

ABSTRACTS
OF
25th National Conference of
Society of Nuclear Medicine, Bangladesh
20 May, 2022
Bangabandhu International
Conference Center (BICC), Agargaon,
Dhaka, Bangladesh

ABSTRACTS

25th National Conference of
Society of Nuclear Medicine, Bangladesh
Doi: <https://doi.org/10.3329/bjnm.v25i1.59692>

PLENARY SESSION

1. Thyroglobulin Revisit in Thyroid Cancer

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ABSTRACT

Thyroglobulin (Tg), a large glycoprotein (660,000 Daltons) which is produced exclusively by thyroid follicular cells, is a useful tumor marker to evaluate disease status in the whole course of differentiated thyroid cancer (DTC). It is highly recommended to use serologic markers such as Tg, anti-Tg antibody (TgAb), and thyroid stimulating hormone (TSH) as well as imaging studies including neck ultrasound (US) and radioactive iodine (RAI) whole body scan (WBS) during DTC patient care. Unfortunately, Tg measurement is associated with many challenges including various influencing factors such as TgAb, TSH level, and different laboratory assay methods. Test interference and measurement heterogeneity are not rare.

Despite its limitations, Tg can be used for problem solving of clinical challenges. (1) Complementary role of preoperative serum Tg can be expected such as measurement in washout of fine needle aspiration because of its high sensitivity and specificity for the diagnosis of metastasis from thyroid cancer in neck mass and lymph nodes. (2) Use of Tg after total thyroidectomy and before RAI therapy is regarded as a useful way for decision-making for adjuvant therapy. Tg-based RAI dose-decision and best timing of measuring serum Tg are being increasingly recommended. (3) Use of hybrid imaging such as SPECT/CT is more helpful for the interpretation of serologic tests than conventional imaging modalities. (4) RAI therapy and follow-up algorithm can be suggested using Tg as a gate keeper. (5) Newer assay methods and sophisticated interpretation of serologic and imaging studies with high sensitivity are suggested.

No Conflicts of Interest

2. Management of Incidental Findings in ¹⁸F-FDG PET-CT: Evolving evidence

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ABSTRACT

¹⁸F-Fluorodeoxyglucose (FDG) positron emission tomography (PET)/CT has proven to be an accurate imaging technique in the diagnosis, staging, restaging, and therapeutic monitoring in several cancer types. Characterisation of incidental, focal uptake on FDG PET-CT with or without CT abnormalities, is a common dilemma in routine clinical practice. In general, the reported incidence is around 6.7-12%. The current evidence and local practices are variable. In general, the heterogeneity is due to multiple factors such as individual experience, local tradition, interpatient variability, etc. The majority of evidence in the current literature is variable and heterogeneous. These are based on case reports, a retrospective or metanalysis. It is difficult to generalise the existing evidence, which is mostly based on the standardized uptake value (SUV). However, SUV is preferable to recommendations made on individual perception and intuitions. Knowledge of physiological and non-physiological ¹⁸F-FDG uptake imaging features is essential for accurate interpretation. Secondly, knowledge of differential diagnosis and incidence of malignancy of various cancer types is necessary. The recommendations are based on multiple factors and should also consider the patient's co-morbidities. The topic is vast, and, in this lecture, I will discuss some common organ-based patterns primarily based on FDG uptake systematically.

SNMB SESSION

1. A glorious 25+ year's journey of SNMB

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ABSTRACT

Society of Nuclear Medicine, Bangladesh (SNMB) is organizing its silver jubilee conference this year, but actual journey of SNMB happens to be more than 25 years, remembering the first conference of SNMB held in 1994.

Though, Nuclear Medicine (NM) was a small community in Bangladesh in early nineties, the leaders of that time had extraordinary far sightedness. Their love for this subject, mission and vision formed an outstanding platform "Society of Nuclear Medicine, Bangladesh" in 1993. Soon enough, this society drew the attention of concerned bodies at national and international levels by active participations in various organizational and scientific events.

Regular organization of annual conferences since its birth is not very common for a professional society. Besides congresses, workshops on contemporary NM topics, scientific programs, CME and presentations are arranged at regular intervals. Renowned NM dignitaries from all around the world attend, train, deliver lectures as well as support these meetings and training programs with their expertise.

SNMB experienced a giant leap first in October 2000, when a good number of members attended the 7th Asia Oceania Congress of Nuclear Medicine and Biology (AOCNMB) in Istanbul, Turkey under the leadership of Prof. M. A. Karim, the then President of SNMB. That congress opened the doors for the delegates not only to participate in the scientific activities but also be an active part of several organizational meetings especially for the promotion and development of NM in East Asia region. As a result, a new platform called "Asian Regional Cooperative Council for Nuclear Medicine" (ARCCNM)

was founded which was officially formed in Hong Kong in February 2001. Prof. M. A. Karim was one of the founding members of ARCCNM. It may also be mentioned that the name ARCCNM was proposed by Bangladesh.

SNMB organized the 2nd Annual General Meeting of ARCCNM in Dhaka in February 2003, where more than 100 foreign participants of around 20 countries attended. In the same meeting the educational enterprise of ARCCNM known as "Asian School of Nuclear Medicine" (ASNMB) was formed where Bangladesh played the key role. Now, this is a globally recognized school of Nuclear Medicine. SNMB also organized the ARCCNM General Meeting for the 2nd time in 2010 in Dhaka. This time "Asian Nuclear Medicine Board" (ANMB) was formed, which is now a very prestigious body of NM certification. This is a great honour for SNMB that Bangladesh is the birth place of both ASNMB and ANMB.

Bangladesh has two faculties in Asia Oceania Nuclear Medicine Board since its inception. In this year one more member of SNMB has been nominated as a new faculty of the board. A good number of our members already got the fellowship (FANMB) of this board and we are looking forward to see more of our fellows as faculty members of the board.

Bangladesh is an active member of AOFNMB, WFNMB, ARCCNM, WARMTH, AOTA and others. The society has also a good collaboration with IAEA. Bangladesh holds the position of Secretary and Treasurer of ARCCNM and AOFNMB for long periods and currently 3 members in the Board of Directors of AOFNMB.

World Association of Radionuclide and Molecular Therapy (WARMTH) is another NM body where SNMB is keeping an active role since its birth. SNMB proudly hosted the 15th ICRT of WARMTH meeting which was rescheduled as virtual because of COVID-19 pandemic though planned to be organized at Cox's Bazar, Bangladesh in December 2020. Bangladesh is representing in the governing body of this prestigious forum since long.

The official journal of SNMB, Bangladesh Journal of Nuclear Medicine (BJNM) was first published in January

1998. Since then, all issues of BJNM were regular, providing a platform for the doctors and scientists of NM field to publish their research works. Besides printed versions an online version with DOI are available too (<https://www.banglajol.info/index.php/BJNM>). Learned members of SNMB are contributing as members of editorial boards and reviewers in many national and international journals namely, World Journal of Nuclear Medicine (WJNM) and Asia Oceania Journal of Nuclear Medicine and Biology (AOJNMB).

Guidelines for the management of Differentiated Thyroid Cancer and hyperthyroidism were officially prepared and published by SNMB in 2015. These protocols are followed and practiced all around Bangladesh. SNMB has good collaborations with various international bodies and national societies of other countries especially Korea, Japan and China and nominating their members for fellowship and Ph.D programs abroad as and when opportunities are available.

Our journey started with only a single headed planar gamma camera 25 years back, but now dual headed SPECT and SPECT-CT s are working in many centers outside the capital city, Dhaka. Once a dream of early years of this twenty first century, PET-CT are ready at our hands now serving multiple institutes in Dhaka and producing own PET radionuclide ^{18}F -FDG after the successful establishment of a cyclotron. For achieving all these promotions and developments, the vital role of SNMB and its active members are unquestionable. At the same time, SNMB kept a commendable contribution in the international arena. Now SNMB is our pride, a prestigious name in NM community both in home and abroad.

