

Principles Of Surgical Oncology

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INTRODUCTION

Surgery is the oldest and most frequently used method of treating solid cancers. It is able to cure more patients with solid cancers than any other single modality of treatment. It is the treatment of choice for localized, solitary, solid neoplasms. In the past, surgeons were wont to operate on all tumors so long as they are operable, usually by removing the gross macroscopic lesion. This practice, which was based on the limited knowledge of the biology of cancers and the technological limitations of those times, was associated with high local recurrence and mortality rates. Unfortunately, many patients in Nigeria today are still being treated this way. Folk wisdom that many patients with solid cancer treated in our hospitals tend not to survive is based on this fact. However with improved histopathology, better understanding of the molecular biology of cancers, careful patient selection and multidisciplinary approach to treatment, surgeons are now able to deploy their skills more strategically, cure cancer patients, prevent distant metastases, reduce local recurrence, increased disease-free and overall survival.

The last few years has seen tremendous progress in chemotherapy, biologic treatments, radiotherapy and other treatment modalities. However, despite these advances, surgery still plays a primary role in the management of solid cancers. The role of the surgeon includes:

- a. Prevention
- b. Screening
- c. Diagnosis
- d. Staging
- e. Treatment as part of a multimodality option that includes chemotherapy and radiotherapy
- f. Rehabilitation
- g. Follow-up
- h. Palliative Care

PREVENTION

Surgery can be used to prevent the development of cancer

particularly in those tumors that have biomarkers or clearly defined risk factors. Recent advances in molecular biology have increased this role of surgery. This can take the form of: 1. Surgical ablation of pre-cancerous lesions e.g. leukoplakia of the tongue, colon in patients with familial adenomatous polyposis coli, thyroid in MENS type II.2. Surgical removal of organs in patients at high risk of malignancy even when a pre-cancerous stage is not yet identified, e.g. the breast or the ovaries in patients with lethal BRCA 1 and 2 germline mutations, colon and uterus in HNPCC

SCREENING

Surgery plays a role in screening patients for cancers. Routine colonoscopy in colorectal cancer and digital rectal examination in prostate cancer are examples of surgical methods of screening for cancer. Though these practices are not yet as systematic as screening mammography for breast cancer or pap-smear for cervical cancer or as widely practiced, they illustrate the potential of surgery as a screening tool.

DIAGNOSIS

In oncology practice, clinical consultation often takes relatively longer than usual, because of the need to take detailed history of the disease, ascertain the presence of risk factors, check for evidence of metastases, the presence of co-morbid factors that may influence the course of disease or treatment, evaluate the family and social history, do a psychological assessment of the patient, ascertain the patient's social and economic resources, the expectation from therapy, patient's treatment preference, and prognostication. The consultation is also an opportunity to educate the patient about the disease process and counter the often present misinformation that the patient may have.

The surgical oncologist must be conversant with all the modalities of investigations available, their indications, merits, demerits, limitations and utility as an adjunct in surgical procedures for screening, treatment or diagnosis. Microscopic diagnosis of cancer is a *sine qua non* before

commencement of treatment. It is responsibility of the surgeon to ensure the following:

- a. Appropriate method of biopsy has been used
- b. Appropriate site has been chosen for biopsy given the subsequent treatment that may be necessary
- c. Adequate tissue has been taken including whenever feasible, surrounding normal tissue
- d. The tissue sample is delivered promptly and in satisfactory condition to the pathologist
- e. The result is communicated in a timely and easily comprehensible manner to the patient and other physicians who may be responsible for patient's care

Examples of methods of diagnosis include:

- (a) Exfoliative cytology. This may be by fine needle aspiration, smears, aspirates, brushes, body fluids etc.
- (b) Core-needle e.g. Tru-Cut, Vim-Silverman needles
- (c) Incisional biopsy
- (d) Excisional biopsy

The advantages of exfoliative techniques are:

- I. Often cheap
- II. Easily repeated
- III. Tolerable, with minimum morbidity and mortality

The disadvantages are:

- a. Limited to soft tissues
- b. Observer dependent and requires a trained cytopathologist
- c. Cannot differentiate *in situ* from invasive disease
- d. May not provide adequate tissue for additional studies
- e. Negative report is not equal to absence of disease

Biopsy techniques have the following advantages

- a. They provide adequate amounts of tissue for histology and other studies
- b. They are associated with minimal risks of dissemination of disease
- c. The risk of sampling error is markedly reduced
- d. Should the lesion be benign, there will be no need for further operation

Incisional biopsy is more appropriate where an attempt at excisional biopsy may compromise the margin of clearance, expose deep tissue planes and prejudice subsequent adequate wide locally curative resection.

