

Modified Sistrunk Procedure: A Novel Method of Hyoid Resection using Skin Punches in Subhyoid Thyroglossal Cysts

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ABSTRACT

Background/objectives: Managing thyroglossal duct cyst requires surgical excision of the cyst with its tract through the tongue base. Incomplete removal results in cyst recurrence, the common complications of incompletely performed Sistrunk procedure. The Modified Sistrunk procedure using skin punches increases the easiness of surgery and chances of complete removal of the tract.

Materials and methods: Resection of the middle body of the hyoid was done by coring out the nonossified bone with 4.5 mm skin punches under 3.5× loupes and the tract above till the base.

Results: A total of 14 primary cases were operated by this slight modification, and no recurrences were seen on 1 year of follow-up.

Conclusion: Sistrunk operation is the treatment of choice for primary thyroglossal cysts. Modified Sistrunk operation using skin punches results in easy and precise coring of the hyoid bone with the tract attached to it. Secondary cysts should be treated with removal of core of tongue base muscle and foramen cecum mucosa along with hyoid and scarred cyst excision.

Keywords: Hyoid bone, Sistrunk's operation, Skin punches, Thyroglossal cyst.

How to cite this article: Naik SM, Kumar BLY, Ravishankara S, Shashikumar T, Deekshith RM. Modified Sistrunk Procedure: A Novel Method of Hyoid Resection using Skin Punches in Subhyoid Thyroglossal Cysts. *Int J Otorhinolaryngol Clin* 2016;8(3):97-100.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Thyroglossal duct cyst is a common developmental abnormality, which occurs in 7% of the population and

is the most common type of developmental cyst occurring in the neck region, accounting for 2 to 4% of all neck masses.^{1,2} It is seen in the early first decade but may also present in adults.^{1,2} Of these, 30% are discovered by the age of 10 years, 20% from 10 to 20 years, 15% in the 30s, and 35% after 30 years.^{1,2} Thyroglossal cyst develops from remnants of the thyroid gland that descend from the foramen cecum on the base of the tongue between the 7th and 8th weeks of development.^{3,4} The thyroid primordium passes anterior, posterior, or through the hyoid bone in its descent in the midline of the neck.^{3,4} Thyroid remnants may persist at any site along this route and form cysts or fistulae.⁵ Commonest clinical presentation of thyroglossal cyst is a painless mass in the midline of the neck in children or young adults, which may increase in size.⁶ It is usually nontender and mobile, sometimes may get infected and present as a tender mass and may be associated with draining sinus and fever later, causing a cosmetic deformity.⁶ A remote chance of malignancy (1%) is also reported.⁷

Sistrunk operation with resection of the hyoid bone and tracing out the tract above with resection reduces the recurrence from 40 to 5% seen with just excision of the tract.⁷ Managing recurrences needs a repeat Sistrunk with meticulous dissection of the scarred tissues and with wide excision of the tongue base.⁷

MATERIALS AND METHODS

We report a retrospective study of 14 cases of primary thyroglossal cysts managed in our institution between January 2012 and October 2015 with a study duration of 34 months. All the 14 (5 males and 9 females) cases were newly diagnosed; none had undergone previous aspiration of the cyst or surgery. The youngest was a 5-year-old boy and the oldest was a 13-year-old girl. A detailed history along with examination and thyroid function test, ultrasound neck, x-ray lateral view neck was done, photography was taken, and a clinical diagnosis of thyroglossal cysts was made (Figs 1 and 2). No computed tomography (CT) scans were done as fine needle aspiration biopsy ruled out the lone thyroid tissue, and sonography confirmed the normal anatomy of the thyroid.

