

Esophageal Cancer: Modern Treatment Efficacy and Advancements

Overview

Esophageal cancer accounts for 3.4% of all cancer incidences and is the seventh most common cancer worldwide.^{1,2} Additionally, esophageal cancer has the fourth worst prognosis among all cancers.³ Figure 1 displays cancer mortality rates. Although survival rates for esophageal cancer are trending in a positive direction,⁴ there remains significant room for improvement.

Recent literature indicates that trimodality therapy is the most effective proven treatment method. Trimodality therapy employs three types of treatment: chemotherapy, radiation therapy, and surgical resection. Shao et al⁵ found that the three-year survival rate was doubled to 48.4% when trimodality therapy was used in comparison to definitive chemoradiotherapy.

One modern treatment method that may prove to be the answer to a greater improvement in efficacy is brachytherapy.² This method involves implanting radiation sources within the treatment area (tumor) in order to deliver the maximum amount of radiation to the target while sparing adjacent tissue. Figure 2 and Figure 3 display dose estimates during brachytherapy treatment planning.^{6,7}

Intraluminal Brachytherapy

A study conducted by Nag et al² (Study 1) examined brachytherapy efficacy when administered following chemoradiotherapy in predominantly early stage esophageal cancer patients. At one month following treatment conclusion, 80% of patients experienced a complete response and 20% experienced a partial response. However, 50% of patients experienced toxicity. At one year, 65%, 10%, 15%, and 10% of patients were observed with local control, local recurrence, local control with distant metastases, and death respectively.

A separate study by Halder et al⁸ (Study 2) conducted a similar study to compare treatment outcomes with and without intraluminal brachytherapy. The only difference from the first study was that cancer staging was significantly more advanced; greater than half of the sample was diagnosed with stage III esophageal cancer.

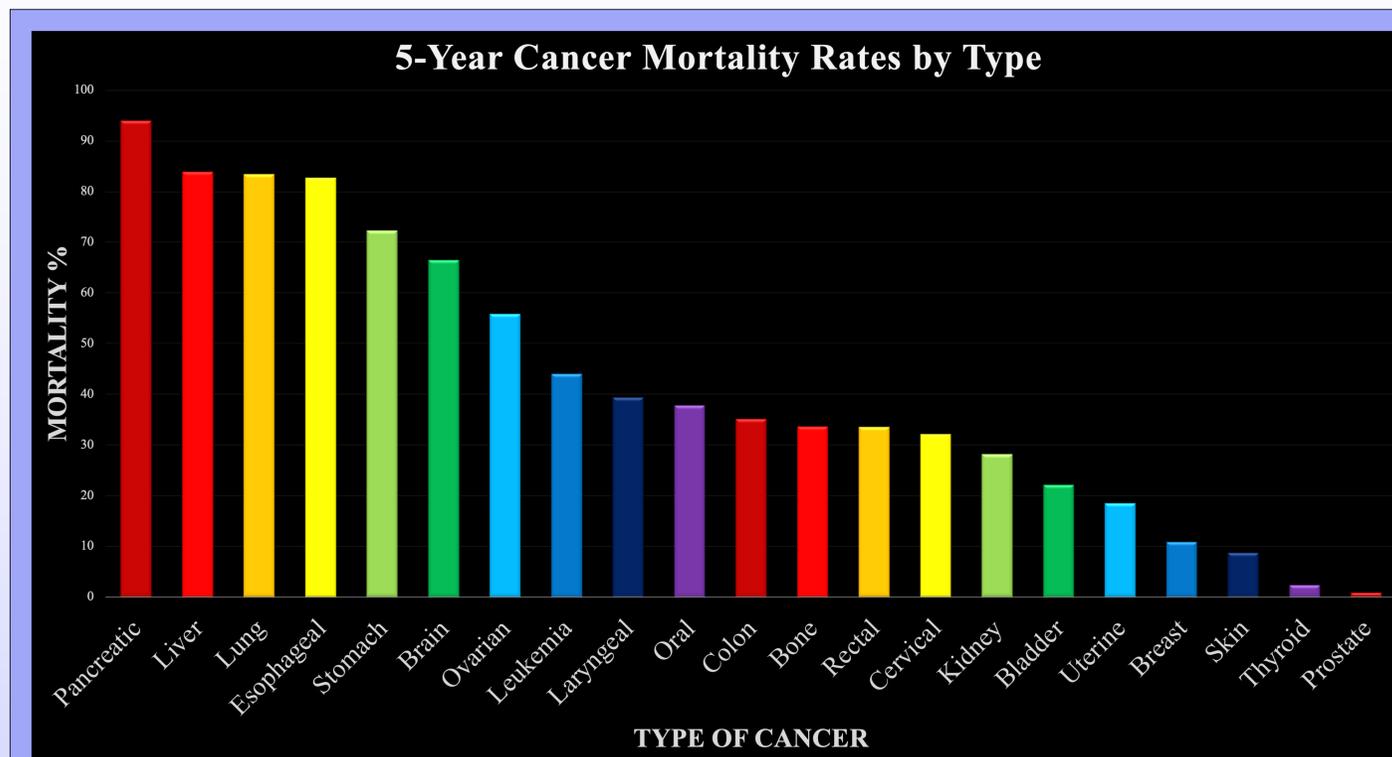


Figure 1. Five-Year Cancer Mortality Rates by Type. (Modified from original author)³