The surgeon must also be able to use radiological techniques judiciously to reach a diagnosis, aid biopsy and treatment as appropriate. While routine X-rays and ultrasound scans are readily available in most parts of Nigeria, the surgeon must be able to decide when more sophisticated investigations and image-guidance are needed and refer patients appropriately.

STAGING

The surgeon is often the first to see the cancer patient, it therefore often his responsibility to stage the disease. The practice of dividing cancer cases into groups according to "stage" arose from the fact that survival rates were higher for cases in which the disease was localized than for those in which the disease has extended beyond the organ or site of origin. These groups were often referred to as "early cases" and "late cases," implying some regular progression with time. Actually, the stage of disease at the time of diagnosis may be a reflection not only of the rate of growth and extension of the neoplasm but also of the type of tumor and of the tumor-host relationship.

It is preferable to reach agreement on the recording of accurate information on the anatomic extent of cancer for each site because the precise clinical description and histopathologic classification of malignant neoplasms may serve a number of related objectives, such as:

- (1) selection of primary and adjuvant therapy, estimation of prognosis, assistance in evaluation of the results of treatment, facilitation of the exchange of information among treatment centers, contribution to the continuing investigation of human cancers.

The principal purpose served by international agreement on the classification of cancer cases by anatomic extent of disease, however, is to provide a method of conveying clinical experience to others without ambiguity.

There are many bases or axes of classification; for example, the anatomic site and the clinical and pathologic anatomic extent of disease; the reported duration of symptoms or signs, the sex and age of the patient, and the histologic type and grade. All of these represent variables that are known to have an influence on the outcome of the patient. Classification by anatomic extent of disease as determined clinically and histopathologically (when possible) is the classification to which the attention of the AJCC and the

UICC is primarily directed.

The clinician's immediate task is to select the most effective course of treatment and estimate the prognosis. This decision and this judgment require, among other things, an objective assessment of the anatomic extent of the disease.

To meet these stated objectives, a system of classification is needed that

- (1) has basic principles applicable to all anatomic sites regardless of treatment, and
- (2) in which clinical appraisal can be supplemented by later information from surgery, histopathology, and/or other technologies. The TNM system meets these requirements.

General rules applicable to all sites

1. All cases must be confirmed microscopically for TNM classification (including clinical classification).
2. Four classifications are described for each site, namely:

Clinical Classification, designated cTNM or TNM. Clinical classification is based on evidence acquired before primary treatment. Such evidence arises from physical examination, imaging, endoscopy, biopsy, surgical exploration, and other relevant findings.

Pathologic Classification, designated pTNM. Pathologic classification includes the evidence acquired before treatment, supplemented or modified by the additional evidence acquired during and from surgery, particularly from pathologic examination. The pathologic assessment of the primary tumor (pT) entails resection of the primary tumor sufficient in extent to evaluate the highest pT category. The pathologic assessment of the regional lymph nodes (pN) also entails removal of a sufficient number of lymph nodes to evaluate the highest pN category. Included in the N classification is a nodule in the fat adjacent to a colorectal carcinoma, greater than 3 mm in largest extent, without evidence of residual lymph node tissue. This is classified as a regional lymph node metastasis. If the nodule is less than 3 mm it is classified as a discontinuous extension of the primary carcinoma (pT3).

For early stages of disease (Stage I, II) pathologic classification of the extent of the primary tumor (T) and lymph nodes (N) is essential. Pathologic staging depends on the proven anatomic extent of disease whether or not the primary lesion has been completely removed. Furthermore, when dealing with Stage III or IV disease, in instances when a biopsied primary tumor technically cannot be removed, or when it is unreasonable to remove it, and if the highest T and N, or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.

