**Supplement material.**

**Table S1. Summary of included studies for the treatment of HCC recurrence in LT patients.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **First Author and Year** | **Country** | **Type of Study** | **Time Frame** | **Patients with HCC recurrence**  | **Treatment for HCC recurrence**(Number of patients, if available) | **Main Findings** | **Overall Survival** |
| **Ringe et al. 1995[1]** | Germany | CR |  | 1 | Re-transplantation  | Liver re-transplantation is effective to treat late HCC recurrence + HBV liver disease | Alive at 2 yr |
| **Regalia et al. 1998[2]** | Italy | RCS | 1987-1996 | 21 | Surgery ± CT, ± RT (7)BSC ± CT, ± RT, ± PEI (14) | The prognosis differed significantly in the 7 patients with resectable recurrence (57% 4-yr survival) vs. the 14 patients with unresectable disease (14% 4-yr survival). | 62% at 1 yr43% at 2 yr29% at 3 yr23% at 5 yr |
| **Castroagudin et al. 2002[3]** | Spain | CR |  | 1 | Bilateral adrenal metastasectomy | Surgical resection of metastases may be indicated in patients with good performance status and absence of additional metastasic disease. | Disease-free at 35 months  |
| **Catalano et al. 2004[4]** | Italy | RCS | 1996-2002 | 2 | Hepatic surgery | Hepatic graft resection is a graft-saving option, but early diagnosis and correct timing are crucial. | 18 and 20 months |
| **Roayaie et al. 2004[5]** | USA | RCS | 1988-2002 | 57 | Hepatic surgery (5), lung resection (7), hepatic RFA (3), adrenalectomy (2), chest wall resection (1), doxorubicin (15), TACE (3), external beam radiation (4), BSC (17) | The absence of bone metastases, recurrence more than 12 months from transplant, and surgical treatment of the recurrence were independently associated with significantly longer survival. | 8,7 months 22% at 5 yr |
| **Stippel et al.****2005[6]** | Germany | CR |  | 1 | Ovarectomy + sirolimus (montherapy) | Radical surgical treatment and immunosuppression may achieve tumor-free survival in selected patients. | Disease-free at 19 months  |
| **Rivera et al.****2006[7]** | USA | CR |  | 1 | Surgery, CT, SIRT (Yttrium-90) | Efficacious treatment for multifocal HCC recurrence. | Disease-free at 4 months |
| **Escartin et al.****2007[8]** | Spain | RCS | 1988-2005 | 28 | Multimodality  | HCC recurrence was difficult to treat curatively. | 7 months |
| **Ho et al. 2007[9]** | USA | CR |  | 1 | RFA | Efficacious treatment for intra-hepatic HCC recurrence | Disease-free at 24 months |
| **Ko et al. 2007[10]** | Korea | RCS | 1992-2005 | 28 | TACE | TACE produces an effective tumor response for targeted HCC recurrence.  | 47.9% at 1 yr 6% at 3 yr 0% at 5 yr |
| **Bates et al. 2008[11]** | USA | RCS | 2000-2006 | 5 | Pulmonary resection | Resection of pulmonary HCC recurrence is a reasonable and safe treatment and should result in survival similar to the nontransplant population. | 22.5 months |
| **Kwon et al. 2008[12]** | Korea | RCS | 1999-2006 | 7 | Pulmonary resection | Pulmonary metastasectomy is safe and associated a good outcome in LT patients. | NR |
| **Lee et al. 2008[13]** | Korea | RCS | 2000-2006 | 24 | Systemic chemotherapy | Palliative chemotherapy has tolerable toxicity but unsatisfactory efficacy. | 4.1 months  |
| **Marangoni et al. 2008[14]** | Uk | RCS | 1988-2006 | 4 | Hepatic resection | Recipients with recurrent HCC in graft may benefit from resection, but cure is uncommon. | 20 months75% at 1 yr |
| **Alamo et al. 2009[15]** | Spain | RCS |  | 7 | mTOR | mTOR long-term effectiveness to control neoplastic recurrence is yet to be seen | NR |
| **Yeganeh et al. 2009[16]** | USA | CR |  | 1 | Lung metastasectomy (wedge resection) + Sorafenib | Complete response of metastatic HCC  | Alive at 18 months |
| **Zhang et al. 2009[17]** | China | RCS | 2004-2008 | 10 | Computed tomography guided brachytherapy  | Safe and effective therapy on intra-hepatic recurrent HCC  | 13.6 months |
| **Bhoori et al. 2010[18]** | Italy | CR |  | 1 | Surgical resection, Sorafenib, Everolimus  | A personalized approach aimed to treat recurrent HCC is possible through analysis of tumoral molecular pathways. | Alive at 8 months  |
| **Han et al. 2010[19]** | Korea | RCS | 1998-2008 | 12 | Pulmonary resection | Pulmonary metastasectomy is safe.  | NR |
| **Herden et al. 2010[20]** | Germany | CR |  | 1 | Sorafenib | Severe adverse events (Sorafenib-induced hepatitis) required treatment interruption | NR |
| **Kim et al. 2010[21]** | USA | RCS | 2007-2010 | 9 | Sorafenib | Sorafenib has tolerable toxicity but dose adjustment may be required | 84% at 4 months |
