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# Video-Assisted Anal Fistula Treatment (VAAFT) for Complex Anal Fistula: A Preliminary Evaluation in China

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**Background:** Although many attempts have been made to advance the treatment of complex anal fistula, it continues to be a difficult surgical problem. This study aimed to describe the novel technique of video-assisted anal fistula treatment (VAAFT) and our preliminary experiences using VAAFT with patients with complex anal fistula.





**Material/Methods:** From May 2015 to May 2016, 52 patients with complex anal fistula were treated with VAAFT at Yangpu Hospital of Tongji University School of Medicine, and the clinical data of these patients were reviewed.

**Results:** VAAFT was performed successfully in all 52 patients. The median operation time was 55 minutes. Internal openings were identified in all cases. 50 cases were closed with sutures, and 2 were closed with staplers. Complications included perianal sepsis in 3 cases and bleeding in another 3 cases. Complete healing without recurrence was achieved in 44 patients (84.6%) after 9 months of follow-up. No fecal incontinence was observed. Furthermore, a significant improvement in Gastrointestinal Quality of Life Index (GIQLI) score was observed from preoperative baseline (mean, 85.5) to 3-month follow-up (mean, 105.4;  $p < 0.001$ ), and this increase was maintained at 9-months follow-up (mean, 109.6;  $p < 0.001$ ).

**Conclusions:** VAAFT is a safe and minimally invasive technique for treating complex anal fistula with preservation of anal sphincter function.

**MeSH Keywords:** **Rectal Fistula • Surgical Procedures, Minimally Invasive • Video-Assisted Surgery**

**Full-text PDF:** <http://www.medscimonit.com/abstract/index/idArt/904055>

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## Background

Anal fistula is an epithelized communication between the rectum or anal canal and the perianal region, of infectious origin. It is termed “complex” when the track crosses more than 30% to 50% of the external sphincter (high transsphincteric, suprasphincteric and extrasphincteric fistulas), is anterior in a female, is recurrent, has multiple tracks or the patient has pre-existing incontinence, local irradiation or Crohn’s disease [1,2]. Complex anal fistula is often a source of concern for both patients and anorectal surgeons because of its high risk of recurrence and postoperative fecal incontinence [3]. In recent years, with increasing emphasis on the preservation of anal sphincter function, various sphincter-saving techniques have become popular research topics in complex anal fistula treatment. Currently, the main techniques include fibrin glue, fistula plug, transanal advancement flap repair (TAFR) and ligation of the intersphincteric fistula tract (LIFT) [4]. However, their healing rates vary widely from 14% to 81.4% [5–8].

Developed by Meinero in 2006, video-assisted anal fistula treatment (VAAFT) is a novel minimally invasive and sphincter-saving technique for treating complex anal fistula [9]. The main feature of this technique is the direct visualization of the fistula tract and internal opening. However, the clinical application of VAAFT is still in its infancy worldwide, and the reported success rates range from 66.7% to 87.5% [10–14]. Therefore, its effectiveness and indication both need to be further investigated. The purpose of this study was to describe this technique and our preliminary experiences using VAAFT with patients with complex anal fistula. To our knowledge, this is the first preliminary evaluation of VAAFT for complex anal fistula in China.

## Material and Methods

### Patients and preoperative examination

From May 2015 to May 2016, a total of 52 patients with complex anal fistula were recruited at Yangpu Hospital of Tongji University School of Medicine. All patients were clinically evaluated via digital rectal examination and underwent a series of preoperative tests to help to identify the fistula tract and internal opening, including anorectal endoscopy, magnetic resonance imaging (MRI), pelvic ultrasound and contrast examination. Colonoscopy was scheduled for patients with suspected inflammatory bowel disease (IBD). Polyethylene glycol electrolyte solution was administered one day before the operation for bowel preparation. This study was approved by the Ethical Committee of our hospital and all patients provided written informed consent.

