

Clinical Study on the Treatment of Low Anal Fistula in Infants and Young Children by Anal Gland Excision and Virtual Hanging Procedure

Hongbo Su, Linmei Sun, Yimiao Liang, Jiansheng Hu, Yongli Zhang, Ni Wei, Chaoyang Li, Lin Tang*

Department of Anorectology, Xi'an Hospital of Traditional Chinese Medicine, Xi'an, China

*Corresponding author: Lin Tang, 404213805@qq.com

Copyright: © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: *Objective:* To compare the efficacy of anal adenectomy with virtual hanging wire and anal fistulotomy in the treatment of low anal fistula in infants and children. *Methods:* 60 children with low anal fistula who were admitted to our hospital from October 2021 to March 2022 and met the inclusion criteria were randomly divided into two groups of 30 cases each; the treatment group was treated with anal adenectomy and virtual hanging wire surgery, and the control group was treated with anal fistula resection. The clinical efficacy after treatment was compared. *Results:* The total effective rate of both groups was 96.67% and the difference between the two groups was not statistically significant ($P > 0.05$). The postoperative pain score of the treatment group was lower than that of the control group ($P < 0.05$). The length of hospitalization and healing time of the treatment group was lower than that of the control group ($P < 0.05$). The anal function of the patients in both groups was normal, and there was no adverse reaction. *Conclusion:* Anal gland excision and virtual hanging surgery for the treatment of low anal fistula in infants and children have the advantages of mild pain, reduced length of hospitalization, short healing time, and better patient experience as compared to anal fistula excision.

Keywords: Anal fistula; Anal gland excision; Virtual hanging procedure; Surgical method; Observation index; Clinical efficacy

Online publication: March 24, 2024

1. Introduction

Anal fistula (anorectal fistula) refers to the abnormal connection between the anal canal or rectum and the skin around the anus due to pathological reasons. In Chinese medicine, it is also known as hemorrhoidal fistula or anal leakage. Main symptoms include pus, pain, wetness, and itching in the anus. An anal fistula is a common disease in pediatric anorectal diseases, where some data showed that 0.5%–4.3% of patients with anal fistula and perianal abscess were children^[1]. Since infants and young children are characterized by unsound development of various organs, low immunity function, and weak resistance to diseases, textbooks generally recommend conservative treatment until childhood followed by radical surgery^[2]. Recently, many scholars believed that children with anal fistula should be treated with surgery as early as possible and that prolonged

conservative treatment will endanger the child's life, increasing the risk of emotional disorders and recurrence. This will bring a burden to the family as well as a diminished trust in the doctor.

After reviewing recent literature on the surgical treatment of infants and young children with anal fistula, it was believed that infants and young children with anal fistula should undergo surgical treatment. However, there is insufficient literature regarding the specific methods and guidelines for the appropriate surgical procedures that should be conducted for affected infants and children. This study explored the procedure of anal gland excision and virtual hanging line surgery for the treatment of infants and young children with low anal fistula and its clinical advantages. To evaluate its effect 60 cases of infants and young children with low anal fistula patients who were admitted to Xi'an Hospital of Traditional Chinese Medicine, Hospital of Anorectal and Intestinal Diseases for consultation and hospitalization, and surgical treatment from October 2021 to March 2022 were selected and divided into a treatment group and a control group. The clinical outcomes before and after surgery were compared between both groups.

2. Data and methods

2.1. General information

This study included 60 cases of infants and young children with low anal fistula who were admitted to Xi'an Hospital of Traditional Chinese Medicine, Hospital for Anal and Intestinal Diseases for surgical treatment from October 2021 to March 2022. The patients were randomly grouped into a treatment group and a control group, with 30 cases per group. The treatment group was treated with anal gland excision and virtual hanging surgery and the control group was treated with anal fistula excision. The treatment group consisted of 20 males and 10 females aged 0.4–3 years, with an average age of 1.48 ± 0.57 years. The disease lasted from 1 month to 35 months, with an average duration of 17.32 ± 7.61 months. The control group consisted of 23 males and 7 females aged 0.5–3 years, with an average age of 1.36 ± 0.47 years. The disease lasted from 1.5 months to 35 months, with an average duration of 16.32 ± 7.34 months. There was no significant difference between the two groups in terms of gender, age, and disease duration ($P > 0.05$) and they were comparable.