| **Kornberg et al. 2010[22]** | Germany | RCS | 1994-2007 | 16 | Surgery (7), TACE (10), RT (3), Sorafenib (1), BSC (5) | Multivariate analysis identified late (>24 months) post transplant tumor relapse and surgical therapy as independent predictors of long-term survival after HCC recurrence. | 10.5 months41.7% at 5 yr |
| **Shin et al. 2010[23]** | Korea | RCS | 1999-2005 | 28 | Multimodality  | Multi-organ HCC recurrence has a very poor prognosis. For local recurrence, surgical resection should be considered.  | 11.7 months52.8% at 1yr 15.8% at 3 yr |
| **Taketomi et al. 2010[24]** | Japan | RCS | 1996-2007 | 17 | Surgery (9)RT ± CT ± RFA (8) | Overall survival rates of the surgical group (87.5% at 5 yr) were significantly better than those of the nonsurgical group (0% at 5 yr) | 76.5% at 1 yr51.3% at 3 yr34.2% at 5 yr |
| **Tan et al. 2010[25]** | China | RCC | 2004-2009 | 20 | TACE (10) vs. TACE + Sorafenib (10) | TACE + Sorafenib group (14 months) showed a significantly better survival than single TACE treatment group (6 months). | 10 months  |
| **Valdivieso et al. 2010[26]** | Spain | RCS | 1996-2008 | 23 | Surgery (11), Sorafenib + mTOR (5), Systemic CT (2)BSC (8) | Survival was significantly higher among patients with R-0 surgery (33.2 months) compared to other patients (11.9 months) | 22.5 months |
| **Wang et al. 2010[27]** | USA | CR |  | 1 | Sorafenib + Sirolimus | mTOR inhibitor + Sorafenib may have anti-tumor activity in HCC recurrence.  | Alive at 18 months |
| **Yoon et al. 2010[28]** | Korea | RCS | 2003-2008 | 13 | Sorafenib | Sorafenib may be a feasible treatment option regarding its efficacy and safety  | 5.4 months |
| **Zhou et al. 2010[29]** | China | RCS |  | 28 | TACE (14) vs. BSC (14) | Patients treated with TACE had significantly longer survival compared to those who did not. | NR |
| **Chok et al. 2011[30]** | China | RCS | 1994-2007 | 24 | Multimodality | The early recurrence group (17) when had significantly poorer overall survival compared withthe late recurrence group (7). | Early HCC recurrence:100% at 1 yr13.3% at 3 yr6.7% at 5 yrLate HCC recurrence:100% at 1 yr 100% at 3 yr71.4% at 5 yr |
| **Gomez-Martin et al. 2011[31]** | Spain | RCS | 2008-2010 | 31 | Sorafenib + mTOR | Co-administration of Sorafenib + mTOR could be effective despite notable toxicity | 19.3 months |
| **Kim et al. 2011[32]** | USA | CR |  | 1 | Sorafenib + mTOR | Complete radiologic response | Disease-free at 5 months |
| **Kim et al. 2011[33]** | Korea | RCS | 1995-2008 | 39 | TACE (11), systemic CT (11), RT (8), surgery (3), BSC (6) | Various clinical approaches have been used in absence of clinical guidelines. The time of HCC recurrence (late vs. early) was not a predictor of poor prognosis.  | 6.9 months 34.3% at 1 yr21.7% at 2 yr |
| **Pfiffer et al. 2011[34]** | Germany | RCS | 2002-2009 | 24 | Multimodality | Even in the Sorafenib era, surgical treatment of HCC recurrence still is the best option to prolong survival. | 23.1 months  |
| **Takahara et al. 2011[35]**  | Japan | CR |  | 2 | Sorafenib | Sorafenib is one option to treat recurrent HCC.  | Alive at 16 months Alive at 4 yr |
| **Waidmann et al. 2011[36]** | Germany | RCS |  | 3 | Sorafenib + mTOR | Close monitoring and careful dose titration is required since major toxicity may occur. | 8 months  |
| **Carr 2012[37]** | Italy | RCS |  | 6 | TACE | TACE is a safe treatment, with 50% response rate  | 23.6 months  |
| **Chen et al. 2012[38]** | Taiwan | RCC | 2003-2011 | 15 | Surgery (5), TACE (4), RFA (1), CT (6), RT (8). | Surgery had significant benefit on survival after HCC solitary or localized resectable recurrence. Multiple metastases were usually unresponsive. | 19.2 months100% at 1 yr for surgery37.5% at 1 yr for TACE0% at 1 yr for palliative CT/RT |
| **Hwang et al. 2012[39]** | Korea | RCC | 1997-2008 | 43 | Pulmonary resection (23), multimodality non-surgical treatments (20) | Survival rate was significantly greater in patients with resectable pulmonary metastases undergone metastasectomy than patients who received other treatments | For surgery group:77.4% at 1 yr 30.6% at 2 yr For non-surgical treatment group:55.1% at 1 yr 0% at 2 yr  |
| **Kitano et al. 2012[40]** | Japan | RCS | 1990-2010 | 3 | Pulmonary resection  | Pulmonary metastasectomy in safe and feasible in selected patients. | NR |
| **Sotiropoulos et al. 2012[41]** | Germany | RCS | 2006-2011 | 14 | Sorafenib + mTOR | Sorafenib may be a feasible treatment option regarding efficacy and safety for recurrent HCC. | 12 months |
| **Staufer et al. 2012[42]** | Germany | RCS | 2000-2009 | 13 | Sorafenib ± mTOR | Side effects prevented full dosing of Sorafenib and necessitated dose reduction/discontinuation in the majority of patients.  | 19.4 months69% at 1 yr |
