

UNIVERSITY OF GOTHENBURG

**Towards eliminating pelvic bone pain after radiation therapy  
among long-term gynecological cancer survivors**

Akademisk avhandling

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av

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Avhandlingen baseras på följande delarbeten:

- I. **Waldenström AC**, Alsadius D, Pettersson N, Johansson KA, Holmberg E, Steineck G, Müller M. Variation in position and volume of organs at risk in the small pelvis. *Acta Oncol.* 2010;49(4):491-9.
- II. Lind H, **Waldenström AC**, Dunberger G, al-Abany M, Alevronta E, Johansson KA, Olsson C, Nyberg T, Wilderäng U, Steineck G, Åvall-Lundqvist E. Late symptoms in long-term gynecological cancer survivors after radiation therapy: a population-based cohort study. *Br J Cancer.* 2011;105(6):737-45.
- III. **Waldenström AC**, Olsson C, Wilderäng U, Dunberger G, Lind H, al-Abany M, Palm Å, Åvall-Lundqvist E, Johansson KA, Steineck G. Pain and Mean Absorbed Dose to the Pubic Bone After Radiotherapy Among Gynecological Cancer Survivors. *Int J Radiat Oncol Biol Phys.* 2011;80(4):1171-80.
- IV. **Waldenström AC**, Olsson C, Wilderäng U, Dunberger G, Lind H, Alevronta E, al-Abany M, Tucker S, Åvall-Lundqvist E, Johansson KA, Steineck G. Relative Importance of Hip and Sacral Pain Among Long-term Gynecological Cancer Survivors Treated with Pelvic Radiotherapy and their relationships to Mean Absorbed Doses. *Int J Radiat Oncol Biol Phys.* 2012;84(2):428-36.

## **Towards eliminating pelvic bone pain after radiation therapy among long-term gynecological cancer survivors**

**Aim:** To investigate the prevalence of self-reported symptoms after pelvic radiation therapy among long-term gynecological cancer survivors, with special focus on pelvic bone pain, how it affects the daily life of the women and the relationship to absorbed doses.

**Methods:** In an unselected, population-based study, gynecological cancer survivors from the Gothenburg and Stockholm regions, treated with pelvic radiation therapy between 1991 and 2003, were compared with a non-radiation-treated control population. Data were collected by means of a study-specific, validated, postal questionnaire with 351 questions reflecting symptoms from the pelvic organs including demographics, co-morbidities, psychological and quality-of-life issues. Treatment details were retrieved from medical records, organs at risk delineated on pretreatment scans, and dose-volume histograms exported. We used epidemiological methods for study design and data interpretation.

**Results:** Among cancer survivors 78 % (616/789) returned a completed questionnaire, among control women 72 % (344/478). Median follow-up was 74 months (26-179 months). Cancer survivors reported a higher occurrence of symptoms from all organ systems studied; the anal sphincter, the bowels, the urinary tract, the pelvic bones, symptoms related to sexuality, and symptoms from lower abdomen and legs. The highest age-adjusted relative risks among all survivors were found for emptying of all stools into clothing without forewarning, relative risk 12.7, and for defecation urgency with an immediate need for a toilet, relative risk 5.7, compared to controls.

Pubic bone pain was reported by 11% (73/637) of all survivors and by 4% (12/339) of the controls. Hip pain was reported by 36% (225/632) of the survivors and sacral pain by 39% (249/633). Hip and sacral pain were common among controls, 33% (113/343) and 52% (179/344), respectively.

Pubic bone pain showed a six-fold increase among survivors who had received radiotherapy as only treatment, a ten-fold increase for pubic bone pain walking indoors and a six-fold increase walking 500 m, compared with controls. Survivors treated with radiotherapy in combination with surgery showed a three-fold increase in pubic bone pain, and a four-fold increase both in pain walking indoors and in pain walking 500 m.

Daily pain from the hips when walking 500 m showed a four-fold increase among survivors treated with radiotherapy as only treatment, and a three-fold increase for daily pain both in hips and sacrum when walking indoors, compared with controls.

Mean absorbed dose to the pubic bone was a significant predictor of pain. The frequency of pubic bone pain among survivors exceeded that of controls at mean absorbed doses of 30 Gy and for hip pain at 37.5 Gy.

**Conclusions:** Our data suggest that radiation-induced pubic bone pain dominates pelvic bone pain among gynecological cancer survivors treated with radiation therapy. Hip and sacral pain being common among controls illustrates the importance of specifically asking about walking difficulties to single out treatment-related symptoms. Keeping the mean absorbed pubic bone dose below 30 Gy and the hip dose below 37.5 Gy may keep the occurrence of long-lasting pelvic pain among survivors of gynecological cancer at the level of the occurrence reported by non-irradiated women.

**Keywords:** Pelvic radiotherapy, Gynecological cancer, Pelvic bone pain, Dose-volume response