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Fig. 1: Preoperative photo of the thyroglossal cyst

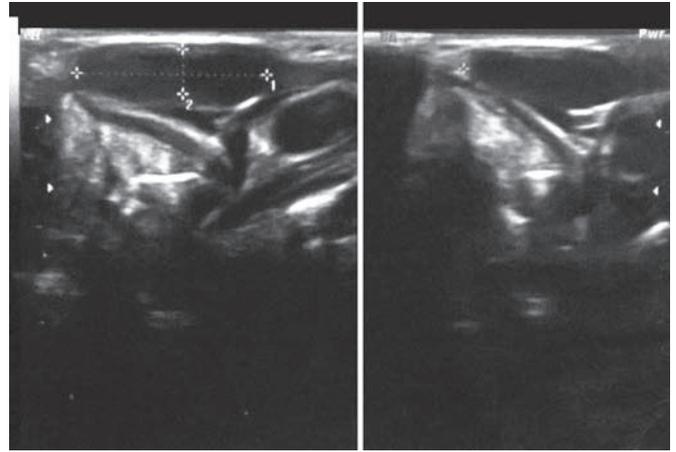
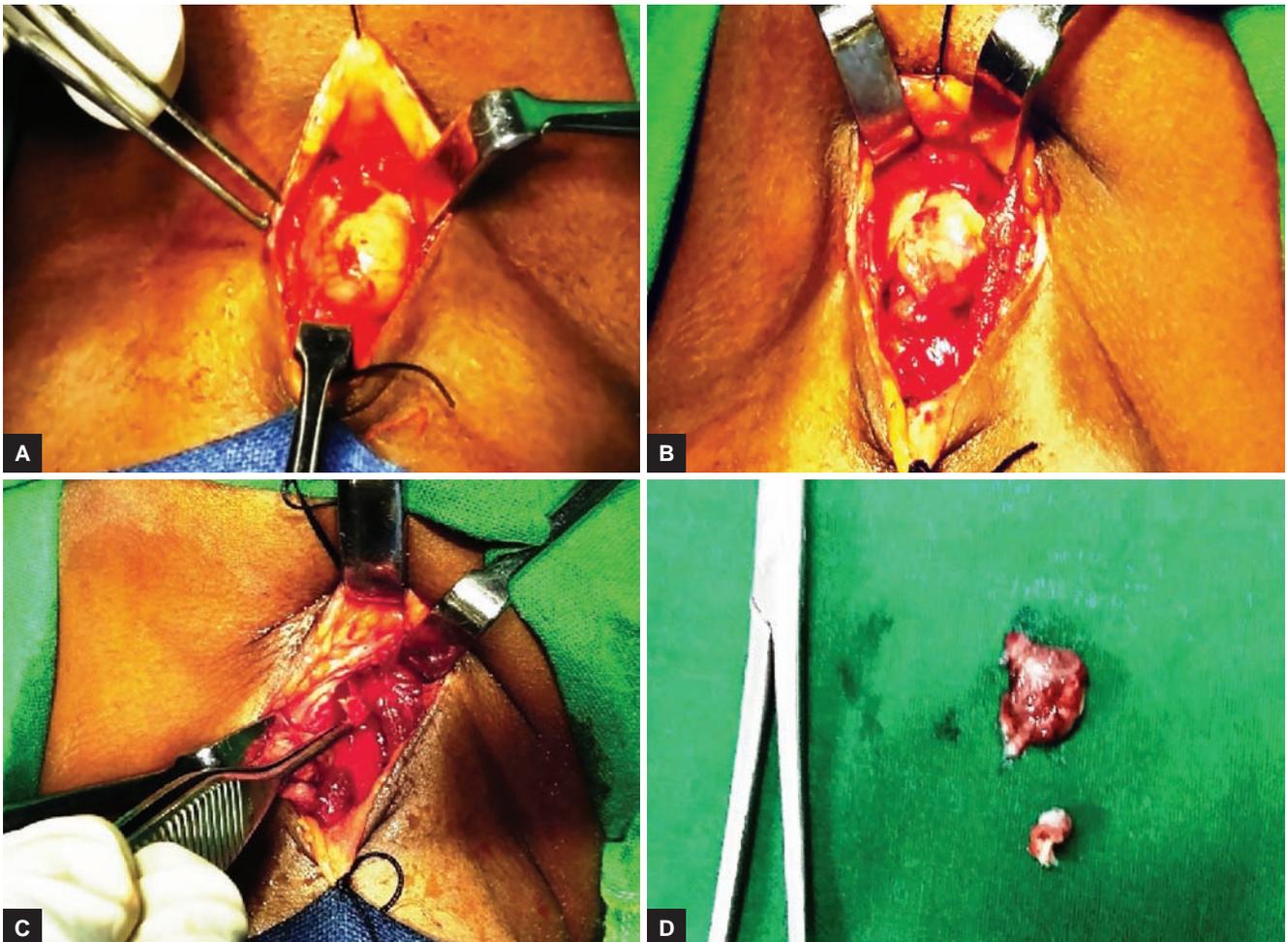