| **Vitale et al. 2012[43]** | Italy | RCS | 2005-2011 | 10 | Sorafenib ± mTOR | Sorafenib is a safe effective therapy. | 14.2 months  |
| **Weinmann et al. 2012[44]** | Germany | RCS | 1998-2009 | 11 | Sorafenib + mTOR | Acceptable toxicity without deterioration of liver graft function. | 20.1 months |
| **Pfeiffenberger et al. 2013[45]** | Germany | RCC | 2002-2010 | 18 | Sorafenib ± mTOR (8) vs.Multimodality (no Sorafenib)(10) | Sorafenib may represent a therapeutic option for recurrent HCC after LT with manageable side effects. | 9 months for Sorafenib group2.3 months for Non-Sorafenib group |
| **Sommacale et al. 2013[46]** | France | RCS | 1997-2011 | 3 | Hepatic surgery (3) | Liver resection in LT patients is safe but associated with high morbidity rate.  | 100% at 1 year |
| **Sposito et al. 2013[47]** | Italy | RCC | 1994-2011 | 39 | Sorafenib ± mTOR (15) vs. BSC (24) | Sorafenib seems to be associated with an acceptable safety profile and benefit in survival. | 10.6 months for Sorafenib group2.2 months for BSC group |
| **Toso et al. 2013[48]** | Canada / Swiss | RCS | 1996-2011 | 30 | Surgery (6), loco-regional therapy (3), BSC (21) | Patients with early HCC recurrence have worse survival. | 33 months |
| **Waghray et al. 2013[49]** | USA | RCC | 2001-2011 | 34 | Sorafenib (17) vs. Multimodality (no Sorafenib)(17) | Sorafenib can be well tolerated and may be associated with a modest survival benefit.  | 63% at 1 yr for Sorafenib group23% at 1 yr for non-Sorafenib group |
| **Yoon et al. 2013[50]** | Korea | RCC | 1997-2009 | 25 | Curative-intent treatments (8), palliative treatments (17) | Multiple recurrence and palliative treatment for recurrent HCC were related to poor survival. | For curative treatment: 62.5% at 1 yr25% at 3 yr25% at 5 yrFor palliative treatments:47.1% at 1 yr0% at 3 yr |
| **Zavaglia et al. 2013[51]** | Italy | RCS | 2008-2010 | 11 | Sorafenib + Cyclosporine (4) or + mTOR (7) | Sorafenib, with or without mTOR, is poorly tolerated and rarely effective  | 5 months18% at 1 yr  |
| **Alsina et al. 2014[52]** | USA | RCS | 2002-2013 | 22 | Sorafenib (9), multimodality + Sorafenib (9), BSC (4) | Sorafenib may improve survival | 30 months for Sorafenib group20 months for non-Sorafenib group |
| **Cheng et al. 2014[53]** | Taiwan | RCS | 2002-2012 | 11 | TACE | TACE is beneficial for treating intra-hepatic multiple recurrence of HCC and it is associated with significantly better survival.  | 6.6 months12.5% at 1 yr |
| **De Simone et al. 2014[54]** | Italy | RCS |  | 7 | Sorafenib + mTOR  | Treatment with Sorafenib + mTOR is challenging because treatment related complications. | 71.4% at 6 months |
| **Gringeri et al. 2014[55]** | Italy | CR |  | 1 | Laparoscopic microwave thermal ablation | Effective loco-regional treatment for solitary HCC recurrence | Alive at 24 months |
| **Gunay et al. 2014[56]** | Turkey | RCS | 2004-2012 | 16 | Surgery + Sorafenib + mTOR (7), Systemic CT + Sorafenib + mTOR (7), BSC (2) | The most effective treatment for isolated HCC recurrence is surgery.  | 54.3% at 1 yr9% at 3 yr9% at 5 yr 21.4 months for surgical group6.7 months for non surgical treatment group |
| **Mazloom et al. 2014[57]** | USA | CR |  | 1 | Stereotactic body radiation therapy | Safe and effective treatment modality | Alive at 1 yr |
| **Perricone et al. 2014[58]** | Italy | RCS | 2010-2013 | 4 | Sorafenib + mTOR  | Combination regimen Sorafenib + Everolimus is poorly tolerated and can be associated with relevant treatment-related mortality. | 10.7 months |
| **Roh et al. 2014[59]** | Korea | RCS | 1996-2011 | 63 | Local treatments (24), systemic treatments (10), combined treatments (21), BSC (8) | The combined treatment with local and systemic therapies resulted in increased survival even in patients with multifocal HCC recurrences  | 12 monthsFor local treatment group:38% at 1 yr9% at 2 yr0% at 3 yr For systemic treatment group:60% at 1 yr20% at 2 yr0% at 3 yrFor the combined treatment group:73% at 1 yr65% at 2 yr25% at 3 yrFor BSC group:17% at 1 yr0% at 2 yr |
| **Yamagami et al. 2014[60]** | Japan | RCS | 2007-2012 | 8 | TACE | TACE with an interventional-CT system is effective in the treatment of recurrent HCC. | 12.9 months42.9% at 1 yr |
| **Sapisochin et al. 2014[61]** | Canada / Spain | RCS | 2000-2012 | 121 | Surgery (31), ablation (8), CT (10), RT (25), Sorafenib (14), TACE (1), BSC (32) | LT patients with HCC recurrence amenable to curative-intent treatments can experience long-term survival  | 12.2 months50% at 5 yr  |

