Pain Assessment after Short Course versus Long Course Palliative Radiation of Painful Bony Metastasis

Thesis

Submitted for Partial Fulfilment of Master Degree in Clinical Oncology and Nuclear Medicine

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بسم الله الرحمن الرحيم
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Abdelfattah Rashad Abdelfattah Elmasry

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List of Abbreviations

Abb.	Full term
3-DCRT	*Three-dimensional conformal radiation therapy*
ASTRO	*American Society for Radiation Oncology*
ATP	*Adenosine triphosphate*
BC	*Breast cancer*
BMP	*Bone morphogenic proteins*
BPI	*Brief Pain Inventory*
BTP	*Breakthrough pain*
CA15-3	*Carcinoma Antigen 15-3*
Cbfa1	*Core binding factor alpha1*
CNS	*Central nervous system*
COX-2	*Cyclo-oxygenase-2*
CT	*Computed tomography*
CXCR4	*C-X-C chemokine receptor type 4*
DNA	*Deoxyribonucleic acid*
DW-MRI	*Diffusion-weighted magnetic resonance imaging*
EBRT	*External beam radiotherapy*
EDTMP	*Ethylenediaminetetramethylene phosphate*
EORTC QLQ	*European Organisation for Research and Treatment of Cancer Quality-of-Life Questionnaire*
FDA	*Food and Drug Administration*
FDG	*Fludeoxyglucose*
HBI	*Hemi-body irradiation*
HIFU	*High intensity focused ultrasound*
IASP	*International Association for the Study of Pain*
IP	*Investigational Product*
IT	*Intra-thecal*
ITDD	*Intra-thecal drug delivery*
IV	*Intravenous*

List of Abbreviations (Cont...)

Abb.	Full term
MM	*Multiple myeloma*
MRI	*Magnetic resonance imaging*
MSCC	*Metastatic spinal cord compression*
mTOR	*Mammalian target of rapamycin*
NCCN	*National Comprehensive Cancer Network*
NMDA	*N-methyl-D-aspartate*
NNT	*Number needed to treat*
NP	*Neuropathic pain*
NSAIDS	*Nonsteroidal anti-inflammatory drugs*
NTx	*N-telopeptide*
OMED	*Daily oral morphine equivalent*
ORT	*Opioid Risk Tool*
PET	*Positron-emission tomography*
PROMIS	*Patient Reported Outcomes Measurement Information System*
PSA	*Prostate-specific antigen*
PTH	*Parathyroid hormone*
PTHrP	*Parathyroid hormone related peptide*
QOL	*Quality of life*
RANK	*Receptor activator of NF-kappa B*
RANKL	*Receptor activator of NF-kappa B ligand*
RCT	*Randomized controlled trial*
RFA	*Radiofrequency ablation*
RR	*Response Rate*
RT	*Radiotherapy*
S.C.	*Subcutaneous*
SBRT	*Stereotactic body radiotherapy*
SCC	*Spinal cord compression*
SDF-1	*Stromal cell derived factor 1*

List of Abbreviations (Cont...)

Abb.	Full term
SOAPP	*Screener and Opioid Assessment for Patients*
SOAPP-R	*Screener and Opioid Assessment for Patients with Pain-Revised*
SPEP	*Serum protein electrophoresis*
TC 99m	*Technetium-99*
UPEP	*Urine protein electrophoresis*
WHO	*World Health Organization*

INTRODUCTION

The most common cause of pain in cancer patients is bone metastases ***(Coleman, 2006).*** Among solid cancers, prostate, breast, thyroid, lung, and renal cell carcinoma account for 80 percent of all skeletal metastases ***(Kvale et al., 2007).***

The primary disease site determines the prognosis for patients with bone metastases; patients with breast and prostate cancer have a longer median survival when it's compared with lung cancer ***(Lutz et al., 2010).***

Bone metastases can be categorized as complicated or uncomplicated, where uncomplicated generally refers to the absence of: impending or established pathological fracture, previous surgical fixation, impending or established spinal cord compression, impending or established cauda equina or nerve root compression (including cranial nerves), neuropathic pain, previous radiation, or associated soft tissue mass. Approximately one-third of bone metastases are considered to be 'complicated' ***(Tiwana et al., 2016).*** Oligometastatic disease describes an intermediate state between disease that is localized to the primary site, and widespread metastases ***(Weichselbaum et al., 2011).*** The specific definition of oligometastases varies but in this review and as used by others, it means five or fewer metastatic lesions. Skeletal-related events typically encompass pathologic fracture, spinal cord compression, surgical

intervention or use of palliative radiotherapy (RT) **(*Ibrahim et al., 2003).***

The treatment of an asymptomatic bone metastasis may be deferred unless the patient develops pain or is at risk for a skeletal-related event. The treatment of bone metastases may involve several types of systemic interventions, including chemotherapy, hormonal therapy, bisphosphonates, or radioisotopes, in addition to local interventions such as external beam radiotherapy (EBRT), stereotactic body radiotherapy (SBRT) hemi-body irradiation (HBI), radioisotopes, surgery, or percutaneous vertebral augmentation depending on the site and extent of disease, histology and biomarker profile of the metastasis ***(Lutz et al., 2010).***

Aim of the Work

The primary objective of the study is to determine whether short term radiation therapy (20 Gy of radiation therapy delivered in 5 treatment fractions) and long term radiation therapy (30 Gy of delivered in 10 treatment fractions) provide equivalent outcomes regarding pain for patients with painful bone metastases.