Congratulations to all members of SNMB on this happy occasion of silver jubilee.

PROFFERED PAPER SESSION I

1. Non-invasive assessment of myocardial perfusion abnormalities in type 2 diabetic patients without symptoms of coronary artery disease by SPECT-MPI

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ABSTRACT

Introduction: Coronary artery disease (CAD), the most common chronic macrovascular complication of diabetes mellitus. Diabetic patients have a high incidence of silent ischemia and MI due to autonomic neuropathy. SPECT imaging is a well-established, non-invasive procedure that offers perfusion and functional information for diagnosis and risk stratification, facilitating early detection of CAD.

Objective: To detect myocardial perfusion abnormality by SPECT-MPI in type 2 diabetic patients without symptoms of CAD.

Methods: A total of eighteen diabetic patients with no history of typical CAD, with or without risk factors, underwent Gated SPECT-MPI using $^{99\text{m}}\text{Tc}$ sestamibi. Single-day stress-rest protocol with adenosine was done in each patient.

Result: Six out of eighteen patients (33.3%) showed abnormal scans suggestive of myocardial ischemia or infarction. Four of these patients had reversible perfusion defects, one patient had a fixed perfusion defect and one had a mixed defect. Among these patients, single vessel territory was involved in three patients and three patients had involvement of double vessel territories. Regarding summed stress score (SSS) value, most of the patients (four) had mild risk whereas the moderate and severe risk of a future cardiac event was observed in one patient each. In addition, two patients had left ventricular dysfunction ($\text{EF} < 45\%$). Five patients with normal MPI and two patients with abnormal myocardial perfusion scans had high transient ischemic dilatation (TID). Risk factors such as male sex, hypertension, hyperlipidemia, obesity and family history of CAD were not significantly correlated to abnormal scans. But abnormal scans were significantly related to a longer duration of diabetes ($P = 0.038$).

Conclusion: This study showed that despite being asymptomatic, a considerable portion of diabetic patients had perfusion abnormalities, not just ischemia but also infarctions. Moreover, some of these patients are at high risk of future cardiac events as assessed by SSS, TID and LVEF.

Keywords: Silent myocardial ischaemia, Diabetes mellitus, Gated SPECT

2. Preoperative Diagnostic Performance of ^{99m}Tc-MIBI Parathyroid SPECT-CT in Hyperparathyroidism and its clinical associations – Single-Center Experience.

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ABSTRACT

Objectives: This study was designed for preoperative precise localization of parathyroid adenoma & to find out their clinical associations in patients with hyperparathyroidism.

Materials and Methods: Total 100 patients of hyperparathyroidism (age range: 7-75 years; female predominant 56%) were enrolled in this study for ^{99m}Tc MIBI SPECT CT. Patients having thyroid or parathyroid surgery and thyroid cancer were excluded. Relevant biochemical parameters of serum calcium, serum vitamin D level, inorganic phosphate, serum creatinine and neck ultrasound were evaluated. Clinical history regarding chronic kidney disease (CKD), renal stone, pancreatitis, malabsorption syndrome, gastrointestinal surgery, osteoporosis and pathological fractures were also evaluated.

Results: Among the 100 patients, 48% had primary hyperparathyroidism (PHPT), 49% had secondary hyperparathyroidism (SHPT) and 3% had tertiary hyperparathyroidism (THPT) based on their raised parathyroid hormone level along with high or low serum calcium, inorganic phosphate and creatinine level respectively. USG revealed 38% positive cases whereas ^{99m}Tc MIBI SPECT CT showed 43% positive cases. Both modalities- USG and SPECT CT detected 36% positive cases of parathyroid adenoma. Majority of the SPECT CT positive cases were PHPT (81.3%). Among this positive group of PHPT, SHPT and THPT, we found single adenoma in 34 cases (79.1%), double adenomas in nine cases (20.9%) and ectopic parathyroid adenoma in 10 cases (23.2%). Among the SPECT CT positive cases, we found three false positive cases as histopathology revealed follicular carcinoma in two cases and lymphocytic thyroiditis of Hashimoto's variant in one case. In two cases of PHPT, SPECT CT were false negative due to cystic degeneration of parathyroid adenoma on histopathology. In clinical associations, 51% cases had vitamin D deficiency (<20 ng/ml) where mostly were in PHPT group. In this study group, 30% cases had CKD and among them three patients were in end stage CKD on dialysis and categorized as tertiary hyperparathyroidism with raised serum creatinine level (>10.0 mg/dl). We also found that 36% patients had renal stone, 10% had pancreatitis, 4% had pathological bone fracture/osteoporosis, 4% had brown tumor, 2% had multiple endocrine neoplasia syndrome-1 (MEN-1) and 1% had Turners syndrome.

Conclusion: Management of PHPT and SHPT depends upon clinical associations and presence of parathyroid adenoma. ^{99m}Tc MIBI parathyroid SPECT CT provides both functional and anatomical information of a parathyroid lesion which is important for precise localization of tumor before surgery.

3. Evaluation of Metabolic and Morphologic Changes of Breast Cancer after Neo-adjuvant Chemotherapy by ¹⁸F FDG PET-CT Scan

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ABSTRACT

Breast carcinoma is the commonest cancer burden for Bangladeshi females. Neo-adjuvant chemotherapy (NACT) is usually given for down-staging the tumor to avoid ineffective, hazardous and expensive chemotherapy regimens. Evaluating the efficacy of NACT is key to overall breast cancer management. Fluorine 18 positron emission tomography-computed tomography (¹⁸F PET-CT) plays a valuable role in determining the efficacy of NACT since it has the capability to distinguish the cellular activity at the earliest; which makes it superior to other conventional imaging modalities. In this study, the role of PET-CT was evaluated following NACT for breast cancer patients. Total 9 patients with locally advanced breast cancer were included in this study and response of NACT was evaluated after 4, 6 and 8 cycles of chemotherapy. The size of the primary tumor ranged from 16 to 78 mm and the maximum standardized uptake value (SUVmax) ranged from 2.2 to 15.3. Post NACT primary tumor size ranged from 7.7 to 70 mm and SUVmax value ranged from 0.7 to 11.2. For metabolic response evaluation, 50% reduction of SUVmax value was considered to differentiate between responders and non-responders. For morphologic response evaluation, RECIST 1.1 criteria was used. Post NACT demonstrated that out of nine patients, after NACT- six patients had more than 50% reduction of SUVmax value and were termed as responders and three were non-responders having up to 50% reduction of SUVmax value. Among nine patients, four patients achieved partial response, four had stable disease and one patient developed progressive disease. In conclusion, PET-CT can evaluate the response of NACT and has the potentiality to be a complete imaging approach for the management of breast cancer patients.

4. Diagnostic Efficiency of ¹⁸F-FDG PET-CT for Detection of Primary site in patients with Cancer of Unknown Primary (CUP)-An INMAS Dhaka Study

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ABSTRACT

Background: Cancer of unknown primary (CUP) is defined as the presence of histologically proven metastatic disease for which the site of origin cannot be identified at the time of diagnosis. CUP is one of the ten most frequent cancers and is the fourth most common cause of cancer-related death. Conventional imaging modalities can detect primary site in less than 30% of CUP patients this may negatively affect patient management. Clearly, there is a need for an alternative, noninvasive imaging modality with a high diagnostic yield. PET/CT, using the radiotracer ¹⁸F fluoro-2-deoxyglucose (FDG), can be an excellent problem-solving tool in patients with CUP.

