Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Pioneering a Novel Cauterising Alum and Silver Nitrate (CAS) Approach for Infantile Perianal Fistulas: A Retrospective Cohort Study

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Cite this paper as: Anas Shikha, Mashal Ahmed, Zahraa Zaghloul, Khalid Eltaeb, Janice Wong, (2025) Pioneering a Novel Cauterising Alum and Silver Nitrate (CAS) Approach for Infantile Perianal Fistulas: A Retrospective Cohort Study. *Journal of Neonatal Surgery*, 14 (32s), 8363-8368.

ABSTRACT

Background: Perianal fistulas in infants pose significant management challenges, often necessitating a difficult choice between prolonged conservative observation and invasive surgical interventions. These treatment options are typically associated with prolonged discomfort or complications, highlighting the need for a more efficient alternative to address current challenges.

Aim and Method: This retrospective cohort study involved infants under 18 months treated for perianal fistulas, either as complications of perianal abscesses or as primary perianal fistulation, at the only paediatric surgical unit in X country from 1st August 2019 to 31st July 2023. The Cauterising Alum and Silver Nitrate (CAS) treatment involved flushing the fistula with alum and silver nitrate solutions, administered at two-week intervals until discharge ceased.

Results: A total of 21 fistulas in 18 patients were treated using CAS. The majority of patients achieved cessation of discharge within one month (90%), with only one case of fistula recurrence requiring an additional application of CAS and two other cases of recurrent abscess treated conservatively with drainage and antibiotics, without further recurrence. Follow-up at a mean of 15.5 months after symptom resolution revealed no adverse effects, although 24% developed simple granulomas requiring topical management.

Conclusion: The CAS treatment approach offers a promising, minimally invasive alternative for managing perianal fistulas in infants, achieving rapid resolution and avoiding surgery. Despite a small sample size and single-centre scope, the consistent protocol provides valuable insights into this effective outpatient option for infant care.

Keywords: *Perianal Fistula, Infant Fistula, Alum, Silver Nitrate, Fistula Cauterisation*

1. INTRODUCTION

Perianal fistulas in infants present a persistent challenge in paediatric surgery, as current treatment options often require balancing prolonged conservative management [1-3] with more invasive surgical interventions [4,5]. Conservative approaches, such as observation, can lead to extended periods of discomfort and ongoing discharge, while surgical solutions carry their own risks, particularly in this vulnerable age group. Consequently, there is a growing need for an alternative, non-invasive yet effective treatment that can expedite healing without the risks associated with surgery.

Potassium Aluminium Sulfate (Alum) has been used for centuries due to its astringent, anti-inflammatory, and antimicrobial properties [6-11]. Silver Nitrate (SN) is another effective agent commonly employed for its cauterising abilities, alongside its antimicrobial benefits [12-16]. While the solitary use of silver nitrate in treating perianal fistulas has been explored in previous studies, yielding promising but variable results [17,18], no consistent standard of care has been established. This study is the first to document a combination treatment involving a novel combination therapy involving Alum and SN. By harnessing the cauterising properties of SN, the astringent effect of Alum, and the strong antimicrobial properties of both agents, this approach aims to provide a quicker resolution of perianal fistulas while minimising the complications associated with surgical intervention.

This study seeks to demonstrate that the Cauterising Alum and Silver Nitrate (CAS) protocol offers an effective outpatient solution, providing shorter treatment times, minimal complications, and, most importantly, a non-surgical path to resolution. Given the limited treatment options available for this condition, the introduction of an approach that could redefine the management of infantile perianal fistulas is both timely and necessary.

2. AIM AND METHOD

This retrospective cohort study examines all infants under 18 months treated for perianal fistula at the sole paediatric surgical unit in X country, from 1st August 2019 to 31st July 2023. The CAS treatment protocol was introduced on 1st August 2019 and was consistently applied to all eligible cases throughout the study period.

A perianal fistula was defined as the persistent discharge of mucus and/or stool from a mature external opening near the anal verge. This encompassed infants who initially presented with perianal abscesses that later evolved into fistulas after the resolution of inflammation, as well as those who primarily presented with stool discharge from an additional opening in the perineum. Infants with systemic diseases or congenital colorectal anomalies were excluded from the study to ensure a more uniform cohort.

