The thyroid gland produces hormones that regulate the body's metabolism and keep it in balance, thereby performing an absolutely vital function. Thyroid diseases have been known for centuries and are commonly encountered in clinical practice. A decrease or increase in thyroid function may cause hypo- or hyperthyroidism respectively. These are essentially disorders of metabolism and result in a wide variety of symptoms. A review of three cases is presented below, illustrating some of the presentations of thyroid dysfunction and their management.

Case 1

A 29 year old lady, mother of one child who was planning for a second child, came to the Out Patient Department with a history of menorrhagia, progressive weight gain and tiredness. The patient looked dull (figure-1a) and on examination was found to have dry and scaly skin (figs 1a and b) and a goiter (Figure 1a, shown with arrow). Her blood pressure was 140/100mmhg and she had slow ankle jerks.

Biochemical evaluation revealed normal parameters except for a high serum TSH level of 88µIU/ml (Normal - 0.3-4.5 ) and a low Total Thyroxine (T4) level of 2.5 µg/dl (Normal: 4.5-12.5) with low Free Thyroxine levels too. These biochemical features are classically seen in primary hypothyroidism. This patient also had Anti-thyroglobulin and antithyroid peroxidase antibody titers more than 100 units confirming the diagnosis of Hashimoto’s thyroiditis. The patient was started on oral thyroxine at a dose of 1.6 µg/kg/day. She was advised to take the medications on an empty stomach at least 30-45 minutes prior to the breakfast as the absorption of thyroxine is hampered by food intake. At three months post treatment, a follow up TSH level was 1.2 µIU/ml. She was advised to continue medications regularly as instructed and to follow up with TSH after 6 months or to review if she conceived.

Thyroid hormone dysfunction in pregnancy:

In a pregnant woman, the requirement of thyroxine increases because of associated physiological changes that occur during pregnancy. The target TSH levels during pregnancy are lower than that of the normal laboratory reference range. The TSH targets for all the three trimesters are given below.

<table>
<thead>
<tr>
<th>Trimester</th>
<th>TSH Target (µIU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester</td>
<td>0.1-2.5</td>
</tr>
<tr>
<td>Second Trimester</td>
<td>0.2-3</td>
</tr>
<tr>
<td>Third Trimester</td>
<td>0.3-3.5</td>
</tr>
</tbody>
</table>

Immediately after delivery, the patient’s oral thyroxine dose can be altered to the pre-pregnant range. Brain development in early fetal life depends on maternal thyroxine till the point of development of the thyroid gland, so the patient requires frequent follow up during the pregnancy.

Fig. 1a: Dull looking face; 1b: Dry scaly skin, and 1c: Icthyosis of the skin.
When the thyroid gland under-secretes, it results in hypothyroidism. A rise in serum TSH levels occurs due to a negative feedback mechanism that exists between the hypothalamic-pituitary-thyroid axis. On contrary, the thyroid gland may also work autonomously and produce more thyroid hormone than is physiologically necessary.

Case 2

A 58 year-old man presented with complaints of neck swelling, protrusion of the eyes and a ‘bumpy’ swelling in the legs (Figure 2a-c). He explained that despite having a good appetite he had a weight loss of around 15 kgs. The clinical examination showed he had tremors of the outstretched hand and also tremors of the non-protruded tongue and pulse rate was 120/minute. He had prominent eyes and bilateral swellings over the tibia suggestive of pretibial myxedema. He also had thyroid acropachy (Fig 3).

Thyroid eye disease – For treatment of active thyroid eye disease, the Clinical Activity Score (CAS), is followed. The CAS for the eye was 4/7 (More than 3/7 is generally considered as an active eye disease). Table 1 shows the clinical activity score which ranges from 0-7 in the initial visit, and up to 10 in the three month follow up visit.

With these clinical findings, he was diagnosed to have Graves’ disease with active ophthalmopathy. Biochemical evaluation showed a suppressed TSH (<0.001 µIU/ml) and an elevated Total Thyroxine (T4 >30µg/dl) and free Thyroxine>10ng/dl. He was investigated further for his ophthalmopathy and MRI orbit showed bulky intraocular muscles with sparing of the respective tendons thereby confirming thyroid ophthalmopathy (Fig-4)

He was initiated on a non-selective beta-blocker propranolol (The dose may be titrated even up to 1000mg/day to keep the pulse rate to less than 80/ min) and carbimazole 30mg once daily. In view of his active ophthalmopathy he was given a pulse dose of 500mg intravenous Methyl prednisolone with a plan to give the same dose (500mg/week) for a total of 6 weeks, followed by 250 mg/week of intravenous Methylprednisolone for a period of 6 weeks. His blood glucose levels and serum potassium levels were checked regularly as methylprednisolone can cause

---

### Box 1: Principles of management- hypothyroidism

1. Serum anti-TPO antibodies and Anti Thyroglobulin antibodies levels should be assessed in a patient with subclinical hypothyroidism as Hashimoto’s thyroiditis is one of the commonest causes of subclinical hypothyroidism especially in females.
2. The Replacement dose of oral thyroxine in adult patients with hypothyroidism is 1.6 µg/kg/day. Tablets have to be taken on an empty stomach. For elderly patients, thyroxine has to be started at a lower dose and dose should be hiked up slowly.
3. Follow up after 3-6 months with TSH; the dose of thyroxine to be adjusted accordingly.
4. Thyroxine requirements are higher in pregnancy.

---

Fig 2a. Prominent eyes, 2b-Visible thyroid gland enlargement, and 3c-Pretibial myxedema/Thyroid Dermopathy. Figure 3. Thyroid acropachy.
hyperglycaemia and hypokalemia. He will require regular follow up with thyroid function tests. The patient was told about the need for continuing carbimazole for at least 18 to 24 months.