*CR: case report; RCS: retrospective case series; RCC: retrospective case-control/comparative study; CT: chemotherapy; RT: radiotherapy; TACE: transarterial chemoembolization; RFA: radiofrequency ablation; BSC: best supportive care; SIRT: selective internal radiotherapy treatment; mTOR: mammalian target of rapamycin; HCC: hepatocellular carcinoma; LT: liver transplantation.*

**Table S2. Risk of bias for non-randomized clinical trials based on the *Newcastle-Ottawa Scale*. The study quality was assessed on nine items categorized into three main criteria. A maximum of 9 stars can be assigned to the highest quality. Studies awarded with 7 stars or more were considered at low risk of bias.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  **Criteria****Study** | **Selection** | **Comparability** | **Exposure** | **Overall****Score** |
| **Regalia et al. 1998[2]** | ★★★ | - | ★★★ | **6/9** |
| **Tan et al. 2010[25]** | ★★★ | ★ | ★★★ | **7/9** |
| **Chen et al. 2012[38]** | ★★★ | *-* | ★★ | **5/9** |
| **Hwang et al. 2012[39]** | ★★★ | *-* | ★★ | **5/9** |
| **Staufer et al. 2012[42]** | ★★★ | *-* | ★★ | **5/9** |
| **Pfeiffeenberger et al. 2013[45]** | ★★★★ | *-* | ★★ | **6/9** |
| **Sposito et al. 2013[47]** | ★★★★ | ★ | ★★★ | **8/9** |
| **Yoon et al. 2013[50]** | ★★★ | *-* | ★★ | **5/9** |
| **Waghray et al. 2013[49]** | ★★★★ | - | ★★ | **6/9** |
| **Gunay et al. 2014[56]** | ★★ | *-* | ★★ | **4/9** |
| **Roh et al. 2014[59]** | ★★★ | ★★ | ★★ | **7/9** |
| **Sapisochin et al. 2014[61]** | ★★★ | ★ | ★★ | **6/7** |

