# M.Ch. Endocrine Surgery -Curriculum

**As per GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.Ch. IN ENDOCRINE SURGERY**

**This curriculum is in accordance with the NMC guidelines for competence based curriculum of academic programs, and modified according to the NAAC requirements. This is also in line with the 2003/2004 curriculum approved by MCI**

**Program Outcomes:**

Endocrine and Breast surgical diseases constitute a considerable disease burden in India, and many require specific expertise for appropriate and safe surgical management. The Himalayan foothills and northern part of Indian peninsula is endemic for iodine deficient goitres which is an endocrine disorder. Besides goitres, India has a huge burden of other endocrine disorders such as thyroid cancer – papillary and follicular thyroid cancers, symptomatic parathyroid diseases, syndromic diseases like MEN 1, 2A involving parathyroid, thyroid and adrenal, diabetes with complications of peripheral vascular disease and diabetic foot infection, and increasing incidence of early and late stage breast cancers in women of all ages and a very small proportion of men. Breast cancer is the commonest cancer affecting Indian women, and its incidence is increasing. With improving awareness, early stage breast cancers are being diagnosed with increasing frequency, and need specific surgical expertise in breast surgery and oncoplastic breast surgery. The program aims at training a surgeon in the specialty of endocrine surgery and breast surgery, encompassing the related knowledge, skills and attitudes so as to enable him/her to function as an independent consultant clinician/ surgeon and a teacher well acquainted with managing surgical procedures, research methods in endocrine surgery and breast surgery. Such a training will help to accomplish the regional, national, and local citizens' health care need for quality care of international standard.

A post graduate student pursuing M.Ch. (Endocrine surgery) course will acquire adequate knowledge at least in the following aspects

(a) Basic Sciences as applied to surgical endocrinology, breast surgery and diabetic foot management so that he/she can complete with their national/international counterparts.

(b) Clinical, surgical, experimental, comparative, investigative, and applied aspects of surgical endocrinology, breast surgery and diabetic foot management to serve their region, state, and country in a cost-effective manner as well as

(c) Recent advances in this field for the progress of the specialty and practice up to dated skill and knowledge to serve the country.

# SUBJECT SPECIFIC LEARNING OBJECTIVES

During M.Ch program, a student will acquire:

a. Knowledge in the basic, clinical, and translational endocrine surgery, and breast surgery and breast surgical oncology to understand the disease burden, distribution, determinants of illnesses relating these fields in the region and country.
b. Clinical, diagnostic, critical thinking, problem solving, self-directed learning and surgical procedural skills required in care of endocrine surgical diseases, in particular thyroid, parathyroid, adrenal, pancreas and diabetic foot and other common illness like endemic goitres, and benign and malignant breast conditions which are prevalent in the state or country and are curable.
c. Skills as related to formulating research questions, initiating, conducting, and analyzing translational, clinical and epidemiologic research. The students shall focus on research oriented toward ease of access, lower the cost of treatment, novel treatment, and prevention of the common endocrine and breast surgical diseases such as thyroid disorders and breast cancer as they are common in the country and region. At the same time these illnesses are also of international concern.
d. Team leadership and networking skills to train the surgical fraternity in the state, country, and region about the common endocrine and breast surgical diseases.
e. Communication skills necessary for working with and educating patients and team members at local, national, regional, and internal forum.
f. Attitudes and values that will allow him or her to provide compassionate, responsive, and respectful ethical care to the patient.

## A. Theoretical Knowledge:

- The student will acquire knowledge in all aspects relevant to the practice of common endocrine & breast surgical diseases, including thyroid, parathyroid, adrenal, endocrine pancreas and breast cancer in the state, country, and region. This includes training and expertise in surgery capable of providing specialist care to our citizens, being a teacher and guiding researcher in surgical endocrinology, to promote the endocrine and breast research in the state, region and the country.
- She/ He will acquire and be able to impart necessary knowledge, skill, and attitudes to diagnose and manage in a cost-effective manner to solve various clinical problems commonly seen in the local community and at secondary and tertiary care centers of the region and country. Special emphasis should be placed on preventive Endocrine and breast surgery to reduce the disease burden in the region.

## B. Teaching skill

The student will be able to teach relevant aspects of endocrine diseases to resident doctors, junior colleagues, nursing and para-medical staff to enhance the skilled work force at local level.

## C. Research methodology

Student will be able to identify and investigate a research problem, prevailing in the local community or state or country, using appropriate methodology.

## D. Group approach

Student will participate in multi-disciplinary meetings with experts in Radiology, Pathology, Oncology, Nuclear Medicine, and other allied clinical disciplines. This will help them to integrate acquired knowledge and apply them aptly.

# SUBJECT SPECIFIC COMPETENCIES

**At the end of the course, the M.Ch student will acquire the following competencies under the three domains:**

**A. Cognitive domain (Knowledge domain)**

By the end of the course, the M.Ch student will be able to

i. Demonstrate that he/she is well versed with the past and current literature on relevant aspects of basic, preventive, investigative, clinical, and interventional surgical endocrinology and breast surgery/ breast surgical oncology. They shall also be capable to diagnose and manage diabetes related complications such as diabetic foot because many people suffer with diabetes related complications in every state of our country.

ii. Demonstrate a thorough knowledge of epidemiology of endocrine and breast surgical disorders which are prevalent at local, regional, state, and country level; natural history, pathological abnormalities, etiopathogenesis, clinical manifestations and principles of management of common endocrine and breast surgical disorders such as thyroid disorders and cancers, parathyroid disorders, adrenal diseases, endocrine pancreatic tumors etc, breast cancers and benign breast conditions, and diabetic foot. How these diseases, their risk factors, and distribution differ in our country or region shall be known to them.

iii. Plan appropriate investigations applicable for diagnosis and management in a cost-effective manner and interpret correctly the results of various routine and specialized investigations necessary for proper management of the patients with endocrine and breast surgical diseases. They shall be able to judicially prioritize their investigation and treatment to meet the resource limitations of the state or country.

