Far Eastern University- Dr. Nicanor Reyes Medical Foundation

Institute of Medicine

A Case Presentation in Clinical Therapeutics 3A

*Case 1: Thyroid disorder, Anemia, and Menstrual disorder*

Presented to:

Ona Cruz, M.D.

Department of Pharmacology

Presented by:

Justo, Beverly Diane B.

Lomboy, Jemmarie S.

Lopez, Juliene Paulo

Section 3-E Medicine

Problem 1: Hypothyroidism

Basis of Diagnosis:

A. Clinical Manifestation

* Weakness and lassitude
* Somnolence
* Slight discomfort when swallowing
* Dry skin
* Non Pitting edema of lower extremities
* Slight periorbital edema
* Slow DTR
* PR of 56 bpm
* Progressive weight gain
* Diffuse anterior non-tender neck mass
* Menses of irregular intervals with occasional missed periods of 2-3 cycles.

B. Past Medical History

* Underwent Radioactive Iodine Treatment

History of radioactive Iodine treatment of the patient is very important because it gives us the idea of possible destruction of thyroid follicular cells.

C. Laboratory Results

* increased T3 10 ng/dL
* decreased T4 0.3 ng/dL
* Increased TSH 60 uU/mL
* Increased cholesterol 252 mg/dL
* (+) thyroid Abs

Hypothyroidism is characterized by low free thyroxine and elevated serum TSH.

Treatment Objective: to normalize thyroid function

Pharmacologic Intervention:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **THYROID PREPARATION** | **EFFICACY** | **SAFETY** | **SUITABILITY** | **COST** |
| **1. Levo-thyroxine** | ++ | +++ | ++++ | + |
| **2. Liothyronine** | +++ | + | + |  |
| **3. Liotrix** | + | + | + |  |
| **4. Dessicated thyroid** |  |  | + | + |

**EFFICACY**

Among the thyroid preparations, **Liothyronine (T3)** is considered to be the **most effective** because it’S 3-4 times more potent than levothyroxine, is almost completely absorbed (95%) and the fastest onset of action. Levothyroxine (thyroxine, T4)= 99% bound to protein, thus most of it is metabolically inactive . Liotrix’s definite benefit has not yet been established. Dessicated Thyroid has highly variable biologic activity, making this preparation less desirable. Equi-effective doses are 100mg of dessicated thyroid=100mcg of levothyroxine=37.5mcg of liothyronine.

**SAFETY**

Levothyroxine is considered to be the safest of the thyroid preparations because of its stability, lack of allergenic foreign protein. Liothyronine has a greater risk of cardiotoxicity due to its greater hormone activity. Signficant amounts of T3 in Liotrix may produce significant elevations of T3 levels and toxicity. The use of dessicated thyroid rather than synthetic preparations is never justified, since the disadvantages of protein antigenicity, product instability, variable hormone concentrations, and difficulty in laboratory monitoring.

**SUITABILITY**

  Levothyroxine is the most suitable because of its long half-life of seven days, which permits once-daily administration, lack of allergenic foreign protein. Liothyronine has a half-life of 24 hrs which requires multiple dosing. It should be noted that iron sulfate decreases T4 absorption, so it should not be taken together with iron supplements.

The shelf-life of synthetic hormone preparations is about 2 years, particularly if they are stored in dark bottles to minimize spontaneous deiodination. The shelf-life of dessicated thyroid is not known with certainty, but its potency is preserved if it is kept dry.

**COST**

  Both the levothyroxine and desiccated thyroid are inexpensive as opposed to Liothyronine and Liotrix. Since the cheapness of dessicated thyroid is not an enough consideration as compare to the disadvantages or harm it may bring to the patient this outweigh the advantage of lower cost, still, levothyroxine is best.

Pharmacologic drug of choice: Levothyroxine

Synthetic levothyroxine is the preparation of choice for thyroid replacement or suppression therapy because of its stability, content uniformity, low cost, lack of allergeneic foreign protein, easy laboratory measurement of serum levels and long half-life. In addition T4 is converted to T3 intracellularly thus administration of T4 would eventually produce both hormones.

Non-pharmacologic Intervention:

* Discontinue kelp.

Since kelp contains a high concentration of Iodine it would activate the Wolff-Chaikoff block thereby leading to a more pronounced hypothyroidism. Levothyroxine, eventhough is a synthetic thyroid hormone, can be administered in increasing increments every 3 to 6 weeks thus it does not stimulate the inhibition of iodide organification (Wolff-Chaikoff block).

