

Predictors of Permanent Hypoparathyroidism after Total Thyroidectomy in Pediatric Patients

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BACKGROUND. The rate of permanent hypoparathyroidism in children is estimated between 5 to 15 percent. However, few studies have reported risk factors. We aimed to identify predicting factors for transient and permanent hypoparathyroidism after total thyroidectomy in pediatric patients.

METHODS. A retrospective chart review was conducted for all children who underwent total thyroidectomy between 2003 and 2019. Data collected included demographics, surgical indications, pathology reports, perioperative and follow-up laboratory studies, and dosage and duration of calcium and vitamin D analog supplementation. Risk factors for hypoparathyroidism were evaluated with uni- and multivariate regression.

RESULTS. The study included 70 patients. Thirty-nine patients (56%) underwent surgery for malignant disease. Twenty-one patients (30%) had postoperative hypoparathyroidism: 15 transient (21%) and 6 permanent (9%). In a univariate analysis staged-thyroidectomy (vs. single-stage total thyroidectomy; $p = .014$), central compartment neck dissection ($p = .013$), malignant disease ($p < .001$) and extrathyroidal extension (ETE; $p = .002$) correlated with overall hypoparathyroidism. ETE ($p = .034$) and younger age at diagnosis (median 10.5 vs. 14.5 years, $p = .035$) predicted permanent hypoparathyroidism. In a multivariate analysis ETE independently predicted permanent hypoparathyroidism (odd ratio 6.5, $p = .049$). Serum calcium levels at postoperative day 1 were significantly lower in patients with permanent hypoparathyroidism compared to transient (6.5 vs. 8.2 mg/dL, $p = .002$).

CONCLUSIONS. Malignancy with ETE was a major risk factor for permanent post-thyroidectomy hypoparathyroidism in pediatric patients. Special consideration should also be given to children younger than 11 years. Finally, serum calcium levels at postoperative day 1 may predict permanent hypoparathyroidism and should be considered in the decision on calcium monitoring and supplementation.

Characteristic	All Patients (n = 70)
Demographic features	
Female gender	50 (71%)
Median age, years (range)	14.5 (2.5-19)
Surgical features	
Staged (completion) thyroidectomy	21 (30%)
Central compartment neck dissection	22 (31%)
Unilateral	9 (13%)
Bilateral	13 (19%)
Lateral neck dissection	12 (17%)
Unilateral	10 (14%)
Bilateral	2 (3%)
Pathological features	
Median size of largest nodule, mm (range)	7.5 (0-110)
Malignant disease	39 (56%)
Multifocality	27 (39%)
Extrathyroidal extension	18 (26%)
Postoperative hypoparathyroidism	
Overall hypoparathyroidism	21 (30%)
Calcium level during hypoparathyroidism, mg/dL ± SD	
Mean calcium level on POD-1	7.7 ± 0.95
Mean calcium level during follow-up	8.9 ± 0.57
Minimal calcium level	7.3 ± 0.93
Transient hypoparathyroidism	15 (21%)
Median time to recovery, days (range)	6 (1-31)
Permanent hypoparathyroidism	6 (9%)