Once a perianal fistula was diagnosed, parents were informed about the CAS procedure and consent was obtained, which was then performed at the bedside in an outpatient setting. The infant was positioned in the lithotomy (supine frog-leg) position to provide optimal exposure of the perianal region (Figure 1). The fistula tract was first flushed with a 20% alum solution, either through a syringe nozzle or using the plastic outer sheath of an intravenous IV cannula (without the needle). This was followed by the application of a 20% silver nitrate solution or, in cases of larger fistulas, the direct application of 75% silver nitrate on a stick. The treatment was repeated at two-week intervals until the cessation of discharge was achieved.

After the resolution of symptoms, follow-up appointments were scheduled at three-month intervals. A dedicated hotline was also provided for parents to report any recurrence or concerns, allowing for early intervention if necessary.

The primary objective of this study was to evaluate the efficacy and safety of the CAS treatment protocol. This was done by calculating the rate of fistula resolution, the number of CAS applications required to achieve cessation of discharge, the duration of treatment, and the incidence of complications, along with their management strategies.

This study utilised a single treatment protocol (CAS) applied consistently across all eligible cases, which minimises potential confounding by controlling for treatment variability. The absence of comparative groups limits the need for confounder adjustments, as the study's aim is descriptive, focusing on the treatment's observed outcomes within a defined cohort. Although retrospective, adherence to a pre-established CAS protocol may help reduce selection and treatment biases often associated with observational studies.

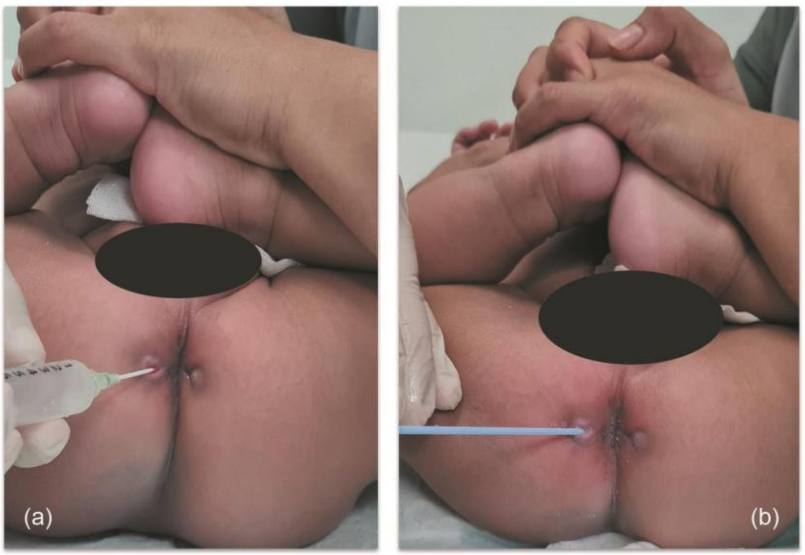

Figure 01: Metachronous Perianal Fistula Located at 9 O' clock Position.

The infant's lower limbs are held in a frog-leg position against the abdomen to optimise exposure. Previously treated fistula site is noted at the 3 o'clock position. **(a)** Application of 10% Potassium Aluminium Sulfate (Alum) using a syringe attached to the outer sheath of an intravenous cannula. **(b)** Application of 75% Silver Nitrate on a stick.

3. RESULTS

A total of 21 perianal fistulas in 18 infants were identified and treated with CAS. The cohort had a predominance of males, with only two female patients. The mean age at presentation was 4 months, and none of the patients had known associated anomalies or systemic diseases.

Three patients developed metachronous fistulas on the contralateral side (at the 3 o'clock or 9 o'clock positions). All of these cases initially presented with a perianal abscess that evolved into fistulas. Most fistulas in male patients were located at the 3 O'clock (n=12) and 9 O'clock (n=7) positions, while the two female patients had fistulas at the 1 O'clock and 11 O'clock positions.

Seventeen patients initially presented with perianal abscesses, which later progressed to fistulas. The remaining four patients, including the two females, presented with a stools-discharging fistula at their first evaluation.

