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Research Article

Pediatric Thyroglossal Duct Cyst Excision: Is Cutbone Forceps Outdated? The Use of Electocautery for Hyoid Bone Removal

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Abstract

Surgical excision of hyoid bone is the mainstay of thyroglossal duct cyst removal. To prevent recurrences, hyoid bone excision is required. Bone excision by cut - bone forceps may prove inaccurate and somewhat dangerous. Therefore, use of alternative methods has been advocated. The proposal of the study is to cut the body of the hyoid bone with the only electric scalpel. Surgical case notes of 57 pediatric patients operated by our Institution with modified Sistrunk technique and complete dissection of the entire body of hyoid bone and its removal at the cartilage junction with lateral horn with monopolar cauterization were reviewed. The population of our study had a mean age of 59.86 ± 29.57 months; 6/57 patients (10.5%) were under 2 years of age. Mean follow up was 55.04 ± 29.08 months ranging 2 to 115 months. In any patients post–operative bleeding was observed. Mean surgical time was 57.02 ± 11.77 minutes ranging from 35 to 125 minutes; 6 cases required postoperative drain. In 3 patients an immediate local edema was observed and in another one a partial wound dehiscence occurred, no late complications were observed. Cyst-recurrence requiring re-do surgery occurred in 5 patients (8.8%). The complete hyoid bone section with electric scalpel only ensures the ideal access to the posterior hyoid space and allows a greater and more symmetrical access to the proximal portion of thyroglossal duct in children with still negligible complication and recurrence rate.

Keywords: Modified sistrunk technique; Sistrunk procedure; Thyroglossal duct cyst; Children; Pediatric series; Thyroglossal remnant

Introduction

Excision surgery for Thyroglossal Duct Cyst (TDC) is quite straightforward: it essentially rests on the modified Sistrunk procedure which includes complete cyst resection along with central part of the hyoid bone together with superior [1-3] and inferior [4] thyroglossal duct remnants. The latter part of the procedure is deemed necessary to reduce the risk of recurrence and has received much attention in literature. In this respect the vast majority of Authors uses the cut bone forceps to resect the hyoid bone even in pediatric patients. However, the use of cut bone forceps does not guarantee complete excision of the central part of the hyoid bone, in addition, despite most papers have been published using this technique [5-8], forceps insertion is a blind and potentially dangerous manouvre especially in small patients. On these findings, excision of hyoid bone by electrocautery may prove as a valid alternative to achieve complete resection of central portion of hyoid bone, minimizing blood loss and avoiding blind manouvres. To our knowledge, there are only scant reports in literature addressing this alternative procedure to resect hyoid bone in TDC [9].

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Materials and Methods

In the period ranging from May 2009 to May 2019, 345 cases of primary TDC were seen at Our Institution, 57 cases of which were operated on with this technique by a single surgeon. Surgery was indicated for recurrent infections and/or significant increase in cyst size. In all 57 patients the excision of the central part of hyoid bone, traditionally made by cut bone forceps, was performed by electrocautery only. Monopolar electrocautery was used not only to remove soft tissue attachments to the hyoid bone in order to skeletonized it [6] but also to split the central portion from its lateral part (Figure 1). Case notes of operated patients were subsequently reviewed and attention was directed to local complications and recurrences. Follow up ranged from 115 to 2 months with an average of 55.04 ± 29.08 months.

