

# The Outcome of Surgical Removal of Thyroglossal Cyst in Children; Experience of a Decade

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## Authors Contribution

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## ABSTRACT

**Objective:** To present postoperative outcome of surgical removal of thyroglossal cyst (TC) in children; single surgeon's experience of a decade.

**Methodology:** This is a retrospective study of 10 children admitted at Northern Area Armed Forces Hospital, Hafr Al Batin, Saudi Arabia, with the diagnosis of TC between period of June 2011 to October 2021. All the patients were managed by single surgeon by surgical removal with an average follow up of 5 years. There were six males and six females. The diagnosis was confirmed on clinical examination and supported by ultrasound evaluation of upper neck midline swelling. Surgical excision was done by Sistrunk procedure under general anesthesia. The outcome of surgical treatment of thyroglossal cyst is evaluated post operatively during an average regular follow up of 5 years.

**Results:** All the 10 children were operated by Sistrunk procedure during the period from June 2011 to October 2021 who were admitted with diagnosis of thyroglossal cyst. There were no associated anomalies. All the patients had excellent cosmetic outcome without any problem of wound infection. There is no recurrence of thyroglossal cyst in this series.

**Conclusion:** Sistrunk surgical procedure to treat thyroglossal cyst in children is safe, effective and feasible with good cosmetic results. It avoids recurrence of thyroglossal cyst and morbidity. We recommend Sistrunk operation as gold standard to treat children with TC.

**Keywords:** Thyroglossal cyst, Ultrasound evaluation, Sistrunk procedure, Cosmetic outcome, recurrence.

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## Introduction

Thyroglossal cyst (TC) is the most common congenital anomaly of neck with a 7 percent population prevalence worldwide.<sup>1</sup> The children present with a mobile, painless, anterior midline upper neck swelling near hyoid bone.<sup>2</sup> There is an equal preponderance between male and female.<sup>3</sup> It constitutes 75% of congenital midline swellings.<sup>4</sup> The development of thyroid gland during intrauterine life begins at the foramen cecum between the junction of posterior third and anterior two third of the tongue.<sup>5</sup> The thyroid gland moves down in its usual position in the neck below the thyroid cartilage anterior to upper trachea. A portion of this tract in which the thyroid gland moves down to its final position may fill with

mucus like fluid creating a TC<sup>6</sup>. The cyst can form anywhere along the thyroid's route of migration. The thyroglossal duct normally involutes by 10th week of gestation. If any portion of the duct persist, secretion from the epithelial lining can result in thyroglossal cyst formation.<sup>7</sup> The cyst is closely associated with hyoid bone and most commonly is found at or below the level of hyoid bone.

TC is diagnosed on clinical examination supported by cervical ultrasound evaluation.<sup>8</sup> A dermoid cyst cannot be differentiated from thyroglossal cyst and the diagnosis is usually confirmed on histopathology.<sup>9</sup> The treatment for thyroglossal cyst is surgical removal by Sistrunk operation which is gold standard procedure to treat TC. The Sistrunk

procedure includes removal of cyst along with central portion of hyoid bone and its potential connection to base of the tongue.<sup>10</sup> Once the TC gets infected it requires antibiotic treatment and the infection must be resolved before the surgery is performed. Once the cyst is infected the surgical removal of TC becomes difficult. To avoid the risk of infection and small risk of malignancy (less than one percent) early surgical removal is recommended.<sup>7</sup> Sistrunk procedure is effective, safe and feasible with good cosmetic outcome.

Many series have reported excellent cosmetic results with 3 to 5 percent chances of recurrence. The recurrence rate of TC is 50 percent if the central portion of hyoid bone is not removed.<sup>9</sup> The risk of recurrence is also higher if the cyst has been previously infected. Post operative serious complication of Sistrunk operation is inadvertent entry into the air way, paralysis of recurrent laryngeal nerve incomplete removal of TC. Post-operative complications of Sistrunk procedure include hematoma, seroma or wound infection and recurrence of TC.<sup>10</sup>

The aim of this retrospective study is to present postoperative outcome of surgical removal of thyroglossal cyst (TC) in children; single surgeon's experience of a decade.

## Methodology

This is a retrospective study of 10 children admitted with diagnosis of thyroglossal cyst (TC) between June 2011 to October 2021. All the patients were managed by single surgeon by Sistrunk procedure with an average follow up of five years. All the patients were otherwise healthy and included in this retrospective study and no patient was excluded. Five patients were male and 5 were females.

The diagnosis of TC was made on careful clinical examination of the midline upper neck swelling. The general examination was done to rule out other congenital anomalies. The diagnosis was further confirmed by ultrasound evaluation of cystic swelling (Table I).

All the patients were operated by Sistrunk procedure under general anesthesia. The skin and subcutaneous tissue was incised by a transverse skin crease small incision. The cyst was dissected and removed along with central body of hyoid bone and the tract up to the base of the trunk (Figure 1,2). Intravenous antibiotics were administered in all patients for 5 days post operatively. Wound care was done by regular cleansing with normal saline followed by application of antibiotic ointment. All patients were discharged home on 6th postoperative day.

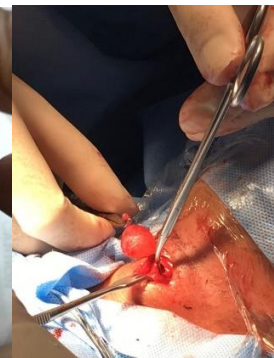
All children had an excellent cosmetic outcome and there was no wound infection. The outcome of Sistrunk procedure for treatment of TC is evaluated to be effective and safe during an average 5 years of follow up (Table II).

