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Moderation in Cancer Surgery

Anshika Mittal Arora

Professor, Department of Surgical Oncology, SNMC, Agra.

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ABSTRACT

Management of cancer has always been an evolving process. Surgery has been one of the pivotal tools in the armamentarium of cancer treatment. In the age of personalised medicine, molecular tumor boards, better understanding of tumor biology and game changing new molecules; the role and especially the extent of cancer surgery has come under scrutiny. This is the era of limited surgery for best oncological outcomes, reduced long term surgical morbidity and functional recovery.

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INTRODUCTION

In cancer care, 'Personalised Medicine' entails tailoring surgical strategies based on the following two considerations: every patient's unique tumor characteristics and the patient's overall health (performance status and co-morbidities). This approach also helps in optimising surgical outcome based on tumor genetics, stage, and the patient's physical condition, moving away from the 'one-size-fits-all' approach. The basic premise of this approach would depend on identifying High-Risk individuals. For example, Genetic testing in a patient with a diagnosed malignancy can identify individuals with a higher risk of developing a second primary, leading to the choice of preventative measures like extended surgery or proactive screening. A Triple Negative Breast Cancer (TNBC) patient with BRCA mutation may consider a Mastectomy over Breast conservation, or even a Risk-reducing Bilateral Mastectomy. On the other hand, in the same TNBC patient with BRCA wild-type Breast Conservation is the preferred surgical option over Mastectomy.

Preoperative planning and morbidity risk assessment are essential part of any surgical procedure. In cancer surgery, it takes central stage, where advanced imaging techniques (MRI, CT scans, PET scans) are used for assessment of operability, extent of disease and to rule out metastatic disease. This helps plant the extent of resection, the radicality and also the reconstructive options. The use of various pre-operative morbidity prediction scales and the performance status of the patient, ensures the right extent of surgery for a particular patient. Performing an extensive resection on a poor performance status patient may lead to major post-operative morbidity and delay of adjuvant oncological therapy, leading to worse oncological outcomes.

Another aspect of preoperative planning in the practice of cancer management is assessment of Tumor Biology using various Tumor Markers and Immunohistochemistry (IHC). Let's discuss this point with the example of surgical management of axilla in Breast Cancer. Historically, complete Axillary Lymph Node Dissection (ALND I TO III) was in practice. Now we know Axillary dissection is at best a staging procedure for prognostic information and is not associated with better oncological outcome. In current practice, Neo-adjuvant systemic therapy (NAST) is being used more and more, not just for Advanced Breast Cancer (ABC) but also for certain Early Breast Cancer (EBC) patients. In the molecular subtype TNBC or Her2-enriched EBC patients, NAST is recommended and has several benefits; for Luminal disease, NAST is used for either Node positive or ABC patients. The approach to surgical management of Axilla in Breast cancer patients who have received NAST differs according to the molecular subtype. In TNBC or Her2-enriched patients the pathological complete response rate in Node positive N1 Axilla is much higher as compared to Luminal subtype Breast cancer patients. Surgical approach with Targetted Axillary Dissection (TAD) has come up as the first option, replacing ALND in TNBC or Her2-enriched patients, whereas ALND still remains the preferred option in Luminal disease. Thus, understanding Tumor Biology can help in making individualised surgical decisions, reducing the long-term morbidities of surgery without impacting on the oncological outcome of the patient.

This was about tailoring the surgical approach and extent of surgery in each individual patient. There are newer studies that suggest even omitting surgery in certain scenarios. Garcia-Aguilar J et.al. [1] published results of prospective, randomized phase II trial in 2022, where they randomised

stage II, III Rectal adenocarsinoma patients to- Totally Neo-adjuvant Therapy (induction chemotherapy followed by chemo-radiotherpy) (TNT) followed by either total mesorectal excision (TME) or watch-and-wait if the patient had achieved clinical Complete Response (c CR). They concluded that preservation of rectum was achieved in half of the patients when treated with total neoadjuvant therapy.

In a multicentre phase II clinical trial published in 2023 [2] patients with stage cT1-2N0-1M0 TNBC or Her2-enriched breast cancer and a residual breast tumor less than 2 cm on imaging after NAST were enrolled. They all underwent Vacuum-Assisted Biopsy (VAB) and histopathological examination of the specimen. Breast surgery was omitted if there was no residual invasive or in-situ tumor in the histopathology, Whole-breast radiation was given as planned to all patients. Among the patients in whom breast surgery was omitted the following result was reported- "median follow-up was 38.4 months (IQR: 22.4-49·5) the 3-year Intra-Breast Tumor Recurrence rate was 0% (primary endpoint) and 3-year Disease Free Survival and Overall Survival rates were 100%." The authors concluded that in the presence of complete Pathological Response following NAST in TNBC and Her2-enriched breast cancer highly selected patients, omission of breast surgery had promising 3-year results.

A prospective noninferiority phase 3 multicentric randomized clinical trial published in JAMA Oncol. in 2023 [3] looked at omitting axillary surgery in very early, node negative breast cancer patients with negative report on Ultrasonography OF Axilla. A total of 1405 patients' data was analysed, at median follow up of 5.7 years, they found- "Five-year distant disease-free survival (primary outcome) was 97.7% in the Sentinel Lymph Node Biopsy (SLNB) group and 98.0% in the no axillary surgery group (log-rank P = 0.67; hazard ratio, 0.84; 90% CI, 0.45-1.54; noninferiority P = 0.02)." The authors concluded that omitting axillary surgery was not inferior to SLNB in this group of patients.

CONCLUSION

The world of oncology is an ever-evolving field, with new developments becoming the norm rather than the exception. Adjuvant and Neoadjuvant systemic and local therapies continue to redefine and challenge the role of fixed surgical practices. The role of personalised surgical decision-making is now essential to cancer care. As precision oncology evolves, personalised cancer surgery stands as a cornerstone of modern cancer care—bridging technological innovation with individualised patient outcomes and marking a step toward truly tailored, data-driven surgical oncology.

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