The majority of fistulas (n=15, 71%) required only one application of CAS to achieve cessation of discharge. Four fistulas (19%) needed two applications, and two fistulas (10%) required three applications. Discharge resolution was achieved within one month in 19 fistulas (90%), and within two months in the remaining 2 fistulas (10%). Notably, none of the patients required surgical intervention.

Recurrence of fistulation occurred in one patient (5%) three months after treatment, and a single application of CAS successfully resolved the issue. Two patients (10%) developed small abscesses (without fistulation) during follow-up, which were managed with needle incision, drainage, and a one-week course of antibiotics.

Patients were followed for a mean duration of 15.5 months after symptom resolution. No adverse effects were reported. However, five patients (24%) developed simple granulomas at the ex-fistula opening, which required one to three applications of silver nitrate.

The results are summarised in Table 1.

Total fistulas (Male: Female)		21 (19:2)
Presentation	Perineal abscess	17 (81%)
	Primary fistulation	4 (19%)
Age at presentation	Mean (SD)	4.11 (2.05)
	Median [Min, Max]	4 [1, 8]
Location of the fistula	9’	7 (33%)
	3’	12 (57%)
	Others	2 (10%)
Complications after treatment	Recurrent Fistula	1 (5%)
	Recurrent Abscess	2 (10%)
	External Granuloma	5 (24%)
Follow-up after resolution	Mean (SD)	15.5 (2.3)
	Median [min, max]	15 [13, 19]

Table 1: Summary of the Results.

SD: Standard Deviation

4. DISCUSSION

Anatomical abnormalities in the anal crypts, combined with infection, are primary factors in developing perianal abscesses and fistulas in infants. While fistulas can arise independently, most cases present following abscess formation. In males, fistulas often appear at the 3 and 9 o'clock positions, potentially due to androgenic effects on anal glands. In females, a more anterior fistula position is observed, likely influenced by the proximity of vaginal vestibule glands, distinct perineal anatomy, and possibly hormonal factors, though direct evidence remains limited [19]. While multiple factors may contribute to the progression of perianal abscess into fistula, the synergistic effect of multidrug-resistant bacteria and abscess recurrence appears to be the most influential. However, these have been discussed in detail elsewhere and are beyond the scope of this study [20].

The treatment of perianal fistulas in infants remains a debated topic, particularly when comparing conservative approaches to surgical intervention. Conservative treatments, such as observation, have been associated with lengthy recovery periods (ranging from 6 to 18 months) and higher rates of recurrence and abscess formation (25-60%). While this method is less invasive, it often requires prolonged treatment, and in some cases, the fistula fails to resolve [1-3]. In contrast, surgical options, including fistulectomy or fistulotomy, offer quicker resolution but come with their own set of complications, such as recurrence and potential risks related to scarring and incontinence [4,5]. In the context of these challenges, many infants can experience spontaneous recovery within the first two years of life without the need for surgical intervention, which supports the case for conservative management as a first-line approach in some cases [1, 2]. However, conservative management alone may leave some infants vulnerable to prolonged discomfort, parental anxiety and the potential for recurrence.

This study aims to address the limitations of both conservative and surgical management by exploring the value of a non-surgical approach using a combination of Alum and SN. This approach is based on the authors' hypothesis that the established history, safety, and suitability of these agents for this condition would offer an effective alternative.

Historically, Alum has been used in medicine for centuries, with Avicenna highlighting its ability to stop bleeding, reduce inflammation, and treat topical infections as early as 1025 in his *Canon of Medicine* [6]. Alum's versatility and safety are well-supported, as it has been employed across various cultures and medical traditions. Over the centuries, it has seen diverse applications, including larger-scale irrigation procedures, such as bladder irrigation to control haemorrhage. Multiple studies affirm alum's safety, noting its lack of systemic side effects and its non-damaging effect on normal tissues, even when used in larger volumes [7-9]. This evidence underlines alum's suitability for smaller applications, such as perianal fistulas in infants, where the volume used is minimal, thus posing a negligible risk, if any, of adverse effects. Additionally, alum possesses potent antibacterial properties, effectively targeting skin bacteria like *Staphylococcus* and *Corynebacterium*, along with *Escherichia coli*, *Enterococcus faecalis*, and *Klebsiella pneumoniae*, which are often implicated in infections associated with perianal fistulas. Its astringent qualities help reduce inflammation and local secretions, limiting infection spread and moisture around the fistula site [10,11]. This drying and antibacterial action makes alum particularly beneficial in managing perianal fistulas, as reducing moisture can prevent secondary infections that complicate healing and contribute to recurrence.

