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**Editor : Dr. A. K. Dewan**

## EDITORIAL

### What is important in Surgery Quality? Surgeon or the Hospital

At least 20,000 patients die every year in the United States while undergoing elective surgery. A much larger number of patients experience other complications. Surgical morbidity and mortality can be reduced in two ways. First, surgical patients can be directed toward hospitals or surgeons likely to have the best results – so-called “evidence-based referral”. Second, efforts can be made to improve the quality of surgical care at all hospitals. The most direct measures of surgical quality are risk-adjusted morbidity and mortality rates.

Consider surgical quality in two other dimensions: structures and processes. Structural measures, the most prominent of which is procedure volume, include a very broad group of variables that reflect the setting in which care is delivered. Procedure volume – the frequency with which a given procedure is performed by the surgeon or hospital – is by far the most recognizable structural variable. Various studies have confirmed that procedural volume is a more important determinant of surgical mortality rates than other hospital characteristics.

Process measures, which reflect the particulars of care that patients, actually receive. It includes preop, perop and postop care by different group of people. Evidence is growing that high nurse-staffing levels are associated with better surgical outcomes. Several studies suggest that subspecialty training might be an independent predictor of favorable outcome. Whether surgical outcomes depend more on the surgeon performing the operation or the hospital in which it is performed is difficult to establish. Nonetheless, studies assessing the relative importance of hospital and surgeon volume might provide useful insights. Many have assumed the former to be the more important factor. Because they tend to be much larger facilities, high-volume hospitals have a broader range of specialists and technology-based services, better-staffed ICUs, and other resources not available at smaller centers. By virtue of these resources, high-volume hospitals might be better equipped to deliver the complex peri-operative care required by patients undergoing high-risk surgery. Hospital volume, but not surgeon volume, is an independent predictor of operative mortality. Again, these findings make sense clinically. Variation in mortality rates might primarily reflect the quality of anesthesia or cardiology services, which might be more closely associated with the hospital than the operating surgeon. Conversely, it is not surprising that surgeon volume will be

more important than hospital volume in explaining variable rates of surgical site complications.

Quality in health care can be described as “doing the right things right”. Quality in healthcare means doing the right thing, at the right time, in the right way, for the right person and having best possible results. How well the procedure was performed (i.e., doing things right) is important for any patient. However, the quality of the decision to operate in the first place (i.e., doing the right thing) might be an equally important issue in surgical care. Thus, a full accounting of surgical quality will require measures of appropriateness and how well patient preferences are incorporated in clinical decisions, not just how well they do after surgery.

**Dr. A. K. Dewan**

Medical Director

## Robotic Surgery – FORMAL INAUGURATION

Da Vinci Robotic Surgery of RGCI & RC formally inaugurated at India Habitat Centre on 21st April 2011. The evening Started with a welcome address by Mr. D. S. Negi (CEO RGCI&RC), followed by a talk on Robotic surgery by Dr. S. K. Rawal (Director Surgical Oncology). A very informative talk on history of Robotic surgery and its benefits to cancer patients was made by special guest Dr. Ashok Hemal (Director of Robotic Surgery, Wake Forest Institute of North Carolina, USA.)



The Evening was attended by leading urologists of the city with over hundred people gracing the occasion.

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## THYROID CANCERS : EMERGING PERSPECTIVES

### INTRODUCTION :

Thyroid cancer is the most common malignancy of the endocrine system. It is the second most common malignancy in the head and neck region. The incidence in male and female vary between 0.8 – 2.1 respectively, per 100,000 population. 95% of these lesions develop from the thyroid follicular cells. The remaining originate from the parafollicular C cells, soft tissue or the lymphoreticular system.

### ETIOLOGY :

The major risk factors are genetic, environmental, and dietary. The history of radiation exposure, especially in childhood, is known to increase the risk of thyroid cancer by 5 – 8 fold, with a latent period of 10 – 15 years. The peak effect is seen at 20 – 30 years. But the latent period following exposure to the nuclear fallout, seen as a sequelae to the Chernobyl disaster, is as low as four years. Duffy and Fitzgerald were the first to describe the malignant potential of the ionizing radiation. These radiations are known to produce deletions and mutations in the cells, which later are unable to produce thyroid hormone in adequate quantity, thereby stimulating TSH formation. A steep rise in the TSH stimulation is known to produce malignant transformation. Low iodine diet, and a positive family history also have a strong correlation in the development of the same.

### PATHOLOGY

More than 90% of thyroid cancers are the differentiated variety. 5–9% are Medullary carcinoma, 1–3% are Lymphomas, and 1–2% are Anaplastic. The Well Differentiated Thyroid Cancer (WTDC) comprise Papillary Adenocarcinoma, Mixed Papillary and Follicular carcinoma, and Follicular Adenocarcinoma.