Materials & Methods: The study was carried out for 18 months in the Institute of Nuclear Medicine & Allied Sciences, Dhaka. A total of 45 patients (aged between 30 and 84 years) were included by purposive sampling. Patients having at least one biopsied metastatic lesion, patients with radiologically and/or clinically suspected metastatic lesion(s) were included. Exclusion criteria were as follows: uncontrolled diabetes and patients with known primary cancer. Whole body FDG PET CT scan was acquired from vertex to mid-thigh in a whole-body PET-CT scanner (Philips 128 slice ingenuity TF PET CT).

Results: The study included 45 patients; PET-CT- positive lesions suggestive of primary malignant tumors were detected in 33 out of 45 patients. The SUV value of the detected primary lesions were 4.2 to 18, mean 8.1. PET/CT achieved a sensitivity of 94%, and specificity of 91%, accuracy of 93.3%, PPV 97% and NPV 84% in detection of unknown primary tumor location.

Conclusion: ¹⁸F-FDG PET-CT is an effective imaging modality for demonstrating the metabolic information in search for unknown primary.

Keywords: CUP, ¹⁸F-FDG PET/CT

5. Short Term Outcome of Radioactive Iodine Ablation Therapy in Patients of Papillary Thyroid Carcinoma with BRAF Mutation

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ABSTRACT

Introduction: The most prevalent malignancy among all forms of thyroid cancers is papillary thyroid carcinoma (PTC). The prognosis is excellent with overall 10 years survival rate of 90%. Recently some studies show that genetic mutations have contributions to clinical and behavioral metastatic risk factors. The most common genetic mutation involved in PTC is BRAF(V600E) mutation. This study was done to see the short-term outcome of PTC patients with BRAF(V600E) mutation after radioactive iodine ablation (RAIA).

Materials and methods: A total of 63 patients with thyroidectomy who were referred to NINMAS for RAIA were included in this prospective cohort study. All of them were tested for BRAF (V600E) mutation. Patients were followed up three monthly for one year. Serum thyroglobulin (Tg) level <1 ng/ml was considered disease-free and Tg> 1 ng/ml was considered persistence of disease based on Tg. Progression of disease was considered in case of rising Tg, local recurrence (evaluated by high resolution ultrasonogram), positive diagnostic whole-body scan (DxWBS). The outcome-based on Tg level, metastasis, recurrence, or local aggressiveness was observed.

Results: A total of 63 patients, male 25 (39.7%) and female 38 (60.3%), were included in this study. Among them, 23 (36.51%) were BRAF (V600E) positive, and 40(63.49%) were negative. Extrathyroidal extension, lymphovascular invasion, capsular margin involvement, larger tumor size was significantly associated with BRAF mutation. No significant association was found with age, histological type, lymph node involvement, multifocality, tumor staging and grading. After one year follow up, among 23 BRAF mutation-positive patients 4 (17.4%) were disease-free, 17 (73.9%) had persistent disease and 2 (8.7%) showed progression of disease; among 40 BRAF negative patients 26 (65%) were disease-free, 10 (25%) showed persistent disease and 4 (10%) had progression of disease; *p*-value was 0.016 which was statistically significant.

Conclusion: In this study, patients with positive BRAF mutation showed aggressive presentation and poorer outcome compared to BRAF mutation negative patients. BRAF mutation analysis in PTC patients provides important prognostic value. These patients might be benefited by receiving more intensive management and frequent follow up.

Key words: Papillary thyroid carcinoma, BRAF (V600E) mutation.

6. Relationship between SUVmax and Metastatic Potential of Non-small Cell Lung Cancer – Preliminary Experience

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ABSTRACT

Objective: Lung cancer is the most common cause of cancer-related death throughout the world. Non-small cell lung cancer (NSCLC) is one of the most frequent tumour which includes squamous cell carcinoma and adenocarcinoma. The present study aims to explore the relationship between 18F-FDG uptake by primary lung tumour measured as the SUVmax and loco-regional or

distant organ metastasis in patients with NSCLC on pretreatment PET-CT study.

Methods: Eighteen patients with NSCLC who underwent ^{18}F -FDG PET-CT scans before the treatment were included in the study. Primary tumour SUV_{max} was calculated; the presence of loco-regional and distant organ metastasis was recorded. The patients with SUV_{max} ≥ 2.5 were divided into low and high SUV_{max} groups by using the median SUV_{max}. Both the low (SUV_{max} < 12.6) and high (SUV_{max} ≥ 12.6) SUV_{max} groups consisted of 09 patients. Their data were compared statistically.

Results: Eighteen cases with SUV_{max} ≥ 2.5 were included for analysis. The SUV_{max} ranged from 3.4 to 33.58. The mean SUV_{max} was 12.45 ± 7.45 and the median SUV_{max} was 12.6. The low SUV_{max} group ranged from 3.4 to 12.6 (mean 6.95 ± 2.76), and the high SUV_{max} group ranged from 12.6 to 33.58 (mean 17.95 ± 6.51). In the low SUV_{max} group, 4 patients had loco-regional metastasis and 5 had distant organ metastasis. In the high SUV_{max} group, 5 patients had loco-regional metastasis and 4 had distant organ metastasis. The chance of loco-regional metastasis in patients with NSCLC was slightly higher in the high SUV_{max} group than in the low SUV_{max} group. On the other hand, the possibility of distant organ metastasis was slightly higher in the low SUV_{max} group than in the high SUV_{max} group.

Conclusion: Loco-regional metastasis is more frequent in the patients of NSCLC with high SUV_{max}, but the possibility of distant metastasis is slightly higher in the low SUV_{max} group. Further study is required with a large number of samples to distinguish the definite relation between SUV_{max} and metastatic potential in non-small cell lung cancer patients.

Keywords: Non-small cell lung cancer, SUV_{max}, loco-regional metastasis, distant organ metastasis.

7. Management of papillary thyroid microcarcinoma: Experience in NINMAS

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ABSTRACT

Purpose: The incidence of papillary thyroid micro carcinoma (PTMC) is increasingly diagnosed along with the rise of papillary thyroid carcinoma (PTC). PTMC is defined as a PTC with the greatest dimensions ≤ 1.0 cm by the World Health Organization. The purpose of our study was to observe the short-term clinical outcome after total thyroidectomy without radioactive iodine ablation therapy (RAIT) for PTMC.

Methods: The registered, thyroidectomized PTMC patients from the record files of the Thyroid division, National Institute of Nuclear Medicine & Allied Sciences (NINMAS) were analyzed between January 2017 to December 2020. The baseline data of age, sex, Tg, TSH, TgAb, HRUS of neck, $^{99\text{m}}\text{Tc}$ -thyroid scan & RAI (^{131}I) uptake following 15 days of surgery were documented. All the patients were treated with Levothyroxine replacement without giving RAIT. Follow-up has been being given at an interval of 6 months. The overall outcome was evaluated after 2 years.

Results: A total of 95 patients M=15(15.78%), F=80(84.22%), average 43 ± 14.14 years were included in the study. On average, initial mean Tg was 12.3 ± 0.57 ng/dl, last Tg 1.72 ± 0.23 ng/dl. Ninety two (96.84%) patients had an uneventful follow-up period. But 03(3.16%) patients had shown lymph nodes metastasis (2) and one patient had recurrent tissue in thyroid bed after 10 months, one year & two years of surgery. They underwent revision neck surgery followed by ^{131}I ablation. Post therapy scan showed RTC in thyroid bed in one patient. In these patients with recurrence, the initial average Tg was 35.02 ng/dl & last follow-up Tg was 0.20 ng/dl after RAIT. Histopathology of recurrent tissue in the thyroid bed and lymph nodes confirmed the PTC.

Conclusion: The results of this study reaffirm that papillary microcarcinoma has an excellent prognosis if managed initially by total thyroidectomy. But recurrence rate of 3.16 % in PTMC evaluated by this study may be considered during counseling of patients, whether they will make option for low dose radioactive iodine ablation.