### Surgical procedure

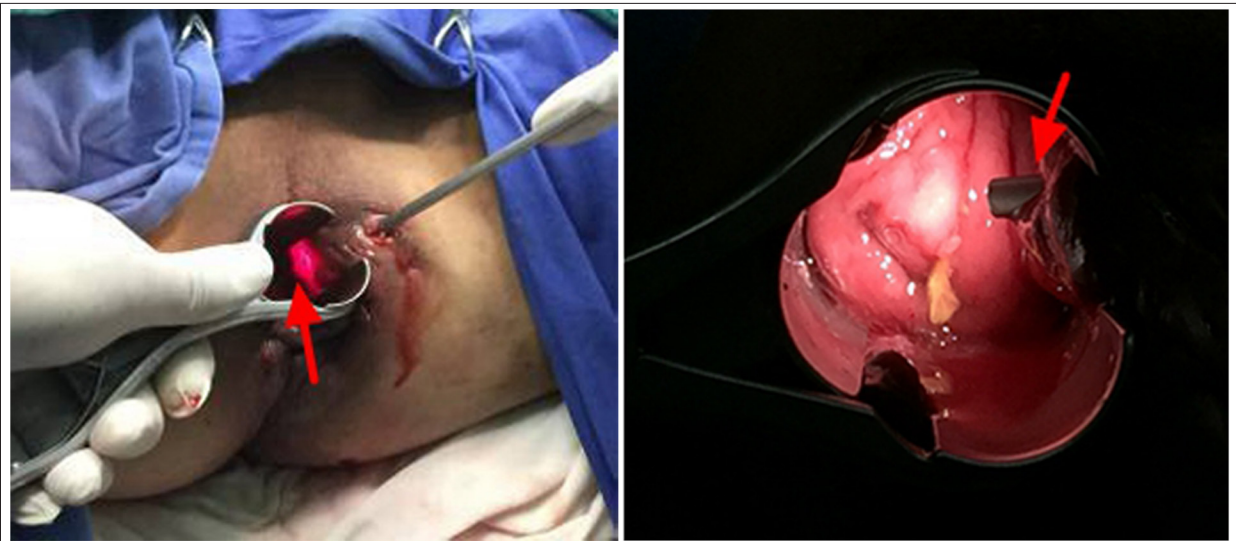
The equipment required for VAAFT is manufactured by Karl Storz GmbH (Tuttlingen, Germany), which includes fistuloscope, obturator, unipolar electrode, fistula probe, endobrush, forceps, and di-wing anoscope. The fistuloscope had an 8° angled eyepiece and was equipped with an optical channel and a working and irrigation channel. The working and irrigation channel had two taps, one of which was connected to a bag of glycine-mannitol 1.0% solution that acted as a washing agent and current conductor. Spinal anesthesia was required. Patients were placed in a lithotomy or prone jackknife position, depending on the suspected site of the internal opening.

The VAAFT procedure was divided into two stages: diagnosis and treatment. The target of the diagnostic stage was the correct identification of the fistula tract and internal opening. The fistuloscope was inserted from the external opening with continuous irrigation of the glycine-mannitol solution, which helped to open the tract and provide a clear view. In some cases, the tough scar tissue around the external opening required removal to ease entry. The fistuloscope was gently advanced forward until it reached the end of the fistula tract. During this process, secondary tracts or abscess cavities could also be completely identified. Then, a di-wing anoscope was inserted into the anus to locate the site of the internal opening by observing the light of the fistuloscope. In most cases, the fistuloscope could enter the rectum or anal canal through the internal opening (Figure 1). Two or three sutures were placed at the margin of the internal opening to isolate it for further identification.

The aim of the treatment stage was the complete destruction of the fistula tract and closure of the internal opening. A unipolar electrode was inserted into the fistuloscope to fulgurate the fistula walls from the inside out under direct vision, taking care not to miss any branching tracts or abscess cavities (Figure 2). When all the tracts were completely destroyed, a forceps or endobrush was inserted instead of the electrode to remove the necrotic material from the fistula walls. The continuous irrigation of the solution ensured that all the peeling necrotic material was rushed into the rectum or anal canal through the internal opening. After thorough cleansing of the tracts, the internal opening was closed with stapler or 3-0 absorbable sutures. To ensure that the opening was fully closed, 0.5 mL of biomedical fibrin glue was sprayed behind the suture through a thin pipe. The fistula tract had to be kept open to allow for sufficient drainage after the operation.

### Postoperative management

6 hours after the operation, patients began a liquid diet if there were no complications. Once patients began to defecate, they



**Figure 1.** Location of internal fistula opening.



**Figure 2.** Fulguration of fistula tract by electrode.

began a semiliquid diet. The wound dressing was removed on the first postoperative day. Antibiotics were not routinely used during the postoperative period.

