

# **Modification of "Box" technique for external beam radiotherapy of pelvis with Co-60 beam**

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**Introduction** “Box” technique at external beam radiotherapy is one of the mainstream methods for radiation therapy of pelvis in many diseases. It comprises a considerably large volume, which includes organs at risk such as bladder and rectum.

- Our goal is to reduce as much as possible the irradiated volume without missing important elements of the clinical target volume (CTV).

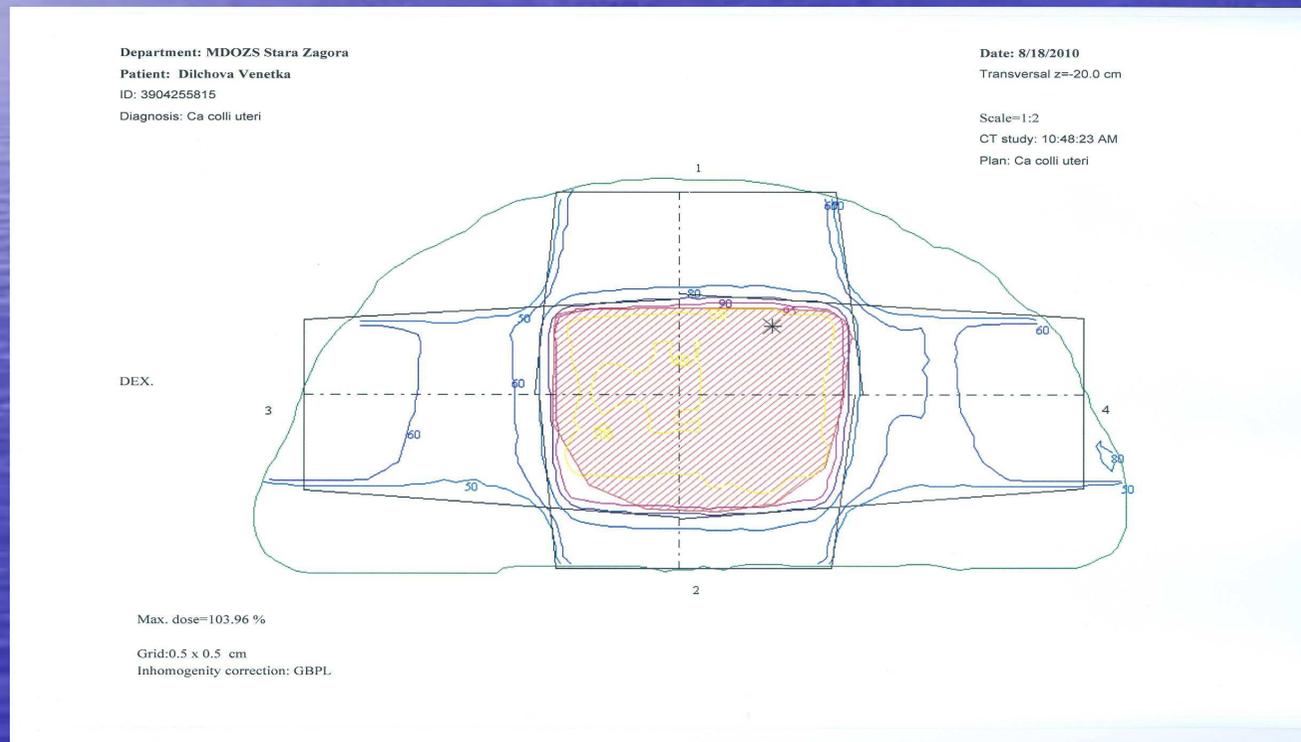
# Methods

- The treatment dose applied in pelvis is normally 50-60Gy. With external Co-60 treatment the planned target volume (PTV) usually includes entirely the organs at risk – the bladder and the rectum. Using images of patients scanned with CT-simulator Siemens Sensation Open 24 (24 slices) we were able to examine the PTV in detail.

# Methods

- Treatment of patients was done with Co-60 teletherapy unit TERABALT without multileaf collimator. Due to the big workload of the teletherapy unit it was impossible to produce individual shielding blocks for the patients. Therefore, a collimator rotation angle of 5 to 10° of the lateral fields in the direction from the symphysis to the sacral promontory helped to reduce their width. This reduced the excess volume exposure. Until now 46 patients were irradiated. Examination of the patients on the CT-simulator showed coverage of the entire volume without significant miss of the structures of the CTV.

# Standard box technique"- this is two of two parallel opposite equally fields "



# New in the "box technique"

Fig. 1. Location of the 4 fields in transversal slice.

Fig. 2. Ordinary location of the lateral fields.

Fig. 3. New – on the same fields, the collimator is rotated by 5 to 10° – in the anterior and cranial towards the posterior and caudal direction.

