Short report

Radiofrequency thermoablation in locally advanced breast cancer

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Abstract

The authors report their experience of 8 cases of breast cancer in six patients, treated by radiofrequency thermoablation. Two patients had bilateral breast cancer infiltrating the skin. All patients, but one, were alive at two years follow-up. The age range was 54–75 years old (median, 71 years old). We observed complete regression in one patient, regression with residual scar in two patients and partial regression in the remaining three patients.

The authors believe that radiofrequency, alone or associated with other treatments, is an easy and useful alternative for the management of breast cancer, in selected patients who cannot undergo surgery or refuse surgical treatment and other treatments.

Introduction

Thermoablation is an easy and repeatable procedure and it can be carried out as a day case under local anaesthetics. Furthermore, it can be associated with other treatments like surgery, hormonal therapy, radiotherapy, and preoperative bulk reduction chemotherapy. A preliminary feasibility studies carried out by Fornage BD et al.2 has shown the safety and feasibility of US guided radiofrequency thermoablation in small (<2 cm) breast cancer.

We report our experience of radiofrequency thermoablation in larger breast cancers (median size of 4 cm), of which three had palpable axillary nodes.

Material and methods

Over a period of 36 months we treated 8 cases of breast cancer by thermoablation. All patients had local advanced disease. Two patients had bilateral advanced breast cancer.

All patients had refused to undergo surgical treatment and chemotherapy as perceived as high risk, despite having been informed accurately of the risk/benefit of any treatment.

Contributing factors that had led patients to refuse any form of surgical treatment were recent stroke, past history of other types of cancer (including malignant skin cancer and uterine cancer), depression, severe heart disease. All patients competence was carefully assessed before considering their decision as binding.

Median age was 71 years old (range: 54–75 years old). Median tumour size was 38.5 mm (range: 25 mm to 60 mm) (Table 1). In three cases, axillary nodes were palpable prior to treatment. In four patients carcinoembryonic antigen (CEA) and Cancer Antigen 15–3 (Ca 15–3) were raised. Mammograms and cytology were positive in all patients (Fig. 1). Hormone receptor status is reported in Table 1.

Prior to the procedure all patients underwent a standard preoperative workup consisting of Chest X-ray, ECG, routine blood tests, as requested by the anesthetist, should sedation or emergency intubation be required, and oncologic markers, as per internal protocol.

The procedure was carried out using Valleylab’s Cool-tip™ RF Electrode ACT2030 needles that were inserted inside the tumour under ultrasound guidance. The radiofrequency generator was used to deliver a temperature of 60°C for 15 min within the tumour. Ultrasonography was used to assess the effectiveness of the treatment. During vaporization of the tumour associated to the thermal effect a hyperechoic area extended gradually to the whole tumour. In all patients the procedure was successfully carried out under local anaesthesia.

In the weeks that followed the procedure the gradual disappearance of peritumoral inflammation was assessed ultrasonographically. In one patient who was affected by severe cardiac disease and orthopnoea, the procedure could be carried out with the patient sitting in upright position.

One diabetic patient who had a nodule infiltrating the cutaneous layer suffered a second degree skin burn, which was successfully treated with simple dressings and careful monitoring of blood glucose levels.

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Table 1
Features of patients with breast cancer treated with TA at our institution.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Age</th>
<th>No. of breast cancers</th>
<th>ERc</th>
<th>PgR</th>
<th>Ki67</th>
<th>Tumour size before T.A.</th>
<th>Tumour size after T.A.</th>
<th>Associated Pathologies</th>
<th>Related treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DS</td>
<td>54</td>
<td>1</td>
<td>+</td>
<td>+</td>
<td>30%</td>
<td>35 mm</td>
<td>0 mm</td>
<td>Depression</td>
<td>A.I.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hysterectomy for Primary carcinoma</td>
<td></td>
</tr>
<tr>
<td>2 NC</td>
<td>69</td>
<td>1</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>37 mm</td>
<td>10 mm scar</td>
<td>Stroke</td>
<td>A.I.</td>
</tr>
<tr>
<td>3 AD</td>
<td>72</td>
<td>1</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>30 mm/50 mm</td>
<td>15 mm/30 mm</td>
<td>Ischaemic Heart Disease</td>
<td>TAM</td>
</tr>
<tr>
<td>4 OG</td>
<td>73</td>
<td>2 bilateral)</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>50 mm/60 mm</td>
<td>30 mm/35 mm</td>
<td>Bone Metastasis</td>
<td>A.I.</td>
</tr>
<tr>
<td>5 SM</td>
<td>70</td>
<td>2 (bilateral)</td>
<td>+</td>
<td>+</td>
<td>20%</td>
<td>25 mm</td>
<td>12 mm</td>
<td>Congestive heart Failure</td>
<td>TAM</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Pericarditis</td>
<td></td>
</tr>
<tr>
<td>6 MG</td>
<td>75</td>
<td>1</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>40 mm</td>
<td>10 mm scar</td>
<td>Depression</td>
<td>TAM</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aortic Aneurysm</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Senile dementia</td>
<td></td>
</tr>
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</table>

Fig. 1. Mammogram of patient D.S. prior to TA.

Fig. 2. Mammogram of patient D.S. after TA.
Hormonal therapy was prescribed to all patients. Tamoxifen was administered to three patients whereas the other three patients were treated with aromatase-inhibitors, due to high thromboembolic risk.

Results

At two-years follow up, five patients were alive. One patient who had undergone TA, following reduction in size of her tumour decided at a later stage to undergo surgery and chemotherapy at another institution and died thereafter. All reported a good quality of life. In two patients the tumour markers had returned to normal values. In one patient there was a complete regression of the tumour with stabilization of the disease. In no patient there was an observable rapid progression of the disease. One patient, with bilateral advanced disease, died three years after treatment.

Discussion

The effect of heat on cancer cells has been known since ancient times. The ancient greek physician Hippocrates had already indicated the benefits of heat to treat tumours.

Thermoablation is a technique that uses radiofrequency waves to generate heat and cause coagulative necrosis of tissues. It can be associated with tumorectomy to reduce the risk of local recurrence, and with preoperative chemotherapy to reduce the bulk of the tumour. Its use has been advocated in conservative breast surgery (e.g. lumpectomy).1,5

The use of thermoablation to treat early stage breast cancer has been reported to achieve promising results by several authors, mainly in pilot studies and phase II studies.2,3,5–8

In a review of literature carried out on 17 studies, the authors conclude that RFA represents a promising therapeutic modality for the treatment of breast cancer.9

It has been suggested that by releasing cytokines, thermoablation could stimulate the immune system to attack cancer cells.4

In our limited experience the use of radiofrequency in breast cancer at different stages seems a valid tool in selected patients who refuse conventional surgery or other treatments or when surgery is contraindicated. Thermoablation has several advantages: it is easy to perform, it can be carried out under local anaesthetics as a day case, it is repeatable, and is more easily accepted by patients.

Conclusion

The use of radiofrequency ablation without surgical excision in locally advanced breast cancer seems to be a promising tool that could be useful in selected cases where surgery is not feasible.

In our small series, we observed a significant size reduction of the tumour and stabilization of the disease in all patients with locally advanced disease who otherwise would have undergone hormonal therapy alone. Although the role of TAM or AI has to be taken into account, we believe that the extent of tumour size reduction and the length of survival could not be accounted by hormonal therapy alone.

However, larger series are necessary to evaluate the effectiveness, limits and indication of thermoablation in the treatment of early and advanced breast cancer.

Ethical approval

The authors declare that ethical approval was not required.

Conflict of interest statement

The authors declare that no conflict of interest exists.

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References