Keywords: Papillary thyroid microcarcinoma, Lymph nodes metastasis, Radioactive iodine ablation.

8. Rest only Myocardial Perfusion Imaging (MPI) with ^{99m}Tc -MIBI and Myocardial viability assessment with ^{18}F -FDG Cardiac PET before revascularization following Myocardial Infarction: Initial Experience

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ABSTRACT

Background: To evaluate myocardial perfusion and metabolism before revascularization following myocardial infarction is very important for better patient management.

Methods: Eighteen male patients (Age: 52.5 ± 8.7 years, BMI: 24.9 ± 3.3 kg/m²) with myocardial infarction were enrolled for ^{99m}Tc -MIBI rest only MPI (dose: 10 mCi) and ^{18}F FDG Cardiac gated PET (dose: 5-7 mCi) for myocardial viability assessment in two different days. In this study group, 50% of patients had both diabetes mellitus and hypertension, 44.5% had obesity and 39% had dyslipidaemia. Overnight fasting with oral glucose loading protocol was followed for cardiac PET study. Among 18 patients, 15 patients underwent coronary angiogram in deferent intervals after myocardial infarction. Recent echocardiography and ECG data were compared accordingly.

Results: On angiogram seven patients had triple vessel disease, five patients double vessel and three patients had single-vessel disease, and five patients had in-stent restenosis (ISR). MPI-PET study revealed: out of 55 lesions 38% perfusion-metabolism match defect, 45.5% mismatch defect and 16.5% showed reverse mismatch defects. Mismatch defects and reverse mismatch defects were designated as dysfunctional viable myocardium (either

hibernation or stunning), and presumed to be suitable for revascularization. Among the match defects: 9% lesions showed viable myocardium with reduction of both perfusion and metabolism, also predicted to be suitable for revascularization. Rest of the 29% match defects revealed fixed defect / large infarct with slight periinfarct ischaemia and obviously were not suitable for revascularization.

Conclusion: Assessment of myocardial perfusion and metabolism status before revascularization following myocardial infarction could create a good impact on patient's management.

PROFFERED PAPER SESSION II

1. Optimization of the Dosimetric Test of the IAEA TECDOC-1583 Guidelines using CIRS Thorax Phantom

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ABSTRACT

Background: The purpose of this work is to verification of the Radiotherapy Treatment Planning System (RTPS) using the IMRT Thorax Phantom (CIRS - 002LFC) such that to observe the deviation between the calculated and measured dose and hence the dose distribution in the phantom. The procedure has been based on International Atomic Energy Agency IAEA-TECDOC-1583.

Materials and Methods: For this research, we have been used the IMRT Thorax Phantom (CIRS - 002LFC). At first, we have been scanned the phantom in GE-Light Speed CT-simulator, the gated data input into Eclipse TPS (version 13.7) and get the calculated result. Then

we have been placed the phantom in Varian D-2300CD-6X LINAC at the same condition and the same setup and get the original result by using IBA Farmer Type Ionization Chamber (FC65-P), DOSE 1 Reference Class Electrometer (IBA) and calculation method. After doing this we have been compared those individual doses.

Results: The deviation between the measured and calculated values for all test cases made with advanced algorithms within the agreement criteria, while the larger deviations have been observed for simpler algorithms. The number of measurements with results outside the agreement criteria has been increased with the increase of the beam energy and decreased with TPS calculation algorithm sophistication. Also, a few errors in the basic dosimetry data in TPS have been detected and corrected.

Conclusion: The work has been helped the users to better understand the operational features and limitations of their TPSs and resulted in increased confidence in dose calculation accuracy using TPSs. The audit results have been indicated the shortcomings of simpler algorithms for the test cases performed and, therefore the transition to more advanced algorithms has been highly desirable.

2. Comparative evaluation of the labeling efficiency and the stability of ^{99m}Tc -Sestamibi complex prepared by two different methods Heating Block and Boiling Water Bath

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ABSTRACT

^{99m}Tc -sestamibi (^{99m}Tc - MIBI) is a lipophilic cationic complex that has been utilized for myocardial perfusion studies. To establish safety and effectiveness, the

radio-complex needs to be non-pyrogenic with radiochemical purity of at least 97% for the clinical trials. As the non-sterilized water is used in the boiling water Bath for the preparation of the radio-complex, there is little chance of the radiopharmaceutical being contaminated by the microbial during needle puncture through a contaminated rubber septum. The purpose of this study was to compare the Boiling Water Bath method to a Heating Block method at which sea sand was packed to 3.5 cm height. The volume 1-3 ml of freshly eluted $\text{Na}[^{99m}\text{TcO}_4^-]$ (400-6660) MBq was added to the kit vials and prepared the radio-complex in two methods. The radiochemical purity (RCP) and stability of the radio-complex were evaluated by Instant Thin Layer Chromatography-Silica Gel (ITLC-SG) and High-Performance Liquid Chromatography (HPLC) at 20min, 1hr, 6hr and 12hr after reconstitution. In the case of the Heating Block method, we also measured the labeling efficiency at different labeling temperatures 24.5°C (room temperature), 40°C, 60°C, 80°C, and 100°C. Our experimental results showed no significant differences between the two methods. The RCPs were more than 98% and the radio-complex was stable up to 12hr after reconstitution. High labeling efficiency (>98%) was also found at 80°C to 100°C which facilitates the use of the Heating Block method as a substitution of Boiling Water Bath for the preparation of ^{99m}Tc -MIBI minimizing the possibility of microbial contamination.

Keywords: ^{99m}Tc -Sestamibi (^{99m}Tc -MIBI), Radiochemical purity, Heating Block, Boiling Water Bath.

3. Radiation protection practices as per JCI requirement at the Nuclear Medicine Department in Evercare Hospital Dhaka

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ABSTRACT

Introduction: Nuclear medicine is a branch of medical science that uses small amounts of radioactive materials

to diagnose or treat a variety of diseases. Radiation protection is an important aspect of nuclear medicine. It is essential to make sure that the investigation is justified and the radiation absorbed dose to the patients as well as to staff members and other individuals involved is kept as low as reasonably achievable (ALARA principle). This is an introduction and an overview of the radiation protection practices in diagnostic nuclear medicine in Evercare Hospital Dhaka (EHD) as per Joint Commission International (JCI) guidelines. It may be mentioned that EHD is the only hospital in Bangladesh accredited by JCI.

Methodology: The Nuclear Medicine and Molecular Imaging (NM&MI) department in EHD always follows radiation safety Protocols such as shielding, surveys of all radiation areas, using safety protective devices, wipe tests, use of personal dose monitoring devices, safe management of radioactive waste, etc. Radiation safety training is mandatory for all radiation workers and staff in nuclear medicine. Radiation signs & symbols are marked in all radiation areas in EHD. NM&MI department is equipped with one dual-head SPECT, one BMD machine and one PET/CT system. Shielding is mandatory for machine rooms, console rooms, patient uptake rooms etc. Designing the layout of the facility and appropriate installation of shields were essential. Shielding is maintained for sealed and unsealed sources. The quality control of the nuclear medicine equipment is regularly performed. The contact time between staff and patient is recorded and assessed. The RCO monitors the radiation levels of all areas in the nuclear medicine department with a survey meter and keeps all data. All working personnel is provided with thermoluminescent dosimeter (TLD) badges. Hand monitoring is also important in nuclear medicine using ring dosimeters.

Result & Discussion: Background radiation counts for different areas of nuclear medicine were successfully collected with the help of a survey meter and the data showed that it is within the acceptable dose limit ($<5\mu\text{Sv/hr}$). Wipe test, contamination monitoring & radioactive waste disposal data are kept in the logbook of NM&MI department. The nuclear medicine radiation workers were found to have received doses within acceptable limits as per ICRP recommended dose limits.