LEVOTHYROXINE

* Dosage

**Oral**:  
The initial dose is 12.5 to 50 mcg orally once a day. The dosage can be increased in 12.5 to 25 mcg/day increments every 2 to 4 weeks.

In older patients or in younger patients with a history of cardiovascular disease, the dosage should be increased in 12.5 to 25 mcg increments every 3 to 6 weeks.

Take the missed dose as soon as you remember. Skip the missed dose if it is almost time for your next scheduled dose. Do not take extra medicine to make up the missed dose.

Take levothyroxine with a full glass (8 ounces) of water. The levothyroxine tablet can dissolve very quickly and swell in the throat, possibly causing choking or gagging.

Take this medicine on an empty stomach, 30 minutes before eating.

Levothyroxine tablets and dry powder should be kept at room temperature, 15-30°C (59-86°F) in a light-resistant, tight container.

Stop using levothyroxine and get emergency medical help if you have any of these signs of an allergic reaction: hives; difficulty breathing; swelling of your face, lips, tongue, or throat.

Call your doctor at once if you have any of these serious side effects: headache;sleep problems (insomnia); nervous or irritable feeling; fever, hot flashes, sweating; changes in your menstrual periods; appetite changes, weight changes; Less serious levothyroxine side effects may include mild hair loss.

If you use any of the following drugs, use them at least 4 hours before or 4 hours after you take levothyroxine: calcium carbonate; **ferrous sulfate iron supplement;** sucralfate; sodium polystyrene sulfonate; antacids that contain aluminu; and cholestyramine and colestipol.

It may take several weeks before your body starts to respond to levothyroxine. **Do not stop** taking this medication suddenly. Even if you feel well, you may still need to take this medicine every day for the rest of your life to replace the thyroid hormone your body cannot produce.

Follow-up after 2 months to check your thyroid function and cholesterol.

Problem 2: Iron deficiency Anemia

Basis of Diagnosis:

A. Clinical Manifestation

* (+) weakness and lassitude
* Menorrhagia
* HEENT: pale palpebral conjunctiva and gums
* Extremities: pale nailbeds

B. Past Medical History

* The patient is self- medicating with Kelp tablets

C. Laboratory Results

* Hemoglobin 7 (12-16gm/dl)
* Hematocrit 28 (38-46%)
* RBC 3.4 (4.8 +/- 0.6 million/ cu mm

(Hemoglobin, Hematocrit and RBC are decreased)

Treatment Objective: To normalize the hemoglobin, hematocrit and RBC count.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Iron Preparations | Efficacy | Safety | Suitability | Cost |
| Ferrous fumarate | +++ | ++ | +++ | ++ |
| Ferrous sulfate | +++ | + | +++ | +++ |
| Ferrous gluconate | ++ | ++ | ++ | + |

**EFFICACY**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Elemental iron | Iron (%) | Elemental iron per tablet (mg) |
| Ferrous fumarate | 66mg/200mg tablet | 33 | 108 |
| Ferrous sulfate | 60mg/ 300 mg tablet  65mg/325 mg tablet | 20 | 65 |
| Ferrous gluconate | 34mg/325mg tablet | 12 | 35 |

Among the most common iron preparations, Ferrous fumarate is most efficient in treating iron deficiency anemia. In the table above, it has the highest iron percent (33%). Also, ferrous fumarate has 108 mg of elemental iron in a 325 mg tablet. We want an iron preparation that has the highest amount of elemental iron in a tablet to normalize hemoglobin, hematocrit and RBC levels.

**SAFETY**

The common adverse effects of the iron preparations available are nausea, epigastric discomfort, abdominal cramps, diarrhea and constipation. In terms of safety, ferrous sulfate is least safe because it has the highest capacity to cause gastric irritations. Ferrous fumarate and ferrous gluconate are both organic iron and these are better absorbed and tolerated in contrast to the inorganic ferrous sulfate.