Results

The 57 patients out of 345 operated on over the considered period from the object of the study. All the said 57 patients were operated by single surgeon. The population of our study had a mean age of 59.86 ± 29.57 months, ranging from 6 to 134 months. There were 34 males and 23 females. Mean surgical time was 57.02 ± 11.77 minutes ranging from 35 to 125 minutes.18/57 (31.58%) patients reported recurrent infections prior to surgery while in the remaining 39 (68.42%) surgery was performed because of significant increase in size over time. In 51/57 patients (89.47%) post operative drainage was not necessary and patients were discharged the first day after surgery; in 6 (10.5%) a drain was necessary for the first 24 hours, and patients were discharged on postoperative day II. Of these 6 patients, 3 presented preoperative infection and showed easily bleeding tissue during surgery; in one patient the cyst was located near the thyroid gland and required a second skin incision to remove the hyoid bone. Minor complications were seen in 4patients (7.02%) consisting in

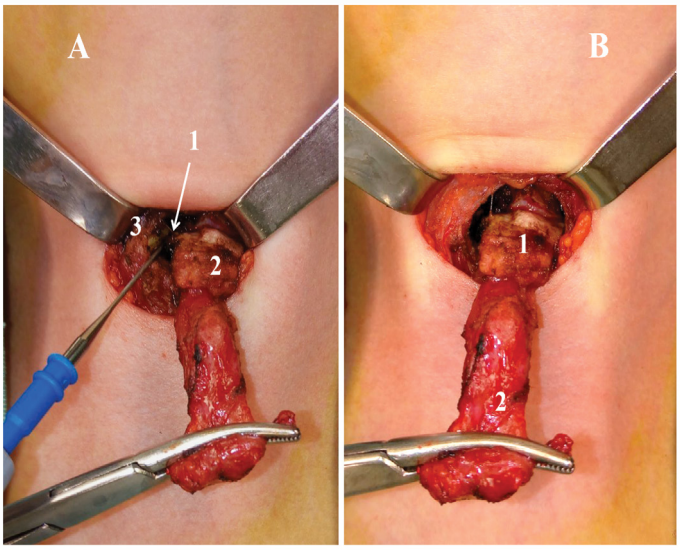

Figure 1: (A) Section by monopolar electrocautery of the growth cartilage (1) to separate de body (2) from the right lateral horn (3) of the hyoid bone. (B) Complete split of the body (1) from the lateral horns. (2) Thyroglossal duct.

mild postoperative edema in 3, promptly resolved with common anti-inflammatory drugs and oral antibiotics and a partial dehiscence of the wound in the fourth one. There were five recurrences (8.77%) that required re-operation: in all cases, the cyst recurrence were in hyoid region. During re-do surgery aproximal patent duct us toward the blind foramen at the base of the tongue was removed: the recurrence was apparently in relation to a proximal residue of thyroglossal duct. No further recurrences were observed after re-do surgery in the considered follow up period.

