Section: General Surgery

Original Research Article

A COMPARATIVE STUDY ON THE EVALUATION OF OUTCOME OF CYANOACRYLATE GLUE VS FISTULECTOMY IN THE MANAGEMENT OF FISTULA-IN-ANO

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Received : 06/02/2026
Received in revised form : 24/03/2026
Accepted : 10/04/2026

Keywords:
Fistula-in-Ano, cyanoacrylate glue, fistulectomy, sphincter-preserving surgery, anorectal fistula, minimally invasive coloproctology, post-operative pain, anal continence.

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DOI: 10.47009/jamp.2026.8.2.155

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (2); 842-848

ABSTRACT

Background: Fistula-in-Ano is a common anorectal condition arising predominantly from cryptoglandular apparatus. Fistulectomy remains the most frequently performed surgical intervention, yet it carries inherent risks of sphincter injury, incontinence, and wound morbidity. Cyanoacrylate glue (CAG) has emerged as a sphincter-preserving, minimally invasive alternative, offering potential advantages in postoperative recovery and patient comfort. The aim is to identify the optimal surgical intervention for uncomplicated fistula-in-ano through a structured prospective comparison of cyanoacrylate glue injection and conventional fistulectomy, with a focus on peri-operative outcomes and patient recovery. **Materials and Methods:** A prospective comparative study was conducted at Dhanalakshmi Srinivasan Medical College and Hospital over six months. Thirty patients with uncomplicated fistula-in-ano were allocated into two treatment arms of 15 each: Group A received cyanoacrylate glue injection and Group B underwent conventional fistulectomy. Outcome parameters assessed included postoperative pain, wound healing, recurrence rate, duration of hospital stay, perianal scarring, and cost-effectiveness at defined intervals across the study period. **Result:** Group A demonstrated significantly shorter operative time (22.3 ± 5.1 vs. 48.7 ± 10.4 min; $p<0.001$), reduced hospital stay (1.1 vs. 3.8 days; $p<0.001$), markedly lower post-operative pain scores on Day 1 and Day 7, and earlier resumption of daily activity (4.2 vs. 14.6 days; $p<0.001$). Wound complications and faecal incontinence were significantly lower in Group A. Recurrence at six months was numerically higher in Group A (13.3%) versus Group B (6.7%), though this difference did not reach statistical significance ($p=0.11$). Primary healing was superior in Group B (93.3% vs. 80%). **Conclusion:** Cyanoacrylate glue injection is a safe and sphincter-preserving technique offering measurable advantages in operative simplicity, peri-operative comfort, and early functional recovery. Conventional fistulectomy retains superiority in primary healing and recurrence prevention. Stratified patient selection and procedural standardisation remain critical determinants of cyanoacrylate success.

INTRODUCTION

Fistula-in-ano is one of the oldest and most frequently encountered problems in anorectal surgery. References to the condition appear as far back as the writings of Hippocrates, who described a rudimentary form of seton treatment. Despite centuries of surgical attention, the condition continues to challenge surgeons in balancing effective cure against the preservation of sphincter function and patient quality of life.[1-3]

The term 'fistula' derives from the Latin word for pipe or reed, aptly describing the pathological tract that forms between the anal canal and the perianal skin. The annual incidence is estimated at approximately 1.2 to 2.8 per 10,000 population, with a consistent male preponderance. The condition spans all age groups, though it most commonly affects adults in the second through fifth decades of life.[4-6]

Pathophysiology: The Cryptoglandular Theory: The most widely accepted explanation for the origin of fistula-in-ano is the cryptoglandular theory, proposed by Parks in 1961. According to this theory, infection begins in the anal glands situated within the inter-sphincteric space. These glands, numbering six to ten, drain into the anal crypts at the level of the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

dentate line. Obstruction of the gland ducts leads to stasis, subsequent bacterial proliferation, and abscess formation. If the abscess ruptures spontaneously or is inadequately drained, a persistent epithelialized tract develops between the anal canal and the perineal skin, constituting a fistula.[7-9]

The internal opening is almost invariably located at the dentate line. The external opening may appear anywhere on the perianal skin, though Goodsall's rule provides a useful guide to predicting the likely course of the tract. Tracts arising from posterior external openings tend to follow a curved course to the posterior midline, while those arising anteriorly usually travel directly to the dentate line.[10]