**Figure S1. Increasing number of publication on the management of recurrent HCC in LT patients.**

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**References.**

1. **Ringe B**, Boker K, Schlitt HJ, et al. Recurrence of hepatitis B virus cirrhosis and hepatocellular carcinoma: an indication for retransplantation? Clin Transplant. 1995;9(3 Pt 1):190-6. Epub 1995/06/01.

2. **Regalia E**, Fassati LR, Valente U, et al. Pattern and management of recurrent hepatocellular carcinoma after liver transplantation. Journal of Hepato-Biliary-Pancreatic Surgery. 1998;5(1):29-34.

3. **Castroagudin JF**, Gonzalez-Quintela A, Martinez J, et al. Bilateral adrenal metastases from hepatocellular carcinoma after liver transplantation. Hepatogastroenterology. 2002;49(43):249-51. Epub 2002/04/11.

4. **Catalano G**, Urbani L, Biancofiore G, et al. Hepatic resection after liver transplantation as a graft-saving procedure: indication criteria, timing and outcome. Transplantation proceedings. 2004;36(3):545-6. Epub 2004/04/28.

5. **Roayaie S**, Schwartz JD, Sung MW, et al. Recurrence of hepatocellular carcinoma after liver transplant: patterns and prognosis. Liver transplantation : official publication of the American Association for the Study of Liver Diseases and the International Liver Transplantation Society. 2004;10(4):534-40. Epub 2004/03/30.

6. **Stippel DL**, Kasper HU, Schleimer K, et al. Successful use of sirolimus in a patient with bulky ovarian metastasis of hepatocellular carcinoma after liver transplantation. Transplantation proceedings. 2005;37(5):2185-7. Epub 2005/06/21.

7. **Rivera L**, Giap H, Miller W, et al. Hepatic intra-arterial infusion of yttrium-90 microspheres in the treatment of recurrent hepatocellular carcinoma after liver transplantation: a case report. World journal of gastroenterology : WJG. 2006;12(35):5729-32.

8. **Escartin A**, Sapisochin G, Bilbao I, et al. Recurrence of hepatocellular carcinoma after liver transplantation. Transplantation proceedings. 2007;39(7):2308-10. Epub 2007/09/25.

9. **Ho CK**, Chapman WC, Brown DB. Radiofrequency ablation of recurrent hepatocellular carcinoma in a patient after liver transplantation: two-year follow-up. Journal of vascular and interventional radiology : JVIR. 2007;18(11):1451-3. Epub 2007/11/16.

10. **Ko HK**, Ko GY, Yoon HK, et al. Tumor response to transcatheter arterial chemoembolization in recurrent hepatocellular carcinoma after living donor liver transplantation. Korean journal of radiology : official journal of the Korean Radiological Society. 2007;8(4):320-7. Epub 2007/08/04.

11. **Bates MJ**, Farkas E, Taylor D, et al. Pulmonary resection of metastatic hepatocellular carcinoma after liver transplantation. The Annals of thoracic surgery. 2008;85(2):412-5.

12. **Kwon JB**, Park K, Kim YD, et al. Clinical outcome after pulmonary metastasectomy from primary hepatocellular carcinoma: analysis of prognostic factors. World journal of gastroenterology : WJG. 2008;14(37):5717-22. Epub 2008/10/07.

