The American Association of Endocrine Surgeons (AAES) is a representative body of surgeons from North America, South America and Mexico who have a special interest in the surgery of endocrine glands. This Association was established in 1981 and continues to grow and expand its membership to include corresponding members (endocrine surgeons from other countries throughout the world), honorary members (physicians outside the discipline of surgery who have contributed significantly to the field of endocrine surgical disease) and allied health members (otolaryngologists, urologists, neurosurgeons etc who have acquired considerable expertise in the field of endocrine surgery). The goals and objectives of the AAES are to enhance the advancement of the science and the art of endocrine surgery. The Association is also dedicated to the maintenance of high standards in the practice of endocrine surgery.

As the field of Endocrine surgery evolves and matures, there is a growing need for advanced post-graduate training in this discipline. To that end the Executive Council of the AAES in 2004 mandated the development of a Fellowship Curriculum with specific objectives in order to provide a more formalized structure to the existing Endocrine Surgical Fellowships. The goal was to also provide a document to help with the development of future fellowship programs, and to ensure similar high quality training across a number of different institutions. The Education & Research Committee of the AAES put together a list of objectives and guidelines for Fellowship training in Endocrine Surgery. These were circulated to the membership for their input and comments. A final draft was reviewed and ratified by the Council in October 2005. It is the hope of the AAES Executive Council that these objectives will provide a structure and a framework for Fellows to enhance their postgraduate training. The Fellow, the program director and the faculty members of a training unit should utilize this Curriculum and strive to meet these objectives. Individual programs will require flexibility in the design of the fellow's rotations and experience.

This document represents a work in progress as these guidelines and objectives will be reviewed and revised by the AAES Education & Research Committee in 2010 to keep up to the changing needs and trends in our field.

Information regarding Fellowship training in Endocrine Surgery can be obtained from our web site www.endocrinesurgery.org

ENDOCRINE SURGERY FELLOWSHIP

Candidates for Endocrine Surgical Fellowship training will consist of surgeons who have successfully completed their residency training in General Surgery. The duration of an Endocrine Surgical Fellowship may vary depending on the design of the Fellowship Program, and the ultimate goals and type of practice pursued by the trainee. It is felt that a minimum of one year is required, although it may be advised that the trainee spend more than one year to meet their goals and objectives.

The Endocrine Surgical Training Center / unit should consist of one or more surgeons who are members of the AAES and have dedicated expertise in the field of Endocrine Surgery. The training center should include onsite Divisions or Departments in; cytopathology and histopathology, endocrinology, genetics, radiology (including nuclear medicine and interventional radiology) and oncology. The trainee should be adequately exposed to these disciplines through either specific rotations in such areas as endocrinology, pathology and radiology, or through multi-disciplinary clinics and rounds. The trainee should learn to collaborate and appropriately utilize these disciplines through the clinical management of endocrine surgical patients.

Throughout their Fellowship the trainee should have the opportunity to participate in journal clubs, tumor board rounds and research projects directed towards endocrine surgical disease. The trainee should be given the opportunity to attend the annual meeting of the AAES, as well as obtain head and neck ultrasound skills through an ACS or AACE sponsored program.

In some programs the trainee may spend a significant proportion of their time in the lab doing basic science research in endocrine surgical diseases. Flexibility in the design of the trainee's rotations will be required to meet both their clinical objectives as well as to allow them to be productive in the laboratory.