In the absence of ophthalmopathy, patients with Graves’ disease can be treated with Radioactive iodine ($^{131}$I). Up to 50% of patients can have hypothyroidism within 3 months as a sequelae of $^{131}$I therapy. So a frequent review of this patient is important. Ophthalmopathy is not a definite contraindication for $^{131}$I therapy if they have inactive eye disease. Certain patients need more than one sitting of $^{131}$I therapy. If the patient has a large goiter which cannot be amended by medical or radioactive therapy, a total thyroidectomy is recommended.

If the patient has hyperthyroidism during pregnancy, the follow up review has to be more frequent with Thyroxine levels. Propylthiouracil has to be used during the first trimester which can be later changed over to carbimazole during the subsequent trimester.

**Tumours of the thyroid**

Similar to other organs in the body, the thyroid gland may develop benign and malignant tumours. However, even malignant tumors of the thyroid gland have an excellent prognosis if diagnosed early and referred appropriately.

**Case 3**

A 72 year old patient was seen in the Endocrinology OPD with a history of a swelling in front of the neck for over 50 years. She had been operated in 1972 for a swelling in the neck, with a probable subtotal thyroidectomy. Ten years after the surgery, she noticed a similar neck swelling, which gradually progressed in size. She had symptoms of dyspnea and hoarseness of voice. She also complained of dysphagia. There were no other symptoms suggestive of hyperthyroidism or hypothyroidism. On examination, a large thyroid gland was palpable which had an irregular surface. It was firm in consistency and had a size of 16 x 15cm. The lower border was not palpable. Pemberton’s sign was positive (Fig 5-a,b). The upper and mid cervical lymph nodes were also palpable. A plain radiograph of the

**Table 1: Clinical Activity Score (CAS)**

For initial Clinical Activity Score (CAS), only items 1 to 7 are scored.

1. Spontaneous orbital pain.
2. Gaze evoked orbital pain
3. Eyelid swelling that is considered to be due to active (inflammatory phase) Graves’ Ophthalmopathy (GO)
4. Eyelid erythema
5. Conjunctival redness that is considered to be due to active (inflammatory phase) GO
6. Chemosis
7. Inflammation of caruncle

Patients assessed during follow-up can be scored out of 10 by including items 8 to 10.

8. Increase of > 2mm in proptosis
9. Decrease in uniocular ocular excursion in any one direction of >8°
10. Decrease of acuity equivalent to 1 Snellen line

**Fig. 5-a & b. Massive thyroid swelling with a positive Pemberton’s sign (Engorged veins shown with arrows).**
lateral view neck, was done to assess the degree of tracheal compression (Fig 6).

An ultrasound of the neck swelling showed multiple solid, isoechoic nodules with a positive halo sign, coarse calcifications and peripheral vascularity in both lobes of the thyroid gland (TIRADS 3). See Figs 6-8.

FNA smears from the right thyroid nodule were suggestive of benign follicular nodule. In view of the large thyroid mass and compressive symptoms, she underwent total thyroidectomy. The surgical specimen on examination showed features of nodular hyperplasia. So the diagnosis of recurrent symptomatic benign nodular hyperplasia of thyroid was made. Nodularity of thyroid tissue is extremely common. In a large population groups with higher prevalence of cancer:

- Children and males
- Adults less than 30 years or over 60 years of age
- Patients with a history of head and neck irradiation
- Patients with a family history of thyroid cancer

For benign nodules, surgery is indicated if any of the following are present:

- Re-accumulation of the nodule despite 3-4 repeated FNACs
- Size more than 4 cm in some cases
- Compressive symptoms (dyspnea, dysphagia)
- Signs of malignancy (vocal cord dysfunction, lymphadenopathy) (3).
study (Framingham, MA), clinically apparent thyroid nodules were present in 6.4 percent of women and 1.5 percent of men.

The National Cancer Institute Thyroid Fine Needle Aspiration State of the Science Conference (“Bethesda Conference”) suggests the following classification scheme:

- Non-diagnostic
- Benign – This includes macrofollicular or adenomatoid/hyperplastic nodules, colloid adenomas, nodular goiter, and Hashimoto's thyroiditis
- Follicular lesion or atypia of undetermined significance (FLUS or AUS) – This includes lesions with atypical cells, or mixed macro- and microfollicular nodules
- Follicular neoplasm – This includes microfollicular nodules, including Hürthle cell lesions
- Suspicious for malignancy
- Malignant

Preliminary studies suggest the potential use of an imaging staging system similar to that used for breast imaging. The Thyroid Imaging Reporting and Data System (TIRADS) system rates ultrasound findings on a score of 1 to 5 based upon ultrasonographic characteristics\(^1\)

Similar to BIRADS category, sonographic TIRADS classification is as follows:

- **TIRADS 1** - normal thyroid gland
- **TIRADS 2** - benign lesions
- **TIRADS 3** - probably benign lesions
- **TIRADS 4** - suspicious lesions (Sub classified as 4a, 4b, and later 4c with increasing risk of malignancy)
- **TIRADS 5** - probably malignant lesions (more than 80% risk of malignancy)

**Conclusion:**
- Hypothyroidism and hyperthyroidism can be treated at the level of primary health care center with frequent follow up.
- Early treatment of hypothyroidism and hyperthyroidism can prevent myxedema coma and thyrotoxic storm respectively.
- Early referral to a surgeon or a higher centre is important if a thyroid nodule is detected, as the prognosis for a malignant thyroid cancer is good.

**References:**