Fig. 2: Sonography of the thyroglossal cyst

All the cysts were in the midline below the hyoid level in the neck. Sistrunk's procedure was planned with a slight modification where we used sharper skin punches than using the routine bone punches. A modified Sistrunk operation using 4.5 mm skin punches was used in all the 14 cases, which helps to precisely core out the tract and its attachment to hyoid bone and prevent recurrence. Skin punches here have replaced the previous

technique of removing a part of the hyoid bone to prevent recurrence. With the help of skin punches, it is easy to core out the part of the bone that is not ossified. We had a stable control over the portion of the resected hyoid, and later the attachment of the tract till the tongue base was cored out under 3.5× loupe (Figs 3A to D and 4). None of our cases were suprahyoid, so a 4.5 mm core of tissue from the hyoid to the tongue base was sufficient.



Figs 3A to D: Cyst excised and hyoid bone excised



Fig. 4: Schematic diagram of thyroglossal tract and skin punch used

Also, intraoral palpation was done while coring out the tissue, and a punch of tongue base removed and later embedded subcutaneous sutures were taken with round bodied 4-0 vicryl. The wound was closed in layers with cosmetic subcuticular in the neck. Postoperative course was uneventful in all cases, and no recurrence was seen for a period of 1 to 4 years of follow-up.

RESULTS

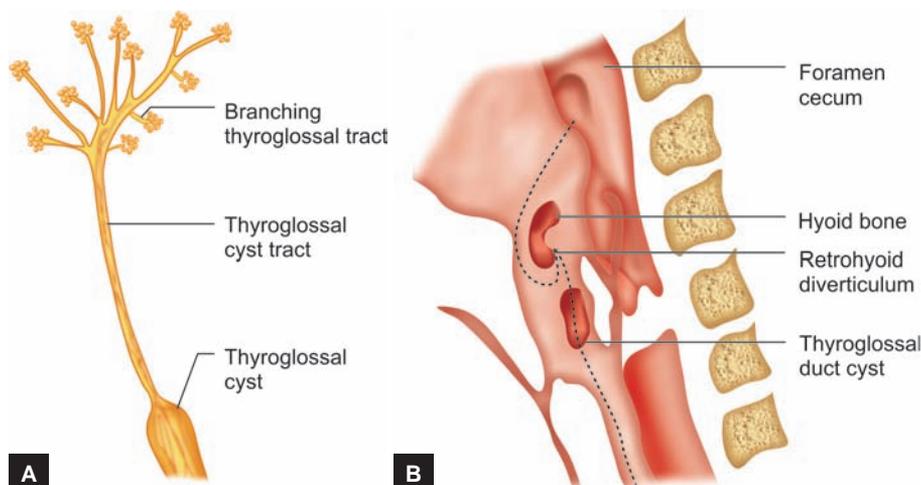
The size of cyst ranged from 0.25 to 5 cm. Study consisted of 14 patients, of whom 5 were (35.7%) males and 9 were (64.2%) females, with a mean age of 7.78 years. The mean age among boys was 7.6 years and girls was 7.88 years. Recurrence was not seen over 1 to 4 years of follow-up. The magnified view of the hyoid attachment and the tract above added with microdissection of the hyoid body with skin punches with coring the tissues till the tongue base also complemented the results. All our cases were subhyoid and primary, so a meticulous dissection in the neck with lesser work at the tongue base also helped us with better results.

