



ORIGINAL ARTICLE

# Recurrence factors and prevention of complications of pediatric differentiated thyroid cancer



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## KEYWORDS

complications;  
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recurrence

**Summary** *Background/Objective:* To investigate the factors associated with recurrence of differentiated thyroid cancer in children. We combined the clinical and pathological features to guide surgical treatment options, ensure efficacy, and reduce complications.

*Methods:* A prospective analysis of clinical data of 43 cases of pediatric differentiated thyroid cancer from March 2008 to June 2014 admitted in our department, including 38 cases of papillary cancers and five cases of follicular cancer; 40 cases were Stage I and three cases were Stage II (Union for International Cancer Control [UICC] Tumor Node Metastasis classification [TNM] staging). We performed the operations according to the condition of lesions and lymph nodes. Operations included subtotal resection in 36 cases, total resection in seven cases. We applied statistical methods to investigate the risk factors of recurrence and postoperative complications.

*Results:* The pathologic lymph node metastasis rate was 67.44% (29/43): Area VI lymph nodes metastases in 20 cases and Area III/IV or Area II/V lymph nodes metastases in nine cases. Postoperative hypocalcemia symptoms were seen in three cases and hoarseness in three cases, for a total rate of 13.95% (6/43). Until December 2015, patients were followed up from 1.5 years to 8.7 years, with a median of 4.9 years. There were three cases of cervical lymph node recurrence, one case of local recurrence, and one case of lung metastasis, for a total recurrence rate of 11.63% (5/43); all patients survived. Log-rank test of Kaplan-Meier curves and Cox stepwise regression analysis showed that lesion number, extrathyroidal extension, and lymph nodes metastases were the risk factors for postoperative recurrence; the relative risk values were, respectively, 3.117, 2.816, and 4.628 ( $p = 0.041$ ,  $p = 0.048$ , and  $p = 0.031$ , respectively) and the 95% confidence intervals (CI) were, respectively, 1.094~8.735, 1.046~7.932, and 1.189~10.205. However, the lesion excision approach was not a risk factor for postoperative recurrence ( $p = 0.107$ ). The logistic stepwise regression model showed that lesion excision

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approach was a risk factor for postoperative hypocalcemia and hoarseness; the odds ratio value was 2.537 ( $p = 0.037$ ) and the 95% CI was 1.034~6.983.

**Conclusion:** Pediatric differentiated thyroid cancer has a high metastatic rate to lymph nodes and distant organs, but the total prognosis is good. Application of total resection cannot necessarily reduce the relapse rate of pediatric differentiated thyroid cancer, but it may increase the postoperative hypocalcemia and hoarseness. The authors propose strictly adhering to various operation indicators, and carrying out various operations with a full understanding of the local lesion and lymph nodes in order to reduce relapse and postoperative complications.

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## 1. Introduction

Pediatric thyroid cancer is rare, accounting for 2.4–9% of epithelial origin solid tumors in children,<sup>1</sup> but there is an increasing trend in the occurrence of this cancer.<sup>2</sup> The most common pathologies of differentiated thyroid cancers are papillary and follicular.<sup>3</sup> Compared with adult thyroid cancer, pediatric differentiated thyroid cancer has different clinical features and there are different treatment strategies, with a lower malignancy, slower progress, longer course, and better prognosis. Currently, a multiple combined surgical-based therapy for the treatment of pediatric thyroid cancer is advocated, but the treatment standard is still not fully integrated, as Chinese and foreign approaches are not consistent. To find a better clinical treatment strategy, the authors explore the risk factors of postoperative recurrence and common complications in this article.

## 2. Methods

### 2.1. General data

We investigated 43 cases of children with pathologically confirmed differentiated thyroid carcinoma who were admitted to our department from March 2008 to June 2014. There were 19 males and 24 females, with a male to female ratio of 1:1.26. Patients were aged from 5 years old to 14 years old, with a median age of 8.7 years. The disease course was from 1 week to 3 months. The main complaints were a cervical area tumor in 25 cases, cervical lymphadenectomy in eight cases, or disease was determined by physical examination or laboratory examinations in 10 cases. (Table 1). We experienced no cases of hoarseness or difficulty breathing.

### 2.2. Preoperative examination

All cases underwent neck ultrasonography, thyroid function, systemic radionuclide scans, and other tests before the operation. Ultrasonography showed lesion located in the left lobe in 17 cases, the right lobe in 23 cases, bilateral lobes in three cases, solitary nodules in 38 cases, multiple nodules in five cases, nodules with calcification in 17 cases,

and cervical lymphadenectomy in 29 cases. Thyroid function tests showed that thyroid-stimulating hormone (TSH) was increased in five cases and antithyroid peroxidase autoantibody (TPOAb) was elevated in two cases, while the rest were normal. An ultrasound-guided fine needle aspiration biopsy was performed in 13 cases, including 11 cases of thyroid cancer, one case where follicular cells were found, and in one case a few atypical cells were identified and could not be ruled out as cancer. A systemic radionuclide scan revealed pulmonary nodules in three cases, which were used with lung enhanced computed tomography (CT) to confirm disease, but no bone metastasis was identified.

### 2.3. Surgical approach and pathology

According to local lesions, lymph nodes, and intraoperative frozen pathology samples, we selected the appropriate lesion excision approach, including subtotal resection (refers to the ipsilateral lobe + isthmus + contralateral partial lobectomy) for 34 cases and total resection for nine cases. The pathology included 38 cases of papillary cancer, five of follicular cancer, and 29 cases of lymph node metastasis. The total lymph node metastasis rate was 67.44%, and Area VI lymph node metastasis was seen in 20/29 cases, accounting for 68.97% of lymph node metastasis cases. Using the Union for International Cancer Control (UICC) Tumor Node Metastasis classification (TNM) staging (2002 Edition) we saw 40 cases with Stage I disease and three cases with Stage II disease (Table 1).

### 2.4. Postoperative follow-up, recurrence, and complications

We used a combination of outpatient service and telephone follow-up for the patients. All cases were followed up successfully. Three cases of lung metastasis (UICC Stage II) received <sup>131</sup>I therapy after the total resection surgery, and the lung lesions disappeared. All cases were reviewed with neck ultrasonography, thyroid function, thyroglobulin, calcium, and chest examination every 3 months for 2 years, every 6 months from 2~5 years, then annually after 5 years. Conventional postoperative oral levothyroxine tablets were used for TSH suppression therapy for 5 years and the TSH levels were maintained below 0.2 mU/L. If a review

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