

# Trichloroacetic Acid Cauterization Using a Cut-Down Tube : Management of Pyriform Sinus Fistula

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## 컷 다운 튜브를 이용한 삼염화아세트산 소작술 : 이상와 누공의 치료

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= 국문 초록 =

경부 염증을 주 증상으로 하는 이상와 누공의 치료로써, 전통적으로 외과적 절제술이 주로 시행되었으나, 근래에 들어서 수술 관련 위험성이 적은 삼염화아세트산 소작술이 선호되고 있다. 본원에서, 2004년 5월부터 2013년 3월까지 컷 다운 튜브를 이용한 삼염화아세트산 소작술을 통해 이상와 누공을 치료한 5명 환자의 증례를 보고한다. 이전까지의 삼염화아세트산 소작술에서, 여러 도구를 이용해 누공의 입구만을 막는 시도를 했던 것과는 달리, 본 증례에서는, 컷 다운 튜브를 이용해 20~50%의 삼염화아세트산을 누공로에 주입함으로써, 이상와 누공 전장을 폐쇄하고자 하였다. 3명의 환자에서는 추적 관찰 중 재발 소견 없었으며, 2명의 환자는 추적 관찰 기간 중 재발하여 삼염화아세트산 소작술을 재시행하였다. 모든 증례에서 부작용 및 합병증은 발생하지 않았다.

**중심 단어 :** 이상와 누공 · 삼염화아세트산 · 소작술 · 컷 다운 튜브.

### Introduction

Branchial anomalies of the third and fourth arch, although rare, usually present as either sinuses or incomplete fistulae of the pyriform sinus.<sup>1)</sup> The fistulous tract originates from the pyriform sinus and passes through the cricothyroid muscle and lobe of the thyroid gland, ultimately terminating in the neck.<sup>1-3)</sup> This branchial arch anomaly usually manifests itself during the first decade of life and is characterized by recurrent neck abscesses or acute suppurative thyroiditis, more frequently on the left than the right.<sup>4,5)</sup>

To prevent recurrence, traditional treatment consists of complete surgical excision of the fistula tract with thyroid lobectomy if the thyroid gland is also involved. However, this surgery is both complicated and risky.<sup>4,6)</sup> For this reason, trichloroacetic acid(TCA) chemo-cauterization of the internal opening of the fistula tract has been replacing the surgery. This procedure has traditionally been performed with a small cotton ball soaked in 20–40% TCA.<sup>4,6,7)</sup>

We report five cases where pyriform sinus fistula presenting as suppurative thyroiditis, and neck abscesses on the left side of the neck were treated utilizing a new method of TCA chemo-cauterization using a cut-down tube.

### Materials and Methods

#### 1. Subjects

A retrospective chart review was conducted at the otolaryngology department of a tertiary training hospital for all pa-

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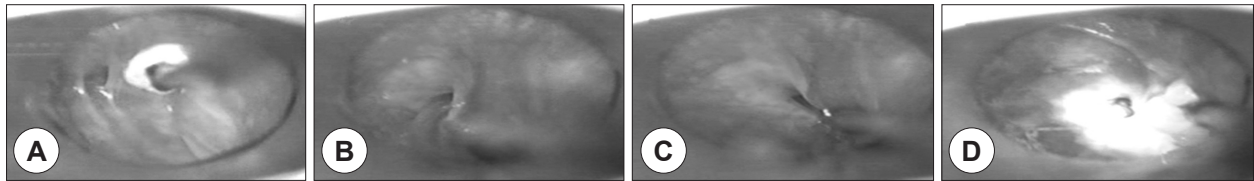
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**Fig. 1.** Details of the surgical procedure. A : Microsuspension was performed with laryngoscope. Internal opening of the pyriform sinus fistula was identified on the left side. B and C : The cut-down tube connected to a 1 cc syringe filled with 20–50% trichloroacetic acid(TCA) was placed into the fistula tract to its base through the pyriform sinus opening, and TCA was injected along the entire length of the tract. D : Sinus opening was cauterized and its mucosa was blanched.



**Fig. 2.** Details of the cut-down tube. A C2 type, 300 mm-length cut-down tube(JMS C.D.T<sup>®</sup>; Hankook Medical Sapurai Corporation, Seoul, Republic of Korea) was connected to a 1 cc syringe.

tients who underwent TCA chemical cauterization with a cut-down tube to treat pyriform sinus fistula. Five patients treated from May 2004 to March 2013 were identified. The diagnostic workup includes laryngoscopy, esophagography, and neck computed tomography(CT).