13. **Lee JO**, Kim DY, Lim JH, et al. Palliative chemotherapy for patients with recurrent hepatocellular carcinoma after liver transplantation. Journal of gastroenterology and hepatology. 2009;24(5):800-5. Epub 2009/01/30.

14. **Marangoni G**, Faraj W, Sethi H, et al. Liver resection in liver transplant recipients. Hepatobiliary & pancreatic diseases international : HBPD INT. 2008;7(6):590-4. Epub 2008/12/17.

15. **Alamo JM**, Barrera L, Casado MD, et al. Efficacy, tolerance, and safety of mammalian target of rapamycin inhibitors as rescue immunosuppressants in liver transplantation. Transplantation proceedings. 2009;41(6):2181-3. Epub 2009/09/01.

16. **Yeganeh M**, Finn RS, Saab S. Apparent remission of a solitary metastatic pulmonary lesion in a liver transplant recipient treated with sorafenib. American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons. 2009;9(12):2851-4. Epub 2009/12/22.

17. **Zhang FJ**, Li CX, Liang Z, et al. Short- to mid-term evaluation of CT-guided 125I brachytherapy on intra-hepatic recurrent tumors and/or extra-hepatic metastases after liver transplantation for hepatocellular carcinoma. Cancer Biology and Therapy. 2009;8(7):585-90.

18. **Bhoori S**, Toffanin S, Sposito C, et al. Personalized molecular targeted therapy in advanced, recurrent hepatocellular carcinoma after liver transplantation: a proof of principle. Journal of hepatology. 2010;52(5):771-5.

19. **Han KN**, Kim YT, Yoon JH, et al. Role of surgical resection for pulmonary metastasis of hepatocellular carcinoma. Lung cancer. 2010;70(3):295-300. Epub 2010/04/01.

20. **Herden U,** Fischer L, Schafer H, et al. Sorafenib-induced severe acute hepatitis in a stable liver transplant recipient. Transplantation. 2010;90(1):98-9. Epub 2010/07/08.

21. **Kim R**, El-Gazzaz G, Tan A, et al. Safety and feasibility of using sorafenib in recurrent hepatocellular carcinoma after orthotopic liver transplantation. Oncology. 2010;79(1-2):62-6. Epub 2010/11/13.

22. **Kornberg A**, Kupper B, Tannapfel A, et al. Long-term survival after recurrent hepatocellular carcinoma in liver transplant patients: clinical patterns and outcome variables. European journal of surgical oncology : the journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology. 2010;36(3):275-80. Epub 2009/10/28.

23. **Shin WY**, Suh KS, Lee HW, et al. Prognostic factors affecting survival after recurrence in adult living donor liver transplantation for hepatocellular carcinoma. Liver transplantation : official publication of the American Association for the Study of Liver Diseases and the International Liver Transplantation Society. 2010;16(5):678-84. Epub 2010/05/05.

24. **Taketomi A,** Fukuhara T, Morita K, et al. Improved results of a surgical resection for the recurrence of hepatocellular carcinoma after living donor liver transplantation. Ann Surg Oncol. 2010;17(9):2283-9. Epub 2010/03/06.

25. **Tan WF**, Qiu ZQ, Yu Y, et al. Sorafenib extends the survival time of patients with multiple recurrences of hepatocellular carcinoma after liver transplantation. Acta pharmacologica Sinica. 2010;31(12):1643-8. Epub 2010/11/26.

26. **Valdivieso A**, Bustamante J, Gastaca M, et al. Management of hepatocellular carcinoma recurrence after liver transplantation. Transplantation proceedings. 2010;42(2):660-2. Epub 2010/03/23.

27. **Wang Y**, Speeg KV, Washburn WK, et al. Sirolimus plus sorafenib in treating HCC recurrence after liver transplantation: a case report. World journal of gastroenterology : WJG. 2010;16(43):5518-22. Epub 2010/11/19.

28. **Yoon DH**, Ryoo BY, Ryu MH, et al. Sorafenib for recurrent hepatocellular carcinoma after liver transplantation. Jpn J Clin Oncol. 2010;40(8):768-73. Epub 2010/05/25.

