a knowledge gap of current testing recommendations. If the 25-hydroxyvitamin D order was identified as unnecessary at the time of order entry, a BPA was generated at the point of care. The BPA was implemented on February 4th, 2019. As of August 31st, 2019 based on the analysis of the number of BPAs generated and the number of tests not ordered as a result, there has been a 26% reduction in the number of inappropriate repeat vitamin D orders.
Conclusions:
Based on the preliminary data, a best practice advisory alert for vitamin D testing can be an appropriate QI intervention to reduce unnecessary vitamin D testing. Ongoing data analysis will be conducted to assess the long-term impact and sustainability of this intervention. Next steps include consideration of implementation of force function to reduce inappropriate repeat vitamin D testing.

# Adrenal

## ADRENAL CASE REPORTS I

### *Metastatic Non Seminomatous Germ Cell Tumor Masquerading as Bilateral Adrenal Masses*

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**SAT-218**

Context: Adrenal incidentalomas are commonly nonfunctional and can be diagnosed with imaging and biochemical testing. However, detection of rare causes of adrenal incidentalomas like metastatic adrenal tumors can makes its' diagnosis very challenging due to vast majority of uncommon primary tumors. Consideration of biopsy for diagnosis and the awareness of rare primary tumors that can metastasize to adrenals is essential to prevent unnecessary adrenalectomies. Our case illustrates one such rare case where bilateral adrenal mass was the initial presentation of obscure retroperitoneal primary NSGCT (Non seminomatous germ cell tumor). Case Description: We present a case of a 34-year-old male with acute abdominal pain found to have huge bilateral adrenal masses. The left adrenal gland was markedly enlarged to 11 x 9 x 5 cm and the right adrenal gland was 6.5 x 3.4 x 7.7 cm. Multiple enlarged and centrally necrotic retroperitoneal lymph nodes (maximum 2.6 x 4.2 x 5.4 cm) along with iliac and inguinal lymphadenopathy were noted. The incidentalomas were proven to be biochemically nonfunctional and extensive imaging and further lab work up ruled out lymphoma, mycobacterial or fungal infection, infiltrative diseases. He then underwent a core biopsy of the left adrenal mass which showed predominantly necrotic tissue, acute inflammatory cells with histiocytes, and rare atypical cells without evidence of malignancy. Repeat core biopsy of left adrenal mass was unrevealing. He finally underwent a core biopsy of a large 4cm retroperitoneal lymph node which ultimately revealed NSGCT. Scrotal ultrasound showed testicular microlithiasis without any testicular mass. He had a very low testosterone level of 21 (241-827 ng/dL) and an a mildly elevated b-hCG (beta human chorionic gonadotropin) of 134 (0-1mIU/ml). A retroperitoneal primary NSGCT with metastasis to the adrenal glands was the most likely diagnosis (visceral metastasis) - Stage III (pTxN3M1S1). He was started on bleomycin, etoposide and cisplatin (BEP) chemotherapy. Conclusion: Rapidly progressing adrenal masses in young males should prompt consideration for metastatic germ cell tumors as a possible cause, even with near normal tumor markers such as alpha-fetoprotein (AFP) and beta human chorionic gonadotropin (B-HCG). Confirmation of the metastatic tumor, via histopathology, is required to avoid unnecessary adrenalectomy.

# Thyroid

## THYROID DISORDERS CASE REPORTS II

### *Levothyroxine Absorption Test: A Potential Therapeutic Tool for Levothyroxine Malabsorption*

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**SAT-483**

LEVOTHYROXINE ABSORPTION TEST: A POTENTIAL THERAPEUTIC TOOL FOR LEVOTHYROXINE MALABSORPTION
ABSTRACT
INTRODUCTION
Persistent hypothyroidism (PH) even on high doses of levothyroxine is a common clinical problem and it is difficult to treat. Levothyroxine absorption test has been used to distinguish between pseudo-malabsorption and malabsorption as one of its causes. This test uses 1000 mcg of levothyroxine to calculate the percentage of levothyroxine absorbed. We present a case of malabsorption in which we used the levothyroxine absorption test to diagnose as well as treat malabsorption.
Case:
55-year-old male with history of papillary thyroid cancer status post total thyroidectomy, postsurgical hypothyroidism, recurrent small bowel obstruction, status post jejunal resection, complicated by high output enterocutaneous fistula, distal high-grade obstruction status post placement of jejunal tube, chronic abdominal pain on narcotics, who initially presented with sepsis and was also found to be hypothyroid.
The thyroid stimulating hormone (TSH) level was 45.25 with free thyroxine (FT4) level of 0.54. He was adherent to his levothyroxine (LT4) 175 mcg once daily which is given one hour after tube feeds have been stopped or one hour prior to any administration of other medications.
Levothyroxine absorption test was done to distinguish between malabsorption versus pseudo-malabsorption. Three different doses of LT4 were used with results all consistent with malabsorption. The percentage of absorption with 175 mcg, 500 mcg, and 1000 mcg LT4 were 3.4%, 7.2%, and 18% respectively. The formula used to determine the percentage of absorption was (total T4 at 2 hour after LT4 administration - baseline total T4 prior to administration in mcg/L) x plasma volume in liter/dose of administered LT4 in mcg. The final prescription dose of 700 mcg once daily was then