Fig. 1

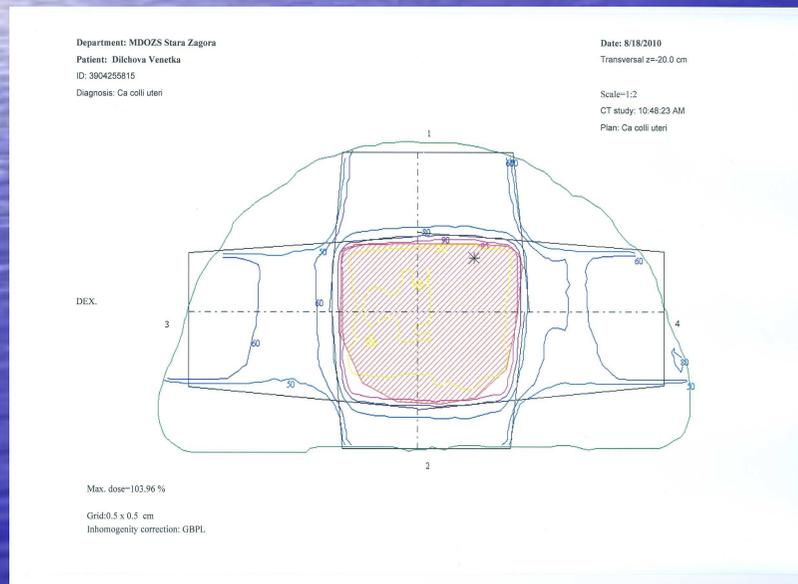


Fig. 2

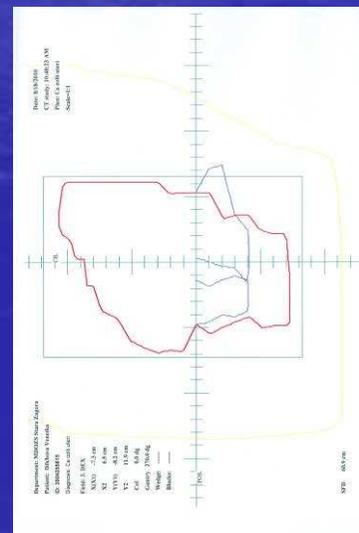
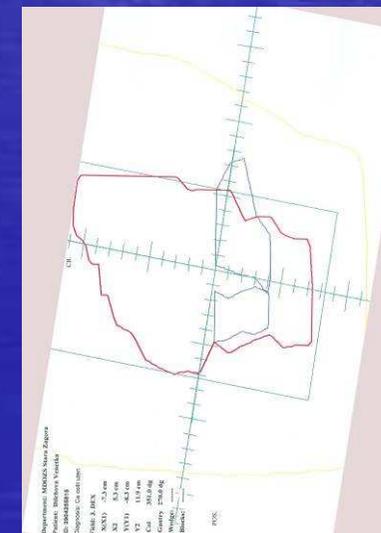
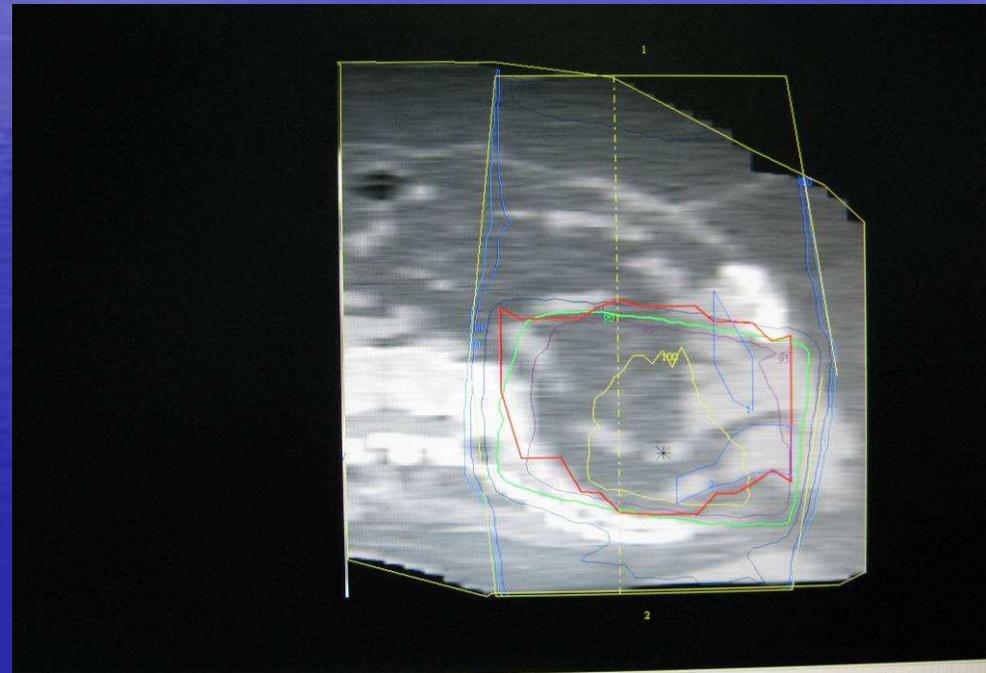


Fig. 3



# In sagittal slice

- The new methodology is particularly preferred when the difference in height of promontorium and coccyx is significant. Then, it is necessary to rotate the lateral fields in the anterior-posterior direction by  $10^\circ$ .



In dose-volume histograms:

Fig. 1. With the ordinary methods, the rectal and bladder doses are higher than the doses in the PTV.

Fig. 2. With oblique lateral fields doses in bladder decrease with 10-20%.

Fig. 1



Fig. 2



red- PTV, blue – bladder, green – rectum, yellow - skin

# Results

- The resulting dose-volume histograms showed a decreased bladder dose of the range of 40-42 Gy. Follow-up of the reactions of 40 patients (out of 46) proved that they had proctitis complaints and significantly fewer complaints in the bladder.
- In 4 patients proctitis and cystitis were reported.
- In 2 patients there were no complaints.
- In common methodology, both proctitis and cystitis complaints are reported simultaneously in most cases.

# Conclusions

- A simple modification of the Box technique for pelvic irradiation used in Co-60 external beam radiotherapy can lead to a significant reduction of the dose to bladder and the decrease of consecutive reactions.