iv. Recognize and manage endocrine surgical emergencies, both rare and common, those which are prevalent in the local setting.

v. Acquire adequate knowledge of application and interpretation of various endocrine and molecular/ genetic laboratory techniques, especially, immunoassays and other methods of hormonal assay and interpretation of laboratory values and a basic knowledge of molecular genetics, including cancer genetics. They shall be capable to think new low-cost devices and assays to save the cost of treatment in the country.

vi. Acquire knowledge of the functioning of various equipment's in routine use in the operating rooms and in the Endocrinology / surgical labs to reduce their maintenance cost for the local authorities.

vii. Be able to plan and conduct a research proposal in the specialty in accordance with guidelines of Ethics Committee and critically evaluate published literature in medical journal. Research shall be focused on local, regional, and national health priorities.

viii. Acquire relevant knowledge of biostatistics to be able to critically read and judge new literature and interpret its application in the context of the country.

ix. Recognize the value of ethical principles of patient care and research, particularly in context of Indian values and beliefs.

x. Be able to take decisions regarding hospitalization or timely referral to other consultants of various specialties recognizing his/her limitations in these areas.

This will help the country in efficient use of scare health care resources.

xi. Have a basic knowledge of data science as it applies to endocrine and breast surgery- including artificial intelligence machine learning devices and wearables.

## B. Affective domain, i.e., attitudes including communication and professionalism (course outcome)

The M. Ch student should:

- Have empathy for patients and their family members.
- Discuss options, including advantages and disadvantages of each investigation and operation, anaesthesia required and ICU care. She/He should be able to discuss medical and surgical issues with them in local, regional or national language using non-scientific terms.
- Be able to perform safe operations with minimal complication rate at par with other institutions in the country and internationally.
- Become confident communicators and should be well accomplished professionals who could serve for the betterment of their country and advancement of science.
- Have developed skills to debate, deliver scientific lecture, participate in panel discussions, and hold group discussions and be ready to deliver the knowledge received by him/her during the course**.** Such skill will elevate the status of the region or country on national or international forum.
- Be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion. They shall have attitude to share their knowledge and skill with surgical fraternity serving in resource limited setting of the country.
- To abide with the laws of the country, always adopt ethical principles and maintain proper etiquette in dealing with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to write reports and give professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## C. Psychomotor domain

At the end of the course, the student will have acquired following skills.

1. ***The student should be able to perform independently the following procedures.***

### Thyroid

a. Be well acquainted with appropriate patient positioning for thyroid surgery
b. Safely identify and ligate the superior pole vessels
c. Demonstrate safe use of an energy device or alternative for hemostatic ligation
d. Formulate a plan for high superior poles or inadequate exposure of these vessels
e. Recognize relationship of the superior vessels with the superior laryngeal nerve
f. Operate or demonstrate use of a nerve monitoring system
g. Demonstrate appropriate lead placement and knowledge of equipment
h. Trouble-shoot common malfunctions
i. Analyse the information obtained from the nerve monitoring apparatus
j. Accurately identify and dissect the recurrent laryngeal nerve including:
k. Recognize relationship with the parathyroid glands
l. Recognize when to consider recurrent laryngeal nerve resection
m. Be familiar with approaches to repair nerve injury
n. Recognize and preserve parathyroid tissue during thyroidectomy including:
i. Recognize parathyroid devascularization
ii. Perform parathyroid auto-transplantation
o. Evaluate for presence of pyramidal lobe to ensure removal of all thyroid tissue
p. Obtain and evaluate for adequate haemostasis
q. Perform central lymph node dissection including nodes posterior to the recurrent nerve
r. Perform or assist in a modified radical neck dissection
s. Exposure to surgical technique for removal of thyroid gland via a minimally- invasive approach:

1) laparoscopic – BABA/ transorovestibular 2) robotic - BABA/ trans-oro-vestibular approach

## Parathyroid

a. Have a thorough knowledge of the familial syndromes associated with primary hyperparathyroidism, be able to formulate a plan for the identification and management of such patients, including indications to perform genetic testing
b. Be able to compare the scope, indications, limitations, and sensitivity, for the following imaging modalities: ultrasound (surgeon vs. radiologist-performed), sestamibi +/- SPECT, MRI, 4D-CT
c. Be able to identify and justify the indications for surgery and surgical options for patients with primary hyperparathyroidism, secondary hyperparathyroidism and tertiary hyperparathyroidism
d. Describe the surgical approach for a patient with suspected parathyroid cancer including en-bloc resection
e. Describe the indications, techniques, and pitfalls of intraoperative adjuncts that are available for parathyroidectomy (Intraoperative PTH, radio-guided surgery, auto- fluorescence)
f. Describe and compare non-surgical management options for patients with primary, secondary, and tertiary hyperparathyroidism including close surveillance, bisphosphonates, calcimimetics, and ethanol ablation
g. Describe and compare the limitations and appropriate utilization of both intra- operative frozen section and PTH aspiration of the parathyroid gland
h. Define long-term cure of parathyroid disease and monitoring for recurrence.

## Adrenal

a. Interpret diagnostic testing performed as part of an adrenal nodule workup, including plasma aldosterone concentration, aldosterone-renin ratio, urine cortisol, salivary cortisol, low-dose dexamethasone suppression test, ACTH, plasma metanephrines, urine metanephrines, DHEA-S
b. Determine when patients should be referred for advanced diagnostic testing for functional adrenal disorders, including salt-loading test, high-dose dexamethasone suppression testing
c. Determine which patients should undergo adrenal vein sampling and interpret the results
d. Select and justify the optimal operative approach for adrenalectomy for each individual patient, accounting for factors such as patient history, physical characteristics, tumour characteristics, and underlying pathology
e. Exposure to surgical technique for removal of the left or right adrenal gland via a minimally-invasive approach: 1) laparoscopic transabdominal, 2) laparoscopic retroperitoneal approach, or 3) robotic approach
f. Demonstrate safe surgical technique for removal of the left or right adrenal gland via an open anterior approach
g. Determine when advanced techniques in adrenalectomy should be employed, including bilateral adrenalectomy or cortical-sparing approaches