OVERALL OBJECTIVES FOR AN ENDOCRINE SURGERY FELLOWSHIP:

- Demonstrate knowledge and understanding of endocrine gland anatomy and physiology, both the normal and pathological states.
- Demonstrate the ability to diagnoses clinical endocrinopathies associated with endocrine surgical diseases
- Develop knowledge of the inherited endocrine disorders and understand the role of genetic counseling and testing
- Have an appreciation of the current controversies and current areas of research in the literature within endocrine surgical diseases.
- Demonstrate the ability to apply this knowledge and safely perform the appropriate surgical operation for a given endocrine surgical disease

CLINICAL CURRICULUM:

A. Develop an understanding of the normal anatomy, histology, physiology, and biochemistry of each of the following endocrine glands. Be able to discuss the secretion and homeostasis of the pertinent hormones of these glands in both the normal and pathological disease states:

- Thyroid gland
  - Thyroxine, thyroid stimulating hormone (TSH), calcitonin
  - Manifestations of hyperthyroidism and hypothyroidism

- Parathyroid gland
  - Calcium / Phosphate / Vitamin D
  - Clinical symptoms and end organ effects associated with hyperparathyroidism (HPT)
  - Short and Long-term manifestations of hypoparathyroidism

- Endocrine pancreas
  - Insulin / Gastrin / Glucagon / Vasoactive Intestinal Peptide (VIP) / Pancreatic Polypeptide (PP) / Somatostatin / Secretin / Cholecystokinin (CCK)
  - Clinical manifestations of hyperinsulinemia
  - Clinical manifestions of postgastric bypass hyperinsulinemic hypoglycemia
  - Clinical manifestations of Zollinger / Ellision syndrome
  - Clinical manifestations of Glucagonoma syndrome
  - Clinical manifestations of VIPoma

- Adrenal glands
  - Aldosterone / Renin / Angiotensin
  - Adrenocorticotropic hormone (ACTH) / Cortisol
  - DHEA-S
  - Catecholamines (epinephrine, norepinephrine, dopamine)

- Gastrointestinal tract
  - Serotonin / Histamine / Motilin / Gastric Inhibitory Peptide / Enteroglucagon / Chromogranin A / GLP-1
  - Manifestations of Carcinoid Syndrome
  - Gastric Physiology

- Hypothalamus / Pituitary gland
  - Oxytocin / Vasopressin / Growth hormone / Melanocyte stimulating hormone / Prolactin

B. Endocrine Cytopathology and Histopathology:

- Thyroid
  - Classification of thyroid malignancies
  - Classification of benign thyroid disease
  - The limitations of Frozen Section results
  - Fine-needle aspiration biopsy (FNA); its application and limitations

- Parathyroid
  - Definitions of hyperplasia vs. adenoma
  - Criteria for parathyroid carcinoma

- Adrenal
  - Classification and diagnosis of adrenal lesions

- Neuroendocrine Tumors (NET) of the GI tract
  - WHO classification of NET
  - Foregut / Midgut / Hindgut Carcinoids
  - Prognostic factors for NET

- Hereditary Endocrine Syndromes
  - Define Oncogene, Tumor suppressor gene
  - Define for each known endocrine hereditary syndrome the chromosomal abnormalities
  - Discuss the role of genetic screening
  - Be able to discuss and differentiate the phenotype and genotype of;
    - MEN I (multiple endocrine neoplasia)
    - MEN IIa
    - MEN IIb
  - Develop a knowledge about the endocrine pathology and management of familial non-MEN syndromes including;
    - von Hippel Lindau (VHL)
    - Neurofibromatosis
    - Paraganglioma syndromes (SDH-B, SDH-D)
    - Cowden's Disease
    - Familial HPT
    - Jaw-Tumor Syndrome
    - Familial Medullary thyroid cancer (MTC)
    - Carney Complex
    - Carney's Triad
    - FHH

C. Discuss the pathophysiology, clinical presentation, work-up, and treatment (include both surgical and medical options) of the following diseases. Describe the natural history and list any prognostic factors associated with the disease:

- Thyroid
  - A solitary thyroid nodule
  - A multinodular thyroid gland
  - Thyrotoxicosis including Toxic adenoma, Grave's disease and Hashimoto's disease
  - Well-differentiated thyroid cancer (WDTC) – including I 131 ablation with and without thyrogen
  - Rare thyroid malignancies - including Medullary Thyroid Cancer, Lymphoma and Anaplastic

