

The role of MRI in the diagnosis of acute radiation reaction in breast cancer patient

This content has been downloaded from IOPscience. Please scroll down to see the full text.

2016 J. Phys.: Conf. Ser. 677 012012

(<http://iopscience.iop.org/1742-6596/677/1/012012>)

View [the table of contents for this issue](#), or go to the [journal homepage](#) for more

Download details:

IP Address: 92.63.74.76

This content was downloaded on 07/02/2017 at 09:22

Please note that [terms and conditions apply](#).

You may also be interested in:

[Modelling of the dielectric properties of normal and irradiated skin](#)

T Tamura, M Tenhunen, T Lahtinen et al.

[Magnetic Braking and Protostellar Disks](#)

Richard R. Mellon and Zhi-Yun Li

The role of MRI in the diagnosis of acute radiation reaction in breast cancer patient

Zh A Startseva^{1,2}, L I Musabaeva¹, AV Usova^{1,3}, I G Frolova¹, K A Simonov^{1,2},
V V Velikaya^{1,2}

¹ Cancer Research Institute, Siberian Branch of the Russian Academy of Medical Sciences, Tomsk, Russian Federation

²National Research Tomsk Polytechnic University, Tomsk, Russian Federation

³Neurobiology Lab, Research Institute of Biology and Biophysics, Tomsk State University, Tomsk, Russian Federation

E-mail: simonov_ka@bk.ru

Abstract. A clinical case with acute radiation reaction of the left breast after organ-preserving surgery with 10 Gy IORT (24.8 Gy) conventional radiation therapy has been presented. Comprehensive MRI examination showed signs of radiation-induced damage to skin, soft tissues and vessels of the residual breast.

1. Introduction

Radiotherapy is important part of combined treatment of breast cancer. The outcomes of many randomized trials suggest that the use of postoperative radiotherapy significantly reduces the number of breast cancer recurrence, the overall 5 - year survival rate reaches high levels (87-95%) [3, 5, 6, 7].

Currently, a new method - intraoperative radiation therapy (IORT), which is conducted by an electron beam of different energy is an important direction in the radiation oncology [1, 2, 4]. The main advantage of IORT is that during the surgery the radiation source can be more accurately sum directly to the tumor bed.

In many centers after IORT performed distant gamma - therapy on the entire volume of the rest of the breast. One of the main problems in evaluation of the remaining breast tissue after intensive radiotherapy. Several, cases of radiation reactions and injuries after the operations and IORT breast tissue had been described in the literature [1, 2].

Tomsk Cancer Research Institute conducted a study of acute radiation reactions during the postoperative period. Typical reactions include erythema, dry and wet epidermatit and late radiation damage to the I-II severity. Magnetic - resonance imaging (MRI) is important characterization of radiation reactions and damage of the remaining breast tissue in conditions of high-dose radiotherapy.

2. Methods

A clinical case with acute radiation reaction of the left breast after organ-preserving surgery with 10 Gy IORT (24.8 Gy conventional radiation therapy) has been presented.



Patient Ch., age - 38 years old, was treated in the Tomsk Cancer Research Institute with the diagnosis of cancer of the left breast B II (T2N1M0). In December 2010, the patient was diagnosed: in the bottom - inner quadrant of the left breast was detected neoplasm 28x23x30 mm with irregular, indistinct contours, the presence of single calcifications. The density of high education, the structure of his uniform. Ultrasonography revealed a suspicion of metastatic lesion of the left axillary lymph node, which was confirmed by cytological examination after biopsy.

In January 2011, the patient performed organ-preserving surgery: sectoral resection of the left breast. Macropreparations: in breast tissue defined tumor site in diameter - 3 cm. After removal of the tumor with the capture of healthy tissue around the edge of a 1.0 cm by resected tumor bed held IORT 6 MeV fast electron, a single dose of 10 Gy, which corresponds to 24.8 Gy the standard rate of photon therapy.

The appearance of the left breast after healing wounds and stitches are removed 20 days after surgery and IORT of: the remaining part of the breast is greatly increased in size, swelling in the lower parts of the breast - marked flushing of the skin, radiation tissue infiltration in the area, where they spent the IORT, severe pain (figure 1).



Figure 1. The appearance of the left breast by 20 days after surgery and IORT

To assess of the radiation reaction in the tissue of the left breast MRI study was conducted. According to the MR imaging of the mammary glands in T1-, T2-weighted mode and using dynamic contrast enhancement 10 ml Magnevist determined a significant asymmetry of the breasts by a massive edema of the left breast, and increase its size by more than half compared to the right. Are visualized postoperative changes of the left breast in the form of a unit cysts 2-3 mm fine hematoma 12 x 9 mm tissue swelling during the random access more pronounced (figure 2).

