

Interventional endocrinology: A futuristic perspective

Rajiv Singla, Sweta Singla¹

Consultant, Endocrinology and Diabetes, ¹Consultant, Neurology and Sleep, The Kalpavriksh Superspecialty Clinic, Dwarka, Delhi, India

ABSTRACT

Interventions in endocrinology make a huge impact on life of patients with endocrine diseases. This brief communication discusses the role played by both medical and surgical interventions in practice of endocrinology. Endocrinology is branch of medicine where treatment is as close to ideal as possible. For people with hormone deficiencies, medical intervention in form of replacement with hormones generated by recombinant technologies is a perfectly natural treatment. Hormone excess is also being evaluated and treated with exceedingly precise surgical interventions with minimal morbidity.

Key words: Endocrinology, future, intervention

INTRODUCTION

“A diabetic patient, presented to endocrinologist for first time, is asked to start on closed loop insulin pump as an interim measure till her diabetes is cured with gene therapy/stem cell transplantation.” This is a plausible scenario from future for endocrinology with ever expanding interventional scope in the realm of endocrinology. The Oxford dictionary defines intervention as “action taken to improve a medical disorder.” This, ideally, should include both medical and surgical measures. But, traditionally, the term intervention implies surgical intervention, which may not actually be correct. In this essay, discussion would be around surgical and medical interventions that bring about stunning changes in course of disease and life of endocrine patients.

INTERVENTIONS IN ENDOCRINOLOGY

Endocrinology is a subspecialty of medicine that deals with endocrine glands and their secretion “hormones.”

Endocrinology largely has two categories of diseases: either oversecretion of hormones or undersecretion of hormones. Traditionally, endocrinology has all been about thoughtful science in which we either suppress or supplement a gland's function. But with advent of science, we are looking beyond the obvious. This can be apparent in case of a nonlocalized parathyroid adenoma, a doubtful pituitary adenoma, suspected insulinoma, and in so many more cases. And in this process of extending our understanding, interventional endocrinology has played a pivotal role. The interventions both therapeutic and diagnostic have been a tool to pave our way into the future, taking us beyond what was obvious through blood investigations and structural imaging [Table 1].^[1,2]

Diabetes remains the most common disorder presenting in endocrine clinics. Though we have not been able to provide a cure, but the above-described scenario might be a reality in the near future with stem cell transplantation. Islet cell transplantation is another rapidly developing technology.^[3] Till then, newer interventions have still made the life a lot easier for patients. The minimally invasive continuous glucose monitoring system has been a boon in evaluation of glucose fluctuations throughout the day and managing brittle diabetes. Closed loop insulin system is another most eagerly awaited development/innovation that might change the way we manage diabetes.^[4] On a smaller but significant level, various smart phone applications are helping people take a better control of their glucose and diet and helping

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Corresponding Author: Dr. Rajiv Singla, 1704, Gyanshakti Apartment, Sector 6, Dwarka, Delhi 75, India. E-mail: docrajivsingla@gmail.com

Table 1: Overview of current endocrine interventions

Gland	Diagnostic	Therapeutic
Pituitary disorders	Cavernous sinus sampling, internal jugular vein sampling ^[1]	Pituitary brachytherapy
Thyroid diseases	Thyroid USG and FNAC, genetic analysis for medullary thyroid cancer ^[2]	Percutaneous ablation of thyroid nodule, prophylactic thyroidectomy
Parathyroid adenomas	Parathyroid venous sampling for localization of parathyroid adenoma	Intraoperative localization of parathyroid adenoma with methylene blue, MIBI, and USG
Pancreas insulinomas	Intra-arterial calcium stimulation testing, pancreatic angiography	Pancreatic chemoembolization
Adrenal disorders	Adrenal venous sampling for primary hyperaldosteronism	Ovarian cystectomy, sperm retrieval and intracytoplasmic sperm injection, antenatal steroid therapy for congenital adrenal hyperplasia, hormonal therapy in transsexuals
Reproductive disorders	Genetic analysis for cause of intersex	
Bone diseases	Whole body venous sampling for tumor-induced osteomalacia	
Multiple endocrine neoplasia	Genetic analysis to characterize the type of MEN ^[2]	Prophylactic thyroidectomy and parathyroid autoimplantation
Diabetes	Continuous glucose monitoring system, genetic analysis for diagnosis of maturity onset diabetes of young	Closed loop insulin delivery, insulin pumps