#### Papillary thyroid carcinoma ( PTC ) :

PTC comprise 80 – 90% of the well – differentiated thyroid carcinoma. They occur in iodine sufficient areas, and are three times more common among females than males. But this female predilection is not pronounced in children. Papillary thyroid carcinomas have a definite association with radiation exposure, positive family history and also with Hashimoto's disease. The average age of onset is 45 years. Between 15 – 80% of the patients have regional nodal metastases. Often enlarged cervical lymphadenopathy may be the first sign of malignancy.

W.H.O. has described 15 histological variants of Papillary thyroid carcinoma. Tall cell, columnar variant, trabecular, diffuse sclerosis, mixed follicular, solid and the oxyphilic types are considered to be the aggressive histological variants. Multicentricity is a characteristic feature seen in 80% of the cases, due to intrathyroidal lymphatic dissemination. Vascular invasion is infrequent. Spread beyond the thyroid gland into the soft tissue of the neck is seen in 15 – 25% of the cases. The most ominous feature is the involvement of larynx or the trachea, resulting in uncontrollable neck recurrence. Distant metastases in the pulmonary area is seen in 10% of the cases. Bone, liver and CNS metastases are rare.

The treatment modality for Papillary thyroid carcinoma remains surgery. Total thyroidectomy is indicated for biopsy proven bilateral carcinoma, those with history of radiation exposure, nodules with size greater than 1.5cm and those with cervical or distant metastases. Neck addressal is required in case of clinically palpable lymphadenopathy or radiologically seen lymph nodes.

Though nodal metastases do not affect the prognosis in young patients, it has a bearing on the prognosis of elderly patients. But several studies have found that lymphadenopathy is an independent risk factor for local recurrence, distant metastases and cancer specific mortality. The 10-year survival when the malignancy is intrathyroidal is 90%. But with extrathyroidal spread, the survival drops to 60%. Post- surgery, 4 – 6 weeks later a whole body scan is done. The residual disease, if present, is then addressed with radio-iodine ablation. Thyroid hormone suppression therapy is given to all patients with WTDC with the aim of keeping the thyroglobulin to a level less than 1mIU/L.

Follow-up for patients in the well-differentiated variety is done initially with thyroglobulin six monthly, followed by annual follow up. Serum thyroglobulin and USG neck is mandatory in the visits. A majority of patients tend to have disease recurrence in the first three to five years. Patients in the high risk groups should have PET scan, serum thyroglobulin and ultrasound in their follow-up visit.

#### External Beam Radiotherapy in WTDC.

#### The indications are:

1. Recurrent tumours which fail to I – 131 therapy
2. Inoperable tumours
3. Poorly differentiated follicular/papillary cancers
4. Hurthle cell carcinoma

#### FOLLICULAR THYROID CARCINOMA:

It is seen in 5-10% of the cases and is found more in the iodine-deficient areas. Angio-invasion is a characteristic feature for follicular carcinoma. The low grade variant affects the younger age, while the aggressive variant affects elderly individuals. 5 – 40% of the patients have distant metastases. Like the papillary carcinoma, follicular cancer show metastases to the lung followed by the bones. Liver and brain metastases show dismal prognosis in the two conditions.

**HURTHLE CELL CARCINOMA** : It is an aggressive variant of follicular carcinoma. Unlike the well differentiated carcinoma, these tumours do not respond to radio-iodine or radiotherapy. Therefore, the mainstay treatment remain as surgery.

#### MEDULLARY THYROID CARCINOMA (MTC) :

Accounts for 3 – 9% of all thyroid malignancies. It originates from the parafollicular C cells, which produce calcitonin. These lesions are sporadic in 75% and hereditary in 25% of the cases. All patients with MTC should undergo screening for germline RET mutation. In contrast to the WTDC, MTCs have no sex predilection. Cervical lymphadenopathy is seen in 25-50% of the patients at presentation. Total thyroidectomy with central compartment neck dissection is mandatory for patients. Modified neck dissection should be performed in case of palpable lateral lymph node. Bilateral neck dissection should be performed if lesion is multi-focal, the disease involves the opposite lobe, or the patient has a contralateral neck node. Considered to be more aggressive than the differentiated thyroid cancer, the 10-year survival rate ranges from 50 – 70%. With extrathyroidal spread, capsular involvement, cervical lymph node metastases or those with distant metastases, the 10-year survival falls to 40 – 50%. An elevated calcitonin despite a complete surgery would mean occult metastases in the lymph node. Re-operation in these situations would be advisable.

