Irradiation of malignant exophthalmos in the course of Graves Basedow disease

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SUMMARY

AIM: To present results of irradiation of ophthalmopathy in the course of Graves-Basedow disease performed in the Radiotherapy Laboratory in University Children's Hospital in Cracow by staff of the Oncology Clinic, Collegium Medicum Jagiellonian University (CM UJ).

MATERIAL AND METHOD: During the period of 2000–2003 therapeutic irradiation of the retrobulbar area was performed in 121 patients with malignant exophthalmos using a total dose of 20 Gy/ 10 fractions of 6 MV photonic beam in the Radiotherapy Laboratory in University Children's Hospital in Cracow. Execution of the treatment plan was controlled by in vivo dose measurements using semiconducting detectors, MOSFET type. Radiotherapy was preceded by intravenous corticosteroid therapy (Solu Medrol) with a dose of 2g/ week for 4 weeks.

RESULTS: During the irradiation treatment 9 patients (7.4%) developed an acute post-radiation reaction of transient character. Ophthalmological control examination revealed an improvement in 97 patients (80.2%) in the form of reduction or total regression of ophthalmopathy symptoms; in 21 other patients (17.3%) stabilization was noted and progression in 3 (2.5%).

CONCLUSIONS: Radiotherapy is a well-tolerated method of ophthalmopathy treatment in the course of Graves-Basedow disease. Efficacy of radiotherapy as an exclusive method of malignant exophthalmos treatment seems to be lower in comparison to irradiation combined with corticosteroid therapy.

KEY WORDS: malignant exophthalmos, radiotherapy, combined treatment

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INTRODUCTION

Radiotherapy has been for many years one of the methods used in treatment of ophthalmopathy occurring in the course of Graves-Basedow disease [1, 2]. The aim of this therapeutic procedure is first of all to inhibit disease progression and reduce or eliminate the functional impairment of the organ of sight and to improve the patient's appearance. It is significant that ophthalmopathy irradiation is accompanied by few side effects [3, 4, 5, 6, 7, 8, 9, 10].

The disease is a result of an autoimmunological process. Activated suppressor T lymphocytes infiltrate the muscles moving the eyeball which leads to their thickening. Some cytokines stimulate orbital fibroblasts to synthesise glycosaminoglycans that absorb water in the retrobulbar area [11, 12, 13, 14, 15, 16, 17, 18]. As a result of this the patient starts to develop ophthalmic symptoms involving periorbital soft tissues, eyelids, oculomotor muscles and even optic nerves [19, 20, 21].

AIM

Diagnosis of ophthalmopathy is mainly based on clinical data. The aim of ophthalmological examination is to assess the state of eyelids, conjunctivas, exophthalmos, oculomotor muscle dysfunction, cornea and visual acuity [22, 23, 24]. In the case of euthyreosis an imaging examination of orbital regions (computed tomography – CT, magnetic resonance – MR) is performed to find the cause of ophthalmic symptoms [25, 26, 27, 28, 29, 30, 31, 32, 33].

MATERIAL AND METHOD

Patients with infiltrative ophthalmopathy in the course of Graves-Basedow disease are qualified in our centre for irradiation treatment according to the following criteria:

1) euthyreosis assessed on the basis of TSH, T3, T4, FT4 levels,

2) qualification for therapy by a consulting ophthalmologist, i.e. ophthalmic symptoms according to the Werner modified scale correspond at least to 3c class [34, 35],

3) CT of the orbits shows characteristic features of Graves-Basedow disease (thickening of straight muscles in both orbits which may be accompanied by increased fat tissue, damaged optic nerve and enlargement of the lacrimal gland),

4) patient's consent to proposed treatment.

Patients were initially treated with glucocorticosteroids (Solu Medrol) administered intravenously – 2g per week for 4 weeks in the Endocrinology Clinic CM UJ. Ambulatory irradiation of retrobulbar areas was performed in the Radiotherapy Laboratory in University Children's Hospital in Cracow by staff of the Oncology Clinic, CM UJ. Overall during the period from January 2000 to December 2003 121 patients were irradiated (91 women – 75.2% and 30 men – 24.8%). Mean age was 55.1 (age range: 32 – 85).