Conclusion: Nuclear medicine staff should always practise radiation safety protocol, so that they would be able to ensure the optimization of radiation exposure. The nuclear medicine department in EHD follows such a protocol and the working personnel demonstrate radiation doses within acceptable limit.

4. Effect of Radioactive Concentration and Loading Volume of Fission Produced $\text{Na}_2^{99}\text{MoO}_4$ on the Chromatographic $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ Generator

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ABSTRACT

The chemical processing of fission produced $\text{Na}_2^{99}\text{MoO}_4$ in 0.2 M NaOH solution has a vital role for the successful production of the chromatographic $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generator inside the hot-cell. The present study emphasizes on the investigation of influence of radioactive concentration (RC) and loading volume (LV) of $\text{Na}_2^{99}\text{MoO}_4$ solution to obtain the maximum $\text{Na}^{99\text{m}}\text{TcO}_4$ yield (with the limited percent of ^{99}Mo breakthrough). Several RC and LV of the $\text{Na}_2^{99}\text{MoO}_4$ solutions were prepared by using pH: 3-4 HNO_3 which contain the same radioactivity. The prepared solutions were loaded into the chromatographic $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generators inside the hot-cell. The RC of the $\text{Na}_2^{99}\text{MoO}_4$ solutions were 88.1 mCi/mL, 35.24 mCi/mL, 17.62 mCi/mL & 11.75 mCi/mL and the LV were 2mL, 5mL, 10mL & 15mL respectively. The measured radioactivity of the obtained $\text{Na}^{99\text{m}}\text{TcO}_4$ elute were found $16.31\pm 0.13\text{mCi}$, $17.68\pm 0.11\text{mCi}$, $16.61\pm 0.12\text{mCi}$, $15.84\pm 0.18\text{mCi}$ respectively for 30 minutes after the loading of $\text{Na}_2^{99}\text{MoO}_4$ (first zero elution). The radioactivity of $\text{Na}^{99\text{m}}\text{TcO}_4$ elute of the $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generators were found $208.18\pm 0.43\text{mCi}$, $213.5\pm 0.44\text{mCi}$, $209.1\pm 0.51\text{mCi}$, $202.3\pm 0.48\text{mCi}$ respectively after 23 hours of second zero elution. The ^{99}Mo break-through of elute, for all experimented $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generators were found within the USP (United States Pharmacopoeia) limit i.e. $<0.015\%$. The current experimental observation shows that the escalation of RC of

$\text{Na}_2^{99}\text{MoO}_4$ results the superior radioactivity of $\text{Na}^{99\text{m}}\text{TcO}_4$ for the $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generators. However, the far reduced volume of the $\text{Na}_2^{99}\text{MoO}_4$ solution (2mL) can cause the system loss of $\text{Na}_2^{99}\text{MoO}_4$ and the lower values of the radioactivity of $\text{Na}^{99\text{m}}\text{TcO}_4$ elute. Thus, the optimized radioactive concentration and loading volume of $\text{Na}_2^{99}\text{MoO}_4$ would yield higher level of $\text{Na}^{99\text{m}}\text{TcO}_4$ elute of the $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generator.

5. Comparative Study of Different Radionuclides in the Imported Fission Produced Mo-99 Solution at Radioisotope Production Division

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ABSTRACT

Radioisotope Production Division (RIPD) is producing Mo-99/Tc-99m generators for medical purposes by importing fission-produced Mo-99 from different countries *e. g.* Belgium, Indonesia and South Africa. Mo-99 producing countries generally use U-235 for fission reaction to produce Mo-99. After separation and purification process, Mo-99 solution is sent to stakeholders like Bangladesh. It is expected that the Mo-99 solution is free from other radionuclides. The study was performed to check the presence of other radionuclides than Mo-99 in imported Mo-99 solution. In this study, some samples of fission produced Mo-99 (imported from different origins) were found to have some undesired characteristic gamma peaks in High Purity Germanium (HPGe) detector of radionuclides I-131, Ce-141, La-140, Nd-147, Ba-140, Te-131, Te-131m, Ru-103, Zr-95, Nb-95 etc., which are the daughter of U-235 also. These radionuclides can be described as impurities of that Mo-99 solution which implies the improper separation of Mo-99 from the mother solution.

6. F-18 radioisotope production with “Cyclone 18/9 MeV IBA Cyclotron” installed at NINMAS

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ABSTRACT

An 18/9 MeV Cyclotron (18 MeV for proton and 9 MeV for deuteron, Model: Cyclone 18/9, IBA) was installed at National Institute of Nuclear Medicine and Allied Sciences (NINMAS), Bangladesh Atomic Energy Commission (BAEC). It is a milestone for Bangladesh because ^{18}F -FDG produced from this cyclotron, is being supplied to all PET centers in Dhaka cities. Installation of this cyclotron reduces the long queue of cancer patients to a greater extent. This 18/9 MeV Cyclotron is capable to fulfil the demand of nuclear medicine industries in PET and SPECT radioisotopes. Radioisotopes such as ^{18}F , ^{11}C , ^{13}N and ^{15}O can be produced with this cyclotron. Solid target option is also available here which can be used for producing ^{67}Ga , ^{68}Ga , ^{124}I , ^{123}I , ^{111}In , $^{99\text{m}}\text{Tc}$, ^{86}Yt , ^{64}Cu , ^{89}Zr radioisotopes. ^{18}F is the PET radioisotope of choice for many radiopharmaceuticals due to its glucose analogous and half-life of 110 min. We started production of ^{18}F -FDG successfully in October 2020. As of today, there are about 100 batches of ^{18}F -FDG production done successfully. Before automation, a low beam current, 10-12 microamp was used to the target of cyclotron for the production of ^{18}F and the amount of ^{18}F produced were sent to the Synthera module for synthesis. After automation, ^{18}F radioisotope production is being carried out with its full capacity. Now 40 to 55 microamp beam current is being used to produce ^{18}F of amount 2500 to 3500mCi for some 60minute bombardment time. So ^{18}F yield is considered the primary factor in producing sufficient activity because we would like to find the optimal operating point that minimizes the production time and cost as well. All parameters like Dee voltage, Vacuum label, Beam current, irradiation time, amount of enriched O-18 water and other parameters are taken into consideration in optimal ^{18}F -FDG production.

Keywords: Cyclotron, FDG, PET, Half-life.

7. In-House Production and Quality Control of ^{99m}Tc -MDP Radiopharmaceuticals at RIPD, BAEC

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ABSTRACT

^{99m}Tc -MDP (Methylene Diphosphonate) is the most commonly used radiopharmaceutical for bone imaging in nuclear medicine. Test production of a small batch (20 Vials) for checking quality control parameters of this radiopharmaceutical was done at Radioisotope Production Division (RIPD), Bangladesh Atomic Energy Commission (BAEC). In this study MDP was prepared according to the guidelines described in IAEA Technical Reports Series No. 466 (Technetium-99m Radiopharmaceuticals: Manufacture of Kits). Analytical grade methylene diphosphonate (MDP) 0.2 gm, stannous chloride dihydrate ($\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$) 0.02g, ascorbic acid ($\text{C}_6\text{H}_8\text{O}_6$) 0.04g, hydrochloric acid (HCl) and sodium hydroxide (NaOH) were used in aseptic condition for the preparation and the final volume (pH= 6.0) was adjusted to 20ml. The solution was dispensed equally in 20 sterile vials (1 ml each). Among those 20 vials, three vials were selected arbitrarily for wet-labelling with ^{99m}Tc of 90 mCi activity freshly eluted from $^{99}\text{Mo}/^{99m}\text{Tc}$ generator produced at RIPD and was then tested for further quality control. Test for apyrogenicity and sterility were performed according to the pharmacopoeias and the results were found negative. Radiochemical purity test was done with HPGe detector by paper chromatography in Whatman 1mm Paper (1×10cm) using acetone and saline (0.9% NaCl) as mobile phase. The radiochemical purity of ^{99m}Tc -MDP was 95.31%, 95.49% and 94.54% respectively for the selected samples. The bio-distribution in Albino Swiss mice was measured in different organs (%dose/organ). Bio-distribution showed high activities in bladder and low activities in femur, liver and intestine.

