

Outcome and Evaluation of the Patient Thyroidectomy with Hyperthyroidism: A Case-Control Study

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Abstract

Introduction: According to reports, pediatric patients with hypothyroidism have a higher risk of complications following surgery than adults. Specifically, this Study's aimed to evaluate how complete thyroidectomy is in youth (18 years) and adults. **Materials and Methods:** A retrospective case-control study of all (n=100) complete thyroidectomies was performed on 32 pediatric and 68 adult patients who were consecutive from were compared at the Department of ENT, Head & Neck Surgery, Islami Bank Medical College and multicentral base hospital, Rajshahi, Bangladesh, from July 2018 to June 2021. **Results:** The average patient age in children was 9.7 years (range 3.4-17.9 years) against 44.9 years (range 18.4-84.2 years) in adults. Compared to adults, surgical procedures on children took an average of (2.18 ± 0.08 hrs.) longer to complete in adults (1.66 ± 0.03 hrs) (p = 0.003). The average weight of a thyroid specimen was 48.0 ± 6.4 grams in adults and 38.6.0 ± 8.9 grams in children (range, 6.6-203 grams; p = 0.34). Children had a higher ratio of thyroid weight to body weight (0.94 ± 0.11 gm/kg) than adults (0.67 ± 0.8 gm/kg; p = 0.05). After surgery, the hyperthyroid condition improved in every patient. There were no operational deaths, recurrences, or long-term hypoparathyroidism. **Conclusion:** It is clear that the technical difficulties associated with treating Graves' disease surgically in children and adults result in longer operational periods. There was no difference in the chances of long-term consequences, including recurrent laryngeal nerve damage or neck hematoma.

Keywords: Hyperthyroidism, Thyroidectomy, Thyroid, Pediatric, Child, Adult.

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Introduction:

Overall, the risk of complications was found to be greater in pediatric patients than in adult patients¹. By definition, a high-volume specialist in the field of thyroid surgical treatment is one who performs more than 30 cases per year on children and their rates of complications are lower². When an endocrine surgeon who performs over 30 operations each year operates on a child, the likelihood of complications is reduced³. We hypothesized that a surgical team consisting of a high-volume specialist in the field of thyroid surgical treatment, a pediatric endocrinologist, and an experienced specialist in the field of thyroid surgical team an experienced nurse may be able to lessen the difference in surgical outcomes experienced by young patients compared to their older counterparts. To assess the efficacy of this strategy, we evaluated the long-term results of 100 consecutive patients of all ages who underwent thyroidectomy for Graves' disease (GD) at a single institution under the care of a high-volume adult and pediatric expert in the area of the thyroid surgical team.

Materials and Methods:

A retrospective case-control analysis was done at the Department of ENT, Head & Neck Surgery, Islami Bank Medical College and Rajshahi Medical College Hospital, Rajshahi, Bangladesh, from July 2018 to June 2021. Both attending surgeons performed all pediatric procedures. All but one patient was treated preoperatively with Supersaturated potassium iodide (SSKI) treatment. The primary purpose of 5 days for this Study was to assess what is recommended. After receiving only half of the recommended amount of SSKI, one child suffered an allergic reaction, and the medication was discontinued. Before operating on 20 children, the hospital prescribed them 0.5 mcg of Calcitriol twice a day for 3

days. It took 15 days to quit the calcitriol completely after surgery. A whole or almost complete removal of both thyroids was done in each patient. An extracapsular dissection was used to remove the whole thyroid gland, referred to as a total thyroidectomy⁴. If it was established intraoperatively that the recurrent laryngeal nerve (RLN) or parathyroid gland(s) would be severely damaged by performing a complete extracapsular dissection, a near-total thyroidectomy was performed in which just a little quantity of thyroid tissue was removed⁵. As a result of the surgical procedure, all patients required admission. In the pediatric patients, serum calcium levels were monitored every 4-8 hours following surgery, and in all patients, calcium levels were checked first thing on a postoperative day one. If the blood calcium level (after correcting for total protein) was below 7.5 mg/dL, treatment with intravenous calcium gluconate was started, and if it was below 8.0 mg/dL, treatment with oral calcium supplementation was started. (e.g., hand paresthesia, perioral numbness, muscle cramps, the presence of a Chvostek's sign). Preoperative demographics, comorbidities and medications were recorded. Operative details, including detailed contemporaneous operative illustrations, postoperative course, and both serum calcium levels and postoperative pathology, were observed. Major problems included damage to the RLN (recurrent laryngeal nerve) for the rest of the patient's life, hematoma, and lifelong hypoparathyroidism. Minor problems included acute RLN neuropraxia and transient hypocalcemia necessitating intravenous calcium infusion. To do statistical analysis, t-test as appropriate. Statistical significance was determined when $p < 0.05$. Values shown are mean \pm standard deviation.

