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Chemocauterization of second branchial cleft fistula using trichloroacetic acid: A preliminary report

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ABSTRACT

Objective: Although second branchial cleft fistula (BCF) can be well treated with surgical excision, neck scarring is unavoidable. We previously reported chemocauterization with trichloroacetic acid (TCA) to close various fistulas. Here, we report chemocauterization of a second BCF without a consequent incision scar.
Methods: This procedure was applied in four pediatric patients whose parents were reluctant to undergo surgical excision for a second BCF. Under general anesthesia, a thin metal suction tip or cut down tube was inserted through the skin opening. Normal saline with or without dye was injected to identify the pharyngeal opening around the palatine tonsil, and 75% TCA solution mixed with dye was injected. Leaked TCA at the pharynx was sucked out meticulously to avoid extensive and unexpected injury to the mucosa, and the external opening was sealed with a thin adhesive film.
Results: There were no immediate complications and recurrence of a second BCF in all patients during the median follow-up of 23 months (range, 18–88 months) with minimal neck scarring.
Conclusion: TCA chemocauterization of second BCF could be a simple, less invasive, and feasible treatment option in pediatric patients.

1. Introduction

Branchial cleft anomalies such as sinuses, fistulas, and cysts arise from an incompletely obliterated branchial cleft during fetal growth [1,2]. Second branchial cleft anomalies represent the most common type, accounting for 80–95%, and a connection between the skin and pharynx is defined as fistula [2,3]. Because it opens onto the skin, a second branchial cleft fistula (BCF) is usually noted at an earlier age than a cyst [4]. In general, BCF can be diagnosed by clinical examinations, although ultrasonography, computed tomography (CT), and magnetic resonance imaging have been used to help make a differential diagnosis or obtain detailed anatomical information [4,5].

Total excision of the fistula tract with or without tonsillectomy is considered the standard treatment for BCF [6]. However, incomplete excision of a BCF can lead to reoperation, and a neck scar is inevitable. For these reasons some patients and parents of pediatrics are reluctant to undergo excision. Trichloroacetic acid (TCA), a chemical agent with the potential to inflict harm on the body such as a chemical burn or ulcer, is used clinically in skin peels and the treatment of warts because of its corrosive properties [7]. To date, we have reported treatments of various fistulas of the head and neck without an open approach using TCA, all of which have achieved satisfactory results [7–10].

Here, we report four patients with a second BCF who were successfully treated using TCA chemocauterization technique that leaves minimal scarring on the neck.

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2. Material and methods

Four children (median age, 5.2 years; range, 4.2–7.2 years) were treated for a second BCF using TCA chemocauterization at a tertiary referral hospital, by two experienced head and neck surgeons between January 2009 and November 2014. Institutional review board approval was obtained to retrospectively review the medical records. Diagnosis of a second BCF was made based on history taking and physical examinations. Fistulography with or without contrast-enhanced CT was performed to evaluate the course of the tract, its relationship with major vessels, and leakage out of the tract.

This procedure was applied in four pediatric patients whose parents were reluctant to undergo surgical excision for a second BCF, none of whom had a history of previous surgery. Before doing surgery, we informed the possibilities about incomplete obliteration of fistula, bleeding, and nerve injuries to the patients and their guardians.

2.1. Surgical technique

All procedures were performed under general anesthesia, and 75% TCA was used in all patients. The tonsillar fossa was exposed using a McIvor mouth gag or rigid laryngoscope under general anesthesia. A thin metal suction tip or cut down tube was inserted through the external opening at the neck. Normal saline with or without dye (methylene blue or indigo carmine) was injected to identify the internal opening around the palatine tonsil, and 75% TCA solution mixed with methylene blue was injected with meticulous protection until the leakage was detected at the internal opening. During TCA injection, we defined effective cauterization as mucosal change around the internal opening. After injection we waited a few seconds to obtain a sufficient effect of TCA, after which all remaining solution was removed as possible by squeezing and suction. During this procedure, the gauze was packed into the oropharynx and the leaked TCA solution was sucked out meticulously to avoid extensive and unexpected injury to the mucosa. The skin around the external opening of the fistula was sealed using a thin adhesive film to prevent injury of the skin [7].

3. Results

The median volume of injected TCA was 0.5 ml (range, 0.5–1.0 ml), and the median time for this procedure was 17.5 min (range, 10–30 min). There were no immediate complications such as burning of the skin and pharynx. Three patients were discharged 1 day after surgery, and one was discharged on the day of surgery. Physical examination of the oral cavity, oropharynx, and hypopharynx before discharge revealed that there was only minimal mucosal swelling around the internal opening without any evidence of upper airway obstruction.

At the first visit (2 weeks after surgery) to the outpatient clinic, external opening of the skin was obliterated in two patients while the other two had hyperemia with remnant opening of the neck, which, however, were no longer evident at the second visit (4 weeks after surgery). Scarring of the external opening was minimal. No recurrence of second BCF was observed in all patients during the median follow-up of 23 months (range, 18–88 months) (Table 1).

3.1. Case 1

A 5.6-year-old girl visited our outpatient clinic with a history of recurrent discharge and infection at the neck. At initial presentation, a pin-point pit on the left side of the neck was observed, and no other specific findings were noted on physical examinations. Under suspicion of BCF, fistulography combined with contrast-enhanced CT was performed. This examination revealed a fistula tract that originated in the neck skin and was delineated along the anteromedial border of the sternocleidomastoid muscle but did not extend to the tonsillar fossa (Fig. 1A). We diagnosed this lesion as a second BCF and recommended transcervical excision, which the patient refused. However, on being informed of TCA chemocauterization she agreed to undergo this treatment. Under general anesthesia, internal opening of the fistula was identified using normal saline mixed with indigo carmine (Fig. 1B). Chemocauterization using 75% TCA (0.5 ml) was performed with meticulous protection of the skin and pharynx (Fig. 1C). There were no immediate complications, and the patient was discharged on the day after surgery. Obliteration of the external opening at the neck was observed at her first visit to the outpatient clinic 2 weeks after chemocauterization. During the 19 months of follow-up, there was no recurrence of the fistula and neck scarring was minimal (Fig. 1D).

3.2. Case 4

A 7.2-year-old boy was referred for evaluation of a mass on the left side of the neck. Skin pitting was observed at the left submandibular region and a 1-cm elliptically shaped tract was palpable. Fistulography with CT revealed that the tract had a connection between the skin and left tonsillar fossa. Before chemocauterization we undertook exploratory internal opening

Table 1
Summarization of clinical course and outcomes.

Case number (gender/years)	History of infection	TCA volume (ml)	Procedure time (min)	Discharge	Confirmation of obliteration (outpatient clinic visit)	Follow-up (months)	Recurrence
1 (F/5.6 years)	Yes	0.5	30	On operative day	2 weeks (first)	19	No
2 (M/4.2 years)	Yes	0.5	10	POD 1	4 weeks (second)	88	No
3 (F/4.8 years)	No	0.55	15	POD 1	2 weeks (first)	18	No
4 (M/7.2 years)	No	1	20	POD 1	4 weeks (second)	27	No

Abbreviations: TCA, trichloroacetic acid; POD, postoperative day.

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