**Table I: Presentation of Thyroglossal Cyst and it's location with reference to hyoid bone.**

Age in years	Gender	Location	Ultrasonography
2	M	Infrahyoid	Cystic Swelling
2	F	Infrahyoid	Cystic Swelling
2	F	Infrahyoid	Cystic Swelling
3	M	Infrahyoid	Cystic Swelling
3	M	Infrahyoid	Cystic Swelling
4	M	Suprahyoid	Cystic Swelling
4	F	Suprahyoid	Cystic Swelling
5	F	At the level of hyoid bone	Cystic Swelling
8	F	Infrahyoid	Cystic Swelling
14	M	At the level of hyoid bone	Cystic Swelling



**Figure 1. Presentation of Thyroglossal cyst with upper neck midline swelling.**



**Figure 2. Sistrunk operation for removal of thyroglossal cyst.**

**Table II: Complications and long- term outcome of management of thyroglossal cyst.**

H/O of infection	Pre op complications	Wound Infection	Recurrence	Cosmetic Results
-	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent
History of infection	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent
-	-	-	-	Excellent

## Results

All the ten patients admitted with diagnosis of TC were operated by Sistrunk procedure. The dissection was easy in all cases. There was no intra operative complication. All patients were started on oral feed on 2nd post-op day.

Careful wound care was done by cleansing with application of antibiotic ointment. No patient had wound infection. All the children had smooth post operative recovery and were discharged home on 6th post operative day in good health. All patients were regularly followed up for a mean period of 5 years. No patient had recurrence of (TC) in this series. We found Sistrunk procedure safe and feasible in management of TC.

## Discussion

Thyroglossal cyst (TC) arises from the remnants of thyroglossal duct which fail to involute during thyroid gland development in intrauterine life.<sup>11</sup> TC are the most common congenital cysts in the neck.<sup>12</sup> It has been reported that 7% of the population has TC worldwide.<sup>13</sup> Controversy exists in the literature about demographic distribution of TC at the time of diagnosis. In a meta-analysis, Allard reported 31.5% patients under 10 years of age, 20.4% during their 2<sup>nd</sup> decade, 13.5% in their 3<sup>rd</sup> decade of life and 34.6% were reported older than 30 years of age.<sup>14</sup> The peak incidence of TC is during the first decade of life. The mean age at presentation in children is 6 years.<sup>15</sup>

In our series, the age ranged from 2-10 years. Literature shows discordant data about gender distribution of TC.<sup>16</sup> Most recent series reported equal distribution of TC among males and female. TC moves with protrusion of tongue and deglutition, in proximity of hyoid bone.<sup>17</sup> It may present with abscess or cellulitis.<sup>18</sup> The movement of TC with swelling is considered as a reliable diagnostic sign.<sup>19</sup>

The average size of TC is 2-4 cm. The most common locations of TC reported are at infrahyoid in 60.9% cases followed by suprahyoid location in 24.1% of cases. Suprasternal TC are also reported as 12.9% and lingual TC are seen in 2.1% cases.<sup>20</sup> In our series, no suprasternal or lingual cysts are seen. The diagnosis of TC is mostly made clinically on the basis of its symptoms and signs.<sup>8</sup> The mass may be soft, mobile and non-tender. Ultrasound of neck confirms the diagnosis of cyst being hypoechoic with identification of thyroid gland in its normal location assuring euthyroid status after surgery. Thyroid function tests may be performed to confirm euthyroid status.<sup>8</sup> TC may be misdiagnosed as lymphadenopathy, a dermoid cyst or cystic hygroma.<sup>21</sup>

Before 1893, TC were being treated by incision and drainage with very high recurrence rate. Schlang in 1893 recommended removal of midportion of the hyoid bone in the continuity with TC.<sup>22</sup> Based on embryological study by Wengloski in 1912, Sistrunk in 1920 recommended

removal of core of tissue between hyoid bone and foramen cecum in addition to Schlang's procedure to prevent recurrence of TC. However, both procedures bear the name of Sistrunk.<sup>23</sup>

Modified Sistrunk procedure is referred to spectrum of operations ranging from Schlang's procedure to a wider Sistrunk operations.<sup>24</sup> Sistrunk in his later publications recommended that entering the oral cavity is unnecessary and that the tongue muscle can be resected without opening the mucous membrane of the mouth.<sup>25</sup>

In our series all children are treated by complete removal of thyroglossal cyst by Sistrunk operation and we did not encounter any recurrence.<sup>26</sup> Its incomplete removal of thyroglossal cyst which leads to recurrence. All the specimen were sent for histopathological confirmation of TC showing respiratory epithelial lining. The Sistrunk operation is safe and effective. Maddalozzo et al have reported 29% incidence of post operative complications in patients younger than 18 years of age.<sup>20</sup> The major complications include recurrence, abscess, hematoma, inadvertent entry into the airway intraoperatively and recurrent laryngeal nerve paralysis. The minor complications include seroma, wound infection and stitch abscess.

In our series no post-operative complication was encountered. Post operative drain placement is controversial. We advocate that with careful hemostasis at operation there is no need of placing a drain in Sistrunk procedure. Turkylnaz et al concluded that the recurrence state in children decreases if surgical treatment is performed by pediatric surgical centers expert in managing children.<sup>16</sup> In another study, it is concluded that the recurrence rate of TC is 3.8% in mono-cystic lesions. The major factor leading to recurrence is incomplete resection of TC. Many studies have concluded that treatment of children with TC by Sistrunk operation is safe, effective and feasible with excellent cosmetic results.<sup>26</sup>

## Conclusion

Sistrunk surgical procedure to treat thyroglossal cyst in children is safe, effective and feasible with good cosmetic results. It avoids recurrence of thyroglossal cyst and morbidity. We recommend Sistrunk operation as gold standard to treat children with TC.

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