derived from the available data, which eventually corrected the patient's hypothyroidism. Repeat testing after 2 weeks showed TSH of 0.17, FT4 of 1.29 and total T4 of 6.5. The suppressed TSH at this point was attributed to chronic narcotic use but FT4 and total T4 improved appropriately.
Conclusion:
There is no gold standard protocol for levothyroxine absorption test so we used a different protocol for LT4 dosing compared to the conventional regimen (1000 mcg of LT4). Our patient did show appropriate levothyroxine absorption on the calculated dose. Hence, the Levothyroxine absorption test may be used both as a diagnostic as well as a therapeutic tool for the patients with LT4 malabsorption causing PH.
References:
G.E. Sun, K.M. Pantalone, C. Faiman, M. Gupta, L. Olansky, B. Hatipoglu, The clinical utility of free thyroxine in oral levothyroxine absorption testing. Endocr. Pract. 20(9), 925–929 (2014)

# Thyroid

## THYROID DISORDERS CASE REPORTS II

### *Levothyroxine Absorption Testing in Three Patients with Severe Hypothyroidism on Adequate Replacement*

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**SAT-503**

**Background:** Levothyroxine (L-T4) absorption is a concern in patients who report appropriate self-administration but remain clinically and biochemically hypothyroid. However, there are no established guidelines for L-T4 absorption testing.
**Clinical Cases:** Two women (A and B) with a history of Graves' disease and radioactive iodine ablation (RAI) on weight-based L-T4 replacement presented to the hospital with severe fatigue and bilateral leg swelling. A third woman (C) with a history of papillary thyroid carcinoma, total thyroidectomy and RAI, on suppressive doses of L-T4 presented to the clinic with fatigue, constipation and weight gain. All patients reported compliance with taking L-T4 with appropriate technique. They had no known medical problems contributing to a malabsorptive state, and were not taking any medications known to interfere with L-T4 absorption.
Initial testing of thyroid function revealed TSH (0.57-3.5 μIU/mL)/Free T4 (0.61-1.18 ng/dL) levels of 10.12/0.249, 45.95/<0.2 and 142/<0.2 in patients A, B and C respectively. Patients A and B tested negative for *Helicobacter pylori* infection, celiac disease and lactose intolerance. Patient C had been successfully treated for *H. pylori* infection in the past. Celiac testing was negative, but the patient tested positive for anti-parietal cell antibodies and vitamin B12 deficiency. She was referred to Hematology & GI specialists. None of the patients had clinical evidence of heart failure and had normal echocardiograms.
In order to evaluate for poor absorption, all patients underwent L-T4 absorption testing. Based on published data, baseline TSH and Free T4 levels were obtained followed by administration of 1000 mcg of L-T4. Next, free T4 levels were obtained at 2 hours for all patients and at 4, 8 and 24 hours for patient A & B. Patients A and B underwent testing in the inpatient setting, while Patient C was tested in the outpatient clinic.
In all cases, a > 50% rise in free T4 levels was observed at 2 hours, suggesting non-adherence or "pseudo-malabsorption". Patients were counseled extensively regarding proper technique and compliance with L-T4. Patients A and B demonstrated rapid clinical improvement in the hospital, and Patient C reported to her next clinic visit with clinical and biochemical improvement.
**Conclusions:** Though guidelines have not been established for L-T4 absorption testing, case reports exist exhibiting the safety and efficacy of L-T4 absorption challenge with a weekly weight-based dose or 1000 mcg of LT4. Our case series show the success of the latter with meaningful results in as little as 2 hours. Case C demonstrates that this test can be done safely and cost-effectively as an outpatient. Standardization of L-T4 absorption test will be of great utility in the management of this common problem encountered by endocrinologists.

# Reproductive Endocrinology

## SEX DETERMINATION AND REPRODUCTIVE AXIS DEVELOPMENT

### *Combined CNV, Haplotyping and Whole Exome Sequencing Implicates Inherited Novel SRY Mutations Not Account for Familial 46,XY Sex Reversal*

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**SUN-034**

SRY is one of the important genes involved in the process of human sex determination. The disturbed sex determination caused by SRY mutation accounts for 10-15% cases with complete gonadal dysplasia (CGD), also known as 46, XY sex reversal. Recently, three distal enhancers are disclosed in the upstream of SOX9 gene. In an inherited 46, XY sex reversal pedigree with 5 patients, p.Arg76Leu mutation of SRY and p.G212S mutation of NR5A1were identified from the proband who present with primary amenorrhea and lack of puberty development. The missense mutation of NR5A1was found to be derived from the mother. Interestingly, the paternal inherited p.Arg76Leu mutation of SRY was revealed from other 2 CGD patients, as well as from apparent normal male family members with fertility. P.Arg76Leu variation was found have no effect to the transcriptional activity of target gene SOX9, neither alteration of the nuclear translocation of SRY. Whole exome sequencing also found SRY mutation, FGF10 mutation, GJB4 gene mutation, etc. with no segregation in the family, which suggested SNVs are not main cause of