Results:

The number of people who have had a whole or near-total thyroidectomy increases to 32 for children and 68 for adults. Table I details the Patient's clinical features. The average ages for both children and adults at the time of surgery were 9.7 (range, 3.4-17.9) and 44.9 (range, 18.4-84.2) years, respectively.

Table I: The differences between adult and pediatric patients in terms of clinical presentation (n=100)

Variable	Adult	Pediatric	p-value
Patients	68	32	
Patients requiring IV Calcium	1	6	0.004
RLN Injuries	0	1	0.32
Hematomas	2	0	0.46
Incidental Cancers	12	1	0.01
Thyroid mass (g)/ Body mass (kg)	0.67	0.94	0.05
Operative Time (hour: in)	1:37	2:09	0.001
Inpatient Post -Operative Days	1.03	1.41	0.004

Results from statistical testing were analyzed using

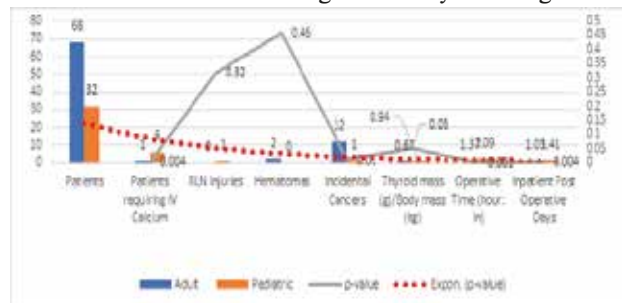


Fig-1: Characteristics of adult and pediatric patients

Pediatric procedures required longer operative time than adults (1.18 ± 0.08 hrs vs. 2.09 ± 0.03 hrs, $p = 0.003$). The average weight of thyroid tissue samples was 48.0 ± 6.4 gm (range: 6.6-203 gm) in adults and 38.6 ± 8.9 gm (9-293 gm) in children ($p = 0.34$). Thyroidectomy specimens from children weighed 0.94 ± 0.11 gm/kg, or significantly more than those from adults (0.66 ± 0.07 gm/kg, $p = 0.05$), suggesting that the glands in children were bigger than those in adults. In one patient, a 2.5-centimetre-wide papillary carcinoma was just one of several malignant tumours. One adult patient had a Hürthle cell adenoma. Postoperative intravenous calcium infusion was needed in 18.0% of pediatric and 1.4% of adult patients ($p = 0.004$), respectively. The greater demand for calcium infusions in children necessitated a lengthier hospital stay than in adults (1.41 ± 0.12 vs. 1.03 ± 0.03 days, $p = 0.004$). One out of 32 pediatric and 12 out of 68 adult patients ($p = 0.03$) were found to have latent cancer after pathological examination of the operating material. One young patient was diagnosed with a papillary microcarcinoma of the thyroid capsule, measuring 0.40 cm at its widest point. In adults, papillary microcarcinomas with a maximum diameter of less than 0.3 cm accounted for 10 of 12 malignancies. When calcitriol was not administered prior to surgery When calcitriol was administered, 50% of pediatric patients still needed a calcium infusion, but it was administered for an average of just 1.25 days in those patients ($p < 0.02$ vs no calcitriol). A youngster who had temporary RLN neuropraxia and had surgery made a full recovery within 6 months. One youngster suffered an RLN transection during surgery, but it was quickly diagnosed and treated. Bilateral vocal cord mobility at 12 months post-surgery was indicative of RLN function restoration, as was found in the patients who had long-term follow-ups. In adults, there were no RLN injuries found. Two adults required operational examination for postoperative hematomas, but no children did ($p = 0.46$). We found no incidences of lifelong hypoparathyroidism or deaths during or after surgery. The greatest follow-up time was 8 years, and the results showed that neither children nor adults experienced a recurrence of Hyperthyroidism. Both children and adults had similar overall incidences of significant issues.