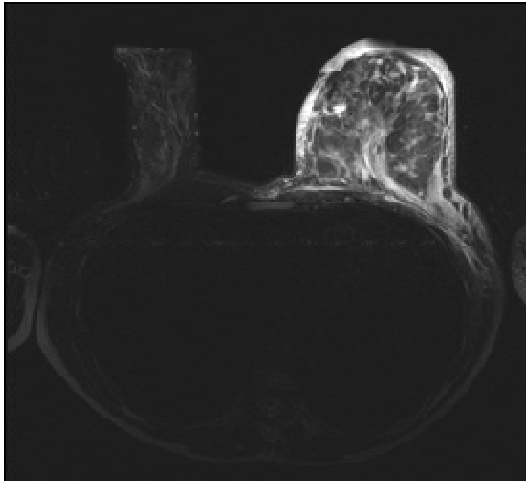


Figure 2. MRI: T2-TSE-Fat, the axial projection. Post-operative changes and intraoperative radiation therapy in a single dose – 10 Gy).

3D reconstructions subtraction scans arterial phase is determined by the asymmetry of blood flow to increase the diameter of blood vessels, and their number with the visualization of smaller branches, which is regarded as an expression of acute radiation reaction of the rest of the left breast after intraoperative radiation therapy (figure 3).

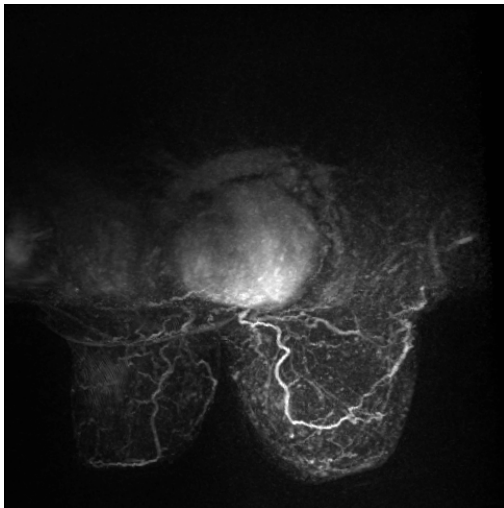


Figure 3. 3D reconstructions subtraction scans arterial phase. The course of laser therapy for treatment of acute radiation reaction: swelling and tenderness of the breast decreased significantly.

In the control MR imaging after laser therapy: positive dynamics - reducing the size of the left breast, swelling and severity of the reaction vessels (figure 4).

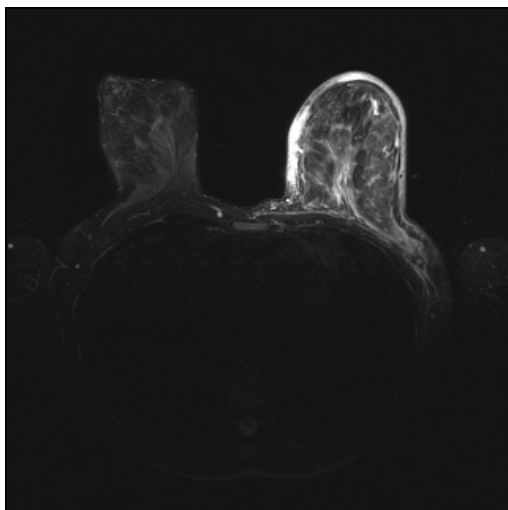


Figure 4. T2-TSE-Fat - sat, axial projection. Marked reduction in the size of the left breast, and the severity of tissue edema.

The patient was prescribed a course of external beam radiotherapy in standard dose fractionation for the rest of the breast. After reaching a total dose on the left breast - 20 Gy increased radiation reaction was observed: bright redness of the skin of the left breast, hyperpigmentation, edema and the presence of a defect in the skin - more than 1 cm in the mammary fold as a manifestation of focal moist dermatitis. Remote gamma therapy has been interrupted for a week and continued magnetic laser therapy. A total of 15 treatments with a pronounced effect. The local dose of radiation therapy increased to 46 Gy. The total (IORT and RT) was 60 Gy in the area of the bed of the removed tumor. In the area of regional lymph nodes - 44 Gy.

3. Conclusions

Thus, in the present case after breast-conserving surgery with 10 Gy (24.8 Gy) IORT diagnosed acute radiation reaction of the remaining breast tissue, the symptoms of which have been identified and described in detail MRI examination. The clinical picture of acute radiation reaction gradually changed after treatment: marked reduction in the size of the breast, the remaining breast tissue is softer, no pain, the patient's condition improved significantly.

References

- [1] Medvedev F V, Mardinskyi Yu S, Gulidov I A, Smirnova I A 2010 *Oncosurgery* **2** (3) 46
- [2] Musabaeva L I, Zhogina Zh A, Lisin V A, Slonimskaya E M 2010 *Medical Radiology and Radiation Safety* **55** (5) 42
- [3] Musabaeva L I, Slonimskaya E M, Zhogina Zh A 2002 Manual for physicians Tomsk
- [4] Musabaeva L I, Startseva Zh A, 2011 *Siberian journal of Oncology* (2) 79
- [5] Simonov K A, Startseva Zh A, Slonimskaya E M 2013 *Siberian journal of Oncology* **2** (56)
- [6] Simonov K A, Startseva Zh A, Slonimskaya E M 2012 *The Siberian Scientific Medical Journal* **32**(6) 34
- [7] Startseva Zh A, Simonov K A, Musabaeva L I, Velikaya V V 2013 *Radiation and Risk* **22** (3) 72