- Parathyroid
  - Primary, secondary, and tertiary hyperparathyroidism (HPT)
  - Parathyroid carcinoma
  - Familial forms of HPT

- Endocrine Pancreas
  - Insulinoma
  - Gastrinoma
  - Glucagonoma
  - VIPoma
  - Somatostatinoma
  - PPoma
  - Non-Functioning NET of the pancreas
  - MEN-1 pancreas

- GI Neuroendocrine Tumors
  - Gastric Carcinoids Type I, II and III - including atypical Carcinoid Syndrome
  - Mid-gut (Carcinoid) tumors – including diagnosis and treatment of Carcinoid Syndrome
  - Appendiceal Carcinoids
  - Rectal Carcinoid Tumors

- Adrenal
  - Primary hyperaldosteronism
  - Endogenous hypercortisolism (Cushing's syndrome vs. Cushing's disease)
  - Pheochromocytoma / Paraganglioma syndromes
  - The incidentally discovered adrenal mass
  - Virilizing adrenal tumors
  - Adrenal cortical carcinoma

D. Discuss the peri-operative management of the following:

- Thyroid
  - Thyroid "storm" and Thyrotoxicosis
  - Grave's disease / Hashimoto's disease

- Parathyroid
  - Hypercalcemic crisis
  - Hungry Bone Disease
  - Vitamin D deficiency

- Adrenal
  - Pheochromocytoma / Paraganglioma syndromes – including blockade
  - Hyperaldosteronism
  - Endogenous hypercortisolism
  - Adrenal insufficiency crisis (Addison's Disease)

- NET
  - Insulinoma / Gastrinoma
  - Carcinoid Syndrome and Carcinoid crisis

E. Outline the differential diagnosis of:

- Thyroid
  - Suppressed TSH level
  - Elevated serum thyroxine level
  - Lateral neck mass
  - Airway obstruction

- Parathyroid
  - Hypercalcemia
  - Elevated PTH level

- NET
  - Hypoglycemia
  - Hypergastrinemia
  - Secretory diarrhea

- Adrenal
  - Elevated Cortisol levels
  - Surgical hypertension

F. Be able to describe and develop the surgical skills needed to perform safely many of the following surgical procedures, and recognize the potential complications and alternative treatment options of each procedure:

- Thyroid
  - Retrosternal goiter
  - Thyroid lobectomy
  - Total / near-total thyroidectomy
  - Compartment Oriented lymph node dissections of the neck
  - Reoperative / completion thyroidectomy
  - Laryngoscopy

- Parathyroid
  - Finding the inferior parathyroid glands
  - Finding the superior parathyroid glands
  - Finding ectopic parathyroid glands
  - Reoperative parathyroidectomy
  - Cryopreservation

- Adrenal
  - The left adrenal gland (anterior, laparoscopic and posterior)
  - The right adrenal gland (anterior, laparoscopic and posterior)
  - Retroperitoneal lymph node dissection

- Neuroendocrine Tumors
  - The head of the pancreas
  - The body / tail of the pancreas
  - GI NET disease including bowel resection and mesenteric nodal dissection
  - Principles of liver resection and radiofrequency ablation

G. Identify and discuss potential areas of controversy in the field of endocrine surgery including:

- Zollinger-Ellison syndrome (with and without MEN I)
- Genetic screening for familial endocrine syndromes
- Operative approach to HPT – including imaged directed, unilateral and four gland exploration with and without iPTH
- Management of WDTC – including I^{131} ablation, utilization of rhTSH, and cancer surveillance
- Utility of laparoscopic adrenalectomy for large tumors

H. Understand the role and apply the appropriate utilization of the following imaging and diagnostic studies in the surgical management of endocrine surgical disease:

- Imaging modalities:
  - Ultrasound
  - CT, MRI, PET
  - Scintigraphy including; meta-iodo benzylguanine [MIBG], sestamibi, Octreotide scan, NP-59 scan
  - Selective venous sampling (parathyroid and adrenal)
  - Intraoperative tumor localization (gamma probe, Intra-Op U/S)