#### Data collection and follow-up

All data were prospectively documented, including patient baseline characteristics, operative data (e.g., operating time, blood loss, fistula type) and postoperative data (e.g., postoperative complications and length of hospital stay). In addition, all patients were scheduled to attend the clinic for follow-up visits at 1, 3, and 9 months postoperatively. The main follow-up outcome measures included whether symptoms of anal fistula persisted or there was recovery over time and whether there was anal incontinence after the surgery. The Gastrointestinal Quality of Life Index (GIQLI) was also employed in this study to evaluate surgery effectiveness and quality of life [15].

**Table 1.** Patient characteristics (n=52).

Variables*	Our group
Age, years	
Median, range	48 (19–71)
Sex, n	
Male	44
Female	8
BMI, kg/m <sup>2</sup>	
Median, range	24.8 (17.4–27.5)
Previous anorectal surgery, n	
No	21
Yes	31
>3 interventions	8

\* BMI – body mass index; n – number of patients.

#### Statistical analysis

Differences in proportions were compared using the paired t-test, Pearson's chi-square, or Fisher's exact test, as appropriate. A *p* value of less than 0.05 was considered statistically significant.

#### Results

A total of 52 patients with complex anal fistula were included in this study, and the baseline demographic and clinical characteristics of patients are listed in Table 1. There were 44 males and 8 females, with a median age of 48 years (range, 19–71

years). Among them, 21 patients were newly diagnosed, including 1 patient with Crohn's disease. The other 31 patients had undergone previous surgery and had recurrent conditions, with 8 of them having a history of more than three surgeries. The median body mass index (BMI) of the group was 24.8 kg/m<sup>2</sup> (range, 17.4–27.5 kg/m<sup>2</sup>).

VAAFT was performed successfully in all 52 patients. The results of surgery are summarized in Table 2. The median operation time was 55 minutes (range, 35–90 minutes). Blood loss was minimal. According to Park's classification [16], 37 patients had high-transsphincteric fistulas, 8 had suprasphincteric fistulas, 5 had extrasphincteric fistulas, and 2 had horseshoe fistulas; 15 patients had multiple fistula tracts or openings. Internal openings were found in all cases, with the most common site being at the level of the dentate line (n=44), followed by the anal canal (n=11), and the rectum (n=5). Among the 52 patients, 50 were closed with sutures, and 2 were closed with staplers.

In the postoperative period, 3 patients with history of multiple previous surgeries suffered from postoperative perianal sepsis and were further treated with cutting setons. In addition, 3 patients had postoperative bleeding due to a laceration of the rectal mucosa around the internal opening. 9 patients required analgesia after the operation, whereas the others reported that their postoperative pain was acceptable. No other complications, such as fecal incontinence, were observed in any patients. The median length of postoperative hospitalization was 3 days (range, 2–7 days).

During the follow-up period, anal fistula recurrence was observed in 8 patients at 1 to 3 months postoperatively, including the 3 patients who suffered from postoperative perianal sepsis. In the remaining 44 patients (84.6%), complete healing without recurrence was observed after 9-month follow-up. In addition, among the 31 patients who underwent previous surgery, 25 (80.6%) achieved primary healing (Figure 3). Furthermore, compared with preoperative baseline data (mean, 85.5), a significant improvement in GIQLI score was found after 1 month (mean, 88.8) and 3 months (mean, 105.4;  $p < 0.001$ ), and this increase was maintained at 9 months (mean, 109.6;  $p < 0.001$ ) after surgery (Figure 4).