Retreatment Classification. Retreatment classification is used after a disease-free interval when further treatment (such as chemotherapy) is planned for recurrent cancer. All information available at the time of retreatment should be used in determining the stage of the recurrent tumor (rTNM). Biopsy confirmation of the cancer is required.

Autopsy Classification. If classification of a cancer is done after the death of a patient by postmortem examination, the classification of the stage is identified as aTNM.

3. After assigning cT, cN, and cM and/or pT, pN, and pM categories, these may be grouped into stages. Both TNM classifications and stage groupings, once established, remain in the medical record. The clinical stage is essential to select and evaluate primary therapy, and the pathologic stage provides additional precise data to estimate prognosis and calculate end results. Therefore, each should remain in the medical record. The pathologic stage does not replace the clinical stage.

4. If there is doubt concerning the correct T, N, or M classification to which a particular case should be allotted, then the lower (less advanced) category is chosen. This also applies to the stage grouping.
5. In the case of multiple, simultaneous tumors in one organ, the tumor with the highest T category is the one selected for classification and staging, and the multiplicity or the number of tumors is indicated in parentheses: for example, T2(m), or T2(5). In the circumstance of simultaneous bilateral cancers in paired organs, each tumor is classified separately as an independent tumor in different organs. In the case of tumors of the thyroid, liver, and ovary, multiplicity is a criterion of T classification.
6. Definitions of TNM categories and stage grouping may be telescoped (expanded as subsets of existing classifications) for research purposes as long as the original definitions are not changed. For instance, any of the published T, N, or M classifications can be divided into subgroups for testing, and if validated may be submitted to the American Joint Committee on Cancer to be evaluated for inclusion into the classification system.
7. In the case of a primary of unknown origin, staging will be based on clinical suspicion of the primary origin (e.g., T0N1M0).

The biggest disadvantage of the current staging systems is their inability to take account of pre-clinical and microscopic metastatic disease. They have also not incorporated some of the new biological measures of disease progression and aggressiveness. In this era of early detection of disease, the earliest stage of many of these staging systems may in fact be rather "advanced"

TREATMENT

Surgery can cure cancer in the early stages and one third of cancers are cured by surgery alone. Despite the current trend to treating all cancers as if they are systemic at presentation, there is no doubt that some are not, as evidenced by the long-term cures obtained in some series without adjuvant treatment. The surgery must take cognizance of:

- A. Adequate margins of resection
- B. Prevention of spillage
- C. Minimal manipulation
- D. Reconstruction

Preoperative preparation of patients may be necessary where the patient's physical condition is very poor and correction of physiologic and biochemical deficiencies may be necessary preoperatively. Careful preoperative planning includes attention to patient's nutritional status which may be significantly compromised in gastrointestinal tumors such as esophageal cancer. Co-morbid conditions have to be properly managed. Hypertension is a common one in this respect in Nigeria.

Modern treatment of cancers is multidisciplinary and the surgeon must be aware of the skills and resources available in other departments such as radiotherapy and how these can be used in every situation to provide patients with the best outcome.

TYPES OF SURGERY

- a. Local resection. This is often adequate for tumors like basal cell carcinoma and mixed salivary gland tumors that are known to be largely locally aggressive. It is however insufficient for other tumors that display extensive local microscopic spread. In all situations, the extent of operation should be determined by the need for adequate margins needed to achieve a cure while plans for reconstruction and post operative function are secondary.
- b. Radical resection with en-bloc excision of lymphatics. Most carcinomas spread by the lymphatic route hence these operations are designed to remove the cancer and its draining lymphatics in continuity. In recent times there has been increasing interest in "elective lymph node dissection" and "sentinel node dissection".
- c. Extensive surgical procedures and supra-radical excisions. Advances in peri-operative care have increased the possibility resections of

increasing large amounts of tissues, e.g. pelvic exenteration for carcinoma of the cervix. The choice of these operations requires considerable surgical judgment but they are justified where the tumor is slow growing and there are no distant metastases. However, the surgeon must brace up to the challenge of emotional rehabilitation of these patients post-operatively.

