Comment on: Does thermal ablation increase or decrease the risk of tumor local recurrence?

Dear Editor,

We read with great interest the article by Jones et al in the October issue of Annals of Surgery(1). The authors studied the effect of cautery versus radiofrequency ablation (or microwave ablation) -RFA- upon local recurrence in a murine model of metastatic colon cancer and they concluded that the use of thermal ablation techniques to aid hemostasis may actually increase the risk of local recurrence. More importantly, they linked this phenomenon with a presumed increase of an area at sublethal temperatures (from 40 ºC to 60 ºC) in the RFA group. We also have studied this phenomenon not only in the lab(2,3) but also in the clinic in a study population of 103 patients in which we employed RF-assisted transection (RFAT) or conventional devices to perform the hepatic surgical resection(4). We demonstrated that parenchymal transection using RFAT actually reduced the risk of local recurrence especially in case of margin invasion during transection (0 % in RFAT versus 27 % in control group). In fact, the use of heat (in the global term of hyperthermia, -local, regional or whole-body-) to kill cancer cells is as old as surgery itself and still today has many applications in oncology. Namely, heat is currently employed for RFA of tumors using high temperatures but also with similar mild temperatures (40-60ºC) in applications like HIPEC (hyperthermic intraperitoneal chemotherapy) or whole-body hyperthermia. Many contradictory data remain in the literature about the beneficial/detrimental effect of these mild temperatures, e.g. there is a recent great debate about the final influence of the elicited autophagy phenomenon with mild temperatures (either pro-oncogenic or anti-oncogenic) (5,6). In fact, partial
Hepatectomy is also a major stimulus for growth of residual neoplasms that could even promote recurrence more than ablation as a recent article published in this journal demonstrated (7). Likely, many of the pro-oncogenic factor are shared by both resection and RFA, like the release of growth factors, inflammation and hypoxia of the resection margin. However, mild temperatures are known to increase tumor oxygenation (8) which further explain the synergy effect with radiotherapy and chemotherapy (HIPEC) in the clinic. In any case, since the early days of hyperthermia application it is clear that a simple detection in just a single point around ablation with such an imprecise system of surface detection of temperature (i.e. thermography) is inadequate and probably useless (9). Furthermore, we must never forget that cautery at least in the conventional clinical use and RFA are both radiofrequency energy (about 400 kHz) and the predicted deposition of energy could be similar depending on several variables (e.g. time of application, electrical variables) that are not described in detail in their article. In fact, in this article the sizes of the obtained ablation zones are not mentioned either even though a 3 mm size was aimed at. In any case, in both techniques the decreasing gradient of temperatures during energy deposition should include both high and mild temperatures and could influence the final result.

Another concern with the methodology in this article is the biological point of view of the implanted tumoral cells and the system of the recurrence evaluation which is, in fact, scarcely described. It is just said “that tumor volume was determined in 3 dimensions” but this is both geometrically and biologically imprecise: Where were they? How were tumors measured when there were several of them in the specimen? Also, oncologically, number of metastases is more relevant than tumor size (10). Moreover, it is said that “no metastases were seen in the sham mice”. How could it be? This is completely awkward.
even in an extremely small sample size for an animal group (n=6) in such “highly virulent colon cancer line” as it is already acknowledged in limitations section.

The topic raised in this article is extremely relevant but careful measurements are completely necessary both technologically and biologically before drawing definitive conclusions. In the meantime, caution should be exercised before discarding such an old technique of heat as means of tumor eradication.

REFERENCES


