

Histoacryl injection in the management of fourth branchial fistula

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Purpose The aim of this study is to evaluate a minimal invasive approach in the management of fourth branchial fistula using *N*-butyl cyanoacrylate (histoacryl) and to study its feasibility.

Patients and methods Between 2006 and 2011, a retrospective study of five children with fourth branchial fistula treated at Assiut University hospital was carried out. Their age ranged from 2 to 5.5 years. Three were females. Histoacryl (adhesive material) was injected through the tract under general anesthesia.

Results All the children presented with a discharging fourth branchial fistula. Three of them had a left-sided fistula. Fistulogram was carried out in all patients; two of them had a complete fistula. The duration of the procedure ranged between 10 and 15 min. No complications were noted. The duration of follow-up

ranged from 2 months to 1 year. No recurrence was encountered during the period of follow-up.

Conclusion Histoacryl injection of the fourth branchial fistula is an effective, easy, and minimally invasive procedure that can be carried out by junior staff. Surgery may be performed as a backup if there is failure or recurrence after injection. *Ann Pediatr Surg* 8:74–76 © 2012 Annals of Pediatric Surgery.

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Introduction

Fourth branchial fistula is one of the congenital anomalies of the neck encountered in pediatric surgery practice [1]. According to some authors, branchial cleft anomalies occur with a frequency equal to thyroglossal duct lesions [2], whereas most authors have reported that the prevalence of fourth arch anomalies is low [1,3].

Our institute has gained experience in histoacryl injection in the management of a perianal fistula, with good results [4]. This led us to extend its use in the management of a neck fistula.

Aim of the work

The aim of this study was to evaluate this minimally invasive procedure of histoacryl injection in the management of children with a discharging fourth branchial fistula.

Patients and methods

Over a period of 5 years between 2006 and 2011, five children with a discharging fourth branchial fistula were managed at the Pediatric Surgery Unit at Assiut University Hospital. Children with a thyroglossal duct fistula were excluded from this study. Their age ranged from 2 to 5.5 years. Three were females. On examination, there was a pin head-sized opening on the side of the neck along the anterior border of the sternocleidomastoid muscle between the level of the hyoid bone and the suprasternal notch. Three patients had left-sided fistulae. All fistulae were present since birth. There were no other associated anomalies. With this typical history and findings, a diagnosis of a fourth branchial fistula was made. A fistulogram was performed in all patients (Figs 1 and 2), which showed an internal opening at the apex of the pyriform fossa in two patients.

Procedure

The procedure of histoacryl injection and the possibility of its failure were explained to the parents in detail. The procedure was carried out in the operating room under general endotracheal anesthesia; the neck was extended by placing a pillow under the shoulders of the patients. The external ostium was identified and the tract was cannulated using a 26 G cannula, which was introduced gently as far as possible through the fistula. A 5% glucose solution was injected first to prevent premature polymerization, and then histoacryl was injected slowly with a steady withdrawal of the cannula. After recovery from anesthesia, the patient received an antihistaminic syrup and an analgesic (paracetamol). The patients were discharged on the same day and the parents were instructed to record any complications even if minor and to return to the hospital if there were any allergic or inflammatory complications. Follow-up was scheduled every week in the first month, every month for 6 months, and every 3 months for 1 year.

Results

The duration of the procedure ranged from 10 to 15 min after the induction of anesthesia. The discharge stopped completely in all patients. The parents rated the simplicity and efficiency of the procedure as satisfactory. Two patients did not attend the follow-up after the second month, whereas the remaining three patients were followed up for 1 year. None of the patients developed complications such as discharge, infection, allergy, or recurrence during the follow-up period.

Discussion

Congenital head and neck anomalies require a thorough understanding of the anatomical and embryological

Fig. 1



Fistulogram showing the complete branchial fistula tract.

