary leaks and fistulas: a pictorial review.](#)
Krokidis M, Orgera G, Rossi M, Matteoli M, Hatzidakis A.
Insights Imaging. 2013 Feb;4(1):77-84. doi: 10.1007/s13244-012-0200-1.
PMID: 23180415 Free PMC Article

LIVER TRANSPLANTATION 14:611-615, 2008

ORIGINAL ARTICLE

Safety and Efficacy of the Percutaneous Treatment of Bile Leaks in Hepaticojejunostomy or Split-Liver Transplantation Without Dilatation of the Biliary Tree

Dorico Righi,¹ Alessandro Franchello,² Alessandro Ricchiuti,² Andrea Doriguzzi Breatta,¹ Karine Versace,¹ Amedeo Calvo,¹ Renato Romagnoli,² P. Fonio,¹ Giovanni Gandini,¹ and Mauro Salizzoni²

¹Institute of Diagnostic and Interventional Radiology and ²Liver Transplantation Center, University of Turin, Italy

GRADE II-3

Conclusioni -1

The dark side of the guidelines

- La gestione delle complicanze deve essere eseguita in **centri trapiantologici di riferimento** con adeguato expertise clinico, chirurgico, radiologico ed endoscopico



AASLD PRACTICE
GUIDELINE

Long-Term Management of Adult Liver Transplant:
2012 Practice Guideline by AASLD and AST

- La radiologia interventistica ha, nella pratica clinica, un ruolo fondamentale nella gestione di queste complicanze, spesso non pienamente riconosciuto nelle linee guida pubblicate:
 - **Pseudoaneurismi**
 - **Complicanze in Pazienti con ABD**
 - **Stenosi intraepatiche**



Conclusioni -3

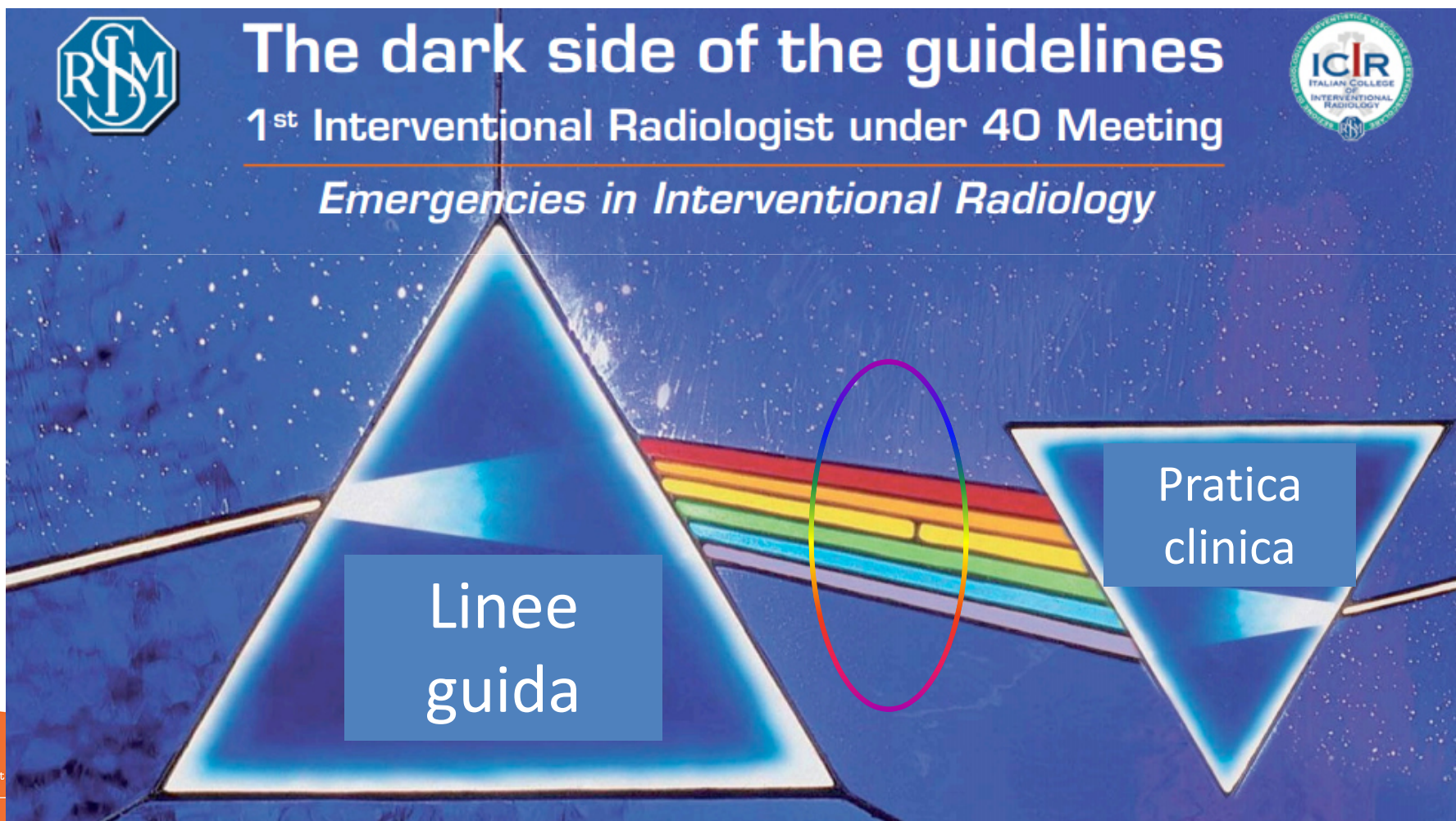
- Il **livello di evidenza** delle pubblicazioni presenti in letteratura è tuttavia **basso**
serie retrospettive e review non sistematiche, prevalentemente pubblicate nei primi anni 2000 (specie per il vascolare)
- Grande variabilità delle strategie terapeutiche da centro a centro in base all'expertise locale
- La creazione e pubblicazione di **algoritmi terapeutici condivisi** tra i **centri italiani con più elevata esperienza** e flusso di lavoro sarebbe auspicabile

Conclusioni -3

The dark side of the guidelines

Le linee guida attuali non danno raccomandazioni precise e puntuali...

La pratica clinica è più complessa della apparente linearità delle linee guida...



The dark side of the guidelines