## 2. Surgical technique

The patients were taken to the operating room and general endotracheal anesthesia was administered. Microsuspension was performed using a laryngoscope. The opening into the pyriform sinus was identified(Fig. 1A). We used the C2 type, 300 mm-length cut-down tube(JMS C.D.T<sup>®</sup>; Hankook Medical Sapurai Corporation, Seoul, Republic of Korea) to transport TCA effectively into the fistula tract(Fig. 2). As the cut-down tube lacked a scale, we measured the length of the inserted tube when the tip reached the base of the fistula tract and marked the length on the tube. The tube was then connected to a TCA-filled 1cc syringe(ranging from 20–50% TCA) and was re-inserted into the fistula tract (Fig. 1B). TCA was injected at the same time the inserted catheter was also being pulled out, with the goal of applying TCA to the entire length of the tract(Fig. 1C). Cauterization of the fistula tracts were confirmed by direct observation of blanching of the fistula openings and surrounding mucosa(Fig. 1D). Fibrin glue (Greenplast<sup>®</sup>; Greencross Corporation, Yongin-si, Republic of Korea; human plasma fibrinogen, thrombin, aprotinin, and calcium chloride) was then placed on surrounding mucosa to prevent possible damage from TCA leakage.

## Results

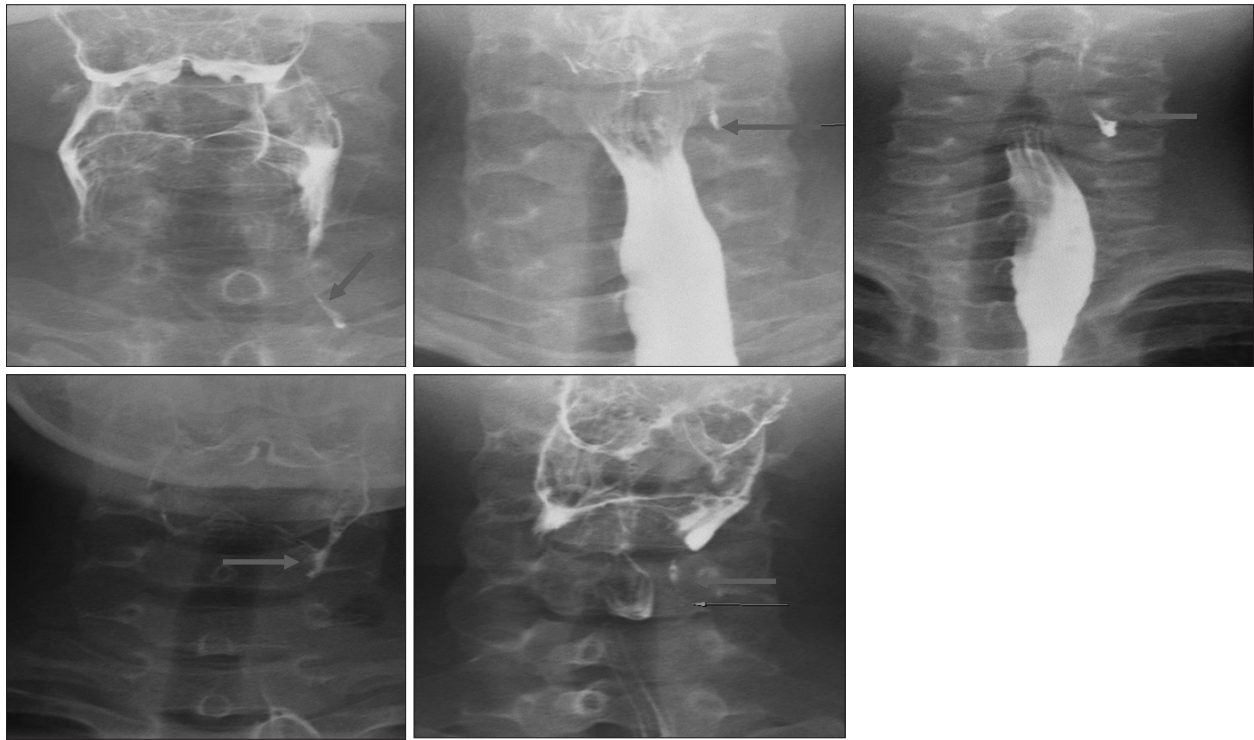
Patient ages ranged from 7 to 58 years. The presenting complaints of the five patients included fever and anterior or left neck swelling. A barium esophagography performed on all five patients identified sinus tracts in the apex of the pyriform sinus in each patient. All fistulas were located on the left side (Fig. 3). Preoperative CT scans showed suppurative thyroiditis in all five patients and neck abscesses in three of the patients. All patients with an infected lesion were first treated with intravenous antibiotics, followed by either immediate chemical cauterization of the fistula or drainage, which then allowed subsequent elective chemical cauterization.