- Diagnostic assays:
  - TSH, T3, T4, thyroglobulin
  - Calcitonin
  - PTH and intra-operative PTH assays
  - Chromogranin A
  - Urinary 5-HIAA
  - Insulin: Glucose ratio
  - Metanephrine (plasma and urinary)
  - Urinary free Cortisol / Midnight Salivary Cortisol
  - Dexamethasone suppression testing
  - Cortisyn stimulation testing
  - Aldosterone / Renin

- Pathological assessment
  - FNA of the thyroid gland (limitations and selective utilization)
  - Frozen sections (limitations and appropriate utilization)
  - Immunohistochemical staining – including *Ki*67
  - Diagnostic criteria of malignancy in NET

I. Research and Critical Appraisal

- Understand the design of both clinical and basic science research studies
- Develop a basic understanding of the statistical methods applied to various study designs
- Develop a basic knowledge of molecular biology as it applies to endocrine surgical diseases
- Be able to critically appraise the medical literature.
- To develop a research question in Endocrine Surgical disease and pursue an appropriate research project during the fellowship with the goal toward peer reviewed publication

ENABLING OBJECTIVES:

A. Complete a detailed evaluation of patients suspected of having an endocrine disease. Collaborate in the diagnostic work up of patients and direct the appropriate investigations.

B. Participate in and manage the pre- and post- operative care of patients undergoing surgery of the thyroid, parathyroid, adrenal and neuroendocrine tumors.

C. Perform and / or assist in the performance of the following surgical procedures;

- Thyroid
  - A retrosternal goiter / multinodular Goiter
  - Thyroid lobectomy
  - Total / near-total thyroidectomy
  - Compartment Oriented lymph node dissections of the neck
  - Reoperative / completion thyroidectomy
  - Direct laryngoscopy
  - Head and neck U/S
  - Intraoperative nerve monitoring

- Parathyroid
  - Finding the inferior parathyroid glands
  - Finding the superior parathyroid glands
  - Finding ectopic parathyroid glands
  - Reoperative parathyroidectomy
  - Image directed / unilateral / four gland exploration
  - Subtotal / Total parathyroidectomy with autotransplantation
  - Administration of local anesthesia
  - Video-assist and throracoscopic approaches

- Adrenal
  - The left adrenal gland (anterior, laparoscopic and posterior)
  - The right adrenal gland (anterior, laparoscopic and posterior)
  - Retroperitoneal lymph node dissection
  - En bloc retroperitoneal dissection for malignancy

- Neuroendocrine Tumors
  - Resection / enucleation of NET in the pancreas
  - NET associated with MEN I syndrome (Thompson Procedure)
  - GI NET disease including bowel resection and mesenteric nodal dissection
  - Perform / understand the principles of liver resection and radiofrequency ablation

D. Be able to interpret and appropriately order endocrine diagnostic testing and imaging studies for each of the following endocrine glands;

- Thyroid
- Parathyroid
- Adrenal
- GI NET
- Endocrine Pancreas

E. Spend quality time working under the direct supervision of a cytopathologist and anatomical pathologist.

F. Spend quality time with the Endocrinology service focusing on pre-operative evaluation of endocrine surgical diseases. Knowledge gained should include the peri-operative management of hormones including insulin, octreotide, and thyroid hormone.

G. Gain exposure to and / or to work with colleagues in other disciplines related to the diagnoses and treatment of endocrine surgical disease such as;

- Nuclear medicine
- Medical Oncology
- Genetics
- Interventional Radiology
- Gastroenterology
- Voice lab

H. Be able to evaluate patients with complex endocrine disease and present a differential diagnosis and an appropriate algorithm for their care.

I. Gain experience in performing clinical and/or basic science research. Be able to collect and analyze data. To participate and/or present at journal club and surgical rounds related to endocrine surgical diseases. To develop experience in writing articles and orally presenting research studies at local and national meetings.

RECOMENDED READING / REFERENCE LIST

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