8. Outcome of Radioiodine Therapy in Graves' Disease Having History of Antithyroid Drug Induced Agranulocytosis

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ABSTRACT

Introduction: Agranulocytosis is a rare but potentially fatal complication of antithyroid drugs (ATD). We reported four patients who developed agranulocytosis after starting ATD. The aim of our study is to evaluate their clinical course and outcome after radioiodine therapy.

Materials and Methods: A total of four patients with Graves' disease having history of antithyroid drug induced agranulocytosis came to NINMAS in 2021 for radioiodine therapy. Symptoms of ATD induced complications were developed within short time in three patients and one patient developed after two and a half years later. In our study, we observed their clinical characteristics and radioiodine therapy outcome.

Results: All four patients were female. The mean age of the patients with ATD induced agranulocytosis was 36±19yrs. ATD induced agranulocytosis developed within two weeks, three weeks, eight weeks and two and a half years later. Three patients had similar blood pictures that developed agranulocytosis acutely. WBC count was 2000 per micro-liter, neutrophil was 07% and lymphocyte was 90% in one patient. The patient who developed agranulocytosis lately was uneventful up to 2.5 years; then she developed adverse reaction like high grade fever, anemia, sore throat and cough. At that time

her WBC count was 1000, per micro-liter, neutrophil was 04%. FT3 level was >20pg/ml. Out of four patients plasmapheresis were done in two patients due to very high hormone level. All the patients were treated with tablet lithium carbonate. Lithium level was 0.1-0.4 mmol/L were within normal limit. One patient was non responsive to lithium carbonate. After improvement of their clinical symptoms, biochemical parameter and decreasing hormonal level were treated with radioiodine therapy. The average dose was 12mCi ¹³¹I. All of them were hospitalized during RAIT for observation. After RAIT three patients become hypothyroid and are on levothyroxine replacement at present.

Conclusion: Life threatening complication following ATD induced agranulocytosis can be minimized with early diagnosis and proper management. Radioiodine therapy remains the most appropriate treatment option for favorable outcome.

Key words: Graves' disease, Agranulocytosis, Radioiodine Therapy.

9. Experience of Bone Scan in Carcinoma Breast Patients with Metastases in Different Organs – Single Institute Based Study.

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ABSTRACT

Background: Bone metastases is a very common phenomenon in carcinoma breast patients. In this study we have analyzed bone scan findings in carcinoma breast patients with different hormone receptor status and different organ metastases.

Patients and methods: This study was conducted at the Institute of Nuclear Medicine and Allied Sciences, Mitford, Dhaka from July 2020 to July 2021. Bone scan was done with Siemens Dual Head Gamma Camera after

intravenous injection of 20 mci of Tc-99m MDP. Both anterior and posterior views were obtained with SPECT when needed. Then the images were interpreted and data were collected.

Results: The patients were divided into two groups, based on the extent of skeletal metastasis. Group-A had 36 patients who showed either extensive (52.7%) or multiple (47.3%) bone metastases, and all of them also had different organ metastases. The result was statistically significant (<0.05). Group-B included 109 patients who were categorized into negative for skeletal metastasis (46.8%), solitary metastasis (9.2%), and two-site skeletal metastases (44%). We found that in group-B, those who were negative for bone metastases were also definitely negative for organ metastases. Besides, some patients had bone metastases without evidence of organ metastases. The result was statistically significant (0.01).

Conclusion: The findings of the study revealed that presentation of organ metastases was related to extent and severity of bone metastasis in carcinoma breast patients.

Keywords: Bone scan, breast carcinoma, organ metastases, skeletal metastases.

PROFFERED PAPER SESSION III

1. Lymphoscintigraphic Sentinel Lymph node Detection in Breast Cancer Patients: Initial experience at NINMAS

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ABSTRACT

Lymph node involvement plays an important role in staging breast cancer, treatment planning and prediction of outcome. Sentinel lymph node (SLN) biopsy is a

well-established approach for assessing axillary lymph node status in breast cancer. SLN is the first lymph node where cancer cell spread from the primary tumor. SLN biopsy is rapidly increasing as the preferred technique for nodal staging in breast cancer, melanoma and cervical cancer patients. Initially blue dye test was used by the surgeons to detect SLNs in breast cancer patients, but now lymphoscintigraphy along with intraoperative γ (gamma) probe detection and use of Isosulfan blue dye is practiced as an important and safe procedure. This helps not only to avoid axillary node dissection but also guide the surgeons to quickly decide with the intraoperative histopathology report of the sentinel lymph node whether its free from metastasis or not. Recently, we have started lymphoscintigraphy for detection of the sentinel node in breast cancer patients at NINMAS and sharing our initial experience.

Keywords: Lymphoscintigraphy, Breast cancer, sentinel lymph node, intraoperative γ probe

2. Recurrence of Neuroblastoma Incidentally Detected on ^{99m}Tc MDP Bone Scintigraphy by an Extraosseous Soft Tissue Uptake– A Case Report

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ABSTRACT

Objectives: Bone scintigraphy with ^{99m}Tc - methylene diphosphonate (MDP) is one of the most useful imaging modalities for the detection of bone metastases as well as for various benign bone disorders. In addition to the positive osseous findings, the unexpected extraosseous findings also sometimes provide important information that may alert the prescribing physician to discover a hidden disease process.

Materials & Method: We performed whole body bone scintigraphy 3 hours after iv administration of 20 mCi ^{99m}Tc MDP in 18 years old female patients due to complaints of generalized body ache as well routine follow-up purposes. She was previously diagnosed with a case of neuroblastoma (left adrenal gland) and underwent left-sided nephrectomy with adrenalectomy & treated with chemotherapy 4 years back.

Results: Bone scintigraphy revealed multiple bony metastases and an area of soft tissue uptake at the left renal bed, at the site of previous surgery. Then, we performed ultrasonography of the abdomen which revealed a well outlined, solid, hypoechoic soft tissue mass (5.4 x 4.4 cm) at left lumbar region and a few enlarged paraaortic lymph nodes. Cytological examination from the soft tissue mass revealed neuroblastoma (recurrence) which recurred after 4 years of surgery. Her post-surgery baseline bone scan was positive for only bone metastases but during 2nd follow-up after 2 years, bone scan was negative for bone metastasis and no soft tissue uptake at left renal bed. Finally, oncologist planned for chemotherapy for a recurrence of neuroblastoma.

Conclusion: Careful evaluation of unusual extraosseous uptake in bone scintigraphy may help to detect hidden pathology as well as can change the treatment planning.

3. Rare Presentation of Muscular Infiltration in Classical Hodgkin's Lymphoma – A Case Series.

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ABSTRACT

Background: Hodgkin disease is usually almost entirely confined to the lymph nodes. Extranodal involvement is much less common in Hodgkin disease compared to non-Hodgkin lymphoma. Healthy skeletal muscle is devoid of lymphoid tissue. Lymphatic infiltration to skeletal muscle from Hodgkin's lymphoma is very rare. The presence of extranodal involvement in initial staging is crucial for treatment planning. Here two cases

of Hodgkin's lymphoma involving skeletal muscles of various sites detected by F 18 FDG PET-CT scan and post-therapy follow-up outcome are reported.

