A CASE STUDY ON NON-TOXIC MULTINODULAR GOITER – PATIENT MONITORING AND PATIENT COUNSELLING BY CLINICAL PHARMACISTS

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ABSTRACT

A goiter simply means an enlarged thyroid. A goiter can either be a simple goiter where the whole thyroid is bigger than normal or a multinodular goiter where there are multiple nodules. Multinodular goiters can be either a toxic multinodular goiter (i.e. makes too much thyroid hormone and causes hyperthyroidism) or non-toxic (i.e. does not make too much thyroid hormone). Symptoms may include slowly growing neck mass, asymmetry tracheal deviation, airway obstruction, dyspnoea, cough and dysphagia. In this case study, a 50 year old female patient was admitted to hospital with a complaint of swelling over neck since 6 years. Patient was diagnosed with multinodular goiter. Total thyroidectomy was done and the nodules were removed. Patient was treated with antibiotics, multivitamins and supportive therapy. After completion of treatment, the patient was relieved from disease and as clinical pharmacists, we counselled the patient regarding the factors aggravating the disease and importance of medication adherence and importance of diet control which is a very important factor as iodine deficiency i.e; iodine intake of <50µg/day, in food and water causes goiter. The patient was advised to have a regular monitoring of thyroid levels.

KEYWORDS: multinodular goiter, asymmetry tracheal deviation, thyroidectomy.
INTRODUCTION
Goiter, or the enlargement of the thyroid gland, comprises a variety of conditions. Multinodular goiter is a commonly used term describing an enlarged thyroid gland with multiple areas of nodularity.[1]

Histologically, MNG is defined as a thyroid enlargement with follicles that are morphologically and functionally grossly altered: it usually develops over years.[2]

MNG is endemic in certain regions of world, mostly in regions of Iodine deficient diet.[3]

EPIDEMIOLOGY
Multinodular goiter is endemic in regions with low iodine in the soil, such as countries in the mountainous areas in south-East Asia, Latin America and Central Africa. The World Health Organization reported a worldwide iodine deficiency rate 9.8- 56.9% and total goiter prevalence of 4.7-37.3% by year 2003.[4] In India about 54 million people have goiter and the number at risk is estimated to be about 167 million.[5]

Nodules appear early in endemic goiter and later in sporadic goiters although patient may be unaware of the goiter until his or her late 40s and 50s.[6]

SIGNS AND SYMPTOMS
- Slowly growing anterior neck mass
- Uni- or multinodularity on examination
- Enlargement during pregnancy
- Cosmetic complaints
- Asymmetry, tracheal deviation and/or compression
- Rarely upper airway obstruction, dyspnoea, cough, and dysphagia
- Sudden transient pain or enlargement secondary to haemorrhage
- Gradually developing hyperthyroidism
- Superior vena cava obstruction syndrome (rare)
- Recurrent nerve palsy (rare)
- Horner’s syndrome (rare).[7]

ETIOLOGY
1. In most endemic areas, iodine deficiency is the main cause of goiter development.[8]
2. Dyshormonogenesis: Uncommon cause of non-toxic goiter and six separate intrathyroidal disturbances have been incriminated in dyshormonogenesis.
   • Defects of iodine trap.
   • Defects of organification - most common defect.
   • Defect of coupling.
   • Protease enzyme deficiency.
   • Synthesis of abnormal iodoproteins.

3. Goitrogens: By blocking steps in thyroid hormone synthesis or inhibiting iodine uptake cause a hyperplastic gland with compensated thyroid function.\(^9\)

**PATHOPHYSIOLOGY**

Due to lack of iodine and goitrogens, deficient thyroid hormone production occurs leading to excessive TSH stimulation.\(^10\) Due to persistent TSH stimulation diffuse hyperplasia of gland(all active lobules) occurs. This results in fluctuations of TSH level and then mixed areas of active and inactive lobules develop. Active lobules become more vascular and hyperplastic. Haemorrhages occur with necrosis in the centre resulting in nodule formation. Centre of nodule is inactive and only margin is active i.e, multinodular goiter(MNG).\(^11\)

**DIAGNOSIS**

Serum thyroid stimulating hormone and free serum thyroxine levels are measured to determine the functioning status of the nodular goiter. An index nodule that is iso-or hypofunctional against the rest of thyroid gland has a reported malignancy risk of 3% to 15% and should be investigated with fine needle aspiration cytology (FNAC).\(^12\) - \(^15\)

A 33% risk of malignancy is reported in avid nodules detected by fluorodeoxyglucose positron emission tomography (\(^{18}\)FDG-PET), so such nodules should also undergo cytological evaluation.\(^16\)

FNAC is an accurate, safe, simple, and cost-effective investigation in the evaluation of nodular goiter. Diagnostic performance of FNAC is enhanced by ultrasound guidance in the identification of nodules with high risk features for aspiration.\(^17\)
MANAGEMENT

Usually surgery is preferred. Reason for doing surgery in nodular goiter is – it is an irreversible stage and chances of complications like development of toxicity, haemorrhage and follicular carcinoma is high and also for cosmetic reason.