Discussions

Surgical treatment of TDC is long established: the vast majority currently agree that Sistrunk modified approach is still the gold standard. In brief, such approach consists in removing the cyst, detaching and removing the middle from the lateral third of hyoid bone and sectioning the thyroglossal duct(below the hyoid bone and above it toward the foramen caecum) [1,2,6,10-12]. TDC affects adults and children with differences in clinical presentation and outcome of surgery. In particular, adults suffer more frequent pain, dysphagia, dysphonia and fistula formation. Pediatric patients, instead, usually show mass or infection [10,11]. The important anatomical differences between adult and pediatric cases is the presence, in children, of growth cartilage between the body and the lateral horns of the hyoid bone, as evidenced in paper of Ryu et al. [9]. Given this difference, complete resection of the hyoid bone can be achieved with a safer approach, by monopolar electrocautery on growth cartilages instead using cut bone forceps (Moure or Liston forceps) as described in the original Sistrunk technique [8]. Interestingly, despite numerous reports about TDC surgery, pediatric series are scant: the most important are those of Thompson et al. [12], Perkins et al. [13] and Geller et al. [2], who reported 261, 231 and 128 pediatric cases respectively. These Authors give several details about surgical technique with special attention to recurrences: however, none of them give details about the hyoid bone excision technique. In 2010 Maddalozzo et al. [14] analyzing 60 cases of pediatric TDC, pointed out that it is important to include in Sistrunk procedure identification of posterior hyoid space (the space limited caudally by the inferior rim of hyoid, cranially by the superior rim of the hyoid and thyro-hyoid membrane, ventrally by the posterior surface of the hyoid, and dorsally by the thyrohyoid membrane) in order to evacuate abnormal tissue from this area, minimizing the risk of recurrences. To reach this area the hyoid must be transected medially to the tendon of the digastrics muscle, wider respect to the original Sistrunk technique in which recommendation is to remove only one –quarter inch of the hyoid bone (approximately 6 mm) [2]. This indication is suggested also by Koempelet al. [15] in 2014: using a ruler and the laryngeal prominence as a marker for the midline, the hyoid bone cut has to be performed at 1 cm - 1.5 cm at left and at right from its central point through the entire thickness bone or cartilage. In this respect, there is nearly general agreement that the hyoid bone is better removed by using cutbone forceps. However, as previously mentioned, such forceps does not guarantee complete excision and may also lead to bone bleeding. To our knowledge Ryu et al. [9] was the first to point out that a non-fused cartilage portion between the body and the horn of hyoid can be easily dissected and divided in patients without mature ossification. Therefore, this Author suggests the use of monopolar electrocautery instead of cut-bone forceps. This report, which deals partly with pediatric and partly with adult patients, prompted us to review our cases. As previously mentioned our series consists of 57 children operated on at a pediatric institution (with this technique) by a single surgeon. To our knowledge this is the largest TDC pediatric series operated on by using monopolar electrocautery for hyoid bone division. We analyzed infection prior to surgery, drain placement, complication rate and recurrence. Complications associated with TDC surgery are rare. Most complications are minor and carry minimal morbidity as local infection, seroma, hematoma and wound dehiscence [2,3,15,16]. In reviews of the published literature the overall reported risk of recurrences following surgical treatment of TDC is approximately 7.3% - 11% [2,10,13,16,17]. In our series minor complications were seen in only four cases (7.02%) presenting 3mild postoperative edema requiring common antinflammatory drugs and oral antibiotics and 1 partial wound dehiscence. Recurrences were five (8.8%) requiring re-operation 2 to 5 months after primary surgery. It must be noted that complication and recurrence rate was similar to other series of TDC in which is used the cutbone forceps [6,8]. So far we can adfirm that the use of electrocautery does not increase complications and

recurrences. In other words, since incomplete excision of hyoid bone is deemed responsible for recurrences [18], this alternative approach seems to prove at least as effective as the cutbone forceps. As previously mentioned, surgical time varied from35 to 125 minutes with an average of 57.02 ± 11.77 minutes. Duration of surgery in TDC removal has received little mention in literature [19,20] but our surgical time appears to be not at variance with the few data reported. Therefore, although the electrocautery require a meticulous dissection, it may be used without significantly altering surgery and anesthesia time. This proves particularly important in small children who are a significant part of our series. This report has some limitations: at first, this is a retrospective study, secondly, we do not have a control group in which cutbone forceps was used to compare for statistical inference. However, even without statistical inference, we believe that a pediatric series of 57 patients is large enough to draw some conclusions. It is likely that a multicentric study might help clarifying that the use of electrocautery will definitely prove far superior in the treatment of TDC without additional complications and recurrences.

Conclusion

The modified Sistrunk technique still remains the procedure of choice for TDC treatment. However, section of the central part of the hyoid bone is the crucial part of the procedure since its incomplete excision is deemed responsible for the vast majority of recurrences. In this respect, use of monopolar electrocautery, is a safe procedure ensuring the ideal access to the posterior hyoid space thereby allowing for a greater and more simmetrical access to the proximal portion of thyroglossal duct. Meticulous use required of electrocautery does not appear to affect surgical time neither are complication and recurrent rates higher than those reported with conventional excision methods. In order to assess if this approach can be adopted on a routine basis, a larger number of pediatric patients and a randomized study will probably be required.

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