Parks classified fistulas into four anatomical types based on the relationship of the tract to the external anal sphincter: inter-sphincteric, trans-sphincteric, supra-sphincteric, and extra-sphincteric. Inter-sphincteric fistulas are the most common, accounting for approximately 45 percent of all cases. Trans-sphincteric fistulas, which traverse both sphincters, represent around 30 percent. Supra-sphincteric and extra-sphincteric varieties are less common but surgically more demanding.[12]

Burden of Disease: Fistula-in-ano constitutes a significant proportion of colorectal surgical workload in both government and private institutions in India. Patients present with chronic perianal discharge, discomfort, and recurrent episodes of local sepsis. The condition impairs physical activity, hygiene, and psychosocial functioning. Repeated surgical interventions contribute to cumulative sphincter damage, heightening the risk of faecal incontinence and further reducing quality of life.[13-15]

Limitations of Conventional Fistulectomy: Fistulectomy, the excision of the fistulous tract from external to internal opening, has for decades been the standard surgical treatment. The procedure offers direct visualisation of the entire tract and allows pathological tissue to be sent for histopathological examination. However, it is not without significant drawbacks.

The primary concern with fistulectomy is the risk of damage to the anal sphincter complex. When the tract traverses a substantial portion of the external sphincter, excision may compromise continence to varying degrees—ranging from minor soiling to frank incontinence of flatus and stool. Published literature reports incontinence rates ranging from 3 to 54 percent, depending on the level of the tract, the extent of sphincter involvement, and surgeon experience. The wide variation in these figures reflects the heterogeneity of fistula complexity across studies.

In addition to incontinence, fistulectomy is associated with a prolonged healing period. The wound is left open to heal by secondary intention, necessitating regular dressing changes over weeks to months. This imposes a significant burden on patients and healthcare resources alike. Infection, delayed healing, and cosmetically unacceptable perianal scarring are further recognised complications. Recurrence rates after fistulectomy have been reported to range from 2 to 9 percent in simple fistulas and may be considerably higher in complex cases.[16-18]

The Rationale for Cyanoacrylate Glue: The shortcomings of conventional surgery have driven the search for sphincter-preserving alternatives. These include the advancement flap, the ligation of inter-sphincteric fistula tract (LIFT) procedure, fibrin glue instillation, bioprosthetic plugs, and cyanoacrylate-based tissue adhesives.

Cyanoacrylate glue (CAG) belongs to the family of alkyl cyanoacrylate adhesives, which polymerise rapidly upon contact with tissue moisture to form a rigid, haemostatic plug. In fistula surgery, the glue is instilled into the curetted and irrigated tract, occupying the dead space and providing a scaffold for fibroblastic ingrowth and tissue regeneration. The procedure can be performed under spinal or local anaesthesia as a day-care surgery.

The key advantages of CAG include the complete preservation of the sphincter mechanism, a short operative time, minimal postoperative pain, and a rapid return to normal activity. Being a minimally invasive technique, it avoids the creation of a perianal wound altogether, eliminating wound-related morbidity. The cost of the adhesive, while initially higher than conventional suture material, is offset by the shorter hospital stay and reduced requirement for dressing changes and follow-up visits. This cost argument holds particular relevance in the Indian healthcare setting, where outpatient follow-up and wound care represent a substantial indirect cost to patients.

The present prospective comparative study, conducted at the Department of General Surgery, Dhanalakshmi Srinivasan Medical College and Hospital, was designed to generate a structured patient-centred comparison of cyanoacrylate glue injection and conventional fistulectomy in patients with uncomplicated fistula-in-ano. Outcomes were evaluated across the domains most relevant to patients and clinicians: post-operative pain, wound healing, hospital stay, continence, recurrence, and cost-effectiveness — with the intent of informing evidence-based procedure selection in routine surgical practice.[19,20]

Aim

To determine the most appropriate surgical intervention for uncomplicated fistula-in-ano by undertaking a prospective comparative evaluation of conventional fistulectomy and cyanoacrylate glue injection, with particular focus on the post-operative complication profile and patient recovery trajectory.

Objectives

1. **Post-operative Pain:** To quantify and compare pain intensity in the immediate and early post-operative period in both study groups using the Visual Analogue Scale (VAS) at standardised time points.
2. **Perianal Wound and Scar:** To assess the character, extent, and chronological progression

ISSN (O): 2687-5365; ISSN (P): 2753-6556

of wound healing and perianal scar formation following each procedure across the defined follow-up period.