Silver compounds also have a rich history in medical use, primarily as an antimicrobial agent. Its mechanism involves disrupting bacterial cell membranes and inhibiting DNA replication, making it effective against a broad range of pathogens [12,13]. SN's cauterising properties have been well-documented in the treatment of conditions like epistaxis and bronchopleural fistulas, further demonstrating its utility in promoting healing through tissue cautery and wound closure [14-16]. Recent studies show its promise in treating anal fistulas, although prolonged treatment periods were required in some cases, raising questions about the contribution of spontaneous resolution versus the SN itself [17,18].

The CAS treatment presents a promising and minimally invasive approach for managing perianal fistulas in infants, offering a unique combination of Alum and SN to maximise therapeutic effectiveness. Alum's astringent qualities help reduce inflammation and secretion while its antimicrobial properties support infection control; paired with SN's proven cauterising effect and ability to prevent bacterial colonisation, this combination provides a multifaceted solution. Our study demonstrated a 100% resolution rate, with most cases (90%) resolving within one month, highlighting CAS as a rapid alternative to traditional, often prolonged methods. Importantly, even the limited instances of recurrence (one fistula and two abscesses) were resolved without the need for surgery: the recurrent fistula responded to a second CAS application, while the abscesses were managed with drainage and antibiotics. These cases did not require further treatment, underscoring CAS's reliability in managing recurrence non-surgically. The only minor complication observed was simple granuloma formation at the ex-fistula site, which was easily managed with topical care. Overall, the high rate of resolution within a short timeframe, combined with minimal complications and the ability to avoid surgical intervention, positions CAS as a potentially transformative approach in setting a new standard for treating perianal fistulas in this vulnerable age group.

A key strength of this study is the use of a consistent CAS treatment protocol, applied uniformly to all eligible patients. This standardisation not only enhances the reliability of the outcomes but also introduces prospective elements by following a structured intervention approach, which mitigates certain biases typically associated with retrospective designs. As a result, the CAS protocol provides a dependable framework for evaluating treatment efficacy within the limitations of observational

research.

5. CONCLUSION

The CAS treatment approach presents a promising, minimally invasive alternative for managing perianal fistulas in infants, effectively bridging the gap between conservative observation and surgical intervention. By achieving rapid resolution without surgical risks and significantly reducing the discomfort associated with prolonged observation, CAS offers a streamlined, low-complication solution that could redefine the standard of care. This safe, efficient method addresses key challenges in current treatment options, providing an innovative pathway to manage this challenging condition with both efficacy and patient comfort in mind.

6. LIMITATION

This study is limited by its small sample size, single-centre design, and lack of a control or comparative group, which may restrict the generalisability of findings. Furthermore, without statistical analysis, conclusions are primarily descriptive. However, the consistent CAS protocol across cases provides a standardised framework, reducing treatment variability and supporting the reliability of observed outcomes. Future studies with larger, multi-centre samples and comparative groups could better evaluate CAS efficacy across diverse settings

REFERENCES

[1] Rosen N, Gibbs D, Soffer S, Hong A, Sher M, Peña A. The nonoperative management of fistula-in-ano. J Pediatr Surg. 2000;35(6):938-9. doi:10.1053/jpsu.2000.6931.

[2] Watanabe Y, Todani T, Yamamoto S. Conservative management of fistula in ano in infants. Pediatr Surg Int. 1998;13:274-6. doi:10.1007/s003830050315.

[3] Chang H, Ryu J, Oh J. Clinical characteristics and treatment of perianal abscess and fistula-in-ano in infants. J Pediatr Surg. 2010;45(9):1832-6. doi:10.1016/j.jpedsurg.2010.03.021.

