



Repair of fistulae in-ano in children using image guided Histoacryl injection after failure of conservative treatment[☆]

Mohamed A. Osman^{a,*}, Mostafa A.M. Elsharkawy^b, Moustafa H.M. Othman^b

^a*Pediatric Surgical Unit, Surgery Department, Faculty of Medicine, Assiut University, Egypt*

^b*Radiology Department, Faculty of Medicine, Assiut University, Egypt*

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Abstract

Purpose: Our aim is to determine the feasibility and safety of N Butyl Cyanoacrylate (HISTOACRYL), adhesive material in the treatment of fistula in-ano in infants and children.

Patients and Methods: 30 patients who presented with a perianal fistula (25 males and 5 females) were studied. Their ages ranged from 9 months to 15 years. All patients received medical (conservative) treatment. Six patients improved, 7 patients were subjected to surgical intervention, and the remaining 17 patients were managed by injection of adhesive material through the fistula under fluoroscopic guidance and general anesthesia after failure of medical management.

Results: Of the 17 children who underwent injection therapy to the fistula in-ano after failed medical management, 14 patients were males. The procedure time was 10 to 15 min. The mean follow up was 18 months. Two patients had a recurrence after one to two months. They were subjected to reinjection, and one of them had a second recurrence. Overall, 16 (94%) of 17 patients have had successful closure of their fistula, and one of them healed from a second injection.

Conclusion: Our method of tissue adhesive Cyanoacrylate injection is safe, feasible, and can be used repeatedly in treatment of fistula in-ano in infants and children.

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An anal fistula is a chronically infected, abnormal tract, between the anal canal and outer skin of the anus. The tract often drains watery pus and has an unclear pathogenesis. Fistula in ano is a common condition in infancy and is often

accompanied by perianal abscess. It is generally accepted that male infants are most commonly affected and fistulas tend to be simple, low and direct [1].

Perianal abscess in infants who are younger than 12 months is associated with a 20% to 80% overall rate of progression to fistula in ano [2,3].

Surgical management of fistula in-ano (either fistulotomy or fistulectomy) is the widely accepted method for treatment of these patients. Recently; there are some articles demonstrating successful non-operative management of fistula in-ano in the pediatric population [4,5].

[☆] The work had been done at pediatric surgical unit.

* Corresponding author. Pediatric Surgical Unit, Children University Hospital, Assiut University Postal code 71515, Assiut, Egypt. Tel.: +20 088 2315760, +20 01227432276; fax: +20 088 2414241.

E-mail address: dr.osman@ymail.com (M.A. Osman).

In our institute, we faced difficulties during postoperative wound dressings due to struggling and apprehension of the child. This results in the parents requesting recommendations on how to deal with the child at home. This is the main reason that led us to find a less invasive maneuver to treat this condition. The extensive use of n-Butyl-2 Cyanoacrylate in surgery encouraged us to use it for closure of the fistula.

1. Patients and methods

This study had been conducted on 30 infants and children, at the Pediatric surgical unit, University Children's Hospital, Assiut University, from January 2003 to September 2009. The fistula was defined as a small opening discharging pus in 25 patients, and perianal abscess was found as a red, tender small swelling at one side of the anus in 5 patients. Children with other anorectal anomalies were excluded. The study was carried out following Assiut University's Ethical Principles for Conducting Studies in Humans. This was discussed with the families and informed consent was obtained. All 30 patients were subjected to conservative treatment in the form of systemic and local antibiotic in addition to meticulous cleaning of perineum for at least 6 months.

After the failure of conservative treatment, parents of 24 children met with the surgeons to discuss the type of treatment options available (either traditional surgery or Cyanoacrylate injection) with clarification of advantages and disadvantages of each. 17 of the 24 families chose injection therapy and remaining 7 families chose the traditional surgical method.

Children avoided eating solid food for at least 8 h, and bowel preparation to clean anus and rectum had been done. In the angiography suite under general anesthesia, the tissue adhesive Histoacryl was mixed to oily contrast media (Lipiodol) in a 50% concentration to allow optimal time of polymerization of Cyanoacrylate and to allow sufficient time

for the Cyanoacrylate to flow in the tract. The patient was positioned in the lithotomy position, the fistula opening was identified and a small cannula (24 Fr) was gently introduced. Five percent glucose solution was injected first to prevent premature polymerization. The adhesive material was injected gently under image guidance until the glue reached the end of the fistula tract. The time of procedure ranged from 10 to 15 min (Figs. 1, 2). After recovery, the patients returned home and received simple analgesia (paracetamol). Follow up was scheduled every week in the first month and then every month for six months, and every 3 months for one year (Fig. 3).