3. **Duration of Hospital Stay:** To document and compare the total inpatient duration for each group and evaluate its implications for patient convenience, cost, and institutional resource utilisation.
4. **Cost-effectiveness:** To compare the total procedural expenditure — encompassing operative materials, anaesthesia, inpatient stay, and post-operative care — between cyanoacrylate glue injection and conventional fistulectomy.
5. **Operative Time, Recurrence, and Continence:** To additionally record operative duration, six-month recurrence rates, and continence status assessed using the Wexner Incontinence Score as secondary outcome parameters.

Review of Literature

Historical Evolution of Fistula Surgery: The surgical history of fistula-in-Ano spans more than two millennia. Hippocrates described a form of seton treatment — passing a thread through the tract to gradually divide the sphincter — a principle refined over subsequent centuries and still employed today for high trans-sphincteric tracts. Sir Alan Parks, in his landmark 1961 publication, systematised the anatomical classification of fistula-in-Ano and established the conceptual framework upon which contemporary surgical decision-making rests. Parks also described the inter-sphincteric approach, which confines dissection to the inter-sphincteric plane, entirely preserving the external sphincter.

The latter decades of the twentieth century witnessed the introduction of a succession of sphincter-preserving techniques aimed at reducing incontinence without sacrificing healing rates. Mucosal advancement flaps, bioprosthetic plugs, and the LIFT procedure each sought to address the recurrence-versus-incontinence trade-off inherent in fistula surgery, with variable and often inconsistent outcomes across reported series.

Fibrin and Tissue Adhesives in Fistula Management: The first reported use of fibrin glue for fistula tract sealing was by Hjortrup and colleagues in 1991, with initial success rates between 60% and 85% in simple fistulas. Subsequent studies, however, demonstrated considerable variability in outcomes, with longer-term recurrence rates substantially eroding initial enthusiasm. The technique nonetheless established the conceptual proof that biological sealing of the tract — without sphincter division — could achieve healing.

Cyanoacrylate tissue adhesives were originally developed for wound closure and haemostasis in military medicine during the 1960s. Their application to fistula-in-ano was first described in the early 2000s. Unlike fibrin glue, which is derived from blood products, cyanoacrylate is a synthetic polymer less susceptible to degradation by proteolytic enzymes, yielding a more durable scaffold within the fistulous tract.

Key Comparative Studies: Koli et al. (International Surgery Journal, 2017) evaluated cyanoacrylate glue in the management of fistula-in-ano and reported reduced operative time, minimal intraoperative blood loss, and a favourable patient comfort profile compared to conventional approaches. The authors identified the complete absence of a perianal wound as the most clinically significant advantage, eliminating wound infection and prolonged dressing requirements.

Sharma et al. (International Journal of Surgery, 2016) demonstrated that primary healing was achieved in a meaningful proportion of patients with simple inter-sphincteric and low trans-sphincteric tracts. The study emphasised that meticulous tract preparation — including thorough curettage and copious saline irrigation — was essential to optimise glue adhesion and minimise recurrence risk.

Shruti S. conducted a prospective study directly comparing cyanoacrylate glue injection with conventional fistulectomy. Patients in the glue group experienced shorter hospital stays, reduced analgesic requirements, and a faster return to normal daily activities. Recurrence rates at short-term follow-up were broadly comparable between groups, though the investigators acknowledged the need for extended observation to draw definitive conclusions.

Advantages and Limitations of Cyanoacrylate Glue: The principal advantages of CAG are well-established in the contemporary literature: unconditional sphincter preservation, absence of a perianal wound, short operative duration, suitability for ambulatory surgery, and low immediate post-operative morbidity. Its applicability across multiple fistula anatomical subtypes and the technical accessibility of repeat treatment in cases of recurrence further enhance its clinical appeal.

The principal limitation of cyanoacrylate glue is the risk of tract recanalization, particularly when internal opening closure is incomplete or when residual infected tissue persists within the tract. Long-term recurrence rates have been reported between 20% and 40% in some series — considerably higher than those associated with fistulectomy in experienced hands. Patient selection is therefore critical: cyanoacrylate glue appears best suited for simple, low fistulas with a single, well-defined tract and a clearly accessible internal opening.

MATERIALS AND METHODS

Study Design and Setting: This was a prospective comparative interventional study conducted at the Department of General Surgery, Dhanalakshmi Srinivasan Medical College and Hospital, over a continuous six-month period.

Sample Size Calculation: Sample size was computed using the methodology described by Rajat Sharma et al., applying the standard formula: $N = Z^2(\alpha) \times \sigma^2 / d^2$, where $Z(1-\alpha/2) = 1.96$ (at 95% confidence, two-tailed), $\sigma = 14.5$ (standard deviation from the reference study), and $d = 5$ (permissible

ISSN (O): 2687-5365; ISSN (P): 2753-6556

precision). This yielded $N = (1.96)^2 \times (14.5)^2 / (5)^2 = 32.31$, operationally rounded to 30 patients (15 per arm) for this single-centre pilot study.

