Prone Versus Supine Position for Breast Cancer Treatment

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Introduction

-Breast is the second most common cancer in women in the United States
-Can occur in men and women, but women more frequently
-Radiation oncology, or radiation therapy, can be used to treat cancer
-Two most common positions to treat breast cancer with radiation therapy are prone and supine

(Deseyne et al., 2020a) (Long, Rollins & Smith, 2019) (Mayo Clinic Staff, 2022) (Wang et al., 2020).

Breast Cancer

-Forms in the cells of the breast which begin to grow abnormally
-"These cells divide more rapidly than healthy cells do and continue to accumulate, forming a lump or mass" (Mayo Clinic Staff, 2022, p. 2)
-Symptoms include lump, change in shape or size, inverted nipple, peeling or flaking skin off the areola, or redness or pitting of the skin
-Several risk factors that can lead to developing breast cancer but not all individuals have any risk factors
(Mayo Clinic Staff, 2022)

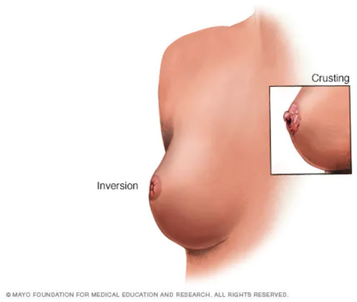

Figure 1: Nipple Changes (Mayo Clinic, 2022a, para. 3)

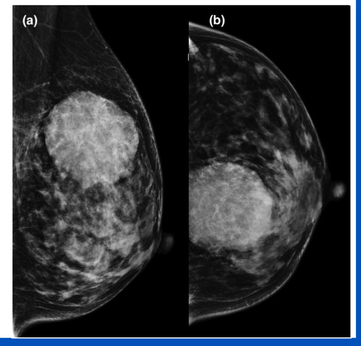

Figure 2: Tumor on Mammogram (Harada et al., 2019, para. 4)

What is Radiation Therapy?

-1 of 3 treatment methods to treat cancer
-Delivers high dose of radiation to the tumor as precisely as possible. Goal is to limit dose to surrounding, healthy tissues
-First step of radiation treatment is simulation where team decides what tissues need to be in the field
-Radiation oncologist uses patient's computed tomography (CT) images to identify area for precise treatment
-Breast cancer treatment uses external-beam therapy whereby patient lies under the machine which emits radiation to outside patient targeted area
-Breast cancer radiation treatments may also utilize respiratory gating which is when the patient's breathing is monitored, and the therapist instructs the patient to hold their breath during treatment. Very good to use with patients with left sided breast cancer to spare dose to heart
-Respiratory gating is also referred to as deep inspiration breath hold (DiBH)
(Long, Rollins & Smith, 2019)

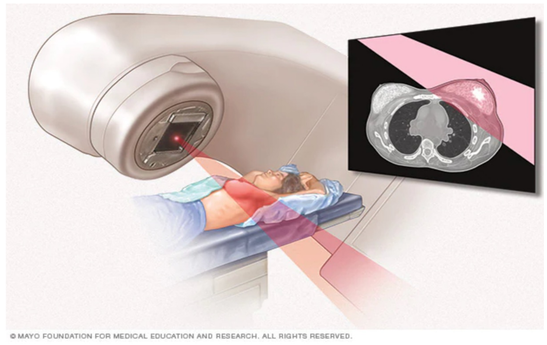

Figure 3: External beam radiation treatment for breast cancer (Mayo Clinic, 2022b, para. 22)

Treatment Concerns

-Treatments can harm the heart and lungs
-Risk is higher for left sided breast cancer
-Cardiovascular problems can include coronary artery disease and myocardial infarction (MI)
-Higher chance of secondary lung cancer
(Yan et al., 2020a)

Supine Position

-Had CT simulation done in this set up as well as prone in order to compare
-Inclined breast board with arms extended over head
-Completed using DiBH for respiration technique; also known as gating
-Better for smaller breasts
-Pros: provides less dose to the contralateral breast, patients find it the most comfortable compared to the standard prone, and the heart dose is also declined
-Con: there is more dose to the lung
(Wang et al., 2020)

Prone Position

-Had CT simulation done in this set up as well as supine in order to compare
-Affected breast hangs down away from chest wall
-Utilized during free breathing respiration
-Pros: minimizes target movement and reduces anterior thoracic expansion during breathing
-Cons: reduces patient comfort, reduces set-up accuracy, longer setup time, blocks ideal beam paths and better only for pendulous breast patients
-Reduces secondary lung cancer
-Should utilize this position if patient smokes
(Deseyne et al., 2020a) (Wang et al., 2021)
(Yan et al., 2020a)

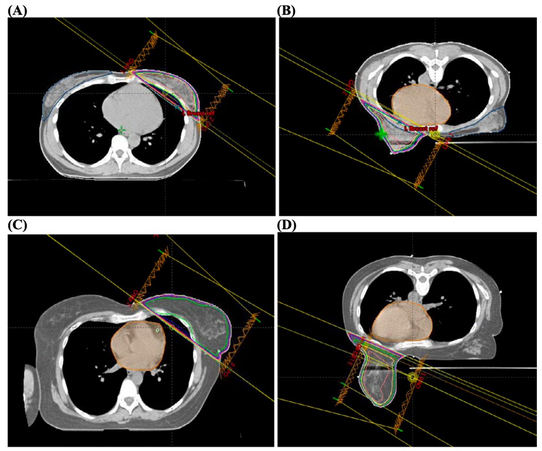

Figure 4: Difference between beam paths for prone and supine (Yan et al., 2020b, p.900)

Crawl Couch

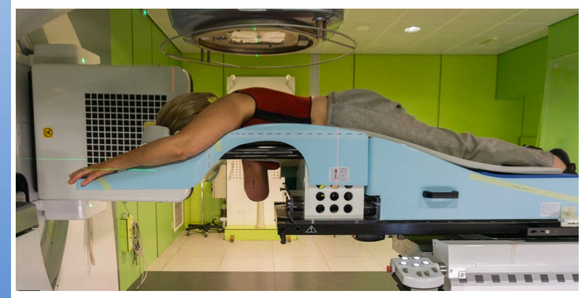

Figure 5: Crawl Couch positioning on prototype (Deseyne et al., 2020b, para. 4)

-Patient is in prone position with opposite arm extended forward and affected side's arm down along patient's side
-Patients wears a unilateral bra that is custom made to fit. Bra pulls contralateral breast out of the way of radiation beam
-Rest of body is supported by board
-The patient position looks like "prone crawl swimming" (Deseyne et al., 2020a, para. 3)
-Utilizes free breathing respiration
-Most patients prefer crawl position over standard prone position because it is more comfortable, less pain & pressure
-Patients placed in a better position so less shifts needed daily
-Radiation beam is less restricted with beam paths
-Con: not many people have this set up due to it being new and the researchers themselves creating it
(Deseyne et al., 2020a)

Conclusion

-Two main positions for breast cancer treatment are prone and supine
-Bigger sample sizes should be used
-Patient history should be looked at when choosing the set-up, i.e., smoking
-More research should be done using dosimetry for the crawl couch versus prone
-Select more right breast patients in future studies
-Future research on intra-fraction motion should be performed

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