CASE REPORTS

Case 1: In a diagnosed case of classical Hodgkin's lymphoma of a 20 years old lady treated by six cycles of chemotherapy PET-CT scan shows hypermetabolic lymph nodes above and below the diaphragm with splenic and skeletal involvement. FDG uptakes (SUVmax: 8.7) are seen in muscles of hip and thigh. After another six cycles of chemotherapy follow up PET-CT scan revealed insignificant interval changes of hypermetabolic lymph nodes and skeletal lesions & regression of splenic lesions; however, there was a mixed response of hypermetabolic muscular lesions.

Case 2: Baseline PET-CT scan of a classical Hodgkin's lymphoma case of a 39 years old lady revealed multiple hypermetabolic supra and infra diaphragmatic lymph nodes, pulmonary, splenic and extensive bony involvement with a focal FDG avid nodule in gluteal muscle (SUVmax: 4.7). Being treated with 3 cycles of chemotherapy follow-up PET-CT scan showed partial metabolic and morphologic regression of supradiaphragmatic lymph nodes, pulmonary, splenic and skeletal lesions, however metabolic progression of infra-diaphragmatic lymph nodes. Newly developed hypermetabolic (SUVmax: 8.2) left psoas, iliacus muscles and metabolic progression of gluteal muscle lesion (SUVmax: 7.8 vs prior 4.7) are seen.

Conclusion: Skeletal muscle involvement in Hodgkin's lymphoma indicates extensive disease spread and poor treatment outcome. F18 FDG PET-CT scan evaluation is important to identify skeletal muscle involvement and guide patient management.

4. Double Ectopic Parathyroid Adenomas in A Patient of MEN-1 Syndrome Detected on ^{99m}Tc-MIBI Parathyroid SPECT CT-Case Report

Sharmin S, Akhter A, Hossain M, Islam S, Hossain S, Afrin R, Biswas T, Rahman F, Mozumder MR, Sultana T, Haque FS, Biswas SK, Begum R, Haque JA.

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ABSTRACT

Background: Multiple endocrine neoplasia type 1 (MEN-1) syndrome is characterized by the combined occurrence of tumors involving parathyroids, pancreatic islet cells, and the anterior pituitary. Here we describe a classic case of MEN 1 syndrome having dual ectopic parathyroid adenomas detected on ^{99m}Tc-MIBI Parathyroid SPECT CT.

Materials and Methods: ^{99m}Tc-MIBI parathyroid SPECT-CT was performed to a 38 years old male having raised parathyroid hormone (PTH). Clinical findings, biochemical parameters, neck ultrasonogram & SPECT-CT findings were analyzed.

Result: The patient was presented with the complaints of headache, dizziness, weakness & weight loss. Biochemically we found raised serum PTH (664.0 pg/ml), prolactin level (104.49 ng/ml) & serum calcium level (10.9 mg/dl) and a small hypoechoic soft tissue mass in the lower pole of right thyroid lobe on Ultrasonogram. He had normal TSH, serum creatinine & inorganic phosphate level but vitamin D insufficiency (20.2 ng/ml). MRI of the brain showed pituitary microadenoma (3 mm size). The patient had positive family history of parathyroid adenoma in his four siblings among nine. Finally, ^{99m}Tc-MIBI parathyroid SPECT-CT revealed double ectopic parathyroid adenomas, one intrathyroidal at right lobe & another one at left suprasternal region. Though we did not have the scope for genetic analysis, the patient was diagnosed as a case of MEN-1 syndrome based on clinical & imaging findings having the simultaneous presence of dual ectopic parathyroid adenomas.

Conclusion: ^{99m}Tc-MIBI parathyroid SPECT-CT plays a pivotal role for both diagnosis and preoperative localization of tumor in such case of dual ectopic parathyroid adenomas in MEN 1 syndrome.

Keywords: Parathyroid adenoma, MEN-1 syndrome, SPECT-CT.

5. Incidental Diagnosis of Prostate Cancer by F-18 FDG PET Scan in a Patient during Post-Operative Evaluation for Caecal Cancer

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ABSTRACT

Worldwide prostate cancer is the second most frequent cancer and the sixth leading cause of cancer death among men. Positron emission tomography (PET) is currently playing an important role in the assessment of prostate cancer using a non FDG PET tracer. ¹⁸F-FDG PET has reported a limited efficacy for the detection of primary and metastatic disease as prostate tumors are characterized by slow glycolysis and low FDG-avidity on FDG-PET images. Incidental high FDG uptake in well-differentiated prostate cancer is rare. We reported a case of 75 years old man who underwent whole body ¹⁸F-FDG PET scan for post-operative evaluation of caecal cancer that demonstrated no evidence of recurrence. However, a focal hypermetabolic lesion of SUV max 12.6 was detected in the right lateral lobe of prostate. The patient's prostatic biopsy from the right lobe revealed well- differentiated adenocarcinoma with Gleason score six (3+3 = 6/10) and raised serum PSA level (6.66 ng/mL).

So, incidental focal intense FDG uptake in the prostate gland should be considered for further investigations to confirm the presence of prostate cancer.

6. Occult Papillary Thyroid Carcinoma initially presenting as lateral neck mass with no evidence of primary tumor in Preoperative and Postoperative examination: A rare case report

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ABSTRACT

Background: Thyroid carcinoma presenting as an isolated cervical mass without clinical and imaging evidence has been rarely reported.

Case report:

A 46 years old man presented with a lateral neck swelling in our institute for preoperative evaluation. Highresolution ultrasound of the neck revealed no nodule within the thyroid gland. But a heterogeneously hypoechoic soft tissue mass is seen in the left side of neck with irregular margin. The patient's thyroid function tests were within normal limit. Thyroid scintigraphy including SPECT/CT of neck showed homogeneous radiotracer distribution in thyroid gland with no hot or cold area. CT portion of SPECT/CT revealed a soft tissue density mass in left lateral neck which showed no significant radiotracer uptake. Excisional biopsy of the neck mass revealed metastatic papillary thyroid carcinoma. Then the patient underwent total thyroidectomy with neck dissection followed by histopathological examination. But no evidence of primary papillary thyroid carcinoma was found within the thyroid gland. On the basis of histopathological report of dissected neck mass as metastatic papillary thyroid carcinoma, he was treated with radioiodine. There was no recurrence or metastasis within six to twelve months after the first surgery. Lateral neck mass occurring primarily as a result of papillary thyroid carcinoma is rare which is really a diagnostic challenge.

Key words: Occult thyroid carcinoma, lateral neck mass.

7. Patterns of ^{99m}Tc DTPA Renogram Findings in Symptomatic Patients with Horseshoe Kidney: Observation of a Single Center

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ABSTRACT

Introduction: Horseshoe kidney (HSK) is the most common congenital fusion abnormality of the urinary tract. Symptomatic patients are often referred for evaluation of renal function by scintigraphy. We have attempted to analyze the findings of ^{99m}Tc -DTPA renogram in diagnosed HSK patients referred to INMAS, Mitford.

Patients and Methods: This retrospective study included 33 diagnosed and symptomatic patients of horseshoe kidney referred for diuretic renogram between December 2017 to October 2021. Each patient was confirmed to have HSK by a combination of investigations including ultrasound, Intravenous urography and sometimes renal CT scans. Dynamic renogram was performed using dual-head Siemens Gamma Camera after injecting 5 mCi of ^{99m}Tc -DTPA. The plotted time-activity curves, sequential raw images and final reports were retrospectively retrieved from the archive and statistically analyzed.

Result: Study subjects comprised of 13 males and 20 females (M:F ratio = 1:1.5) with ages ranging from 5-65 (average 31.7 ± 2.6) years. Among them, 8 out of 33 (24.2%) had a history of surgical intervention. About 57.5% of kidneys were low-lying in position with more than 60% having normal perfusion. Besides, 41.9% of the right moieties had evidence of pelvicalyceal dilatation and 45.1% showed varying degrees of functional, partial or complete obstruction, with 54.8% having parenchymal impairment. In case of the left moieties, 33% had features of dilatation and 63.6% revealed some levels of obstruction and parenchymal insufficiency.