## GEP – NET

Have thorough knowledge of the pertinent operations:

a. Know how to conduct each of the following key steps for exploration of a non-localized PNET – either minimally invasive or open
    i. Kocher manoeuvre to mobilize second portion of duodenum and pancreas head
    ii. Dividing gastrocolic ligament to approach lesser sac and pancreas body/tail
    iii. Intraoperative ultrasound to assess for lesions and for proximity to duct
b. Know on how to conduct each of the following key steps for pancreatoduodenectomy – either minimally invasive or open
    i. Mobilizing the duodenum and pancreatic head
    ii. Isolating the SMV
    iii. Mobilizing the stomach and duodenum to assess proximal extent of resection
    iv. Skeletonizing the porta hepatis

v. Cholecystectomy and transecting the CHD
vi. Mobilizing and transect the proximal jejunum
vii. Transecting the pancreatic neck and divide the remaining structures to the specimen
viii. Reconstructing pancreaticojejunostomy, hepaticojejunostomy, and gastrojejunostomy
ix. Drain placement

c. Be able to perform each of the following key steps for distal pancreatectomy - either minimally invasive or open
   i. Extent of resection
   ii. Dividing the gastrocolic ligament to approach lesser sac
   iii. Ligating and dividing the gastrosplenic ligament including the short gastrics (if spleen preserving, then preserve at least 50% of the short gastrics in case need to take splenic vein)
   iv. Mobilizing the inferior and superior borders of the pancreas. The splenic artery will be along the superior border
   v. Dissecting the splenic vein free posteriorly
   vi. Identifying the lesion in the pancreas and ensure adequate margin
   vii. Ligating the splenic artery/vein independently (unless spleen preserving)
   viii. Mobilizing the retroperitoneal and lateral attachments to the spleen (unless spleen preserving)
   ix. Transecting the pancreas and typically will reinforce the staple line
   x. Drain placement

d. Be able to proceed intraoperatively for each of the following GI NETs:
   i. Gastric Type 3
      a. Endoscopic resection, wedge resection, or gastrectomy with lymphadenectomy
   ii. Small Bowel NET
      a. Segmental bowel resection with regional lymphadenectomy
      b. Intraoperative assessment of remainder of small bowel for synchronous disease
   iii. Duodenal NET
      a. Transduodenal resection if localized
      b. Pancreatoduodenectomy otherwise (see below)
   iv. Appendiceal NET
      a. Appendectomy adequate if ≤2 cm
      b. Right hemicolectomy if> 2cm,or lymphovascular/ mesoappendiceal invasion, or atypical histologic features
   v. Rectal
      a. Transanal resection if ≤2 cm, T1
      b. Low anterior resection if >2 cm with lymphadenectomy, or rarely APR

e. Be able to proceed intraoperatively for each of the following PNETs:
   i. Non-functional PNET
      1. Hereditary: resect if >2 cm and avoid resection of small stable tumours if out of range of planned extent of resection (e.g. parenchyma-sparing)
      2. Non-hereditary:
         a. Enucleation, distal pancreatectomy or pancreatoduodenectomy if localized
         b. If >2 cm, resection with lymphadenectomy
   ii. Gastrinoma
      a. Non-localized – usually in pancreas head - duodenotomy, IOUS, enucleation, periduodenal node dissection (see below)

b. Localized - enucleation with periduodenal lymphadenectomy, pancreatoduodenectomy, or distal pancreatectomy/splenectomy/lymphadenectomy (see below)

iii. Insulinoma
   a. Enucleation if localized
   b. Surgical options if not localized
   c. Discuss why octreotide should be avoided pre-operatively

iv. Glucagonoma and VIPoma
   a. If in tail of pancreas
   b. If not in tail of pancreas

**Breast**

Will be able to perform:

i. Core needle biopsies (Both unguided and image guided)
ii. Tumor Mapping and TIVAD insertions/removals
iii. Fibroadenoma excision, WLE of suspicious lesions
iv. Mastectomies – Simple, Palliative, modified radical mastectomy, skin sparing mastectomy
v. Sentinel Lymph node biopsy– SLNB (using dye, Radiocolloid material and/or ICG), Axillary sampling/ Low Axillary sampling
vi. Axillary dissection
vii. Breast Conservation surgeries- conventional and oncoplastic (OPS), at least level 1 OPS

**Thymus**

a. Transcervical thymectomy
b. Trans-Sternal
c. Video-assisted thoracoscopic thymectomy

**Diabetic foot**

a. Prevention of diabetic foot ulcers: care of feet in diabetics
b. Non-operative management of diabetic foot and complications
c. Debridement and usage of newer agents for wound healing and regeneration
d. Minor and major amputations
e. Debridement
f. Offloading foot, and guiding patients for use of appropriate orthotics and prosthetics for prevention and rehabilitation

***2. Will be able to interpret:***

1. Radiologic studies for diagnosis and treatment of endocrine and breast surgical diseases including:
   i) Plain X-ray/ USG, mammography, CT scan/MRI
   ii) Radionuclide imaging including PET scan.
   iii) DXA for osteoporosis and body composition studies.
2. Ancillary tests: Fine needle aspiration cytology, core needle biopsies, vacuum assisted biopsies, image guided biopsies, basic molecular genetic techniques and their interpretation and application.