Patient Selection

Table 1: Inclusion and Exclusion Criteria for Study Enrolment

Inclusion Criteria	Exclusion Criteria
Age ≥ 18 years	Complicated or complex fistula-in-ano
Uncomplicated fistula-in-Ano (inter-sphincteric or low trans-sphincteric)	Recurrent fistula-in-ano or prior anorectal surgery
No prior anorectal surgical intervention	Immunocompromised states, Crohn's disease, or tuberculosis-associated fistula
Willingness to participate and complete scheduled follow-up	Active perianal sepsis mandating staged operative intervention
	Pregnancy or lactation

Patient Allocation: Thirty consecutive eligible patients were enrolled and allocated into two treatment arms of 15 patients each by randomisation. Group A (n=15) received cyanoacrylate glue injection and Group B (n=15) underwent conventional fistulectomy. Both procedures were performed under spinal anaesthesia, and all operating surgeons had equivalent proficiency in both techniques, ensuring procedural standardisation across groups.

Surgical Techniques: Group A – Cyanoacrylate Glue Injection: Following pre-operative mechanical bowel preparation and intravenous antibiotic prophylaxis. Under spinal or local anaesthesia, the patient was positioned in the lithotomy position. Per rectal examination and proctoscopy inspection was done and internal opening was visualised. The tract was identified by probing and confirmed with hydrogen peroxide.

The tract was thoroughly curetted with a metallic curette to remove all granulation tissue and debris. Vigorous irrigation with normal saline was performed to cleanse the canal.

Cyanoacrylate glue was then carefully instilled into the tract using a fine cannula introduced through the external opening, progressively withdrawn as the glue was injected from internal to external end. The internal opening was closed separately with an absorbable suture where anatomically accessible. The external opening was dressed with a small non-adherent pad.

Patients were discharged the same day or the following morning with oral analgesics, antibiotics, and dietary advice. Wound care instructions were provided. Follow-up was arranged at one week, four weeks, and three months.

Group B – Conventional Fistulectomy: All procedures were performed under spinal anaesthesia with the patient in the lithotomy position. The external opening of the fistula was probed, and a malleable probe was gently passed through the tract to identify the internal opening. The tract was delineated by instillation of hydrogen peroxide or methylene blue.

The entire fistulous tract was excised en bloc including an ellipse of perianal skin around the external opening. Operative haemostasis was secured, and all excised tissue was submitted for routine histopathological examination. The wound was left open to heal by secondary intention. No primary closure was attempted. A non-adherent dressing was applied, and the patient was transferred to the recovery room.

Postoperatively, patients were commenced on oral analgesics, antibiotics, and stool softeners. Wound dressing was performed daily, initially in the inpatient setting and subsequently by the patient or caregiver at home following instruction.

Post-operative Management and Follow-up: Standard post-operative care comprised oral analgesia, stool softeners, and twice-daily sitz baths for both groups. Group A patients were discharged on post-operative Day 1 once assessed as clinically stable; Group B patients were managed as inpatients until wound care requirements permitted safe discharge. Follow-up visits were scheduled at one week, one month, and three months post-operatively within the six-month study window. Recurrence was defined as the reappearance of a discharging opening or perianal abscess necessitating further intervention.

Statistical Analysis: Data were entered in Microsoft Excel and analysed using SPSS version 26.0. Categorical variables were summarised as frequencies and proportions and compared using the Chi-square or Fisher's exact test as appropriate. Continuous variables were expressed as mean ± standard deviation and compared using the independent samples t-test. A two-tailed p-value < 0.05 was pre-specified as the threshold for statistical significance.

RESULTS

Baseline and Demographic Characteristics: The two study groups were well-matched at baseline for all major demographic and clinical parameters, with no statistically significant differences in mean age, sex distribution, or fistula type ($p>0.05$ for all). This comparability ensures that observed differences in post-operative outcomes are attributable to the intervention rather than baseline confounding variables.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: Baseline Demographic and Clinical Characteristics. NS = Not Significant; CAG = Cyanoacrylate Glue.