- When entire thyroid gland is diseased total thyroidectomy is better option.
- Subtotal thyroidectomy is done depending on the amount of gland involved, amount of normal gland existing and location of nodules.
- Often partial thyroidectomy or Hartley Dunhill operation (isthmus + one lateral lobe and opposite side subtotal or partial) is also done depending on the amount of diseased gland and normal tissue behind.
- Prevention of multinodular goiter is possible by supplementing with L-thyroxine (0.1-0.2mg) when patient develops goiter in puberty. Formation of nodular goiter can be prevented by correcting iodine deficiency or by using iodine rich diet like eggs/seafood/milk or iodised salts and also avoiding goitrogenic drugs and diet.[18]

POST SURGICAL COMPLICATIONS

1. Haematoma

It can be avoided by ligation of vessels, at the time of surgery and performing Valsva at the end of operation to check for venous ooze. A haematoma can compress the airway and should be identified early and evacuated.

2. Airway obstruction

Tracheotomy may be required. Compression by haematoma, tracheomalacia and laryngeal oedema or myxoedematous cords also cause obstruction to airway.

3. Injury to recurrent laryngeal nerve.

4. Injury to superior laryngeal nerve.

5. Wound infection.

6. Hypocalcaemia.

Removal or devascularization of parathyroid glands causes numbness and tingling of lips, hands and feet. In such cases calcium level may be less than 8.0 mg/dL. Critical period is 24–96h after operation. Always check for serum calcium levels postoperatively. It may require calcium and vitamin D supplementation by oral or i.v route depending on severity of hypocalcaemia.
7. **Pneumothorax.**
Due to injury to pleura in lower neck.

8. **Hypothyroidism.**
It is usually seen 4–6 weeks after operation. This would require long-term thyroid replacement.\(^{[19]}\)

**CASE STUDY**
A patient of 50 year old female was admitted in Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India with a complaint of swelling over the neck since 6 years.

- **History of present illness:** Swelling started gradually and progressive in nature and attained the present size i.e, 9x5cms. History of backache since 2 years.

- **Personal History:** Patient has normal appetite and takes mixed diet, regular bowel and bladder habits and is a smoker.

- **Local Examination:** Swelling over the anterior part of neck size-9X5cms, irregular in shape and swelling moves on deglutition. Swelling extending superiorly to thyroid cartilage, inferiorly to sternal and posteriorly to sternocleidomastoids which is firm and nodular in consistency. Carotid pulsation palpable.

On admission, her body temperature was afebrile, blood pressure was 110/70mm of Hg, pulse rate was 74 beats/min.

- **Microscopic Examination:** Smear studies showed moderate number of benign follicular epithelial cells in sheets and clusters, some with hurttle change against haemorrhagic background. Plenty of colloid and good number of hemosiderin laden cyst macrophages seen.

- **Gross Examination:** Surface- nodular with congestion, cut section- multiple cysts filled with colloid and hemorrhages are seen. Focal areas of calcification are also seen. Section studies showed features are suggestive of multinodular colloid goiter with areas of calcification.
Laboratory investigations indicated Haemoglobin-12.8gm%, Total leukocyte count-6500Cells/ microlitre, Neutrophils-72%, Lymphocytes-26%, Eosinophils-2%, Monocytes-*0%(2-10%), ESR-10mm/hr, Random blood sugar-82mg/dL, Serum creatinine-0.9mg/dL, Blood urea-27 mg/dL, T3-128 ng/dL, T4-8.7µ/dL, TSH-0.89µ/ml.

*Low monocyte count indicates the risk for infection.

**THERAPY**

Drug chart -

<table>
<thead>
<tr>
<th>DAY</th>
<th>DRUG</th>
<th>DOSE</th>
<th>FREQUENCY</th>
<th>ROUTE</th>
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<tbody>
<tr>
<td>1-13</td>
<td>Cap.Becosules</td>
<td>OD</td>
<td>Oral</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Inj.Monocef, Inj.Voveran, Inj.Rantac</td>
<td>1gm</td>
<td>BD</td>
<td>IV</td>
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<td></td>
<td>Syrup Grillinctus-BM Asthalin nebulisation</td>
<td>3cc</td>
<td>BD</td>
<td>IM</td>
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<td></td>
<td>Budecort nebulisation</td>
<td>150mg</td>
<td>BD</td>
<td>IV</td>
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<td>5ml</td>
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<td>Syrup Grillinctus-BM Asthalinnebulisation</td>
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<td>1000mg</td>
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<td>Oral</td>
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<td>budecortnebulisation</td>
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<td>Oral</td>
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<td>BD</td>
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<td>Tab.Cefixime</td>
<td>200mg</td>
<td>BD</td>
<td>Oral</td>
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</tbody>
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After admission, normal diet was given and Cap. Becosules OD were given as a vitamin supplement to reduce pallor of the patient. This was continued for thirteen days. General characters were fair and vitals were stable.