***B. The student w i l l b e able to observe or perform under supervision the following procedures –desirable skills.***

a. Conventional Endoscopic thyroid, parathyroid, adrenal and pancreatic operations
b. Robotic thyroid, parathyroid, adrenal, pancreas surgery
c. Oncoplastic breast surgery
d. VATS thymectomy, parathyroidectomy
e. Fine needle aspiration cytology
f. Breast ultrasound
g. Oncoplastic surgeries (Level 1 and 2)
h. Breast reconstruction after mastectomy

# Syllabus

**Course contents:**

## I. Cognitive domain

### A. Basic Science of Endocrine and Breast Surgery

The students shall have acquired the following knowledge at the end of the course:

1. History of Endocrine surgery
2. General principles of hormone synthesis, action, degradation, receptors, analogues and antagonists
3. Receptors, biorhythms
4. Surgical Anatomy, Embryology and Physiology – Thyroid, parathyroid, adrenal, endocrine pancreas
5. Structure of pituitary - Cells of origin, the basic metabolism and function of anterior pituitary hormones with our feedback loops (growth hormone and prolactin) and those with feedback loops (FSH, LH, TSH and ACTH).
6. Hypothalamic pituitary pathways and related releasing substance.
7. Corticotrophic releasing factor and its relationship to ACTH.
8. Physiology of ACTH including diurnal variation.
9. ACTH changes in response to stress, illness and trauma.
10. Knowledge of the functioned significance of ADH, Growth hormone and Oxytocin.
11. Receptors, biorhythms
12. Surgical anatomy of thymus
13. Pathophysiology of Myasthenia Gravis and the possible role played by thymus gland.
14. Surgical anatomy and embryology and applied anatomy of breast and axilla
15. Breast cancer Triple assessment: clinical examination, breast imaging and percutaneous needle biopsies
16. Endocrine Pharmacology and Pharmacokinetics
17. Endocrine Pathology and Cytology
18. Genetics including cytogenetics and applied genetics including principles of Sanger sequencing and the importance of next generation sequencing and applied inherited basis of disease
19. Anatomy of foot - Arches, Blood supply and venous drainage of lower limb
20. Aetiology and pathology of Diabetic foot ulcer, Charcot foot.
21. Principles and performance of biostatistics

### B. Clinical Endocrine Surgery Part I

1. Thyroid

Compare the pathophysiology, risk factors, and clinical presentation for the following thyroid diseases:

i. Solitary thyroid nodule
ii. Multinodular thyroid gland
iii. Hyperthyroidism/Thyrotoxicosis including toxic adenoma, Graves' disease, and Hashimoto's disease
iv. Well-differentiated thyroid cancer (WDTC)
v. Rare thyroid malignancies - including medullary thyroid cancer, lymphoma and anaplastic thyroid cancer
vi. Familial/ syndromic thyroid cancers

1. Discuss indications for thyroid ultrasound, elastography, axial imaging, and nuclear medicine imaging. Describe the TIRADS versus ATA classification system in relation to different types of thyroid nodules
2. Imaging in thyroid
3. Analyse radiologic studies to appropriately distinguish between surgically resectable from unresectable thyroid lesion
4. List indications for fine needle aspiration (FNA) biopsy of different thyroid nodules and neck masses
5. Describe the Bethesda classification for the cytologic interpretations of thyroid lesions
6. Recommend molecular testing of thyroid FNA specimens when indicated.
7. Discuss findings of molecular testing and their implications
8. approaches to identify and preserve the recurrent and superior laryngeal nerve during thyroid surgery
9. Recognize (preoperatively or intraoperatively) when to consider resection of an involved recurrent laryngeal nerve
10. Outline an approach to rehabilitation of a patient needing recurrent nerve resection or suffering from a nerve injury including:
    i. Primary repair
    ii. Cable graft
    iii. Ansa to distal nerve repair
    iv. Secondary approaches to vocal fold paresis and paralysis
11. Describe extended thyroid surgery indications and situations that require tracheal resection, laryngectomy, or other extended operations
12. Analyse a pathology report and recognize the classic histopathologic findings for papillary thyroid cancer, follicular thyroid cancer, medullary thyroid cancer, anaplastic thyroid cancer, and thyroid lymphoma
13. Explain indications for adjuvant therapy following surgery for thyroid cancer based on staging, pathologic characteristics, operative findings, and post- surgical imaging (radioactive iodine scan) and recommend adjuvant treatments when appropriate, including these options:
    i. RAI Treatment
    ii. External beam radiation therapy
    iii. Targeted therapy (BRAF inhibitors and TKI)
14. Discuss and recommend options for recurrent and metastatic disease including:
    i. Additional surgery
    ii. Additional RAI or external beam
    iii. Systemic treatment
15. Recognize common complications of thyroid and lateral neck surgery. Formulate a plan to treat post-operative complications including:
    i. Postoperative haemorrhage and surgical bed hematoma
    ii. Hypocalcaemia
    iii. Recurrent nerve injury
    iv. Chyle leak
    v. Surgical site infections

16. Formulate an evidence-based surveillance program for thyroid cancer survivors based on established guidelines (such as NCCN)
    1. Appropriately use these tests in surveillance:
    i. TSH, Thyroglobulin (Tg), anti-Tg antibodies
    ii. Neck ultrasound
    iii. Select other imaging such as chest imaging and/or PET/CT in appropriate cases.
    2. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up plan

2. Parathyroid
    1. Create differential diagnoses for hypercalcemia and describe how to differentiate among possible diagnoses
    2. Compare the pathophysiology, clinical presentation, natural history , and indications for surgery in patients with primary, secondary and tertiary hyperparathyroidism as well as patients with parathyroid carcinoma
    3. Explain and compare normocalcemic primary hyperparathyroidism and normohormonal primary hyperparathyroidism to classical primary hyperparathyroidism. Describe clinical manifestations and role of surgery for both of these variants
    4. Describe the familial syndromes associated with primary hyperparathyroidism. Formulate a plan for the identification and management of such patients, including indications to perform genetic testing
    5. Compare the scope, indications, limitations, and sensitivity, for the following imaging modalities: ultrasound (surgeon vs. radiologist-performed), sestamibi +/- SPECT, MRI, 4D-CT
    6. Describe and justify the indications for surgery and surgical options for patients with primary hyperparathyroidism, secondary hyperparathyroidism and tertiary hyperparathyroidism
    7. Describe the surgical approach for a patient with suspected parathyroid cancer including en-bloc resection
    8. Describe the indications, techniques, and pitfalls of intraoperative adjuncts that are available for parathyroidectomy (Intraoperative PTH, radio-guided surgery, auto-fluorescence)
    9. Describe and compare non-surgical management options for patients with primary, secondary, and tertiary hyperparathyroidism including close surveillance, bisphosphonates, calcimimetics, and ethanol ablation
    10. Describe and compare the limitations and appropriate utilization of both intra-operative frozen section and PTH aspiration of the parathyroid gland
    11. Define long-term cure of parathyroid disease and monitoring for recurrence.
3. Other Neck Pathology
    a. Thyroglossal cyst
    b. Familiarity with parotid and submandibular salivary gland disease
    c. Branchial cysts
    d. Causes and management of cervical lymphadenopathy.
4. Oncologic Endocrinology
5. Radiology and Radiation Therapy in Endocrinology
6. Management of Endocrine surgical disorders in children and pregnancy
7. Endocrine Hypertension
8. Breast
    a. Breast cancer: incidence, aetiology and risk factors
    Assessment of breast cancer risk according to age and ethnicity and gender
    b. Knowledge about non-genetic factors that increase or decrease breast cancer risk.