**SUITABILITY**

|  |  |  |  |
| --- | --- | --- | --- |
| Preparation | Tablet size (mg) | Elemental iron per tablet (mg) | Usual adult dosage (tablets per day) |
| Ferrous fumarate | 325 | 108 | 2-3 |
| Ferrous sulfate | 325 | 65 | 3-4 |
| Ferrous gluconate | 325 | 35 | 3-4 |

Ferrous fumarate, ferrous sulfate and ferrous gluconate are all administered orally. In terms of dosaging, ferrous fumarate is the most suitable because it is usually given 2-3 times OD and the elemtal iron per tablet is higher (108 mg/tablet) in contrast to the other two preparations.

Unless otherwise instructed, store ferrous fumarate, ferrous sulfate, and ferrous gluconate preparations should be stored in tight, light-resistant containers.

The iron preparations mentioned are considered contraindicated in patients with hemosiderosis, hemochromoto­sis, hemolytic anemias, or known hypersensitivity to any component of the product. Because of the GI irritating properties of the drugs, oral iron products are also considered contraindicated by some clinicians in patients with GI ulcerative diseases.

Oral iron preparations can bind to orally administered tetracyclines, thereby decreasing the absorption of both compounds. If both drugs are necessary, give the tetracycline dose 2 hours before or 3 hours after the iron dose. Because chloramphenicol may delay the response to iron administration, avoid using chloramphenicol in patients with iron deficiency anemia. Iron can decrease the efficacy of penicillamine, probably by decreasing its absorption. Doses of the two drugs should be spaced as far apart as possible, should both be required. Antacids, eggs, or milk administered concurrently with oral iron preparations can reduce the bioavailability of the iron. Separate iron doses from these items as far apart as possible. Iron salts may precipitate phosphate in the GI tract.

**COST**

Among the three oral preparations, the cheapest is ferrous sulfate, and the most expensive is ferrous gluconate.

Pharmacologic Drug of Choice: FERROUS FUMARATE

Ferrous fumarate is the drug of choice for the patient because it is the most efficient, having the highest elemental iron content that will help normalize the abnormally low hemoglobin, hematocrit and RBC levels.. It is also suitable, safe and cost-friendly for the patient.

Non-Pharmacologic Intervention

The patient is adviced to discontinue kelp tablet supplements because it is said that kelp can reduce the count of RBC and platelets. If not discontinued, this may exacerbate the patient’s anemia and will arise to a more abnormally low RBC count.

Milk or antacids are contraindicated. The patient can take water or orange juice instead. Ask the patient to take iron supplements with food to alleviate gastrointestinal distress but this may decrease iron absorption by as much as 40-66%. Iron rich foods must be considered in the diet (liver, beef, seafoods, green leafy vegetables). The patient should know the potential adverse effects of iron which includes nausea and vomiting, diarrhea or constipation or black stools and tooth discoloration.

Problem 3: Menorrhagia

Basis of Diagnosis:

A. Clinical Manifestation

* Menses have become unusually prolonged with passage of large clots
* Prolonged menstrual duration of 9-10 days with passage of clots and consuming 8-10 napkins per day fully soaked on the second to sixth day
* Decreased hemoglobin, decreased hematocrit

B. Laboratory Results

* Hemoglobin 7 (12-16 gm/dL)
* Hematocrit 28 (38-46%)

Treatment Objective:

* To achieve euthyroid state in order to normalize monthly menstrual cycle

Pharmacologic Intervention:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Drugs | Efficacy | Safety | Suitability | Cost |
| Oral Contraceptive Pills | ++ + | + + | + +++ | ++ |
| NSAID | + | + | ++ | + +++ |
| Tranexamic Acid | ++ | +++ | ++ | + + |

**EFFICACY**

The Efficacy of OCP increases in prolonged use. Usually give oral by 1-3 days following IV by 4 to 12 weeks. It acts indirectly decreasing the excessive bleeding during menstruation. Tranexamic acid is usually given 1- 1.5 g in divides doses 2-4 times daily. It acts directly to the bleeding not affecting the underlying problem. The use of NSAIDS in the entire treatment is not clinically advisable due to its adverse effects. To address the problem, we need an increasing dose of the drug in order to achieve is desired effect. The initial dose is 500mg. We increase the dosage gradually until we reach its maximum allowable dose.

**SAFETY**

Some **OCP’**s common adverse effect like Increase blood pressure, headache breath tenderness,and changes in libido and this symptoms usually disappears after a few months of use. However, the regaining of ovulatory functions after the cessation of the drug may be prolonged. **Tranexamic acid** on the other hand has few minor adverse effects like nausea vomiting diarrhea vision disturbances and no drug interactions related to the patient. **NSAID’s** is least safe among the aforementioned drugs above, some of the side effects like Gastrointestinal bleeding, rashes, pruritus, asthma, renal toxicity and hypertension.

