Viewpoint

The use of thermal ablation in the treatment of colorectal liver metastasis—proper selection and application of technology

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Colorectal cancer is the third most common cancer worldwide and it is ranked the second most frequent cause of cancer associated mortality in the western countries (1). Around 50% of colorectal cancer patients eventually develop liver metastases and when left untreated, colorectal liver metastasis (CLM) leads to only 31% survival rate at 1 year, 7.9% at 2 years, 2.6% at 3 years and 0.9% at 4 years (2). While complete surgical resection via hepatectomy is the accepted gold standard, thermal ablation has been used as an alternative or adjunctive treatment in patients with CLM. The use of thermal ablation for treatment of CLM can vary based on the local practice and individual referral pattern, however it is important to understand the proper utilization of this technology as well as its important clinical aspects.

Recently in 2020, Takahashi *et al*. systematically reviewed the role of thermal ablation for the management of colorectal liver metastasis in their published article (3). The author made clear that specific indications for thermal ablation exist and it should not be automatically used in lieu of liver resection without a prospective randomized clinical trial, even when it is technically feasible (4). This is such an important point since many medical oncologists in the community (including in our area) who treat patients with CLM do not understand the concept and technicality of liver ablation versus resection. It has been published by Groeschl *et al.* in 2014, that the local recurrence rate after liver resection is significantly lower when compared to the best thermal ablation (<1% versus 6%, respectively) (5). Thermal ablation of liver tumors located near the hilum or biliary pedicles is considered a contraindication. Concerns for suboptimal thermal ablation for superficially located liver tumors have also been debated by many experts. Despite these facts, significant bias among providers (interventional radiologists versus surgeons) remains present in determining the treatment plan for CLM. In order to help mitigate this issue, a multidisciplinary tumor board discussion is imperative to properly delineate the best individualized approach for each patient with CLM.

The use of thermal ablation as an adjunct to hepatic resection (either via open or minimally invasive method) has increased the utility of liver surgery as part of CLM treatment algorithm. Thermal ablation enables for parenchymal-sparing liver surgery principle to be followed, which allows for a future liver resection to be safely undertaken in a case of recurrent liver tumor(s), commonly seen with metastatic colorectal cancer. The ability to complete multifocal bilobar tumor clearance within a single operation is a definitive advantage of incorporating thermal ablation into the surgeon's armamentarium. Avoiding multiple procedures leads to a lower patient morbidity, earlier administration of adjuvant chemotherapy, and ultimately less financial burden to the healthcare system. For patients who can not undergo liver resection due to poor liver function, significant prohibitive medical comorbidities, or frozen abdomen from prior multiple laparotomies, the thermal ablation can provide an effective local tumor control, comparable to those of liver resection for tumors smaller than 3 cm (6). In this setting, thermal ablation leads to superior outcome when compared with selective intra-arterial chemoembolization, radioembolization, or external stereotactic radiation. It is therefore crucial for modern liver surgeons to be well versed in performing an ultrasound-guided ablative procedure intraoperatively, via 'open' and minimally invasive method.

The authors also appropriately highlighted the superiority of microwave ablation (MWA) over radiofrequency ablation (RFA) technology in terms of tumor local control. MWA is associated with a shorter ablation time, higher ablative temperature, more homogenous tissue ablation, less heat sink-effect, and therefore lower local recurrence rate (7). Due to these advantages, we prefer to use MWA technology for CLM in our practice, similar to what is seen in the majority of high-volume hepatobiliary centers in the USA.

Based on the surgical technique, the authors also pointed out the difference clinical and oncological outcomes between percutaneous and laparoscopic thermal ablation. Laparoscopic liver tumor ablation carries a clear advantage over percutaneous approach in terms of more accurately assessing the extent of liver metastasis by directly inspecting the liver surface and peritoneal lining to exclude peritoneal disease (carcinomatosis), otherwise missed by the preoperative computed tomography (CT) or magnetic resonance imaging (MRI) scans. Even positron emission tomography (PET) scan is well known to underdiagnose CLM lesions smaller than 1 cm. While the percutaneous thermal ablation under CT guidance may not require general anesthesia or hospital admission, its failure rate is higher (therefore shorter disease-free survival) when compared to the laparoscopic ablation, partly due to the reason mentioned above. Surgical approach also allows for the ablative procedure to be performed more aggressively (and more confidently) without fear of causing delayed thermal injury to the surrounding viscera.

Lastly, we would like to congratulate the authors for publishing a well-thought out paper with excellent supportive data and references. This article adds to the body of published literature on the proper application and expectation of thermal ablation for the treatment of CLM.

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Footnote

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