c. Genetic predisposition: breast cancer risk and risk of other malignancies
d. Risk estimation models (Gail, Claus, Tyrer- Cuzick, BOADICCEA)
e. Management of high and moderate risk women
f. Breast Cancer Screening
g. Breast cancer: biology, natural history and prognosis
h. Breast cancer: Staging
i. Management of borderline and high risk lesions
j. Localization of impalpable lesions (benign, borderline or malignant)
k. The role of Multidisciplinary Team meeting in breast cancer
l. Systemic therapy – neoadjuvant and adjuvant chemotherapy
m. Other breast malignancies- incidence, diagnosis and treatment modalities

## C. Clinical Endocrine Surgery Part II

1. Adrenal
    a. Compare the scope, indications, limitations, and sensitivity for the following imaging modalities available for the adrenal gland (CT,MRI, PET, MIBG, Octreotide scan, Dotatate)
    b. Describe the work up and management of an incidental adrenal mass
    c. Describe the clinical presentation, requirements for biochemical diagnosis, perioperative testing, surgical treatment, and perioperative management for the following adrenal diseases:
        1. Primary hyperaldosteronism
        2. Adrenal Cushing's syndrome
        3. Pheochromocytoma
        4. Virilizing adrenal tumour
    d. List the key steps in performing a left and right adrenalectomy, using both open and minimally-invasive approaches
    e. Describe the surgical approach for a patient with suspected or biopsy-proven adrenocortical cancer, including en-bloc resection of other organs, lymphadenectomy, and justification of operative approach
    f. Describe the potential complications associated with open and laparoscopic adrenalectomy
    g. Describe non-surgical management options for patients with an adrenal nodule that does not meet criteria for resection, including repeat hormonal evaluation and surveillance imaging
    h. Discuss the inherited endocrinopathies that can be associated with adrenal pathology, and formulate a plan for the identification and management of such patients, including indications to perform genetic testing.
    i. Formulate a plan for post-operative management of functional adrenal tumours and malignancies, including medication regimens, biochemical surveillance, and repeat imaging
    j. Interpret diagnostic testing performed as part of an adrenal nodule workup, including plasma aldosterone concentration, aldosterone-renin ratio, urine cortisol, salivary cortisol, low-dose dexamethasone suppression test, ACTH, plasma metanephrines, urine metanephrines, DHEA-S
    k. Determine when patients should be referred for advanced diagnostic testing for functional adrenal disorders, including salt-loading test, high-dose dexamethasone suppression testing
    l. Determine which patients should undergo adrenal vein sampling and interpret the results
    m. Select and justify the optimal operative approach for adrenalectomy for each individual patient, accounting for factors such as patient history, physical characteristics, tumour characteristics, and underlying pathology

n. Exposure to surgical technique for removal of the left or right adrenal gland via a minimally-invasive approach: 1) laparoscopic transabdominal, 2) laparoscopic retroperitoneal approach, or 3) robotic approach
o. Demonstrate safe surgical technique for removal of the left or right adrenal gland via an open anterior approach
p. Determine when advanced techniques in adrenalectomy should be employed, including bilateral adrenalectomy or cortical-sparing approaches

## 2. Gastroenteropancreatic neuroendocrine tumours (GEP-NETs)

a. For each of the following GEP-NET, describe the symptoms, clinical manifestations, hormones, and effects of each GEP-NETs associated hypersecretory state:
    i. Pancreatic NET
    ii. Insulinoma
    iii. Gastrinoma
    iv. Glucagonoma
    v. Somatostatinoma
    vi. Vasoactive Intestinal Peptide (VIP)-oma
    vii. Pancreatic Polypeptide (PP)-oma
    viii. GI-NET
    ix. Gastric carcinoid - differentiate between the three sub-types based on aetiology, including plasma gastrin levels and gastric pH
b. Review common drivers of NET-associated hereditary endocrinopathies MEN1, VHL, NF1, Tuberous sclerosis
c. Differentiate the molecular targets and accuracy of functional imaging tests (eg. indium-111 pentetreotide versus 68-Ga DOTATATE PET-CT imaging)
d. Discuss indications for observation vs. surgery, considering relevant factors such as tumour size and MEN1
e. Describe initial medical management of functional tumours, including pharmacology
f. Describe medical management of carcinoid syndrome and evaluation for carcinoid heart disease
g. Identify medical agent for refractory carcinoid syndrome
h. List pharmacological agents for carcinoid crisis
i. In hereditary endocrinopathies with concomitant tumours, describe order of surgical resection
j. Differentiate surgical approaches based on tumour location, functional subtype (e.g. insulinoma vs. gastrinoma), and degree of local invasion or metastatic burden.
k. Recognize specific consideration for midgut NET: laparoscopic versus open; prophylactic cholecystectomy; extent of lymph node dissection; management of poorly-differentiated/high-grade tumours
l. Discuss management options for NET liver metastases (NETLM) with unknown primary
m. Intraoperative ultrasound to assess for lesions and for proximity to pancreatic duct

## 3. Thymus

a. Pathophysiology of Myasthenia Gravis and the possible role played by thymus gland.
b. Knowledge on principles of different tests used for diagnosis and differentiating myasthenia gravis from similar neuromuscular pathology.
c. Medical management of Myasthenia Gravis
d. Principles and indications of plasmapheresis including immunosuppression therapy.

e. Management of Myasthenic / cholinergic crisis
f. Management of benign and malignant tumors of thymus
g. Indications of thymectomy and operative approach to thymus gland: cervical and trans-sternal and thoracoscopic.