#### ANAPLASTIC THYROID CANCER :

Accounts for less than 5% of all thyroid cancers. Over one third of these patients have a long standing goiter which undergoes anaplastic transformation. It is seen in the elderly age group. These





tumours neither concentrate radio-iodine nor do they express thyroglobulin. They lack TSH receptors. Surgical resection is not recommended if the disease found is extrathyroidal. The median overall survival described is 2 – 6 months. With a combination of surgery, radiotherapy and chemotherapy, a median survival of 13 months has been reported.

**PEDIATRIC THYROID CANCERS :** As in adults, thyroid cancer is the most common endocrine malignancy in children. It is a rare disease and is extremely rare before the age of 10 years. Paediatric malignancy, too, has a female preponderance. History of radiation exposure is evident in 7 – 11% of the patients with a latent period of 10 years. More than 90% of these lesions are papillary thyroid cancer. Diffuse sclerosing and the follicular variant of the papillary carcinoma are the most common. Most presentations are in the form of cervical lymphadenopathy (60 – 80%), or in the form of thyroid nodule. At the time of diagnosis, these lesions are generally locally advanced, with associated metastases. A majority of these lesions are diffuse and are micronodular. Radio Surgery (Total thyroidectomy with lymph node dissection), radioiodine and thyroid hormone therapy remain as the mainstay of treatment for pediatric thyroid carcinoma. Younger children, less than 10 years tend to show a higher disease aggression and a majority succumb to the disease in adulthood. Older children and adolescents have an outcome similar to the adults. In the follow – up period, pediatric patients are kept at a higher suppressive dosage of thyroxine in comparison to the adults.

#### THYROID CANCER AND PREGNANCY

Thyroid cancer is among the five most common cancers which occur during pregnancy. Therefore thyroid nodules seen during pregnancy are more likely to be malignant. Pregnancy per se poses a lot of limitations in imaging and radioactive ablation therapies. Hence delaying surgery post delivery prevents maternal and fetal complications, without adversely affecting the treatment outcome.

#### INVESTIGATIVE TOOLS:

**Role of Ultrasound:** The most useful imaging is done with high frequency linear transducers of 7 – 12 MHz. Nodules as small as 3 – 4mm can be easily detected. In experienced hands, ultrasound has a high specificity of 90%. It can identify about 80% of the thyroid malignancy and is considered more sensitive than CT or MRI. The use of colour flow Doppler in ultrasound facilitates differentiation of thyroiditis, benign hyperplastic and the malignant nodules.

**Radio-isotope scans:** Scanning of thyroid nodule was the mainstay of imaging of thyroid malignancy in the 1950's. With the advent of CT and MRI, radio-isotope imaging has significantly reduced. The chief indications are in directing sampling of the nodules in multi-nodular goiter, in deciding follicular neoplasms for surgical intervention / observation.

**F.N.A.C.:** Histo-pathological diagnosis of thyroid nodule rests on the overall accuracy of F.N.A.C. which is quoted to a figure of 92 – 95%. Studies have shown sensitivity ranging from 80- 93.5% and a specificity 56 – 94%. Ultrasound-guided FNAC is indicated in cases with complex nodules, non-palpable lesions, posteriorly located lesions, multinodular goiters, previous non-diagnostic FNAC, or when seen in close proximity to the vascular structures.

#### ROLE OF RECOMBINANT HUMAN TSH :

Use of human rTSH (Thyrogen, Thyrotropin alpha) has obviated the morbidity associated with hypothyroidism in the post – operative setting, to facilitate subsequent thyroid scanning. In the past, the bovine TSH used had associated complications of urticaria and anaphylactic shock, which are not seen with the human

preparation. The therapeutic role of this drug is being tapped in patients with brain metastases, mediastinal lymphadenopathy and those with lumbar metastases with paraplegia.

#### TARGETED THERAPY IN THYROID CANCER

Novel therapies for advanced and metastatic WDTC and MTC, non-responsive to the conventional treatment have been introduced. Several randomized trials, testing the use of Vascular Endothelial Growth Factor receptor inhibitor and the mutant kinases, in the metastatic setting are underway. The use of Sorafenib and Sunitinib has shown promising results. Partial response rates upto 30% with prolonged disease stabilization have been observed with the use of the various targeted therapies.

#### NEW TECHNOLOGY IN THYROID SURGERY:

**Harmonic Scalpel technique:** The use of this tool has been able to achieve a perfect balance between hemostasis and greater tissue preservation. Based on the ability of the tool to cut and coagulate vessels through its mechanical vibration, a harmonic scalpel provides a good surgical aid in facilitating bloodless surgery with greater precision.