Before the treatment initiation an individual plexiglass mask was created for all the patients which allowed the limits of irradiation fields to be reconstructed. CT examination of the orbits was performed in all the patients for therapy planning purposes. Due to the need to precisely define the distance between irradiation field margins and lenses, the distance between tomography layers was 3 mm. Irradiation technique was based on exposing the retrobulbar area to the effect of two opposite, isocentric beams which would create one, common (flat) line from the lens direction (Fig. 1) [36, 37]. The area of extraorbital structures was protected by shields made of Wood's alloy. Dimensions of the irradiation field were within limits of 4 cm x 5 cm. To irradiate the retrobulbar areas a photon beam (energy of 6 MV) emitted by a Mevatron Primus accelerator was used. Planned dosage of radiation was 20 Gy applied in 10 fractions. The schedule of ophthalmopathy was arranged in the treatment planning system. Each patient had a planning tumour volume (PTV) area projected (left PTV and right PTV containing retrobulbar area together with peribulbar muscles and critical organs, i.e. lenses and eyeballs). Evaluation of dose distribution in the treated area and critical organs was possible as a result of the use of dose volume histograms (DVH) from the treatment planning system (Fig. 2). Execution of the treatment plan was controlled by in vivo measurements of doses using semiconducting, MOSFET type detectors. Dosage was controlled once during

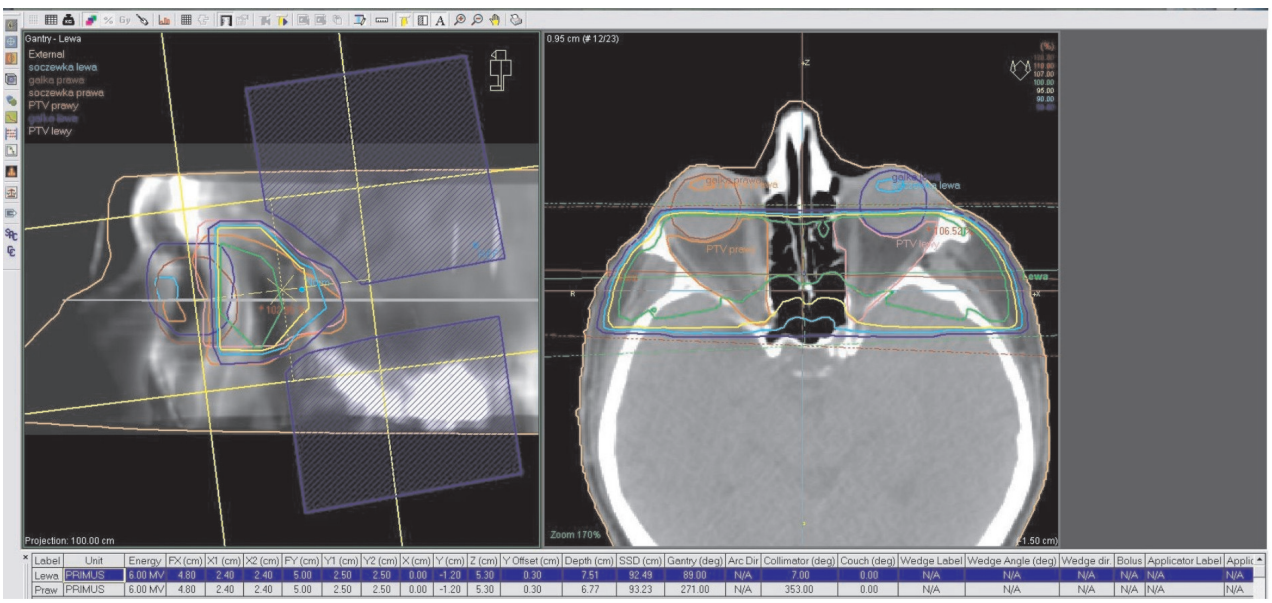

Fig. 1. System of beams and dose distribution durring irradiation of the retrobullar area in Graves Basedow disease