2.2. Diagnostic criteria

The patients were diagnosed based on the China Hengshui Conference (1975), Unified Standard Classification of Anal Fistulas:

Low simple anal fistula: only one fistula that extends deep below the external sphincter, with the internal opening located in the vicinity of the anal sinus.

Low complex anal fistula: one or more fistula located deep in the sphincter with multiple external openings and two or more internal openings.

High simple anal fistula: a single fistula tract that passes above the deep part of the sphincter, with an internal opening located in the anal sinus site.

High complex anal fistula: multiple external orifices, with branching of the fistula. The main tract extends deep through the external sphincter muscle and there are one or more internal orifices.

2.3. Inclusion criteria

Inclusion criteria: (1) Patients diagnosed according to the diagnostic criteria and classification of anal fistula, combined with the morbidity characteristics of infants and young children; (2) within 3 years of age; (3) no contraindications to surgery; (4) children without abnormal anal morphology and function; (5) family members consented; (6) children who had complete medical history data and were able to complete follow-up visits.

2.4. Exclusion criteria

Exclusion criteria: (1) Children who do not meet the above diagnostic criteria and inclusion criteria; (2) children with serious congenital diseases of heart, brain, liver, kidney and hematopoietic system; (3) children with atopic anal fistula or combined with other anorectal diseases; (4) allergies and keloidal body; (5) children suffering from eczema, jaundice, and asthma; (6) children who are unable participate in follow-up visits or dropped out halfway.

2.5. Abscission criteria

Abscission criteria: (1) Children with poor compliance during the trial; (2) children with serious adverse events, complications, and special physiological disorders; (3) children with incomplete clinical data.

2.6. Trial methodology

2.6.1. Preoperative condition assessment

The patient's detailed medical history was obtained and all relevant examinations were completed. Those who were contraindicated for surgery and anesthesia were excluded. The child's family was informed about the surgical procedures and their consent was obtained.

2.6.2. Preoperative preparation

Infants under 1 year old were refrained from consuming any food 4 hours before surgery; toddlers 1–3 years old were refrained from consuming any food 6 hours before surgery. A clean enema was administered 2 times before the surgery, followed by intravenous administration of antibiotics half an hour before surgery. Anesthesia was used intravenously in all cases, and the patients underwent cystotomy, with the anal canal and lower rectum disinfected three times with type III aneriodine cotton balls. Lastly, sterile disinfectant towels were prepared.

2.6.3. Surgical methods

The treatment group adopted the procedure of anal gland resection with virtual hanging, which was operated as follows. Firstly, a probe was used to probe from the external opening of the anal fistula to determine the alignment of the fistula and the location of the infected anal gland. If the location of the infected anal gland is not easily detectable, it can be located by measuring the dentate line of the anal sinus or observing any signs of redness and depression. By using the probe as a guide, the proximal fistula skin, subcutaneous tissue, and fistula wall was excised to access the infected anal sinus. The proximal fistula wall was excised and any excess tissue was removed to ensure smoothness. The length of the excision was kept at 0.8–1 cm. For the infected internal opening, the anal sinus was incised directly to the infected anal glands, with a depth of about 0.5 cm to ensure smooth drainage. Excess mucosa around the inner mouth was ligated to facilitate the narrowing of the inner mouth, leaving a 2–3 cm ligature line for drainage. The same procedure was repeated if there were more than one anal gland infection. For the distal fistula, the fistula wall was completely removed while retaining the normal skin and subcutaneous tissue. A spatula was used for scraping and the lumen was wiped with gauze strips for easy removal of the wall tissue. Then, inflammatory hyperplasia granulation around the external opening was excised. The remaining lumen was ensured to have a normal hanging slack and a rubber band was used when necessary. This procedure was repeated for cases with multiple branches or anal fistulae. After thorough hemostasis and trimming of the skin edge, the wound was thoroughly rinsed with hydrogen peroxide and saline covered with Vaseline gauze, and bandaged with aseptic auxiliary materials.

The control group underwent anal fistula resection as follows. Firstly, a probe was used at the external opening of the anal fistula to determine the alignment of the fistula and the location of the infected anal glands.

