Reliability of Radiofrequency Ablation of Liver Metastases from Colorectal Cancer

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Citation

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Abstract

Radiofrequency ablation has been advocated as an alternative in the treatment of liver metastases from colorectal cancer: however reliability, survival benefit and safety are still under scrutiny and no long term follow up studies are available. Many scientists suggest that randomised trials comparing radiofrequency ablation and surgery are not acceptable on ethical ground. Given the lack of large-scale studies, individual cases of liver metastases from colorectal cancer treated with radiofrequency albeit eligible for surgery, may cast some light on reliability of radiofrequency ablation.

Following right hemicolectomy for colonic cancer, a 62 y.o. female underwent complete ablation of a 2 cm metastasis in the fifth liver segment. Within a year the lesion recurred and radiofrequencies were again extensively applied. Six months later, recurrence was detected by PET scan and surgical resection was undertaken. The specimen was sent for microscopic examination.

Viable tumor cells from metastatic adenocarcinoma were detectable at the perifery of the metastatic nodule. The case had the most favourable characteristics for successful radiofrequency ablation. The dismal result, although anecdotal, may suggest that at present surgery remains the first choice treatment of liver metastases from colorectal carcinoma.

ABBREVIATIONS

PET-positron emission tomography;
US-ultrasound;
CT-computerized tomography;
NMR-nuclear magnetic resonance;
H&E- hematoxylin and eosin.

INTRODUCTION

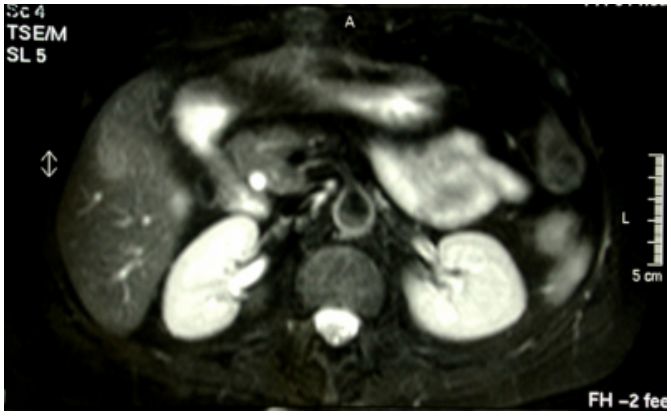
Radiofrequency thermal ablation is described as a safe, effective and well tolerated procedure in the treatment of liver tumours, both primary and metastatic. However reliability and survival benefit are still under scrutiny and no long term follow up studies are available as yet. No randomized clinical trials are presently available. A recent study has made reference to the proposed so called interval hepatic resection, advocating the use of radiofrequencies instead of watchful waiting. In the same paper the authors suggest that radiofrequencies have been used so far in suboptimal candidates only. ([1]) A non-randomized study from the Royal Free College found that 3-year median survival after liver resection and after radiofrequency ablation for solitary colorectal liver metastasis were comparable: however the number of patient is small and survival curves are preliminary. ([8]) So far there is general consensus that surgery remains the golden standard for the treatment of liver metastases from colorectal carcinoma and surgical resection should be offered to all patients who have potentially curable disease and no contraindications for surgery. ([2,3,4]) We report on a case of a small and easily accessible solitary colorectal liver metastasis that was treated by radiofrequency ablation. Although anecdotal, the case may add useful information to this presently debated issue.

A 62 year old lady underwent a right hemicolectomy and lymph node dissection for a Dukes C1 (pT3, N1, M0) colon adenocarcinoma. Evaluation for metastatic disease, by ultrasound (US) and CT scan, was negative both preoperatively and one month following surgery.

At a nuclear magnetic resonance study (NMR) done two months after surgery, a 1.5 cm lesion was detected at the border between V and VI liver segment (fig. 1).

Figure 1

Figure 1: Nuclear magnetic resonance study, two months after original surgery: a 1.5 cm lesion at the border between V and VI liver segment.



The finding was confirmed one month later by US and CT scan, the latter suggesting that the diameter had increased to 2 cm.

The patient refused to undergo surgery again, only a few months after colonic resection; therefore the attending physician addressed her to a qualified centre for percutaneous radiofrequency ablation. Four months following primary surgery she received a 12 minute treatment with a mean 1400 mA. The procedure was interpreted as fully successful at a CT scan performed the following day (fig. 2) and then again at 3 months intervals for the two following years.

Figure 2

Figure 2: CT scan performed the day following radiofrequency ablation: radiological complete regression of the lesion at the border between V and VI liver segment.

At 27 months follow up, the CT scan revealed a definite increase in size of the area previously treated by radiofrequency ablation. The patient underwent a second percutaneous radiofrequency treatment: two insertions of three electrodes were done, for a total 28 minutes treatment with a mean 1800 mA: the CT scan control revealed a 6 cm area of thermal necrosis, and the procedure was considered successful. A NMR done one month later, casted some doubt that residual disease could be present on the medial margin of the treated area: the suspicion was confirmed at PET scan.

