Subcutaneous implantation of nodular goiter after endoscopic thyroidectomy: a case report

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Case Report

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Abstract

Background

Nodular goiter is a common benign tumor in clinical practice, it refers to a simple diffuse goiter due to repeated progression, causing follicular epithelium to diffuse into focal hyperplasia and degeneration in parts. Finally, because of long-term hyperplastic lesions and degenerative diseases, alternately repeatedly gland nodules in different stages of development, which is essentially a benign lesion and there are few reports confirming metastasis.

Case presentation:

The patient was a 26-year-old female with a history of right lobe subtotal thyroidectomy for thyroid nodules one year prior. Postoperative pathological examination revealed a nodular goiter with cystic changes in the "right lobe thyroid tumor". This time, she was admitted to the hospital because of the discovery of bilateral neck mass for one month. Physical examination: multiple protruding masses were seen in the neck, and the largest mass was located on the right side of the neck with a length of about 2 cm. Ultrasound showed multiple isoechoic nodules were found bilaterally in the neck, most of which were located in the sternocleidomastoid muscle. CT scan of the neck showed multiple nodules below the right lobe of the thyroid and in the front of the neck, and thyroid implantation lesions were considered. During the last operation, it was confirmed that the mass was scattered and mostly not in the area of the previous operation, and the pathological diagnosis was consistent with nodular goiter. It is thought to be caused by distant metastasis of a benign tumour and this is a very rare case.

Conclusions

This case report suggests that nodular goiter, as a benign lesion, may also present with implantation or metastasis, which should be considered in clinical practice, Surgeons need to prevent nodular goiter implantation during surgery.

Background

Nodular goiter is a common clinical disease of the thyroid gland, which is characterized by focal hyperplasia, degeneration or atrophy of follicular epithelial cells, and fiber segmentation in the late stage of simple goiter disease[1]. Thyroid nodules have been detected using modern high-resolution ultrasound in up to 76% of healthy individuals[2].

Palpable thyroid nodules occur in 3–7% of the adult population and are more common in women[3]. Its incidence is related to iodine nutrition level, estrogen level, ionizing radiation, heredity, and other factors [1]. However, because it is a benign lesion, implantation metastasis rarely occurs. This case report
introduces a case of postoperative implantation metastasis of a nodular goiter, which inspired us to rethink about benign tumor metastasis and surgery.

Case Presentation

The patient, a 26-year-old female, had a history of subtotal thyroidectomy on the right lobe of the thyroid gland one year ago due to endoscopic thyroidectomy, and postoperative examination suggested "nodular goiter in the right lobe of the thyroid gland" with cystic changes, and was readmitted to the hospital due to "bilateral neck space occupying for one month". Physical examination: Multiple masses were found protruding on the neck, the surface skin was not red and swollen, and no varicose veins were found. The largest mass was located on the right side of the neck, with a length of approximately 2 cm, medium texture, no tenderness, a clear boundary, and fair activity. The mass did not move upwards or downwards during swallowing. (Fig. 1). Auxiliary examination: (1) Description of the ultrasonic results: Multiple isoechoic nodules were detected on both sides of the neck, most of which were located in the sternocleidomastoid muscle. The larger nodules on the right were about 25mmx8mmx14mm, and the larger nodules on the left were about 16mmx10mmx15mm. The boundary was clear, part of the nodules was irregular, and dotted and linear blood flow signals were visible inside. Ultrasonographic diagnosis was bilateral solid neck nodules with metastatic cancer? (Fig. 2). (2) Cervical CT plain scan: The thyroid was partially absent, and there was no abnormal density or abnormal enhancement of the residual thyroid. Multiple nodular and slightly high-density shadows were observed in the lower part of the right lobe of the thyroid and the anterior part of the neck. The larger ones were about 1.8cm×1.2cm in size, with relatively uniform density and obvious enhancement. The boundary between some lesions and the adjacent sternocleidomastoid muscle was unclear, considering the thyroid implant lesions? (Fig. 3).

The patient underwent neck mass excision and biopsy under general anesthesia. There were a total of six lesions, most of which were not in the previous surgical area, and the larger one was about 2 cm in length, with a clear boundary, regular shape and complete capsule (Fig. 4). The surgery was successful, and no complications occurred during the perioperative period. Postoperative examination suggested that the "thyroid implant lesion on the neck" was consistent with nodular goiter (Fig. 5).

