

Capstone for Impact Submission | GY2019

Project Title: Radiation-Induced Insufficiency Fractures after Pelvic Irradiation for Gynecologic Malignancies: A Systematic Review

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Branch: Diagnostics & Therapeutics

Path of Excellence: N/A

Handover/Transition:

If this project can be continued by another UMMS student, you may contact them at the following email address/phone number (N/A if project cannot be handed over): **N/A**

Summary:

Pelvic insufficiency fractures (PIFs) are an under-appreciated late toxicity of radiation therapy for gynecologic malignancies. Through a systematic literature review we further define incidence, risk factors, and management practices of PIFs. With an improved understanding of PIFs, additional studies can be developed to identify optimal prevention and treatment strategies.

Methodology:

A systemic literature review (PubMed indexed from 1980 to 2018) of studies describing PIFs that result from radiation therapy for gynecologic malignancies.

Results/Conclusion:

Thirty-one studies describing PIFs following radiation therapy for gynecologic malignancies were reviewed. Among 30 studies, crude incidence of PIF ranged from 0.4-100% (median 8.0%), with conventional (AP-PA, four-field box) and modern (3D-CRT, IMRT) techniques having similar median crude incidences (8.0% and 8.3%, respectively). The 5-year actuarial incidence of PIF, reported by ten studies, ranged from 2.1-63% (median 11%) with a higher median incidence in patients treated with conventional techniques (15%) compared to IMRT (4.8%). Risk factors associated with development of PIF included patient characteristics (age, weight, body mass index, menopausal status, use of hormone replacement therapy, birth history, smoking status), medical co-morbidities (rheumatoid arthritis, diabetes mellitus, osteoporosis), and characteristics of radiation treatment (treatment modality, dose, chemotherapy use). The most common presenting symptom of PIF was pain. Median time to PIF development ranged from 6.5-44.4 months (median 12 months) following radiation therapy. The sacrum was the most frequent location for fracture development (56% of fractures). Conservative management (e.g. analgesics, rest) was used more than bone-directed therapies (e.g. bisphosphonates, hormone replacement therapy) for treatment of PIFs (89% and 3.7% of patients, respectively).

The large variability in incidence and risk factors associated with PIF development is likely related to the different detection methods, radiation techniques, doses, and gynecologic cancers treated in the studies identified by this systematic review. Additional studies are needed to further define prevention and treatment approaches for insufficiency fractures.

Reflection/Lessons Learned:

Though this project I got to learn more about research (specifically systematic reviews) but also more about the field I am going into (radiation oncology). A lot of the places I interviewed at asked me about this project. I think it helped bolster my application to radiation oncology.