29. **Zhou B**, Shan H, Zhu KS, et al. Chemoembolization with lobaplatin mixed with iodized oil for unresectable recurrent hepatocellular carcinoma after orthotopic liver transplantation. Journal of vascular and interventional radiology : JVIR. 2010;21(3):333-8.

30. **Chok KS,** Chan SC, Cheung TT, et al. Late recurrence of hepatocellular carcinoma after liver transplantation. World journal of surgery. 2011;35(9):2058-62. Epub 2011/05/21.

31. **Gomez-Martin C**, Bustamante J, Castroagudin JF, et al. Efficacy and safety of sorafenib in combination with mammalian target of rapamycin inhibitors for recurrent hepatocellular carcinoma after liver transplantation. Liver transplantation : official publication of the American Association for the Study of Liver Diseases and the International Liver Transplantation Society. 2012;18(1):45-52.

32. **Kim R,** Aucejo F. Radiologic complete response with sirolimus and sorafenib in a hepatocellular carcinoma patient who relapsed after orthotopic liver transplantation. Journal of gastrointestinal cancer. 2011;42(1):50-3. Epub 2010/08/18.

33. **Kim HR**, Cheon SH, Rha SY, et al. Treatment of recurrent hepatocellular carcinoma after liver transplantation. Asia-Pacific journal of clinical oncology. 2011;7(3):258-69. Epub 2011/09/03.

34. **Pfiffer TE**, Seehofer D, Nicolaou A, et al. Recurrent hepatocellular carcinoma in liver transplant recipients: parameters affecting time to recurrence, treatment options and survival in the sorafenib era. Tumori. 2011;97(4):436-41. Epub 2011/10/13.

35. **Takahara T**, Nitta H, Hasegawa Y, et al. Using sorafenib for recurrent hepatocellular carcinoma after liver transplantation--interactions between calcineurin inhibitor: two case reports. Transplantation proceedings. 2011;43(7):2800-5. Epub 2011/09/14.

36. **Waidmann O**, Hofmann WP, Zeuzem S, et al. mTOR inhibitors and sorafenib for recurrent heptocellular carcinoma after orthotopic liver transplantation. Journal of hepatology. 2011;54(2):396-8. Epub 2010/11/30.

37. **Carr BI**. Hepatic artery chemoembolization for hepatocellular carcinoma recurrence confined to the transplanted liver. Case Rep Oncol. 2012;5(3):506-10. Epub 2012/11/10.

38. **Chen WT**, Yu CY, Huang TL, et al. Does transarterial embolization improve survival for recurrent hepatocellular carcinoma after living donor liver transplantation? Chinese Journal of Radiology (Taiwan). 2012;37(3):101-4+v.

39. **Hwang S**, Kim YH, Kim DK, et al. Resection of pulmonary metastases from hepatocellular carcinoma following liver transplantation. World journal of surgery. 2012;36(7):1592-602. Epub 2012/03/14.

40. **Kitano K**, Murayama T, Sakamoto M, et al. Outcome and survival analysis of pulmonary metastasectomy for hepatocellular carcinoma. European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery. 2012;41(2):376-82. Epub 2011/07/06.

41. **Sotiropoulos GC**, Nowak KW, Fouzas I, et al. Sorafenib treatment for recurrent hepatocellular carcinoma after liver transplantation. Transplantation proceedings. 2012;44(9):2754-6. Epub 2012/11/14.

42. **Staufer K**, Fischer L, Seegers B, et al. High toxicity of sorafenib for recurrent hepatocellular carcinoma after liver transplantation. Transplant international : official journal of the European Society for Organ Transplantation. 2012;25(11):1158-64. Epub 2012/08/14.

43. **Vitale A**, Boccagni P, Kertusha X, et al. Sorafenib for the treatment of recurrent hepatocellular carcinoma after liver transplantation? Transplantation proceedings. 2012;44(7):1989-91. Epub 2012/09/15.

44. **Weinmann A**, Niederle IM, Koch S, et al. Sorafenib for recurrence of hepatocellular carcinoma after liver transplantation. Digestive and liver disease : official journal of the Italian Society of Gastroenterology and the Italian Association for the Study of the Liver. 2012;44(5):432-7. Epub 2012/01/24.

45. **Pfeiffenberger J**, Koschny R, Hoffmann K, et al. Sorafenib treatment is save and may affect survival of recurrent hepatocellular carcinoma after liver transplantation. Langenbeck's archives of surgery / Deutsche Gesellschaft fur Chirurgie. 2013;398(8):1123-8. Epub 2013/10/05.