If the location of the infected anal gland is not easily detectable, it can be located by measuring the dentate line of the anal sinus or observing for any signs of redness and depression. By using the probe as a guide, the proximal fistula skin, subcutaneous tissue, and fistula wall was excised to access the infected anal sinus. A spatula was used for scraping and the lumen was wiped with gauze strips for easy removal of the wall tissue. Additional branches were treated the same way to ensure thorough removal of the affected tissue. For the infected internal opening, the anal sinus was incised directly into the infected anal glands at a depth of about 0.5 cm to allow smooth drainage of the fistula. Excess mucosa around the mouth was ligated to narrow the opening, leaving a 2–3 cm ligation line to facilitate drainage. This procedure was repeated for cases of multiple anal gland infections. After thorough hemostasis and trimming of the skin edge, the wound was thoroughly rinsed with hydrogen peroxide and saline covered with Vaseline gauze, and bandaged with aseptic auxiliary materials.

2.6.4. Intraoperative precautions

Multiple methods were used to accurately locate the internal opening and thoroughly deal with it. The choice of surgical incision was mainly based on the depth and size of the fistula tract, which should be cleared thoroughly and drained adequately while minimizing sphincter damage. Strict aseptic conditions were maintained during the operation and the protection of fresh wounds was prioritized. This was to prevent postoperative infections caused by contamination. The patient was gently handled during the operation to protect the normal tissues and prevent injury to the important blood vessels and nerves.

2.6.5. Postoperative treatment

The postoperative treatment included several aspects:

Secondary care was provided. The condition of infants and young children changes rapidly after surgery, so they should be closely observed for any changes in body temperature, respiration, pulse, and heart rate, including symptoms of vomiting, gastroesophageal reflux, or aspiration to prevent choking.

After 4 hours of postoperative abstinence from drinking and fasting, the patient should be fed liquid food, and then back to a normal diet after 1 day according to the patient's condition.

Postoperative antibiotics were administered for 3 days. Administration of antibiotics was continued if the blood level was still high after 3 days.

After each bowel movement, the anus was flushed with hemorrhoidal flushing powder (internal preparation of Xi'an Hospital of Traditional Chinese Medicine, composed of 10 Chinese medicines such as manganese nitrate, alum, chrysanthemum, pepper, etc.) (1 bag each time, 1000 mL of hot water), and then fumigated (1 bag each time, 1000 mL of hot water) for 5–10 minutes.

Routine dressing change was carried out twice a day and the wounds were rinsed with hydrogen peroxide and saline. Cotton balls of type III aniline were used to disinfect the wounds. Gauze coated with ointment (at the early stage of 1–5 days) was applied to remove heat and toxins, decay, and regenerate muscle; during the late stage (6–15 days), the ointment was applied to activate blood circulation, remove blood stasis, regenerate muscle function, and relieve pain. If the wound is edematous, the ointment was used to reduce swelling and relieve pain. When the granulation tissue on the wound appeared fresh and the secretion was clear and in small amounts, the drainage strip was removed about 4–8 days after the operation.

3. Clinical efficacy evaluation standards

According to the Diagnostic and Therapeutic Effect Criteria of Chinese Medicine and Anorectal Diseases issued by the State Administration of Traditional Chinese Medicine in 1995, guiding principles for clinical research

of new Chinese medicine were formulated by the Ministry of Health. It was categorized into 4 levels: cured, effective, very effective, and ineffective. “Cured” indicated good wound healing with the disappearance of pus, pain, swelling, and itching; “effective” indicated good wound healing, disappearance of pus, and significant improvement of swelling, pain, and itching; “very effective” indicated unhealed wounds, partial disappearance of pus, and average improvement of swelling, pain, and itching; “ineffective” indicated unhealed wounds, presence of pus, and no improvements in swelling, pain, and itching. The total effective rate = (cured + effective + very effective)/number of cases × 100%.

Pain, anal margin edema, and urinary retention were recorded within 1 week after treatment. Pain was scored on a 4-point scale: 0 points = no pain, not affecting rest; 2 points = mild pain, affecting rest; 4 points = obvious pain, signs of crying; 6 points = severe pain, signs of crying. Anal margin edema and urinary retention were recorded based on the appearance of symptoms. The course of treatment was determined based on postoperative hospitalization time and wound healing time (days). Within 6 months after treatment, the patient was observed for recurrence of anal fistula at the original lesion site.