[4] Stokes R, Wanaguru D, Saadi A, Adams S. Management of perianal abscesses in infants without general anaesthesia: a systematic review of the literature. Pediatr Surg Int. 2020;36:1317-25. doi:10.1007/s00383-020-04728-7.

[5] Puliński M, Hawryluk N, Choiński W. Analysis of treatment methods and outcomes for perianal abscess (PA) and fistula in ano (FIA) in infants. Nowa Med. 2020;27(2):33-9. doi:10.25121/nm.2020.27.2.33.

[6] Avicenna. The canon of medicine. In: Goodman LE, translator. Oxford: Oxford University Press; 1999. Chapter 2, Medical substances. Original work published 1025.

[7] Goel AK, Rao MS, Bhagwat AG, Vaidyanathan S, Goswami AK, Sen TK. Intravesical irrigation with alum for the control of massive bladder hemorrhage. J Urol. 1985;133(6):956-7. doi:10.1016/s0022-5347(17)49330-x.

[8] Arrizabalaga M, Extramiana J, Parra JL, Ramos C, Díaz González R, Leiva O. Treatment of massive haematuria with aluminous salts. Br J Urol. 1987;60(3):223-6. doi:10.1111/j.1464-410x.1987.tb05487.x.

[9] Ostroff EB, Chenault OW Jr. Alum irrigation for the control of massive bladder hemorrhage. J Urol. 1982;128(5):929-30. doi:10.1016/s0022-5347(17)53282-6.

[10] Alzomor AK, Moharram AS, Al Absi NM. Formulation and evaluation of potash alum as deodorant lotion and after shaving astringent as cream and gel. Int Curr Pharm J. 2014;3(2):228-33. doi:10.3329/icpj.v3i2.17512.

[11] Amadi LO. A review of antimicrobial properties of alum and sundry applications. Acta Sci Microbiol. 2020;3(6):55-63. doi:10.31080/asmi.2020.03.0553.

[12] Politano A, Campbell K, Rosenberger L, Sawyer R. Use of silver in the prevention and treatment of infections: silver review. Surg Infect (Larchmt). 2013;14(1):8-20. doi:10.1089/sur.2011.097.

[13] Rai M, Yadav A, Gade A. Silver nanoparticles as a new generation of antimicrobials. Biotechnol Adv. 2009;27(1):76-83. doi:10.1016/j.biotechadv.2008.09.002.

[14] Green M, Tailor H, Keh S. Historical use of silver nitrate for the management of epistaxis – evidence-based practice? J Laryngol Otol. 2022;137:962-4. doi:10.1017/S0022215122002146.

[15] Stratakos G, Zuccatosta L, Porfyridis I, et al. Silver nitrate through flexible bronchoscope in the treatment of bronchopleural fistulae. J Thorac Cardiovasc Surg. 2009;138(3):603-7. doi:10.1016/j.jtcvs.2008.10.054.

[16] Boudaya M, Smadhi H, Zribi H, et al. Conservative management of postoperative bronchopleural fistulas. J Thorac Cardiovasc Surg. 2013;146(3):575-9. doi:10.1016/j.jtcvs.2013.04.023.

[17] Attaallah W, Tuney D, Gulluoglu B, et al. Should we consider topical silver nitrate irrigation as a definitive nonsurgical treatment for perianal fistula? Dis Colon Rectum. 2014;57:882-7.

doi:10.1097/DCR.0000000000000143.

[18] Kaya S, Altuntas YE, Kement M, et al. Outcomes of silver nitrate use in perianal fistula: are perianal fistulas still a nightmare for surgeons? Ann Ital Chir. 2019;90:480-4. PMID:31617853.

[19] Shafer AD, McGlone TP, Flanagan RA. Abnormal crypts of Morgagni: the cause of perianal abscess and fistula-in-ano. J Pediatr Surg. 1987;22(3):203-4.

[20] Shikha A, Ahmed M, Wong ER, Eltaeb K, Wong J. Limited incision-and-drainage versus conservative management of perianal abscess in infants. Pediatr Surg Trop. 2025;2(2):96-101.