The patient was offered a third treatment by percutaneous radiofrequency, but at this stage she asked for surgical consultation. Laparotomy and wide surgical excision was done soon thereafter, encompassing the V and VI segments. Shortly after surgery, the specimen (8 x 7.5 x 6 cm) has been sliced at 0.5 cm, fixed in buffered formalin for 24 hrs and completely embedded in paraffin. Multiple sections have been taken from every block and stained with H&E for microscopic examination. The bulk of the nodule was necrotic while well preserved adenocarcinoma cells were detectable at the periphery of the metastatic nodule that was surrounded by a fibrous pseudocapsule and tumor free liver parenchyma (fig. 3-4).

Figure 3

Figure 3: Microscopy of neoplastic tissue in the area previously treated with radiofrequencies.

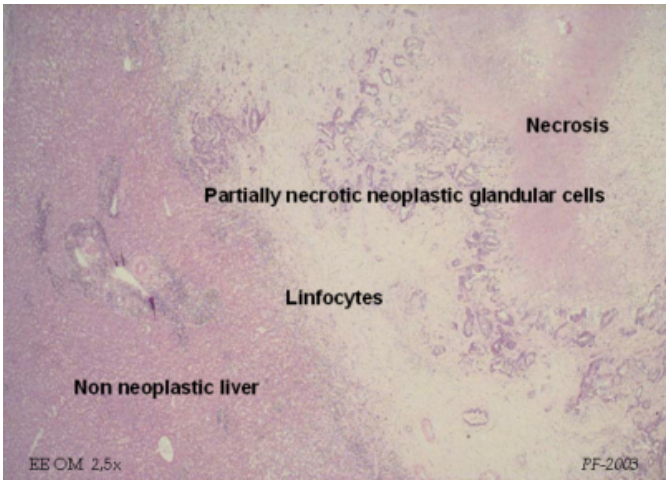
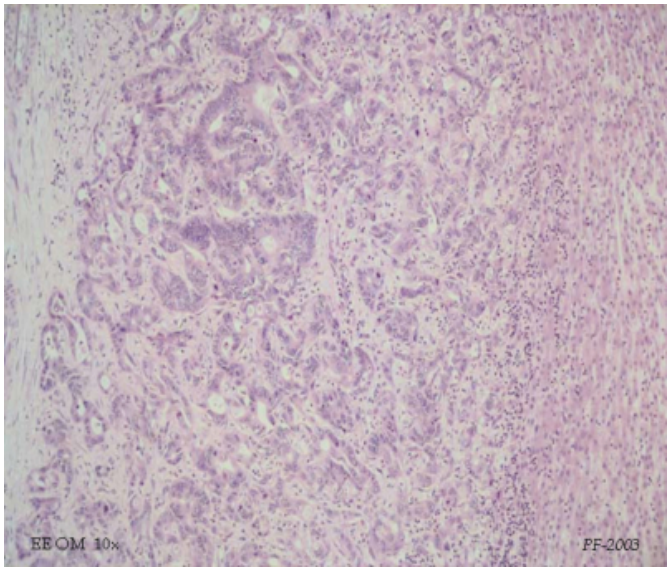


Figure 4

Figure 4: Detail, at higher resolution, of glandular neoplastic tissue.



DISCUSSION

Radiofrequency ablation is an appealing recently developed technique aimed to cause thermal necrosis of tissues by applying radiofrequency radiations within the tissues themselves. Possible pitfalls and limits of the technique have been extensively addressed in the literature and some problems have been successfully solved. ([5,6,7]) Recently, consensus has been gathered on the role of intraoperative radiofrequency in combination with surgery for the treatment of multiple metastases. ([8,9]) However, in spite of improvements and reported successes of percutaneous radiofrequency ablation, there is general consensus that at present surgery represents the golden standard of treatment for metastatic liver disease and should be offered to all patients unless serious contraindications are present. ([10])

This concept has been reaffirmed by Primrose in a review article on the treatment of colorectal metastases ([2]), in which all presently available treatments are compared, to conclude that so far there is no convincing evidence that radiofrequency ablation is superior or equal to surgery in terms of (a) reliable ablation of all neoplastic tissue, (b) improvement of long term survival, (c) safety, as for mortality and mainly morbidity. We ourselves, in three instances have found persistence of viable tumour cells in the area of liver colorectal metastases pretreated with radiofrequency ablation.

According to the literature and to our surgical experience, we do believe that the patient described in this report should have been treated surgically from the beginning. However she also had all the characteristics that the radiologists consider the best prerequisites for a fully successful radiofrequency ablation: a single lesion smaller than 3 cm in diameter, easily accessible, located not too close to large vessels or biliary ducts.([7]) The technique applied was undoubtedly adequate, and the results were evaluated using the currently accepted imaging criteria. Therefore the relapse and the finding of vital tumour in the surgical specimen following the second and even more extensive thermal ablation, is an indication that the procedure may not be as fully reliable as one would like, before considering it as an acceptable alternative to surgery.

Evidence in favour or against radiofrequency ablation as the first choice treatment of liver neoplasms could only be obtained by conducting randomised trials, comparing surgery and radiofrequencies. However, so far it seems that there has been reluctance in undertaking similar studies. Therefore anecdotal cases fortuitously allocated to radiofrequency ablation, in spite of clear eligibility to curative surgery, may be worth reporting and collecting as a tool to evaluate this interesting little invasive technique of ablation.

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