4. Observation indicators

4.1. Anal function

The anal function was assessed according to the Browning and Parks standard, where the scoring criteria were formulated as follows: 0 points = able to control the excretion of solids, liquids, and gases; 2 points = able to control the secretion of solids and liquids, but not gases; 4 points = able to control the excretion of solids, but not liquids and gases; 6 points = unable to control the secretion of solids, liquids, and gases. The scores between the two groups were compared preoperatively and at 1 month and 6 months postoperatively.

4.2. Digital rectal exam

The scoring criteria of the digital rectal exam were formulated as follows: 0 points = normal function of the wrapped finger; 2 points = signs of anal contraction, reduced function of the wrapped finger; 4 points = weak wrapped finger but signs of anal contraction; 6 points = no anal contraction. The scores between the two groups were compared preoperatively and at 1 month and 6 months postoperatively.

4.3. Measurement of postoperative pelvic floor electromyography and anorectal pressure

The scoring criteria were formulated as follows: 0 points = normal pelvic floor muscle electrical activity and anorectal pressure; 2 points = one of the pelvic floor muscle electrical activity and anorectal pressure is reduced, and the other one is normal; 4 points = the pelvic floor muscle electrical activity and anorectal pressure are both reduced; 6 points = the pelvic floor muscle electrical activity and anorectal pressure disappeared. The scores between the two groups were compared preoperatively and at 1 month and 6 months postoperatively.

5. Statistical processing

Statistical analysis was performed using the SPSS 20.0 software. Measurement data was analyzed using the chi-squared (χ^2) test; the rank sum test was used for the hierarchical data; and the paired *t*-test was used for the before-and-after comparisons within the group when normal distribution and chi-square were obeyed. Comparisons between groups were analyzed by analysis of variance (ANOVA). Results were considered statistically significant at $P < 0.05$.

6. Results

6.1. Comparison of the clinical efficacy between the two groups

As shown in **Table 1**, the total effective rate of both groups was 96.67%, and the differences between the groups were not statistically significant ($P > 0.05$).

Table 1. Comparison of clinical efficacy between the two groups of patients [n (%)]

Group	Cured	Effective	Very effective	Ineffective	Total effective rate
Treatment group ($n = 30$)	19 (63.33)	8 (26.67)	2 (6.67)	1 (3.33)	29 (96.67)
Control group ($n = 30$)	18 (60)	7 (23.33)	4 (13.33)	1 (3.33)	29 (96.67)

6.2. Comparison of postoperative pain, length of hospitalization, and healing time between the two groups

As shown in **Table 2**, the postoperative pain score, length of hospitalization, and healing time of the treatment group were lower than that of the control group, and the differences between the two groups were statistically significant ($P < 0.05$).

Table 2. Comparison of postoperative pain scores (points), hospitalization time, and healing time between the two groups (d)

Group	Postoperative pain	Length of hospitalization	Healing time
Treatment group ($n = 30$)	1.03 ± 0.22	7.63 ± 2.04	15.06 ± 4.01
Control group ($n = 30$)	1.38 ± 0.36	9.76 ± 2.55	19.96 ± 5.45
<i>t</i>	-4.54	-3.57	-3.97
<i>P</i>	< 0.05	< 0.05	< 0.05

There was no anal margin edema, urinary retention, or recurrence of anal fistula in either group. The anal function scores, anal diagnostic condition, pelvic floor electromyography, and anorectal manometry at preoperative, 1 month, and 6 months postoperative were all 0. The differences between the groups were not statistically significant ($P > 0.05$).

7. Discussion

An anal fistula is a common disease among pediatric anorectal diseases, and some data showed that 0.5%–4.3% of patients with anal fistula and perianal abscess were children^[1]. Studies abroad have found that more than 85% of infantile anal fistulas occur in the first year of life up to 1 year of age. This disease mainly affects more than 90% of male children, while female children are less affected. Although infantile fistulas may occur in any part of the perianal area, their external orifices are most commonly found on both sides of the anus in the 3 o'clock and 9 o'clock directions^[3]. As various organs in children are not fully mature, their immunity function is lowered, resulting in weak resistance to diseases. Generally, a visit to the clinic is recommended as the first conservative treatment. Treatments include external washing with a 1:5000 diluted potassium permanganate solution, sitz baths, and the systemic application of antibiotics in cases of acute inflammation. If the fistula recurs, radical surgery is performed after the child reaches childhood^[4]. Anal fistula is not self-healing and can only be treated through surgery. This treatment method is currently recognized by both Chinese and Western

medicine practices.