Discussion

The diagnostic challenge in this case was to determine whether benign thyroid nodules were capable of implantation or metastasis. It is well known that malignant tumors have the characteristics of malignant growth, invasion and metastasis, and can be transferred by direct invasion, blood circulation and lymphatic system. In recent years, the mechanisms of malignant tumor invasion and metastasis have become well understood. However, reports of benign lesions with metastasis are mostly individual cases without a systematic explanation. In 2004, Harach et al. proposed that benign thyroid tumors could also be transplanted. The literature describes four cases of ectopic implantation of nodular goiter years after resection, presenting as subcutaneous nodules or thyroid tissue surrounded by connective tissue at the surgical site, suggesting that benign nodular goiter may also be invasive[4]. In 2007, Kylie et al.
3044 patients, all of whom underwent total resection or subtotal resection for thyroid nodules, and only one patient had local recurrence in the area of true thyroid surgery[5]. Sun et al. reported a case of pulmonary and rib metastasis of non-toxic nodular goiter at initial diagnosis, which was only reported in China and is very rare [6]. Yang Feicheng et al. reported a patient with breast implantation after endoscopic thyroidectomy through thoracotreast approach. The patient was admitted to the hospital for "left breast mass was found six months after nodular thyroid surgery" and underwent left breast mass resection. Postoperative examination revealed nodular goiter accompanied by cystic changes. This is the first reported of ectopic implantation of a benign thyroid tumor in China[7]. In this case, the surgeon found that most of these nodules appeared outside of the previous surgical area, which was considered more likely to be metastasis of a benign tumor rather than tumor implantation in the surgical area.

The cause and mechanism of nodular goiter metastasis remain unclear, and may be related to the patient's genetics, immunity, lesion site, hormone levels, pathological changes and environmental changes. In 1988, Komorowski et al. analyzed 138 autopsy cases and found that the fibrous connective tissue surrounding benign thyroid tumors was a pseudocapsule that did not prevent the separation of thyroid tumor cells from the primary nodules[8]. In 2007, a study reported that patients with recurrent thyroid nodules after surgery were diagnosed with toxic polynodular goiter, suggesting that steroid-induced goiter is a risk factor for recurrence of goiter recurrence. However, follow-up data showed that there was no significant difference in TSH levels between the recurrence group and other groups[5]. Malkomes et al. found higher concentrations of platelet-derived growth factor (PDGF) and its receptors α and β in thyroid cells with benign thyroid nodules than in normal thyroid tissue. It appears to play a key role in the proliferation of thyroid cells as well as in the development of thyroid nodules and the recurrence of goiter, and may be a potential diagnostic or prognostic biomarker for thyroid disease, helping to identify people at risk for goiter[9, 10].

**Conclusion**

This case report suggests that there may also be postoperative implantation and distant metastasis in benign diseases, which can be used for the differential diagnosis of neck space-occupying lesions after nodular thyroidectomy. At the same time, clinicians are reminded that there is also a risk of ectopic implantation of benign thyroid nodules during surgery, and implantation due to surgical operations should be avoided, which can reduce the incidence of postoperative tumor implantation metastasis.

**Declarations**

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**Author contributions**
LF, MC, and HY: Conception of reporting case; LY, YH, and LY: Performed the operation. LF and LY: Writing-draft; MC and HY: Writing-review; HW: administrative. All authors read and approved the final manuscript.

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**Availability of data and materials**

All data generated or analyzed during this study are included in this published article.

**Ethics approval and consent to participate**

Written consent for patient was obtained. No ethics approval was required.

**Consent for publication**

Written informed consent for publication was obtained from the participant.

**Conflict of interest**

All other authors have declared no conflicts of interest.

**References**


Figures

**Figure 1**

Mass was visible on the patient's neck multiple and palpable at the circle.

**Figure 2**

Color ultrasound indicated isechoic nodules in bilateral neck.
Figure 3

Multiple nodular slightly high-density shadows in the anterior part of the neck on CT.

Figure 4

Intraoperative nodules were found scattered in the neck with clear boundary and complete capsule.
Figure 5

Postoperative pathological examination revealed nodular goiter.