**4. Diabetic foot**

a. Clinical evaluation of foot complications in diabetic patients.
b. Interpretation of Doppler study for evaluation of vascular status.
c. Defining surgeon's role in multidisciplinary management of such cases.
d. Surgical procedures like debridement, minor and major amputation. Indications and principles of vascular reconstruction.

5. Ethics, economics and psychosocial aspects of management of endocrine diseases

**D. Recent Advances in Endocrine and Breast Surgery**

1. Molecular pathways in thyroid oncogenesis, targeted therapies
2. Recent advances in Clinical, Comparative, Experimental and Operative procedures in Endocrine Surgery
3. Review of recent literature and trials in the field of Endocrine surgery, breast oncology and oncoplastic breast surgery
4. Shall be well versed with the standard guidelines and recommendation

## II. Psychomotor domain

**1. Thyroid nodule:**

i. Explain the natural history of thyroid nodules to patients. Answer questions regarding incidence of cancer in thyroid nodules from patients and referring physicians and alleviate the anxiety of a new growth on imaging
ii. Educate patients and physicians about the prudence of observation for benign appearing nodules c. Prepare patients for the possibility of indeterminate or non-diagnostic FNA results. The endocrine
iii. surgeon should also be able to lead the patient through the decision making process if such a
iv. result is obtained and be able to discuss the risks and benefits of surgery vs observation

**2. Multinodular goitre:**

i. Discuss indications for surgery and be able to re-assure patients and referring physicians that goitres can be observed if they do not meet an indication for surgery
ii. Discuss the probabilities that certain symptoms may or may not improve following surgery

**3. Well differentiated thyroid cancer:**

i. Reassure patients papillary thyroid cancer generally has an excellent prognosis in younger patients. Also discuss the real life socioeconomic implications of being diagnosed with a cancer, even if that cancer has a good prognosis
ii. Discuss in detail the appropriate risks and benefits of observation for small papillary thyroid cancers
iii. Explain the risks and benefits of thyroid lobectomy and total thyroidectomy. Be able to aid the patient in deciding on the option that is best for the patient
iv. Discuss the risks of surgery including recurrent laryngeal nerve injury and hypoparathyroidism and what those injuries would mean of the patients health and lifestyle if they occur
v. Present a patient's story in a multi-disciplinary tumour board. Be able to

proficiently communicate with other members of the treatment team before and after surgery and clearly delineate the follow up plan

vi. Prepare the patient for potential adjuvant therapies such as radioactive iodine and TSH suppression

vii. Discuss the implications of post thyroidectomy hypothyroidism

**4. Medullary thyroid cancer:**

i. Discuss the long term treatment for medullary thyroid cancer which may include recurrence and additional surgeries

ii. Explain to a patient the potential implications regarding the potential to be diagnosed with other cancers. Also be able to discuss the implications of a familial syndrome on other members of the family and potentially in young children

iii. Guide the patient through the follow up period including explaining the significance of doubling times

**5. Anaplastic thyroid cancer:**

i. Conduct frank conversations with the patient and the family about end of life care and decision making

**6. Parathyroid**

i. Explain how to counsel patients regarding the possibility of surgical failure or need for reoperation in the future

ii. Describe the informed consent discussion for a patient with suspected familial primary hyperparathyroidism as compared to a patient with sporadic primary hyperparathyroidism.

iii. Explain how to counsel patients with secondary hyperparathyroidism regarding hungry bone syndrome

iv. Describe the multimodal management of parathyroid disease and establish working relationships with primary care providers, endocrinologist, and nephrologists

**v.** Explain how to counsel patients regarding parathyroid cancer

**7. Adrenal**

i. Working as part of a multi-disciplinary team, formulate a plan for management of patients with complex adrenal disorders, including hyperaldosteronism, hypercortisolism, pheochromocytoma, adrenal cortical carcinoma, adrenal metastasis, or genetic syndromes with adrenal nodules

ii. Counsel patients on the risks, benefits, indications, and alternatives to adrenalectomy for surgical indications to include: hyperaldosteronism, hypercortisolism, pheochromocytoma, large non-functional nodule, adrenocortical carcinoma, adrenal metastasis

iii. Counsel patients on the implications and prognosis of their underlying adrenal disorder

iv. Explain pathology results to patients in plain language

v. Formulate a plan for long-term post-operative follow-up of patients with adrenal disorders, based on their underlying pathology

vi. Counsel patients on any intra-operative complications and their potential longer-term implications

**8. GEP- NET**

a. Counsel patients on the malignant potential and risk of the above syndromes

b. Determine which patients with GEP-NETs harbour hereditary endocrinopathy risk and appropriately determine consultation with genetics team

c. Collaborate with a multidisciplinary team for patients with recurrent or metastatic GEP-NET

d. Evaluate when and for which patients to consult with other surgical specialists (surgical oncology, hepatobiliary, etc.) for optimal surgical care

## 9. BREAST SURGRY/ Breast surgical oncology

i. Breast cancer: Psychosocial and follow-up care. 'Survivorship' issues

- The need of psychological or social support in women with newly diagnosed breast cancer and during the entire course of disease

-The role of follow-up care in breast cancer survivors: detecting recurrences, influence on survival

- Methods in follow-up and the frequency of follow-up
- Conservative and surgical management of lymphoedema
- Chronic pain and sensory disorders after breast cancer treatment
- Endocrine issues in breast cancer survivors, like menopause symptoms and bone health
- Depression, anxiety and fear of recurrences
- Cognitive disorders
- Sexuality

**ii.** Knowledge and skills in allied subjects/ specialties, as applicable to practice of breast surgery, oncoplastic breast surgery and breast oncology:

### 1. Anesthesia and pain management

- Evaluate patient's eligibility for general anesthesia in collaboration with the anesthesiologist
- Evaluate patients eligibility for local or regional anesthesia
- Perform local anesthesia

### 2. Postoperative complications

- Evaluate patient risk regarding postoperative complications and conduct preventive procedures
- Counsel patients regarding their individual risk of surgical complications
- Conservative and surgical management of wound healing complications

## 10. DIABETIC FOOT

i. chronic care of diabetes mellitus in the ambulatory setting
ii. prevention and surveillance of microvascular and macrovascular complications in diabetes mellitus
iii. diabetes detection and management before, during and after pregnancy including gestational diabetes.
iv. patient-centered care in patients with diabetes mellitus
v. Integrated foot care and footwear in patients with diabetes mellitus, aspects of setting up an integrated foot clinic and developing a basic orthotic center.