Professor Liang believes that infants and young children with anal fistula patients require surgical treatment as soon as possible to treat the disease. As the child grows up, the low simple anal fistula may progress into a complex anal fistula. Surgical risks and chances for recurrence also increase, which may have a negative postoperative impact on the function of the anus. Hence, it is recommended that affected infants and young children be diagnosed and treated early to alleviate the burden on the patient and their family^[5].

Traditional resection for low anal fistula is advantageous due to its short duration, smooth drainage, and easy dressing change. However, this procedure easily damages normal tissue, increasing the patient's risk of serious complications such as incomplete anal incontinence and anal deformity^[6]. Hanging fistula has the advantages of minimizing trauma, less bleeding, and reduces the risk of anal incontinence and deformity^[7]. Its slow process makes it suitable for the treatment of high anal fistula but is prone to anal foreign body sensation, with more obvious and persistent pain. Furthermore, the presence of rubber bands

allows for feces accumulation, which makes cleaning inconvenient.

According to the anatomical location of the anal glands in infants and young children, this study innovatively used anal gland excision and virtual hanging wire surgery to treat low anal fistula in infants and young children. Anal gland excision and virtual hanging line surgery have several advantages. Firstly, this procedure completely removes infected anal glands from the source of the infection. The surgical excision of the proximal fistula ensures smooth drainage to avoid contamination of the affected area by feces and secretions. This is also to determine whether the fistula is connected with the other anal glands to avoid residual branch tubes which could result in the recurrence of the anal fistula. Ligation of excess mucosa around the inner opening leaves a ligation line not only to avoid mucosal ectasia but also to avoid the formation of residual cavities, which could result in false healing. This process also reduces postoperative bleeding. This surgical process involves the complete removal of the distal fistula wall, where rubber bands are loosely placed around the lumen to prevent residual epithelium of the wall, which may lead to recurrence. This is also to retain the integrity of the perianal skin and subcutaneous tissue.

8. Conclusion

Anal gland excision and virtual hanging wire surgery for the treatment of low anal fistula in infants and young children have the advantages of smaller wounds, reduced pain, rapid wound healing, and no damage to the anal function, which is worthy of clinical popularization.

Funding

Xi'an Municipal Bureau of Science and Technology, No. 21YXYJ0060

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Yoshino H, Kawakami K, Yoshino G, et al., 2016, Case of Anal Fistula with Fournier's Gangrene in an Obese Type 2 Diabetes Mellitus Patient. *J Diabetes Investig*, 7(2): 276–278.

- [2] Graf W, Andersson M, Kerlund JE, et al., 2016, Long-Term Outcome after Surgery for Crohn's Anal Fistula. *Colorectal Dis*, 18(1): 80–85.
- [3] Sun YT, Liang HT, Wang Chen, 2021, Research Progress of Factors Related to the Development and Treatment of Anal Fistula in Infants and Children. *Journal of Clinical Pediatric Surgery*, 20(1): 69–73.
- [4] Wang X, 2022, Progress in the Treatment of Perianal Abscess and Anal Fistula in Infants and Children. *Wisdom Health*, 8(15): 35–37.
- [5] Hao Z, Liang J, 2019, Professor Liang Jinghua's Experience in Treating Perianal Infections in Infants and Children. *Western Chinese Medicine*, 32(11): 50–52.
- [6] Liu M, Zhao B, 2023, Research Progress on Etiology and Treatment of Pediatric Perianal Abscess and Anal Fistula. *Chinese Pediatrics with Integrative Medicine*, 15(2): 121–124.
- [7] Chen JX, 2023, Clinical Effect Observation of Anal Fistula Hanging Wire Surgery for the Treatment of Low Anal Fistula in Infants and Children. *Transportation Medicine*, 37(1): 93–94.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.