How to differentiate between recurrent, de novo and residual lesions of primary hepatocellular carcinoma after locoregional therapy

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Aims and objectives

Residual lesions after treatment of HCC are those lesions within the bulk of the targeted mass being not adequately ablated by thermal process or completely embolized with residual arterial activity seen within these lesions in arterial phase after 1 and 3 months of post-procedural follow up. Recurrent lesions are those areas of residual arterial activity on contrast enhanced imaging studies after being completely ablated in the first imaging study after the procedure. De novo lesions are those lesions with

Hepatocellular carcinoma needs a precise diagnosis of its different findings after treatment to make an ideal plan to predict outcome and decision about the future treatment and follow up plan.
Methods and materials

We collected data from 270 patients in the period from 1st June 2013 till 31 July 2015, all are suffering from primary hepatocellular carcinoma on top of cirrhotic liver. Management lines include percutaneous local ablation by radiofrequency and microwave and transarterial embolotherapy by Lipiodol- Doxorubicin mixture (100 mg of powdered form of Doxorubicin and 10 ml of lipiodol for each patient injected as a mixture into the feeding arteries of the tumors) or drug eluting beads loaded by 100 mg of Doxorubicin powder form. All patients are treated within BCLC guidelines.

All the patients underwent contrast enhanced triphasic study by CT or MRI within 1 month before the procedure and 1 month after it, with the second follow up study being ordered after 2 to 3 months after the last imaging study.
Results

120 patients are treated by percutaneous local thermal ablation, 24 of them by microwave and 96 by radiofrequency ablation. In the microwave ablation group, the first follow up contrast imaging study showed complete response in 20 patients, in 12 of them no recurrent or de novo lesions in the second follow up study after 3 months, in 3 patients the ablated lesions are showing some activity classified as recurrent process after complete response. In 5 patients we observed new lesions in the liver away from the completely ablated mass. All patients with recurrent process or new lesions away from the completely ablated masses are managed by transarterial chemoembolization due ill-defined nature of the newly observed activity. In the microwave group the remaining 4 cases have showed incomplete response with residual arterial activity within the mass, two of them are managed by repeat local ablation and the rest two are scheduled for transarterial chemoembolization.

About the 96 cases managed by radiofrequency we observed complete response in 80 cases, 3 cases developed new lesions away from the ablated mass in the first follow up imaging study and 13 cases have shown incomplete tumoral ablations with residual activity, the 3 cases of de novo and 3 cases of residual lesions after radiofrequency are scheduled for transarterial embolotherapy and 10 cases of residual lesions after radiofrequency (RF) ablation underwent another setting of RF ablation. About the 80 cases with complete response after ablation, two of them have shown de novo lesions in the second imaging follow up study and five cases developed recurrent lesions within the primary mass, four of them are treated by transarterial embolotherapy and one had managed by another setting of RF ablation.

150 cases are treated by transarterial embolotherapy, 45 cases are treated by drug eluting beads (DEB's) loaded by Doxorubicin powder 100 mg; this mixture was injected directly into the mass/s. Complete response in the first postoperative imaging study is observed in 31 cases, among them 11 cases display recurrent enhancement within the mass and five cases showed new lesions in the liver one case of them show additional finding of main stem portal venous invasion in the second post-procedural imaging study, incomplete response with residuals of tumoral enhancement is observed in 14 cases, 5 of them display postoperative complications (main stem portal vein thrombosis and/or ascites) so conservative management was advised. The remaining nine cases showed incomplete response are scheduled for another setting of embolotherapy. Three of them are treated by diffuse injection of lipiodol- Doxorubicin mixture due to de novo lesions away from the primarily injected mass and the remaining six cases are managed by another setting of DEB's embolization.
105 patients managed by lipiodol-Doxorubicin mixture with immediate post-embolization angiographic study revealed complete occlusion of the feeding vasculature. Post-procedural imaging study after 1 month revealed a wide range of findings of lipiodol concentration and tumoral residual enhancement. Complete lipiodol concentration within the mass with no abnormally enhancing regions in the liver is observed in 73 cases, 15 of them displayed perilesional enhancing satellites in the second imaging follow up study defined as recurrent as well they may be considered as de novo lesions, with segmental portal venous invasion in 6 cases indicated by areas of transient hepatic attenuation differences (Kim, Kim et al. 2005). The remaining 32 cases display incomplete lipiodol concentration, 20 cases of them display residual enhancement within the primary mass/s, the remaining 12 cases display complications like de novo lesions in five cases, four of them are scheduled for second setting of embolotherapy, with portal venous segmental or main stem invasion and/or refractory ascites in seven cases.
Images for this section:

<table>
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<th>Groups</th>
<th>Local ablation group</th>
<th>Transarterial embolotherapy group</th>
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<td><strong>Subgroups</strong></td>
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<td>Radiofrequency group</td>
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<td>Complications</td>
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**Fig. 1:** Table: Summary of all cases included in our study

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![CT scans](image1)

Complete response after Chemolipiodol embolization. 59 years old man with single right lobe hepatic focal lesion proved to be primary HCC on top of cirrhotic liver after transarterial chemo-lipiodol embolization, (a) Arterial phase of triphasic CT examination showed complete concentration of lipiodol within the lesion with no difference compared with (b) delayed scan implying no residual tumoral activity within the mass. The case is classified in the group of complete response in the first imaging study after the procedure.

**Fig. 2:** Complete response after Chemolipiodol embolization

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**Fig. 3:** Complete response after Doxorubicin loaded beads embolization

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**Fig. 4:** Complete response after Doxorubicin loaded beads embolization

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Conclusion

Imaging-guided treatments for patients with unresectable hepatocellular carcinoma (HCC) include transarterial catheter-based maneuvers, such as transarterial chemoembolization (TACE), and local thermal ablative techniques, including ethanol ablation and radiofrequency ablation (RFA). (Chung, Lee et al. 2012) as well microwave ablation (MW).

Chemotherapeutic agents (e.g., doxorubicin) can be injected directly into the venous system but many side effects that may be life-threatening such as cardiac toxicity could happen, another side effect like pain, nausea, vomiting, myelosuppression, and alopecia can occur. So higher concentrations of the drug delivered to the tumor are proved to be more safe to decrease systemic exposure with systemic chemotherapy, periodic transarterial chemoembolization (TACE), which involves injection of a chemotherapeutic agent such as doxorubicin, mitomycin C, or cisplatin mixed with lipiodol which is a viscous embolic material had been used. (Kettenbach, Stadler et al. 2008)

Accurate assessment of lipiodol concentration and residual amount of active tumoral tissue is important for HCC after TACE and provides the interventionist with better information to evaluate the effect of Chemolipiodol embolization and to offer a feedback for TACE. (Xu, Xiao et al. 2015)

Repeated transarterial chemoembolization (TACE) / transarterial embolotherapy is often needed because complete response couldn't be achieved after the first session even with complete tumoral necrosis after the first post-procedural imaging follow up study. (Chung, Lee et al. 2012)

Patients with solitary lesions without recurrence appear to have more survival compared with those who develop recurrence especially with multiple tumors. (Covey, Maluccio et al. 2006)

Recurrent lesions arise just near to the previously managed focal lesions. Residual lesion means inadequate ablation. However, de novo lesion predicts bad outcome.
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References