Besides the above, post graduate students in M. Ch Endocrine surgery should be involved in patient care and management of Endocrine Emergencies apart from bedside and didactic teaching of undergraduate and postgraduates, as assigned to them.

# TEACHING AND LEARNING METHODS

### General principles

Acquisition of practical competencies being the keystone of post graduate medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

### Teaching Methodology

The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

### Formal teaching sessions

This should include regular bedside case presentations and demonstrations, assisting surgical procedures in operation theaters (Annexure A), lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments.

This will comprise of the following:

### Minimum sessions

- Bedside rounds. - Daily
- Seminars - once in 4 weeks
- Journal club - once in two weeks
- Endocrine -histology conference - once in 4 weeks
- Endocrine conference - once in 8 weeks
- Endocrine-radiology conference - once in 4 weeks
- Endocrine –Nuclear Medicine conference -once in 4 weeks
- Endocrine – Radiology – Nuclear conference -once in 4 weeks
- Clinical case discussion - once a week
- Outpatient Endocrine clinic - daily
- Operation theatre. - Two tables five days a week
- Mortality/Morbidity meeting - once in three months
- Combined Grand rounds/. - once a year

Clinical meetings/CPCs (at Institution level)

- Student project presentation. - once in 6 months
- Student Log Book review - once in 6 months
- Clinical Department Audit - once a year

All above may refer to sessions conducted in given Department and not for each trainee.

### Attendance

Attendance for all formal teaching sessions will be strictly marked by the faculty member in charge of the session on the prescribed department attendance sheet (Annexure B).

Mandatory attendance of 80% is required to be eligible for final M.Ch exit exam. In addition, every senior resident is required to mark his/ her attendance in the the attendance register every day.

### Didactic Lectures

In addition, 10 lectures per year covering recent advances in all aspects of endocrine diseases would be taken by faculty. All post graduate students will be required to attend these lectures as well and short term basic and clinical courses on:

- Biostatistics

- Research methodology and experimental lab medicine relevant to endocrinology
- Use of computers in medicine
- Bioethics, ethical issues in endocrine practice including Diabetes care.

- In addition, student should attend accredited scientific meetings (CME, symposia, and conferences) once or twice a year.
- Additional sessions on Research methodology, experimental Laboratory Medicine relevant to Endocrinology, use of computers in Medicine, Biostatistics, ethical and legal issues in endocrine practice including diabetes care, teaching methodology, hospital waste management, health economics, are suggested.
- The post graduate students shall be required to participate in the teaching and training program of undergraduate and post graduate students and nurses.
- A post graduate student of a post graduate degree course in super specialties would be required to present one poster presentation or read one paper at a national/state conference; should write a research paper from his/her work which should be published/accepted for publication/sent for publication during the period of his postgraduate studies.

**Log Book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Endocrine Surgery Wards, OPDs, OTs – minor and main, Emergencies. This should indicate the procedures assisted and performed, and the teaching sessions attended. The purpose of the Logbook is to:

a) Help maintain a record of the work done during training,
b) Enable Consultants to have direct information about the work; intervene, if necessary,
c) Use it to assess the experience gained periodically.

The Log Book should be used to aid the internal evaluation of the student. The Log Book shall be checked and assessed periodically by the faculty members imparting the training. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be necessary before he/she would be allowed to appear in the examination.

- The **Department should encourage e-learning activities.**

- **Clinical postings: Recommended schedule for three years training**

Each post graduate student will undergo the following rotations in various clinical areas during the three years of training in M. Ch Endocrine Surgery

i. **Ward/Indoor service:** minimum 45 weeks
ii. **Outpatient clinics/Consultations**: minimum 45 weeks
iii. **Operation theatre**: minimum 45 weeks

Provision for elective posting to reputed departments in other institutions within India or abroad would be available to gain experience in new areas in India or abroad.

## Research

Each post graduate student will be required to undertake research under the

guidance of the faculty. He/she will be required to submit a research plan within 6 months after joining the
course. In addition, the post graduate student will participate in various departmental research activities. Should prepare at least 1 original paper accepted for publication/ready for sending to a journal for publication, to be eligible for the exam.

**During the training program, patient safety is of paramount importance; therefore, skills are to be learnt initially by observation, later to be performed under supervision followed by performing independently.**

**Recommended Minimal Operative Experience**

| Operation | Performed | Assisted |
|---|---|---|
| Hemithyroidectomy | 15 | 40 |
| Total/subtotal Thyroidectomy (Toxic Goiter) | 5 | 20 |
| Total Thyroidectomy | 5 | 30 |
| Recurrent Thyroid Operation | 02 | 05 |
| Mediastinal Tumour Exploration | 02 | 05 |
| Central/lateral Compartmental Clearance | 05 | 10 |
| Mediastinal Lymph Node Clearance | 01 | 04 |
| Parathyroidectomy for PHPT | | |
| Conventional | 05 | 30 |
| Recurrent or Persistent | 00 | 04 |
| Parathyroidectomy for SHPT | 02 | 05 |
| Cervical /trans-sternal Thymectomy | 02 | 05 |
| Open Adrenalectomy | 02 | 05 |
| Endocrine Pancreatic Tumour | 00 | 01 |
| Endocrine Tumour of gut (Carcinoid) | 00 | 01 |
| Modified Radical Mastectomy | 10 | 30 |
| Conservative Breast Surgery | 05 | 10 |
| Breast Reconstruction | 02 | 05 |
| Cervical/ Trans-sternal Thymectomy | 02 | 05 |
| Surgical Procedures for Diabetic Foot | 05 | 10 |
| Minimal Invasive Endocrine Surgical Procedures (Adrenalectomy, Thyroidectomy, Parathyroidectomy Thymectomy, Insulinoma, Enucleation, Gonadal Excision, Oopherectomy) | 05 | 10 |