Surgery (Total Thyroidectomy) was done on fourteenth day. After surgery, the vocal cord movement was normal and at 7:00PM, BP was 90/70mm of Hg, pulse rate was 60bpm, at 9:00PM, BP was 110/70mm of Hg, pulse rate was 60bpm, at 11:00PM, BP was 120/70mm of Hg, pulse rate was 64bpm.

On fourteenth day, vitals were stable, patient had a complaint of cough with expectoration and bilateral crepts. Inj.Ceftriaxone-1gm, IV, BD was given to avoid infection, Inj.Voveran-1amp, IM, BD was given to reduce pain after surgery, Inj. Rantac-1amp, IV, BD was given to prevent gastric irritation, Syrup Grilinctus BM-5 ml, TID was given to subside cough which occurred as a result of postoperative complication.

On fifteenth day, BP was 110/80mm of Hg, pulse rate was 79bpm, patient had a complaint of tingling of fingertips. Cough subsided and crepts decreased after administration Asthalinnebulisation- 8th hourly, Budecortnebulisation- 12th hourly to clear airway obstruction, Tab. Shelcal-1000 mg, BD was added to reduce tingling of fingers which occurred as a result of postoperative hypocalcemia, Cap. Becosules OD were added as vitamin supplement. Soft diet and oral fluids were given.
On sixteenth day, general characters were fair, pulse rate was 72bpm and no complaints of cough and fever. Soft diet was given and same medication was continued till eighteenth day. On examination, wound was healthy and no gaping.

On nineteenth day, general characters were fair and vitals were stable. Inj. Monocef, Inj. Voveran, Inj. Rantac were discontinued to remove the pus caused due to infection. Tab. Shelcal-1000mg, BD, Cap. Becosules-OD, Syrup Grillinctus-BM-5ml,TID, Asthalin nebulisation-8th hourly, Budecortnebulisation- 12th hourly was continued till twenty third day.

On twenty fourth day, general characters were fair and vitals were stable. Along with previous medication, Tab. Diclo-BD was added to reduce pain caused after removal of pus.

On twenty sixth day, general characters were fair and vitals were stable. Syrup Grillinctus, Tab Diclo, Asthalinnebulisation and budecortnebulisation were discontinued as airway obstruction got completely reduced. Tab. Shelcal, Cap. Becosules were continued and Tab. Cefixime- 200mg, BD was added to prevent infection.

On twenty seventh day, general characters were fair and vitals were stable. Tab. Cefixime, Cap. Becosules, Tab. Shelcal were continued and Tab. Thyroxine-100 µg, OD was added to maintain the thyroxine levels. This medication was continued till day thirty.

On thirty first day, Tab. Shelcal, Cap. Becosules, Tab. Cefixime, Tab. Thyroxine were continued and Tab. Dolo-650mg, SOS was added which acts as analgesic to reduce fever.

The patient's condition and vitals were completely stable and was discharged.

Patient monitoring, discharge counselling was done by clinical pharmacists.

**Discharge medication**
Tab. Shelcal-1000mg, BD for 13days
Tab. Thyroxine-100µg, OD for 13days
Cap. Becosules-OD for 15days
CONCLUSION
Multinodular goiter is where the enlarged thyroid appears with number of separate lumps (nodules) in the gland. Symptoms may include slowly growing neck mass, asymmetry tracheal deviation, airway obstruction, dyspnea, cough and dysphagia. In the present case, a 50 year old female patient was admitted to hospital with a complaint of swelling over neck since 6 years. Total thyroidectomy was done and the patient was treated with effective medication. Patient got relieved from signs and symptoms due to close monitoring by physician, nursing staff and therapeutic monitoring by clinical pharmacists. The patient was prescribed with thyroid hormone replacement and was asked to have a follow-up visit, to have a check on thyroid hormone levels. As clinical pharmacists, we monitored the patient for vitalis, prognosis, any side effects exhibited by the patient and encouraged patient for medication adherence. We counselled the patient in appropriate way about the clinical importance of proper diet. Therapeutic drug monitoring, drug utilization review and discharge counseling was done by clinical pharmacists.

REFERENCES