46. **Sommacale D,** Dondero F, Sauvanet A, et al. Liver resection in transplanted patients: a single-center Western experience. Transplantation proceedings. 2013;45(7):2726-8. Epub 2013/09/17.

47. **Sposito C**, Mariani L, Germini A, et al. Comparative efficacy of sorafenib versus best supportive care in recurrent hepatocellular carcinoma after liver transplantation: a case-control study. Journal of hepatology. 2013;59(1):59-66. Epub 2013/03/19.

48. **Toso C**, Mentha G, Majno P. Integrating sorafenib into an algorithm for the management of post-transplant hepatocellular carcinoma recurrence. Journal of hepatology. 2013;59(1):3-5.

49. **Waghray A**, Balci B, El-Gazzaz G, et al. Safety and efficacy of sorafenib for the treatment of recurrent hepatocellular carcinoma after liver transplantation. Clin Transplant. 2013;27(4):555-61. Epub 2013/06/14.

50. **Yoon YC**, Hong TH, You YK, et al. Clinical analysis of recurrent hepatocellular carcinoma after living donor liver transplantation. Clin Transplant. 2013;27(2):E192-8. Epub 2013/02/07.

51. **Zavaglia C,** Airoldi A, Mancuso A, et al. Adverse events affect sorafenib efficacy in patients with recurrent hepatocellular carcinoma after liver transplantation: Experience at a single center and review of the literature. European Journal of Gastroenterology and Hepatology. 2013;25(2):180-6.

52. **Alsina AE,** Makris A, Nenos V, et al. Can sorafenib increase survival for recurrent hepatocellular carcinoma after liver transplantation? A pilot study. The American surgeon. 2014;80(7):680-4. Epub 2014/07/06.

53. **Cheng YC**, Chen TW, Fan HL, et al. Transarterial chemoembolization for intrahepatic multiple recurrent HCC after liver resection or transplantation. Annals of transplantation : quarterly of the Polish Transplantation Society. 2014;19:309-16. Epub 2014/07/01.

54. **De Simone P**, Crocetti L, Pezzati D, et al. Efficacy and safety of combination therapy with everolimus and sorafenib for recurrence of hepatocellular carcinoma after liver transplantation. Transplantation proceedings. 2014;46(1):241-4. Epub 2014/02/11.

55. **Gringeri E**, Boetto R, Bassi D, et al. Laparoscopic microwave thermal ablation for late recurrence of local hepatocellular carcinoma after liver transplant: case report. Progress in transplantation (Aliso Viejo, Calif). 2014;24(2):142-5. Epub 2014/06/13.

56. **Gunay Y**, Guler N, Akyildiz M, et al. Management of patients with recurrent hepatocellular carcinoma following living donor liver transplantation: a single center experience. The Gulf journal of oncology. 2014;1(15):12-8. Epub 2014/03/13.

57. **Mazloom A**, Hezel AF, Katz AW. Stereotactic body radiation therapy as a bridge to transplantation and for recurrent disease in the transplanted liver of a patient with hepatocellular carcinoma. Case Reports in Oncology. 2014;7(1):18-22.

58. **Perricone G,** Mancuso A, Belli LS, et al. Sorafenib for the treatment of recurrent hepatocellular carcinoma after liver transplantation: does mTOR inhibitors association augment toxicity? European journal of gastroenterology & hepatology. 2014;26(5):577-8. Epub 2014/04/04.

59. **Roh YN**, David Kwon CH, Song S, et al. The prognosis and treatment outcomes of patients with recurrent hepatocellular carcinoma after liver transplantation. Clinical Transplantation. 2014;28(1):141-7.

60. **Yamagami T,** Yoshimatsu R, Ishikawa M, et al. Transcatheter arterial chemoembolization with an interventional-CT system for recurrent hepatocellular carcinoma after living donor liver transplantation. Hepato-Gastroenterology. 2014;61(133):1387-92.

61. **Sapisochin G**, Goldaracena N, Astete S, et al. Benefit of Treating Hepatocellular Carcinoma Recurrence after Liver Transplantation and Analysis of Prognostic Factors for Survival in a Large Euro-American Series. Ann Surg Oncol. 2014. Epub 2014/12/05.