Parameter	Group A – CAG (n=15)	Group B – Fistulectomy (n=15)	p-value
Mean Age (years)	36.8 ± 8.9	38.5 ± 9.1	0.51 (NS)
Sex (Male: Female)	11: 4	12: 3	0.68 (NS)
Inter-sphincteric fistula	9 (60%)	8 (53.3%)	—
Low trans-sphincteric fistula	6 (40%)	7 (46.7%)	—

Operative and Post-operative Outcomes: The mean operative duration in Group A was substantially shorter (22.3 ± 5.1 minutes) compared to Group B (48.7 ± 10.4 minutes; p<0.001), reflecting the relative procedural simplicity of glue injection. Hospital stay was considerably briefer in Group A (1.1 ± 0.4 days vs. 3.8 ± 1.2 days; p<0.001). Post-operative pain assessed by VAS was significantly lower in Group A on both Day 1 (2.8 ± 0.9 vs. 6.4 ± 1.1; p<0.001) and Day 7 (1.1 ± 0.6 vs. 3.9 ± 0.8; p<0.001). Return to routine daily activities occurred significantly earlier in the cyanoacrylate group (4.2 ± 1.3 vs. 14.6 ± 3.7 days; p<0.001).

Wound-related complications — including superficial infection and delayed wound healing — were observed in 3 patients (20%) in Group B versus 1 patient (6.7%) in Group A (p=0.04). Partial faecal incontinence assessed at the one-month visit using the Wexner score was documented in 2 patients (13.3%) in Group B (Wexner score 2–3, classified as mild) and in none of the Group A patients (p=0.04). Comprehensive comparative outcomes are presented in [Table 3].

Table 3: Comparative Surgical Outcomes at Six-Month Follow-up. *Statistically significant (p<0.05). NS = Not Significant; VAS = Visual Analogue Scale; CAG = Cyanoacrylate Glue.

Outcome Measure	Group A – CAG	Group B – Fistulectomy	p-value
Operative Time (min)	22.3 ± 5.1	48.7 ± 10.4	< 0.001*
Hospital Stay (days)	1.1 ± 0.4	3.8 ± 1.2	< 0.001*
Return to Work (days)	4.2 ± 1.3	14.6 ± 3.7	< 0.001*
VAS Score – Day 1	2.8 ± 0.9	6.4 ± 1.1	< 0.001*
VAS Score – Day 7	1.1 ± 0.6	3.9 ± 0.8	< 0.001*
Wound Complications	1 (6.7%)	3 (20%)	0.04*
Recurrence at 6 months	2(13.3%)	1 (6.7%)	0.11 (NS)
Faecal Incontinence	0 (0%)	2 (13.3%)	0.04*
Primary Healing Rate	80%	93.3%	0.11 (NS)

Healing and Recurrence: At the six-month endpoint, the primary healing rate was 93.3% in Group B and 80% in Group A. Recurrence was documented in 2 patients (13.3%) in Group A and 1 patient (6.7%) in Group B; whilst numerically higher in the glue arm, this difference did not attain statistical significance (p=0.11). Among Group A recurrences, one patient underwent repeat cyanoacrylate injection and one was converted to conventional fistulectomy. The single recurrence in Group B was managed with repeat fistulectomy.

DISCUSSION

The findings of this prospective comparative study confirm that cyanoacrylate glue injection confers several clinically significant peri-operative advantages over conventional fistulectomy in patients with uncomplicated fistula-in-ano. The statistically significant differences favouring Group A across operative time, hospital stay, pain scores, wound complication rate, and continence preservation are consistent with the emerging body of evidence supporting sphincter-preserving approaches in carefully selected candidates.

Operative Efficiency and Anaesthetic Considerations: The substantially abbreviated operative duration in Group A — less than half that of Group B — directly reflects the technical simplicity of glue application, which eliminates the need for tissue plane dissection, haemostasis, and wound preparation. In resource-constrained institutional settings, this efficiency has practical implications for operative list throughput and anaesthetic utilisation. For patients with significant cardiorespiratory or metabolic comorbidities in whom prolonged anaesthetic exposure represents incremental risk, a shorter operative time constitutes a meaningful safety advantage beyond procedural convenience.

Post-operative Pain and Recovery: Post-operative pain is a principal determinant of patient-reported satisfaction and functional recovery trajectory. The markedly lower VAS scores across both early (Day 1) and intermediate (Day 7) time points in Group A are directly attributable to the complete absence of an open surgical wound — the predominant source of post-fistulectomy morbidity. Patients undergoing conventional fistulectomy require daily wound dressings, sitz baths, and ongoing analgesia over a healing period frequently extending four to six weeks. The avoidance of all wound-related care in Group A translates into reduced healthcare contact, lower dressing-related expenditure, and substantially improved functional recovery, as reflected by the approximately fourfold difference in return-to-work interval between the groups.