**SUITABILITY**

**OCP** is the most suitable in patients condition because his Menorrhagia that is brought about by her hypothyroidism and the treatment of her condition will take months to fully treated and also to correct the excessive menstrual bleeding. And Within that treatment period OCPs are very suitable as an interim drug because It helps suppress the LH surge that makes the endometrium more thickened that increases menstrual bleeding. **Tranexamic acid** on the other hand is also useful in the patients conditions, however it only addresses the bleeding problem itself but not the hormone problem, and because the treatment of the primary disease of the patient is long, patient may still experience heavy bleeding in the long run. As for **NSAID’s** it also prevents bleeding but not the hormone problem

**COST**

Amongst the drugs mentioned **NSAIDs** are the most cost effective such as ibuprofen (advil) and mefenamic acid (Ponstel). It’s very cheap and are readily available in any of the local drugs outlets. And also you can buy this without any prescription. Unlike OCPs and the Tranexamic acid, **OCPs** usually sells in packs because it’s not just once pill that your gonna be using in order for the drug to take full effect. As for **Tranexamic acid (Lysteda**), it has a moderate price but still NSAID’s are much cheaper.

**Drug of choice:**

Oral Contraceptive pills

Non-pharmacologic Intervention:

* Discontinue kelp.

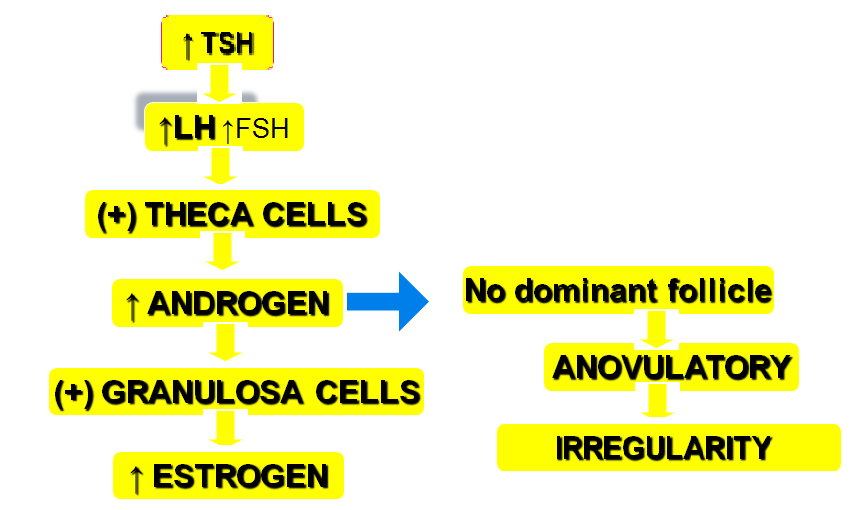
Oral Contraceptive pills (Progestin)

* Dosage

5 to 10 mg IM daily for 6 doses

* tell your doctor and pharmacist if you are allergic to progestins, aspirin, tartrazine (a yellow food coloring), or any other medications.
* tell your doctor and pharmacist what prescription and nonprescription medications, vitamins, nutritional supplements, and herbal products you are taking. Be sure to mention any of the following: carbamazepine (Tegretol), phenobarbital (Luminal, Solfoton), phenytoin (Dilantin), and rifampin (Rifadin). Your doctor may need to change the doses of your medications or monitor you carefully for side effects.
* tell your doctor if you have or have ever had breast lumps or breast cancer, vaginal bleeding between menstrual periods, liver tumors, liver disease, or diabetes.
* tell your doctor if you are pregnant or plan to become pregnant. If you become pregnant while taking progestin-only contraceptives, call your doctor.
* tell your doctor if you use tobacco products. Cigarette smoking may increase the risk of heart attacks and strokes. You should not smoke while taking this medication.
* Take the missed dose as soon as you remember it, and go back to taking progestin-only contraceptives at your regular time. If you take a dose more than 3 hours late, be sure to use a backup method of birth control for the next 48 hours. If you are not sure what to do about the pills you have missed, keep taking progestin-only contraceptives and use a backup method of birth control until you speak to your doctor.

**PATHOPHYSIOLOGY**



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