DISCUSSION

Thyroglossal cyst is a common congenital disorder occurring in the midline in the anterior part of the neck.⁸ Usually, the presentation is in the younger age group and a proper surgical intervention results in cosmetically good appearance.⁸ When inadequately treated, it may result in recurrence, infection, or sinuses.⁸ During the development *in utero* by the 7th or 8th weeks, the thyroid gland descends downward below the thyroid cartilage to reach normal position through thyroglossal duct and by 10th week thyroglossal duct obliterates (Figs 5A and B). When there is a failure of obliteration of the duct, it results in cystic dilatation at any point during life.^{8,9}

During the same, hyoid bone also develops and thyroglossal tract gets attached to the bone, so the cysts are present in the midline between the base of the tongue and thyroid gland.^{8,9} Most of the cysts are diagnosed early in life and few in adults. Swellings are midline, nontender, mobile, and move with protrusion of the tongue.¹⁰ When the cyst gets infected, it becomes painful. Confirmation with neck sonography and radioactive scan is required because sometimes the cyst may contain ectopic thyroid, which alone may be functioning with absence of the normal gland. So, an excision of cyst in such cases leads to lifelong supplementation with thyroxine.¹¹ If the cyst is incompletely removed and if any secretory epithelium is left behind, there is a high chance of recurrence.⁸

Modified Sistrunk operation using skin punches is used to core out the central part of hyoid bone to which the tract is attached.⁸ Proper identification of the tract and excision prevents recurrence. Resection from the tongue base can be difficult if there is narrowing at that point, especially in older age.¹² Tung et al⁸ defined graded approaches for primary and recurrent cases as types 1 to 6.¹³ Types 1 and 2 (primary cases) are without hyoid excision, with the cysts being subhyoid and smaller cyst at the base of the tongue.^{8,13} Types 3 to 6 were for



Figs 5A and B: Embryology of thyroglossal tract at the hyoid and at the base of tongue

recurrent cases, which apart from cyst excision and hyoid bone resection included removal of a variable part of the tongue base, core of the tissue of the tongue base, and some part of the pharyngeal mucosa.^{8,13}

Hossain et al¹⁴ reported no recurrence over a period of 3 years in a study of 12 cases of thyroglossal cysts where Sistrunk's operation was done, with 10 mm of hyoid tissue removed. Zhang et al¹⁵ reported a modified endoscopic Sistrunk's procedure where cystectomy and marsupialization were done endoscopically for cysts at the tongue base. Here, recurrent cysts were diagnosed with contrast CT and seven patients were treated by this method. Kimple et al¹⁶ described a case of 2 cm mass confined to the tongue base, which was robotically excised transorally. Madana et al¹⁷ reported a case of simultaneous occurrence of a thyroglossal duct cyst and a lingual thyroid in the absence of an orthotopic thyroid gland in a 7-year-old girl. Naik et al¹⁸ reported a case of ectopic thyroid tissue in a thyroglossal cyst with no orthotopic normal thyroid tissue on sonography and scintigraphy. The patient with hypothyroid was given thyroxine replacement and observed.¹⁸

CONCLUSION

Thyroglossal cyst results due to failure of obliteration of embryonic duct formed during the migration of thyroid gland. Modified Sistrunk operation using skin punches helps to core out the tract precisely along with piece of hyoid and results in low recurrence rate and preserving near normal anatomy of hyoid bone.

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