Incision and drainage was performed on three patients prior to chemical cauterization. In one patient, complete surgical excision of fistula, and chemical cauterization with TCA were concurrently performed due to repeat recurrence. In the other four patients, only chemical cauterization with TCA using the cut-down tube was performed. We used 20–50% TCA, and the insertion length of the cut-down tube reaching the opening of the fistula varied from 1–3 cm. The amount of injected TCA ranged from 0.1–0.4 cc(Table 1).

The average follow up time for the patients was 73 months (range, 10–106 months). Two of the patients showed recurrence during the follow-up period and chemical cauterization with TCA was re-attempted to try and obliterate the remaining internal opening. The other three patients showed no recurrence during the follow-up period. In all five patients there were no intra-operative or post-operative complications, such as surrounding mucosal damage, deep neck infection, and vocal fold paralysis.

## Discussion

Pyriform sinus fistulae are epithelialized tracts representing a malformation of the embryological third and fourth branchial pouch.<sup>8)</sup> The great majority of cases are located on the left side, and most commonly present either as acute suppurative thyroiditis, recurrent neck abscess, or as a neck mass with



**Fig. 3.** Barium esophagography of all five patients showed all fistulae locations to be left-sided(arrow).

**Table 1.** Summary of the patients

No	Age/gender	Site	Concentration <sup>†</sup> (%)	Amount <sup>‡</sup> (cc)	Depth <sup>§</sup> (cm)	Interval*(months)
1	M/58	Left	50	0.1	2	–
			30	0.1	2	2
2	F/9	Left	20	0.1	1.8	–
			20	0.1	1.5	3
			30 & 50	0.1	1	5
3	M/7	Left	30	0.4	3	–
4	M/29	Left	20	0.4	1.7	–
5	F/19	Left	30	0.3	2	–

\* : Interval to recurrence, † : Concentration of injected trichloroacetic acid, ‡ : Amount of injected trichloroacetic acid, § : Depth of inserted cut-down tube

symptoms of unilateral neck swelling, local erythema, pain, fever, dysphagia, and respiratory distress.<sup>2)</sup> All of our cases were left-sided and manifested as suppurative thyroiditis.<sup>1,4,5)</sup>

Traditionally, surgical neck exploration with removal of the entire fistulous tract and hemithyroidectomy during an inflammation-free period has been the treatment of choice.<sup>5)</sup> However, the fistula path lies in close proximity to the superior and recurrent laryngeal nerves, esophagus, trachea, and, at times, the aorta, which can make this surgical procedure quite difficult. Also, any history of previous infection and presence of scar tissue would make the procedure even more difficult.<sup>9)</sup>

Endoscopic cauterization minimizes the risk of injury to these structures, as no open excision is required. Moreover, it is fast and relatively simple. Complications appear to be very

rare, and recurrences can be treated by a second endoscopic cauterization with good long-term outcomes.<sup>6)</sup> For these reasons, endoscopic cauterization has been replacing surgical excision as the treatment of choice.<sup>5-7)</sup> A number of various endoscopic techniques have been reported and include electrical cauterization with the aid of either a diathermy probe or a low-powder diode laser, as well as chemical cauterization utilizing either a stick of silver nitrate or a cotton tip of TCA.<sup>8)</sup>

TCA chemocauterization has been suggested as a first-line treatment of pyriform sinus fistula. It showed a high success rate of 77.3% after the first trial and 93.2% after the second trial, with good long-term follow-up results.<sup>6)</sup> However, TCA chemocauterization is a procedure aimed at separating the fistula tract from the hypopharynx, not for the complete obliteration of the fistula tract itself.<sup>6)</sup>

From this point of view, we designed this study using the cut-down tube to deliver TCA deep into the fistula tract in hopes of achieving obliteration along the total length of fistula tract.

We expect a higher success rate and lower recurrence rate when TCA chemocauterization is performed using a cut-down tube applying TCA along the entire length of the fistula tract rather than with cotton tip cauterization applying TCA only to the internal opening circumferentially.<sup>7)</sup> When TCA chemocauterization is performed using cotton tip, small gauze, or probe, additional local pressure is expected as the performer put some pressure on mucosa with such tools. Such pressure could be helpful for desquamation of the fistula tract. However, we think such effect is negligible as we have observed mucosal blanching around the internal opening of the fistula tract and confirmed the cauterization of the tract.

In our study, two of the five patients receiving TCA chemocauterization with a cut-down tube showed recurrence on follow-up, while three of the five patients having the procedure did not show recurrence. We believe recurrence is largely associated with the skill of the operator and as more procedures are performed by the same operator, a higher success rate and a lower recurrence rate will follow.

## Conclusion

Although more cases and continued follow-up are necessary to validate the effectiveness of this method, we believe that TCA chemocauterization of pyriform sinus fistula can be safer and more effective when performed utilizing a cut-down tube applying TCA to the entire length of the fistula tract as compared with cauterization of only the internal opening using a cotton tip.

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