Fig. 2



Cannulation of the fistula.

origins for complete excision without recurrence or injury (particularly nerve injury). Although the branchial apparatus was first described by VonBaer, the anomalies in its development were reported by Von Ascherin [5]. The human branchial apparatus comprises five paired mesodermal arches, separated by four pairs of endodermal and ectodermal invagination that are called pouches and clefts [6]. Anatomically, fourth branchial arch anomalies represent vestiges of a tract that originates as a sinus tract from the apex of the pyriform sinus. It travels inferiorly in the trachea–esophageal groove posterior to the thyroid gland, and to the thorax, where it loops below the aorta on the left and the subclavian artery on the right. The descending part of this tract before the first loop is the most common site for clinical infection [7]. Most branchial anomalies (95%) arise from the second branchial apparatus; the rest of them arise from the first and the third arch. The remnants of the fourth branchial arch are exceedingly rare [8,9]. Fourth branchial anomalies

represent only 2–8% of all branchial anomalies. Because of their rarity, consistent recommendations on the diagnosis and management of fourth branchial fistulae are lacking, and reports on recurrence and complication rates vary widely [10].

Physical examination is useful to confirm the finding or the absence of any other anomalies. The tract may be palpable as the child stretches his neck.

Preoperative imaging is useful in assessment of unusual anomalies of the branchial apparatus. Recent reports recommend a fistulogram, a computed tomography scan, or MRI for the evaluation of anomalies of the branchial apparatus and for their differentiation from similar lesions [11,12].

Most fourth pouch anomalies are diagnosed in childhood and 97% occur on the left side of the neck [13]. In our study, 60% presented on the left side.

Knowledge of the branchial fistula internal opening is important to prevent recurrence as suture ligation should be performed close to these openings. We confirmed the diagnosis with a fistulogram and by cannulating the tract on the operating table.

A Medline search was performed using the PubMed, Ovid, ScienceDirect, and Google Scholar databases to identify articles reporting on the management of a pediatric fourth branchial fistula using histoacryl; the result was negative. However, there were several articles that reported on the use of tissue-adhesive materials and glue in adults for tissue approximation and hemostasis in surgery [14]. Their results, in addition to our previous experience in the management of fistula *in ano* using histoacryl [4], led us to report our experience with a histoacryl injection for fourth branchial fistulae in children. The tissue-adhesive histoacryl is composed of enbucrilate; we used it colored with dyestuff D Et violet No 2. The mode of action of histoacryl depends on the presence of tissue moisture, which immediately polymerizes into a solid substance with a stable connection to the tissue [4].

The definitive therapy for a fourth branchial fistula is surgical excision. Conservative treatment in the form of an antibiotic is used in the preoperative stage in cases of infection. Several surgical approaches have been described. The most common approaches are neck dissection with hemithyroidectomy, a step ladder approach [6], and a combined approach with an oral route [6]. All of these approaches have several complications and a high rate of recurrence, and require expert surgeons to perform them [15].

To avoid or decrease the rate of complications, currently, minimization of surgical dissection is performed by less invasive maneuvers such as stripping of the branchial fistula by passing a stripper inside the tract [16] or endoscopic cauterization of a pyriform fossa sinus tract [17].

To avoid aggressive surgery and its complications, in our study, we used a histoacryl injection to treating fourth branchial fistulae in children. The injection was administered through a cannula during its withdrawal to avoid

adhesion of the cannula to the tissue. The procedure was performed under general anesthesia to make it more comfortable to the operator. It was a simple procedure and could be repeated several times.

This approach of injection of a histoacryl adhesive material is a minimally invasive technique, without surgical dissection, and can be carried out in a short duration of time. No complications were encountered and no recurrence of discharge was documented in this study, which may be attributed to the small number of cases and the short follow-up period in our study. The procedure can be done by junior surgeons. The parents of our patients found the simplicity of the technique satisfactory. The main aim of extensive surgical dissection is to stop the discharge and this was achieved simply by injecting histoacryl.

Conclusion

Injection therapy of fourth branchial fistulae using the adhesive material histoacryl is effective, simple, safe, easy, and can be performed by junior staff. Furthermore; surgery can be easily performed in recurrence or failure of injection.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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