Sphincter Preservation and Continence: The complete absence of incontinence in Group A, compared to a 13.3% rate in Group B, reinforces the fundamental rationale for sphincter-preserving techniques. Even in fistulae classified as low or

ISSN (O): 2687-5365; ISSN (P): 2753-6556

simple, dissection in proximity to the sphincter complex carries an inherent risk of functional impairment. This risk is compounded by individual anatomical variation, the fibrotic distortion of tissue planes resulting from repeated septic episodes, and the cumulative effect of any prior anorectal interventions. Although the Wexner scores recorded in the affected Group B patients fell within the mild range, they represent a tangible reduction in continence function with potentially enduring quality-of-life consequences — particularly for younger, working-age patients for whom even minor soiling is occupationally and socially disabling.

Recurrence and Healing Rates: The recurrence advantage observed in Group B 6.7% vs. 13.3% in Group A. Cyanoacrylate glue operates by physically obliterating the fistula lumen without formally addressing the infected internal opening at the level of the anal crypt. Persistent microscopic epithelialisation, inadequate tract debridement, premature glue displacement before complete polymerisation, or suboptimal volume delivery may each contribute to treatment failure. Published series on cyanoacrylate for fistula-in-ano report healing rates ranging from 40% to 85%, with heterogeneity driven by patient selection, glue formulation, and procedural standardisation. The 80% primary healing rate achieved in Group A in this study compares favourably with the upper range of this literature and may reflect the protocol's emphasis on meticulous pre-injection tract preparation, as also emphasised by Sharma et al. and Koli et al. in their respective series.

Cost-Effectiveness: Economic considerations hold particular relevance in the Indian public health context, where patients are frequently dependent labourers or semi-skilled workers for whom an extended period away from work represents significant financial hardship. While cyanoacrylate glue carries a higher per-procedure material cost than fistulectomy consumables, this differential is substantially offset by the significant reductions in inpatient bed-days, post-operative dressing requirements, analgesic consumption, and the indirect costs arising from prolonged convalescence and work absence.

Study Limitations: This study has several limitations that must be acknowledged in interpreting its findings.

- The sample size of thirty patients, though adequate for preliminary comparative analysis, is insufficient to detect modest differences in outcome parameters with statistical confidence. A larger multicentre study would be required to provide definitive comparative data.
- The follow-up period of six months is adequate for assessing short-term outcomes but does not permit assessment of long-term recurrence, which may not manifest until twelve to twenty-four months after the initial procedure. Recurrence data from this study must therefore be interpreted with caution.
- The non-randomised allocation of patients to treatment groups introduces the possibility of selection bias. Patients with more complex tracts may have been systematically directed toward fistulectomy, potentially confounding outcome comparisons.
- The assessment of some outcome parameters—notably perianal scarring and subjective pain experience—involves a degree of interobserver variability, which could not be fully eliminated in a single-centre study.
- Long-term continence assessment, including formal manometric evaluation, was not performed as part of this protocol. The absence of continence data limits the ability to draw conclusions regarding sphincter-related outcomes.
- These limitations are acknowledged and should be addressed in future adequately powered, multicentre randomised controlled trials.

CONCLUSION

This prospective comparative study conducted at Dhanalakshmi Srinivasan Medical College and Hospital demonstrates that cyanoacrylate glue injection is a safe and sphincter-preserving technique for the management of uncomplicated fistula-in-ano. It confers statistically significant benefits over conventional fistulectomy in operative duration, post-operative pain, hospital stay, early return to daily activity, wound complication rate, and continence preservation — making it particularly well-suited for patients who prioritise functional recovery and minimal procedural morbidity.

Conventional fistulectomy retains established primacy in primary healing rates and long-term recurrence prevention, and remains the definitive procedure of choice when complete anatomical clearance is the therapeutic priority. The two techniques are best regarded as complementary within a stratified management framework: cyanoacrylate injection as an effective first-line sphincter-preserving option for simple tracts, with conventional fistulectomy reserved for non-responders, anatomically complex cases, or situations in which recurrence prevention outweighs recovery speed.

Prospective, adequately powered, multicentre randomised controlled trials with extended follow-up are recommended to establish definitive evidence-based guidelines for cyanoacrylate use in fistula-in-ano management, and to refine patient selection criteria within both resource-limited and tertiary surgical settings.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556