## Discussion

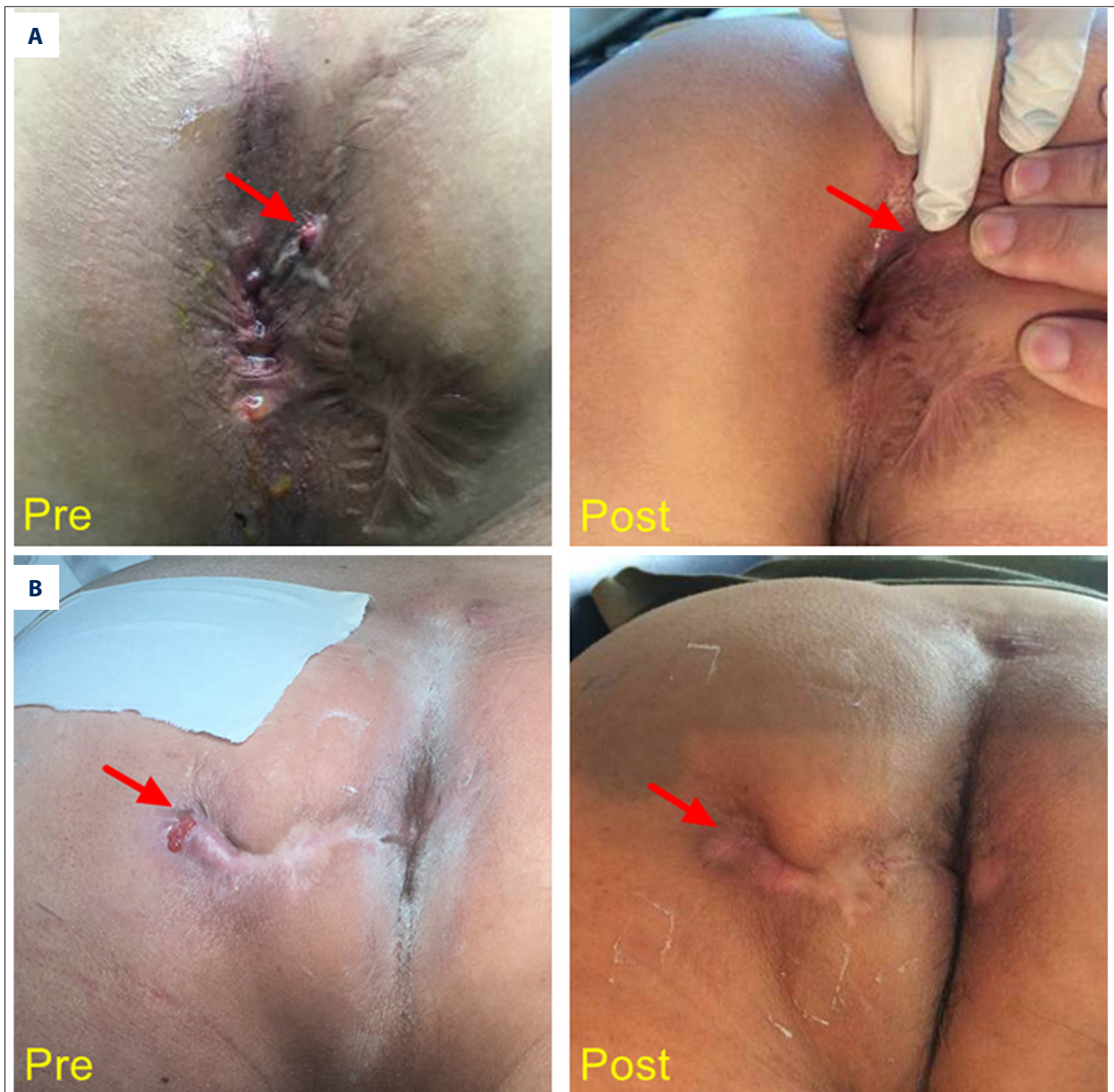
Although many attempts have been made over the decades to treat complex anal fistula, it continues to be one of the most challenging clinical problems in anorectal surgery [4]. Traditional surgical treatments, such as the lay-open procedure and fistulotomy, are effective in the treatment of simple and most distal fistulas, with an almost 100% success rate [17]. However, when they are used to manage complex anal fistula, the high risks of