Discussion:

In youngsters, the incidence of Graves' disease is 1 in 10,000. (6) Because only a minority of pediatric patients achieve remission⁷, Surgery or radioactive iodine treatment will be necessary for the vast majority of individuals⁸. What we've seen lends credence to the idea that, in the hands of experienced thyroid surgeons, thyroidectomy can be a successful treatment for children. The Mayo Clinic has published the biggest series to date documenting the surgical management of GD in children⁹. As many as 78 young children, ranging in age from 3.1 to 17.9 years, were surgical candidates for GD repair. Seventy-seven per cent of patients had a whole or near-total thyroidectomy, and 23 % had bilateral subtotal thyroidectomy. To reduce the likelihood of RLN damage or hypoparathyroidism, a small quantity of thyroid tissue is left behind after a sub-total thyroidectomy¹⁰.

No RLN damage, hematomas, or cases of persistent hypoparathyroidism were recorded in the Mayo Clinic dataset. Transient RLN neuropraxia occurred in 1 patient (1%), and transient hypoparathyroidism in 5 individuals (6%). While the pathology specimens revealed the presence of 5 microcarcinomas (6%), 4 of the 18 patients (22%) who had bilateral partial thyroidectomy reported a return of their Hyperthyroidism⁹.

We took a more severe surgical strategy to the therapy of GD in both children and adults by doing entire or near-total thyroidectomies in all cases because of the significant recurrence rate following partial thyroidectomy. There was no recurrence of GD in our cohort of patients, proving the efficacy of our treatment method.

According to HCUP-NIS statistics, children are more likely than adults to experience problems after undergoing a thyroidectomy (9.3% vs. 6.1%, $p < 0.01$)¹¹. The most prevalent mild consequence among children in our group was transitory hypocalcemia, likely caused by transient hypoparathyroidism. On the other hand, preoperative calcitriol treatment cut in half the percentage of patients who required intravenous calcium infusions after surgery and lowered the length of such infusions by more than half. RLN injury was observed in two of the children in our cohort. A soft voice was observed in one child. It was discovered immediately after surgery, and a direct laryngoscopy done two months later confirmed the diagnosis of unilateral vocal cord paresis. After six months, the vocal cords on both sides were working normally, and the patient's voice had returned to normal.

During surgery on a 4-year-old patient, surgeons noticed and rectified an RLN transaction. By using direct laryngoscopy, we identified unilateral vocal cord paresis at 6 months post-op. Direct laryngoscopy showed normal vocal cord movement and voice 18 months following surgery. It's worth noting that the RLN damage happened to the one patient who couldn't get preoperative SSKI treatment because of an allergic response.

Twelve of 68 adults and one of 32 children were diagnosed

with occult malignancy. Only one of the 12 malignancies seen in adults was a multifocal papillary carcinoma, with a maximal diameter of 2.5 cm, whereas the other 11 were unifocal papillary microcarcinomas. One child had a papillary microcarcinoma of the thyroid, measuring about 0.4 centimetres in diameter and staying entirely within the thyroid capsule. These findings emphasize the need for surgeons to obtain sonographic imaging of the thyroid gland if asymmetry or a change in gland size is noticed in the context of GD. If nodules are found, they must be assessed in accordance with current standards¹².

There is no reason to prefer surgery over radioactive iodine for the final treatment of GD despite the detection of microcarcinomas in the context of GD, which will be difficult to diagnose by preoperative ultrasonography. Recommended radioactive iodine activities for the ablation of thyroid tissue in GD patients with microcarcinomas¹³. Microcarcinomas and healthy thyroid tissue are both expected to be eliminated. Thyrotoxicosis Study Group follow-up data corroborates this hypothesis by showing that patients treated with radioactive iodine or surgery have significantly lower rates of differentiated thyroid cancer compared to those treated with antithyroid medications alone who experienced spontaneous remission¹⁴. These observations support recent recommendations that high-volume endocrine surgical teams should operate on children and adults requiring surgery for GD^{8,15}.

Conclusion:

We show that a whole or near-total thyroidectomy in children is safe and does not increase the risk of a recurrence of GD when done by skilled surgeons. Our excellent surgical team consisting, massive in size, can achieve excellent outcomes with very low complication rates.

Conflict of Interest: None.

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