- d. With the increased role of chemotherapy, more elaborate treatment schedules, the toxicity of the drugs to peripheral veins, the need to reduce morbidity, improve patient compliance and mobility while undergoing treatment, the creation of vascular access channels has become an important management technique in clinical oncology practice. There are several methods but the most useful are those that implant ports under the skin that are then accessed as required. Their main limitation is catheter sepsis.
- e. The various treatment modalities that are used may lead to complications whose treatment requires surgical intervention. For example drug extravasation may require skin excision and grafting, while recto-vaginal fistula complicating pelvic irradiation may require multi-stage repair process.
- f. Surgery for the treatment of metastasis has developed gradually over the last few years and has become established in some clinical scenarios. These include resection of solitary pulmonary metastasis in sarcomas, especially osteosarcoma, hepatic metastases in colorectal carcinoma and in some solitary brain metastases. Metastasectomy is indicated where:
 - a. The primary tumor has been controlled or can be controlled
 - b. There is only a single metastases or where multiple they are limited to one lobe in a lobulated structure, the remainder of which after resection is compatible with good outcome
 - c. It has been shown that the outcome of that treatment in that clinical scenario is associated with significant benefit to the patient
 - d. Tumor doubling time is sufficiently long
 - e. No significant co-morbid factor

REHABILITATION

Surgery has a role in rehabilitation of patients with cancer who have lost body image or function as a result of treatment. Breast reconstruction is increasingly done for patients' whose primary cancer has been managed by mastectomy. Surgical management is also indicated in cases of postoperative lymphoedema post ablation of regional lymph nodes, correction of deformities, restoration of function etc.

FOLLOW-UP

Because of the role of surgeons as the first port of call for many patients with cancer for diagnosis and sometimes definitive treatment, they have a major role to play in follow up of patients. Follow-up care must be directed and evidence based. Needless tests and investigations to look for metastases are not proven in many cases to contribute to overall improvement in patients' survival and may interfere with quality of life as they serve as a constant reminder to the patient of their primary diagnosis.

PALLIATIVE CARE

Most patients in Nigeria present with advanced disease and the most that can be done with them is palliative care and even here, the surgeon has a major role to play. Palliation refers to the relief of symptoms, impending symptoms, prevention of complications or potential complications without altering the course of the primary disease. This may include "debulking surgery". This must however be sparingly done and only in clinical situations in which it has been proven to be useful as it may accelerate the disease process in some patients. The palliative care options available include:

- a. Adequate control of pain. This is usually done with drugs but rarely surgery may be required
- b. Relief of gastrointestinal, urologic or biliary obstruction
- c. Control of hemorrhage
- d. Nutrition management through the use of feeding tubes, ostomies etc.
- e. Management of airways
- f. Management of renal failure
- g. Management of rectal or urinary incontinence

MULTI-MODALITY TREATMENT

Over the last thirty years, the attitude to the management of cancer has changed to one of using all the different options in combination. This often requires that the specialists whose input are required patient management meet to discuss and plan treatment. The range of specialist present is often quite wide depending on the location of the

tumor and what may need to be for the patient.

MOLECULAR BIOLOGY

In the past 2 decades, there have been tremendous developments in the field of molecular biology and the application of this knowledge to the therapy of cancer. The rate of growth of this field has been exponential and it is likely to change the manner of treating patients with cancer. Already, humanized antibodies like trastuzumab are already in clinical use and many more agents are in the horizon. Genetic markers of cancers that allow early detection, risk factor prediction, biology of tumors, and response to treatment are being identified and their usefulness the subject of intense debate and clinical trials..

FACTORS THAT INFLUENCE OUTCOME OF TREATMENT

1. Patient related factors. Patients' health belief and behavior affect presentation to hospital and compliance with prescribed treatment. Co-morbid factors may also affect patient's ability to tolerate treatment and their educational level as well as socio-economic resources may influence their access to care.
2. Surgeon related factors. Adequate training, knowledge of current concepts, ability to work in a team and volume of work done are some of health care team related factors that influence treatment outcome.
3. Environment related factors. The resources available in different parts of the country for the management of cancer patients are highly variable and influence the types of treatments available.

Surgical management of cancer continues to be very important regardless of the great strides that have been made in chemotherapeutic and radiotherapeutic management of cancers. There are efforts to create societies to promote the multidisciplinary care of cancer patients as well as offer local opportunity for training and research. Given the amount of information that is currently required to properly manage patients and the new information that is being generated daily, the field of surgical oncology requires more training and service centers in Nigeria.

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