Conclusion: Functional status of a horseshoe kidney is often compromised owing to its tendency of developing infection, obstruction, calculus formation, tumors and accidental injury. Dynamic test like ^{99m}Tc -DTPA renogram plays important role in providing physiological and anatomical information in the management of HSK patients.

Keywords: Horseshoe kidney, ^{99m}Tc -DTPA renogram, diuretic renogram

8. Experience of Thyrogen Stimulated Radioiodine therapy in Metastatic Thyroid Carcinoma: A case report

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ABSTRACT

A 50 year old post-menopausal woman was referred to INMAS, Dhaka in November 2017 for radio-iodine ablation. She underwent decompression surgery in April 2017 for a compressed fracture in D₁₂ vertebra. HPR revealed metastatic carcinoma from soft tissue origin. She had H/O right hemithyroidectomy in 2007 (no document available). PET CT scan revealed absent right lobe of thyroid gland with a small nodule in left lobe with increased ^{18}F Fluoro Deoxy Glucose (FDG) uptake in sternum, D₁₂ and L₁ vertebrae. Her Thyroglobulin (Tg) level was high (Tg: 255 ng/ml). As there was no definite primary neoplastic lesion with the given clinical context thyroid cancer could be considered as the primary. Immunohistochemistry (IHC) from D₁₂ vertebra confirmed metastatic follicular carcinoma thyroid. The patient underwent a completion thyroidectomy in 2017. No malignancy was found in histopathology. She was then diagnosed with follicular thyroid carcinoma with multiple bone metastases. During post-completion thyroidectomy evaluation after 15th postoperative day, ultrasound imaging of neck showed small remnant in right thyroid bed (0.57 X 0.39 cm), multiple sub centimetric lymph nodes in right mid-cervical and left supraclavicular regions. Thyroid scan showed a small area of radiotracer concentration in right lobe region. Her serum TSH: 6.82mIU/L, Tg: 255 ng/ml, AntiTgAb: 14.06 IU/ml, corrected calcium: 10.02 mg/dl, PTH: 13.8 pg/ml. As the patient had multiple bone metastases, her serum TSH was not raised to optimum level on repeated estimation for effective radio-iodine ablation. Patient was financially solvent. So, we advised her to take recombinant TSH (injection thyrogen) to raise the TSH level artificially. After taking thyrogen, her S. TSH was

> 150 mIU/L. Then she was treated with 200 m Ci ^{131}I in May 2018. Low dose of Tab. Levothyroxine was prescribed 48 hours after radio-iodine ablation as she had hormone-secreting bony metastases. Post therapy scan revealed focal area of good tracer uptake in thyroid bed and focal intense tracer uptake just below the sternal notch (manubrium-sterni). On 1st follow up after 4 months of ablation, her serum T4: 145.95 n mol /L, TSH: 0.16m IU/L, Tg: 4.75 ng/ml, AntiTgAb: 10.45 IU/ml, USG of neck: No residual thyroid tissue in thyroid bed, few sub centimetric reactive lymph nodes in both sides of neck. She was followed up regularly in our institute. Her 1st and 2nd diagnostic whole-body scans with off thyroxine were positive and revealed focal increased radiotracer concentration just below the sternal notch (manubrium-sterni). Her off thyroxine serum TSH was: > 50 m IU/L, Tg: 148.65 ng/ml and TSH: > 60 m IU/L, Tg: 145.65 ng/ml respectively. So, she received radio-iodine therapies two times subsequently (200 mci in each schedule) those were given on 2020 and 2021 respectively for bony metastasis (manubrium-sterni). Her serum TSH level was raised to optimum level after thyroxine withdrawal. Post therapy scans revealed focal intense tracer uptake in manubrium-sterni. No other site of metastasis could be seen. Now the patient is clinically stable and under our regular follow-up.

9. Thyroid functional status after 1 year of fixed-dose radioactive iodine therapy for hyperthyroidism at INMAS, Rajshahi

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ABSTRACT

Objectives: Radioactive iodine (RAI) therapy is a highly effective modality for the treatment of different types of

hyperthyroidism. The fixed doses of RAI had been practiced at the Institute of Nuclear Medicine and Allied Sciences (INMAS), Rajshahi for a long time which was upgraded in 2015 by SNMB. The objective of this study was to observe the treatment outcome of a modified fixed dose of RAI on hyperthyroid patients.

Patients and Methods: In this retrospective study the treatment outcome was evaluated in previously diagnosed 49 hyperthyroid patients who were treated with fixed-dose of radioactive iodine. The patients were chosen randomly starting from year 2002 to 2019. Among them 61.22% were females and 38.78% were males. Diagnosis of hyperthyroidism was done by evaluation of thyroid stimulating hormone (TSH), free triiodothyronine (FT_3), free thyroxine (FT_4), high resolution ultrasonogram of thyroid gland and radioactive iodine uptake. All of them received fixed-dose of radioactive iodine (9-20 mCi) depending on the type of hyperthyroidism, severity of the disease and overall assessment of the thyroid gland, especially gland size with nodularity. Higher doses were usually used in treating patients with multinodular goiter. Follow-up was done at 2 months of therapy, then at 3 monthly intervals for the first year and then as needed based on fluctuation of thyroid function.

Result: In the randomly chosen sample, 30 patients were diagnosed as diffuse toxic goiter and 19 as toxic multinodular goiter. The goal of RAI therapy was considered as either attaining euthyroid state or hypothyroid state. The study shows that within 1 year of RAI therapy 71.42% of the patients became hypothyroid and 10.20% became euthyroid. About 38.78% of the patients received more than single dose of RAI.

Conclusion: Fixed-dose RAI is very safe and highly effective to achieve treatment goals in hyperthyroid patients. However, lifelong follow-up is important to ensure timely treatment of recurrence and hypothyroidism.

10. Association of excess dietary iodine intake with papillary thyroid carcinoma

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ABSTRACT

Introduction: The incidence of Papillary Thyroid Carcinoma (PTC) has been increasing worldwide since last few decades according to the archives of the National Institute of Nuclear Medicine and Allied Sciences (NINMAS). This overall rise is also evident in Bangladesh. Some research works showed that this high incidence of PTC might have association with excess dietary intake of iodine. Bangladesh Government introduced iodine fortified dietary salt in 1995. This study was conducted to ascertain the association of excess dietary iodine intake of the Bangladeshi population with PTC.

Patients and methods: This cross-sectional study was carried out at NINMAS, Dhaka, from March 2020 to June 2021. A total 111 number of participants from

different areas of Bangladesh were included. Among them, there were 53 pre-operative PTC patients (study group), and 58 age and sex-matched healthy individuals (comparison group). As the urinary iodine level is a good marker of dietary iodine intake, the urinary iodine concentrations of all the participants were measured.

Results: The mean urinary iodine concentration was 223.54±55.78 microgram/liter in the PTC group and 154.29±61.83 microgram/liter in the healthy group. A remarkable number of participants in both the PTC group (42 out of 53; 79.3%) and the healthy group (18 out of 58; 31.0%) had biochemical evidence of excess iodine intake. The number of participants with excess iodine intake was significantly ($p<0.05$) high with 8.48 times odds (95% CI 3.30-22.33) in the PTC group.

Conclusion: This study revealed that a remarkable number of participants in both the PTC and healthy group had biochemical evidence of excess dietary iodine intake as their urinary iodine concentrations were high. Moreover, the number of participants with excess iodine intake in the PTC group was significantly higher than the healthy group, which indicates a causal relationship between excess dietary iodine intake and the increased incidence of PTC. So, the proportion of iodine in commercially available dietary iodized salt may need to be revised.

Keywords: Papillary thyroid carcinoma, excess dietary iodine intake, urinary iodine level.