Surgery was carried out in 7 patients, under general endotracheal anesthesia. In the lithotomy position, the fistula was identified and a narrow sound was inserted into the tract. The tract was slit in low fistula (fistulotomy) or a circular incision of radius 1.5 to 2 cm around the external opening, a core of tissue around the tract was dissected till the internal opening that closed. A Vaseline gauze was inserted in the wound. The first dressing was carried out at the hospital in front of the parents who were taught to perform the dressings at home until healing occurs.

2. Results

Six of 30 patients were improved and healed after medical treatment, so they were further excluded from the study. Surgery was carried out in seven patients, either fistulotomy in four patients and fistulectomy in three patients. The remaining 17 patients were subjected to tissue adhesive Cyanoacrylate injection.

Mean age at the injection was 8 years (range, 11 months to 11 years). Mean duration of symptoms from initial onset to injection was 7.5 months (range, 5 to 10 months). The procedure was done under general anesthesia to make the procedure easier for the patient and the operator. The parents



Fig. 1 Fistulogram.

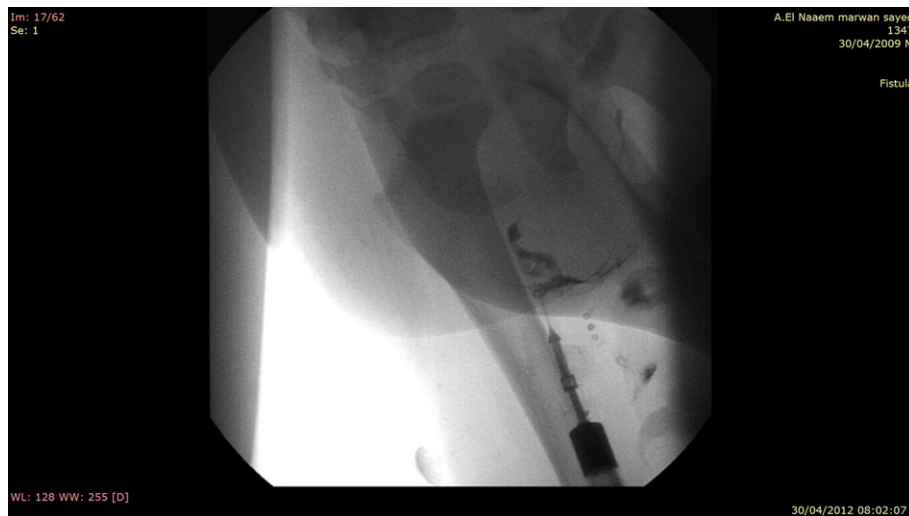


Fig. 2 Injection of histoacryl.

were asked to record any complications even if minor, and to come back to hospital if there were any allergic or inflammatory complications. Two patients recorded some minor complications in the form of itching unresponsive to simple analgesia, and their discharge was delayed for 24 h and they received antihistamine and paracetamol analgesia. During follow up (the mean follow up is 18 months), recurrence occurred in two patients, after 4 months and after 7 months. They were subjected to reinjection. One of the two healed and the second showed another recurrence and his parents refused the third trial of injection, giving improvement in 16 (94%) patients.

3. Discussion

In adults, fistula in-ano is a heterogeneous group of disorders that can cause significant pain, social impairment,



Fig. 3 Healed fistula.

and hygienic problems. Fistula is a chronic inflammatory process that does not heal spontaneously so surgery is the mainstay of treatment. Recently, sphincter saving approaches have been applied for treatment of perianal fistula in order to avoid fecal incontinence if sphincter was damaged [6].

In the pediatric population, anal fistulas are poorly understood, the etiology may be due to congenital abnormalities of anal crypts which may be more susceptible to infection or it may be due to dermal infection by diaper exposure. Some authors concluded that the high incidence of recurrence has been attributed to the congenital abnormalities of the anal crypts [7]. Other possible causes of fistula in ano are androgen excess or androgen–estrogen imbalance, and inflammatory bowel disease [8]. Fistula in-ano in infants and children have certain characteristics including male predominance; manifestation at less than 12 months of age, multiple, but separate tracts in less than 20%; and rarity of complex fistulae that distinguishes this condition from adults.

Perianal abscess is a relatively common condition in children. It occurs most often in male infants younger than 1 year but can occur in either sex and at any age. The exact incidence and prevalence of perianal abscesses are not well established. In spite of the relative frequency of perianal abscess, our study had less number of abscesses because we are working in a tertiary children's hospital, and the abscesses could be treated in primary centers.