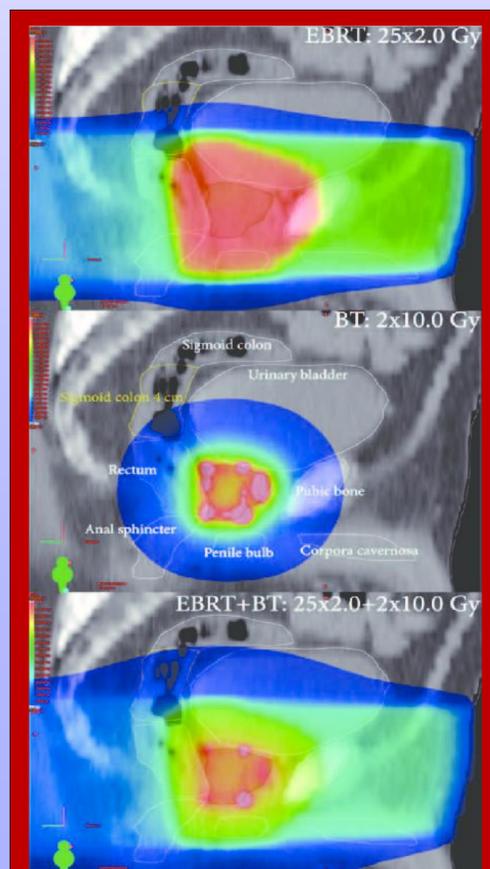


Figure 2. Dose estimates for EBRT, BT, and EBRT + BT.⁶

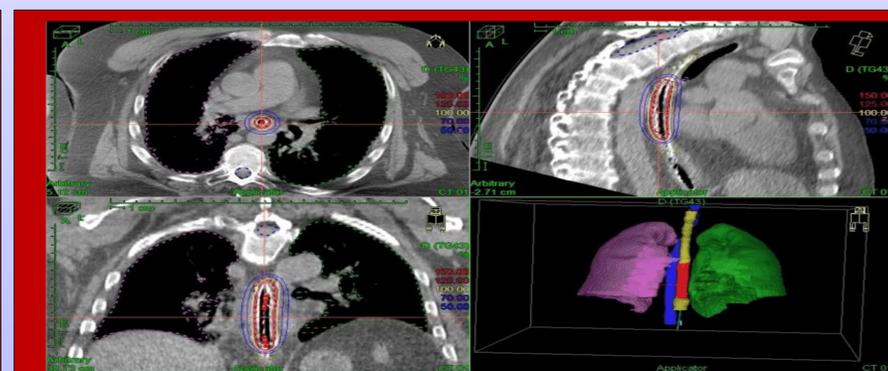


Figure 3. Treatment planning and dose estimates for high dose rate intraluminal brachytherapy.⁷

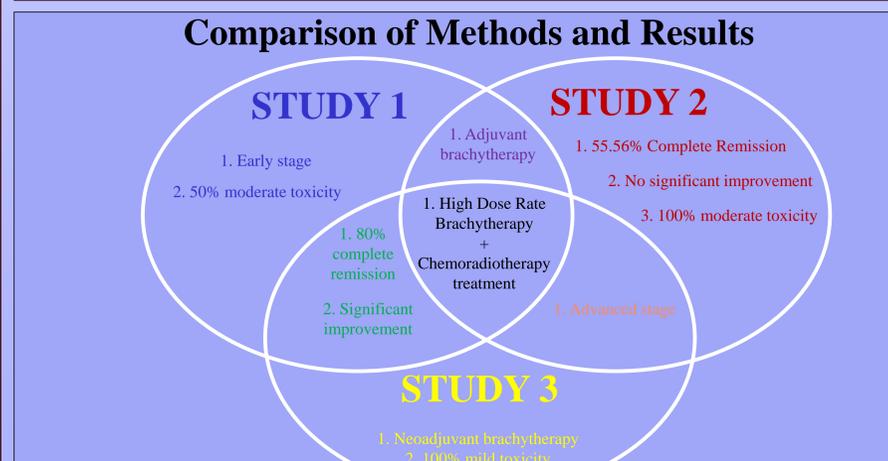


Figure 4. Comparison of Methods and Results. (Modified from original authors)^{2,7,8}

The improvement in complete response rates was a mere 0.31% and partial response increased by 2.08%.

Safaei⁹ et al (Study 3) investigated retrospective results from patients who received high dose brachytherapy prior to chemoradiotherapy for esophageal cancer. The sample consisted of 20 stage II and 35 stage III esophageal cancer patients. 80% of patients experienced a complete remission of the disease and minimal to no dysphagia at the conclusion of treatment. 20% of the sample experienced partial response.

Figure 4 displays a comparison of the studies.

Implications

Intraluminal brachytherapy shows promise in the improvement of esophageal cancer treatment. When comparing the three studies, the following trends are observed:

1. Brachytherapy is more effective in early stages of esophageal cancer.
2. Neoadjuvant brachytherapy is more effective than adjuvant brachytherapy.

Current literature on brachytherapy exists which indicates advances within the field. Future research is required to further examine the efficacy and optimal method of intraluminal brachytherapy for the treatment of esophageal cancer.

References

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