USG: Ultrasonography, FNAC: Fine needle aspiration cytology, MIBI: Technetium 99m-methoxyisobutylisonitrile imaging

us achieve stringent control. They remind people of the medication and can make statistical analysis of their control, or they may simply tell us how the glucose has been at various times in graphic manner that help analysis for better glycemic control.

The value of endocrine interventions cannot be overstated in cases of multiple endocrine neoplasias. The act of diagnosing the type of MEN (Multiple Endocrine Neoplasia) by genetic analysis and thereby being able to do prophylactic surgeries has no parallel in medical science in altering the course of any other disease.^[2]

Another intervention that has been used extensively in diagnosing and treating a large number of endocrine neoplasias is selective venous sampling. By demonstrating a certain predefined gradient across an endocrine gland, tumorous growth can be confirmed. This technique has particularly been useful in defining pituitary tumors especially corticotrophinomas, where it is performed in form of cavernous sinus sampling. Internal jugular venous sampling, a further not-so-invasive technique for the same has been validated in our country for diagnosing adrenocorticotrophic hormone (ACTH) producing pituitary adenomas.^[1] Similarly, for diagnosing small and occult pancreatic insulinoma, value of intra-arterial calcium stimulation cannot be overemphasized. Selective venous sampling will be playing a major role in diagnosing difficult cases of tumor-induced osteomalacia in near future.

In reproductive endocrinology, replacement of sex steroids in hypogonadal males and females can be as gratifying and fruitful as any surgical intervention in any other disease.^[5] In transsexuals, hormonal therapy has yielded stunning results and has blurred the traditional gender definitions. Advances being made in evaluation and treatment of infertility are

giving hope to infertile couples and bringing them joy of their life. Who knows, we may be able to make a skin cell transdifferentiate into an ovum or a sperm in near future.

On therapeutic front, brachytherapy is increasingly being used for pituitary, adrenal, and endocrine tumors with at least as good results as provided by external beam radiotherapy.^[6] More and more, nuclear medicine-based radiation therapies are expected in near future and these are expected to provide targeted therapy with minimal side effects. Some of these therapies are already available for tumors like metastatic medullary thyroid carcinoma and metastatic thyroid carcinoma.

Role of endocrine interventions in oncology is fast expanding. Rescuing ovarian reserve with gonadotropin-releasing hormone (GnRH) agonists during cytotoxic chemotherapy is rapidly becoming a norm rather than being an exception.^[5] GnRH agonists are increasingly being used for medical gonadectomy in cases of prostate carcinomas.

We know that future is reflection of the past. Replacement therapies for hormonal deficiencies in endocrinology have always resulted in miraculous results, e.g., in growth hormone-deficient children, Addisonian patients, hypothyroid patients, and hypogonadal patients.

Some groups have tried to reserve the term “interventional endocrinology” for antiaging medicine. It is believed that hormonal deficiencies that increase with age play a major role in aging process and replacing them might halt or even reverse the aging. Growth hormone, insulin-like growth factor 1, dehydroepiandrosterone (DHEA), melatonin, adipocytokines, and estrogens have been proposed to play a major role.^[7] There may be no consensus about reserving term “interventional endocrinology” for antiaging medicine

among scientific community, but we would not be astonished if in near future gene therapy and interventions in hormonal milieu may bring us the elixir of unending youth.

CONCLUSIONS

No other medical or surgical field can boast of an impact equivalent to endocrine interventions, especially the nonsurgical interventions. With expanding sphere of our knowledge and science, it seems to be an exciting lifetime to live in as an endocrinologist.

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