## Recommended Reading:

**Books (latest edition)**

1. Textbook of Endocrine Surgery , Orlo Clark, Quan-Yang Duh, Electron Kebebew, Jessica E Gosnell, Wen T Shen (ed), 3rd Edition Jaypee Brothers Medical Publishers, New Delhi, India, 2016.

2. Surgery of the Thyroid and Parathyroid Glands, Third ed. by Gregory W. Randolph, 2021
3. The Thyroid - A Fundamental And Clinical Text Vol 1 and 2Lewis E Braverman David S.Cooper, 11th edition, 2020.
4. Tumours Of Endocrine Organs Pathology & Genetics WHO Classification Of Tumours 2022
5. Difficult Decisions in Endocrine Surgery by Peter Angelos (Editor); Raymon H. Grogan (Editor), 2018
6. Endocrine Surgery: A Companion to Specialist Surgical Practice, Fifth ed. by Tom W. J. Lennard (Editor), 2014
7. Controversies in Thyroid Surgery by John B. Hanks (Editor); William B. Inabnet III (Editor), 2016
8. Breast, Endocrine and Surgical Oncology by Brendon J. Coventry (Editor), 2014
9. Head and Neck and Endocrine Surgery by Mahmoud Sakr (Editor), 2016
10. Minimally Invasive Therapies for Endocrine Neck Diseases by Celestino Pio Lombardi (Editor); Rocco Bellantone (Editor), 2016
11. Williams Textbook Of Endocrinology 14th Edition Henry, Kronenberg, Melmed 2020
12. Bailey And Love's Short Practice of Surgery 28th ed, 2022
13. Management of Neuroendocrine Tumors of the Pancreas and Digestive Tract by Eric S. Raymond (Editor); Sandrine Faivre (Editor); Philippe Ruszniewski (Editor), 2014
14. Atlas of Endocrine Pathology by Lori A. Erickson, 2014
15. Atlas of Endocrine Surgical Techniques by Quan-Yang Duh; Orlo H. Clark; Electron Kebebew, 2010
16. Atlas of Head and Neck Endocrine Disorders by Luca Giovanella (Editor); Giorgio Treglia (Editor); Roberto Valcavi (Editor), 2015
17. Atlas of Parathyroid Surgery by Alexander Shifrin (Editor), 2020
18. Color Atlas of Thyroid Surgery by Yeo-Kyu Youn; Kyu Eun Lee; June Young Choi, 2013
19. Tips And Tricks In Endocrine Srugery Juh C Watkinson
20. Clinical And Experimental Pheochromocytoma William Manger 2012
21. Supreme Triumph Of Surgeons Art A Narrative History Of Endocrine Surgery Martha Zeiger
22. Benign Disorders And Disease of The Breast 3rd Edition Hughes Mansel Saunders
23. Oncoplastic Breast Surgery, 2Nd Edition by Florian, Fitzal and Peter Schrenk
24. The Breast: Comprehensive Management of Benign and Malignant Diseases 5th Edition 2017 By Kirby I. Bland
25. The Thymus Gland C. Ratnatunga

## E- resources

- Endocrine Surgery | Videos | Access Surgery
- Endocrine Surgery | Videos | ClinicalKey
- Thyroid Surgery | Videos | ClinicalKey
- Access Surgery
- Cochrane Library Endocrine and Metabolic Topic
- EMBASE
- Scopus
- UpToDate
- Web of Science Core Collection
- NCCN guidelines
- ATA guidelines for well differentiated, medullary and anaplastic thyroid cancer
- NANETS guidelines
- ASES guidelines

## Journals:

1. World Journal Of Surgery
2. Indian Journal Of Surgery
3. British Journal Of Surgery
4. Archives of Surgery
5. Annals of surgical oncology
6. Surgery
7. Annals Of Surgery
8. Journal Of Clinical Endocrinology And Metabolism
9. World Journal of Endocrine Surgery
10. Indian Journal of Endocrine Surgery and Research
11. JAMA Network
12. Thyroid Journal of the American Thyroid Association
13. Thyroid Journal Program
14. Frontiers in Endocrinology | Thyroid Endocrinology
15. Thyroid Research and Practice
16. Thyroid Research - Springer
17. Journal of Endocrinology
18. European Thyroid Journal
19. Thyroid Science
20. Annals of Thyroid Research
21. Thyroid disease
22. Thyroid Disease and Diabetes
23. Thyroid and Parathyroid Disorders
24. Endocrine-Related Cancer
25. Journal of Biomedical Science
26. Hormones and Cancer
27. Journal of Endocrinology
28. Endocrine
29. Endocrine Practice
30. Frontiers of Hormone Research
31. BMC Endocrine Disorders

32. Hormone Research in Paediatrics
33. Pediatric Endocrinology Reviews
34. International Journal of Endocrinology and Metabolism
35. Clinical Endocrinology
36. Molecular Genetics and Metabolism
37. Pancreatology
38. Journal of Bone and Mineral Metabolism
39. Endocrine Development
40. Vitamins and Hormones
41. Frontiers of Hormone Research
42. Hormone and Metabolic Research
43. International Journal of Endocrinology
44. Endocrine Research
45. Endocrine Pathology
46. Journal of Endocrinological Investigation
47. Journal of Pediatric Endocrinology and Metabolism
48. Endocrine Reviews
49. JCEM
50. Journal of the Endocrine Society