Over the decades, several approaches have been developed for management of fistula in-ano. They include medical therapy, fistulectomy or fistulotomy, advancement mucosal flaps, the use of setons, fibrin glue and recently fistula plugs. All of the procedures carry a reasonably high recurrence rate, and fecal incontinence is a high risk for patients with supra-sphincteric tracts who undergo fistulotomy techniques, which led surgeons to find less invasive options that may resolve the fistula without the risk incontinence or recurrence.

Fibrin glue had been used in the management of adult anal fistula with promising result, having patients without discomfort

of prolonged wound healing that may be associated with fistulotomy. The simplicity and repeatability of the technique led us to use Histoacryl in our study [9–12].

As for infants and children, the postoperative care is more challenging than that in adults. This difficulty is due to the apprehension of the child during dressing changes. This difficulty led us to find an easy, simple, and repeatable approach to manage this lesion. Moreover, some authors encourage conservative management that consists of just continuous cleansing of perineum, in our series, antibiotic therapy against gram negative organisms and anaerobic bacteria has been added [13]. Conservative treatment has a different range of time ranging from 3 months [14] up to 18 months [13]. In our study we select 6 months for conservative treatment for two reasons. Firstly, it was midways between different studies, and second is a financial cause.

Histoacryl had been used extensively in adult and children, e.g. surgical incisions and lacerations [15], facial trauma [16], branchial fistula [17], episiotomy [18], congenital tracheoesophageal fistula [19], gastrophrenic fistula [20], gastrointestinal fistula [21], and bleeding esophageal varices [22], and this pushed us to use Histoacryl to manage fistula in-ano in the pediatric population to avoid postoperative care and complications.

Medline searches were performed using the Pubmed, Ovid, and Google Scholar databases to identify articles reporting on management of pediatric fistula in ano using Histoacryl, the result was negative. The promising results of adhesive material, in addition to technological improvement, led us to report our experience with injection of Cyanoacrylate for fistula in-ano in pediatric population after failure of conservative treatment. We used colored glue (colored with the dyestuff D Et violet No. 2). The mode of action of Cyanoacrylate glue depends on the presence of tissue moisture, which immediately polymerizes into a solid substance with a stable connection to the tissue. It is not toxic and has a minimal inflammatory effect [23,24]

In our study, only six patients (20%) responded to conservative management for more than three months. This low number of improved patients may be due to the long duration of treatment so parents may lose their interest to follow the exact instructions of management.

The remaining 24 families were offered a choice of second line of treatment which is either traditional surgery or injection of Cyanoacrylate. Seven families refused injection therapy.

In our study, we used Histoacryl injection for treating fistula in-ano in 17 children depending on its rapid polymerization and rapid connection to the tissues. Histoacryl is mixed with Lipiodol 1:1 to get optimum time of polymerization and better flow of the Cyanoacrylate in the tract. Actually, we did not evaluate the time of polymerization after mixing; depending upon the previous literatures that used Histoacryl for many indications. In the study of Stoesslein et al. (1982) they concluded that the time of polymerization was markedly delayed after mixing with Lipiodol and this can be controlled to allow material with

good flow properties [25]. We aim to close and to approximate the tissue of the fistula tract without surgical intervention to avoid the risks of surgery and also to avoid bothering the child and his parent from postoperative daily wound care.

The injection was carried out through the cannula during its withdrawal to avoid adhesion of cannula to the tissue. The procedure was done under general anesthesia to make it easier for the patient. It was a simple procedure and can be repeated many times.

Fistula in-ano healed in 15 cases, the remaining 2 cases were subjected to a second injection that was done easily, one of them healed and a second recurrence occurred in the second child. His parents refused a third trial. Overall 16 patients with fistula in-ano healed (about 94%), including one after a second injection. We believe this may be considered a promising result. The recurrence in two cases may be due to rapid injection with insufficient amount of Histoacryl, and we may require experience in more cases to fix the proper cause of failure.

Our result is better than that of Adel et al. in 1993, who used fibrin tissue adhesive to treat complicated fistulae and reported a success rate of 60% [8], and Hjortrup et al. reported closure rate of 74% using a commercial fibrin sealant [9].

Our technique can be done in a same day surgery environment with a low cost when comparing this to other techniques. The price of the glue may cost 20\$/ampoule (120 EGP).

In the future, if a recurrence occurs, then surgery will be the next step. The removed tissue will be subjected to histological study to get more data regarding tissue fibrosis.

Depending on wide use of tissue adhesive material in many surgical conditions without significant side effects, we may conclude, from our preliminary results in a relatively small group of 17 children, that the procedure is useful in children with fistula in-ano. It is safe, feasible, repeatable, and with a low recurrence rate.

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