**Endoscopic Thyroidectomy:** The technique of using an endoscope for thyroid resection has added a new dimension. The high magnification and better optical resolution have facilitated the surgical procedure, reducing the complications and hospital stay and added cosmesis to the ultimate result. Certain patient-selection criteria should be met prior to performing these procedures. Low-grade tumour with size less than 4cm, age less than 45years, thyroid nodules less than 4cm, non-irradiated neck, non palpable lymphadenopathy are some of these criteria.

**Robotics:** The use of Robotics in the surgical application of head and neck cancer is a new armamentarium. Though widely used in gynae-uro-oncological procedures, FDA approval for its use in head and neck has been recently achieved. The improved range of motion and three-dimensional perception of the operative field is an added asset to the operating surgeon. But the major limiting factor is the lack of tactile feedback and proprioception.

Though these technological advancements are fraught with certain limitations, nevertheless, they have brought in certain technological innovations to surgical procedures, enhancing efficacy. Improved visualization, minimal surgical manipulation, perfect haemostasis and minimal complication, all facilitate faster recuperation and shorter hospitalization.

**Dr. Tapaswani Pradhan**

#### COMMISSIONING OF NEW OPERATION THEATRES



RGCI & RC added another feather in its cap with the commissioning of four more state of the art modular Operation Theatres and that too with simultaneous commissioning of the robotic surgical system. The OTs are equipped with the latest equipments keeping the RGCI & RC philosophy of technological eminence.



## MINIMALLY INVASIVE SPINE SURGERY (VERTEBROPLASTY AND KYPHOPLASTY) FOR SPINAL METASTASES AT RGCI

Among patients with metastatic cancer, an estimated 10% develop malignant lesions to the spine. Approximately 10–15% of these patients develop symptoms, mainly in the form of pathologic vertebral compression fractures, significant enough to require intervention every year.

The most common location within the spinal axis is the thoracic spine (40–50%), but all levels of the spinal column can be affected. Over 70% are multifocal (more than a single vertebral level involved at presentation). There is no histologic preference that has been described for spinal metastases, and virtually every kind of malignant cancer has been described to spread to the spine.

Pain is the most common symptom from spinal metastases, with over 90% of patients complaining of some form of pain. The second most common symptom from spinal metastases is neurologic dysfunction. About 60–70% of patients will complain of weakness, sensory abnormalities or have signs of myelopathy on examination.

Diagnosis begins with simple anteroposterior and lateral plain radiographs. Any asymmetry or irregularity as well as lytic lucencies are suggestive of pathologic involvement. Once an abnormality is suspected, computed tomography and MRI with gadolinium are mandatory to further evaluate the extent of disease and architecture of pathologic involvement for treatment planning.

The goals of treatment for patients with spinal metastases include palliation of pain and stabilization of spine to prevent further neurological deterioration and possibly improve the present neurological deficit. It has been proved with randomized control trials that combined surgery and radiotherapy give better outcomes than radiotherapy alone. But all cancer patients are not fit for major surgery. In that subgroup, minimally invasive techniques like vertebroplasty and kyphoplasty can be carried out.

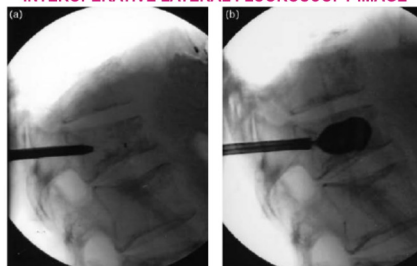
Vertebroplasty procedure involves percutaneous access into the vertebral body, usually through the pedicle with a large bore cannulated trephine, and injection of polymethylmethacrate (PMMA) cement in a semiviscous state into the vertebral body. Kyphoplasty is a newer modification of vertebroplasty introduced in the late 1990s, by which inflation of a specialized balloon allows for restoration of vertebral body height and reduction of kyphosis prior to injection of cement. The procedure is ideally performed

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bilaterally (via both pedicles) to maximize cement application, but unilateral injections are also effective and necessary if one pedicle is not radiographically visualized due to tumor involvement. We regularly carry out vertebroplasty and kyphoplasty with good results at RGCI & RC.

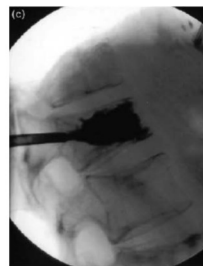
### Kyphoplasty Technique

#### INTEROPERATIVE LATERAL FLUOROSCOPY IMAGE



(a) after transpedicular cannulation with kyphoplasty trochar,

(b) during inflation of kyphoplasty balloon



(C) injection of polymethylmethacrate into cavity and vertebral body.

Dr. R. S. Jaggi

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