**Table 2.** Results of surgery.

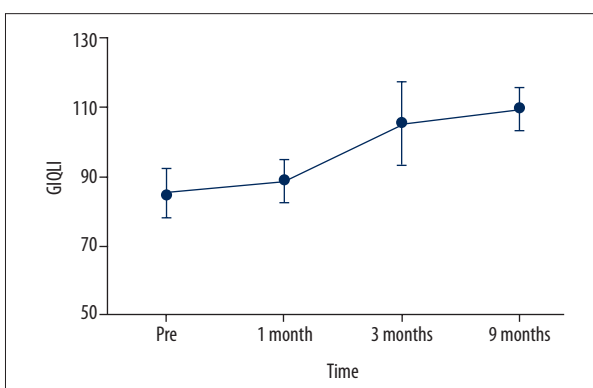
Variables*	Our group
Operation time, minutes	
Median, range	55 (35–90)
Blood loss, mL	
Median, range	5 (5–15)
Fistula type, n	
High-transsphincteric	37
Suprasphincteric	8
Extrasphincteric	5
Horseshoe	2
Internal openings, n	
Single	44
Multiple	8
Internal opening site, n	
Dentate line	44
Anal canal	11
Rectum	5
External openings, n	
Single	40
Multiple	12
Fistula tracts, n	
Single	37
Multiple	15
Postoperative hospitalization, day	
Median, range	3 (2–7)
Postoperative complications, n	
No	37
Perianal sepsis	3
Bleeding	3
Intolerable pain	9
Faecal incontinence	0
Prognosis at 9-month follow-up, n	
Healing	44
Recurrence	8

\* n – number of patients.





**Figure 3.** Typical cases. (A) A patient with two previous surgeries achieved healing after VAAFT. (B) A patient with four previous surgeries achieved healing after VAAFT.



**Figure 4.** Preoperative and follow-up scores in Gastrointestinal Quality of Life Index (GIQLI).

recurrence and damage to anal sphincter function remain serious problems [3]. Cutting setons were once the primary treatment for complex anal fistula. This technique could preserve anal sphincter function to some extent. However, many studies indicated that the fecal incontinence rates remained high, ranging from 20.5% to 67% [18]. Draining setons can minimize damage to anal sphincter function, but the fistula recurrence rates vary from 19.5% to 47.0% [19,20]. Fibrin glue injection is a simple approach to treating complex anal fistula with minimal

side effects, but the long-term success rate is only approximately 14% [5]. Therefore, currently, fibrin glue injection is generally used in combination with other therapeutic approaches. Fistula plug is also a simple treatment method with the reported healing rates ranging from 38.0% to 72.7%, although it has yet to be widely used because of the high cost [6,21,22]. TAFR is a sphincter-saving technique for complex anal fistula treatment, but the recurrence rates range from 7% to 49% [7,23,24]. The primary causes of surgery failure are local tissue ischemia after mobilization of local structures and the tendency of flaps to retract or dehisce [12]. LIFT is another widely recognized sphincter-saving technique with a success rate of approximately 81.4% [8]. However, this procedure is technically challenging and may jeopardize the blood supply of the anal sphincter and rectal mucosa. In 2011, Wilhelm described a new technique for sphincter-preserving anal fistula repair using a novel radial emitting laser probe, with a healing rate of 81.8% after a median follow-up of 7.4 months [25]. The drawback of this technique is the difficulty associated with identifying the internal opening, secondary tracts, and abscess cavities.

Most of the current treatments for complex anal fistula are based on three main principles: correct identification of the fistula tracts and internal opening, complete destruction of the tracts, and preservation of anal sphincter function [9,26]. However, some studies have shown that the real key to fistula healing lies in the sealed closure of the internal opening coupled with adequate drainage of the fistula tract [27]. VAAFT is designed based only on these two key points: it provides real-time visualization of the anatomy; therefore, surgeons can properly handle the internal opening and ensure sufficient drainage of the debrided tract. In the present study, 52 patients with complex anal fistula underwent VAAFT. Healing without recurrence was achieved in 44 patients (84.6%) after 9 months of follow-up. Moreover, their quality of life was significantly improved. Our results were similar to those reported in previous studies and strongly suggested that VAAFT was effective and safe for the treatment of complex anal fistula [11–14,27]. We also found that VAAFT showed excellent effectiveness in patients with recurrent anal fistula for whom various treatments had failed. In our study, 25 of the 31 patients with history of multiple previous surgeries achieved primary healing. Furthermore, VAAFT appeared to provide a new approach to treating complex anal fistula associated with Crohn's disease. In the study conducted by Schwandner [28], VAAFT was attempted in 13 patients with Crohn's-associated complex fistula, and the success rate reached 82% after 9 months of follow-up. Our study also included 1 patient with Crohn's disease, who achieved healing and showed no recurrence after 9 months.

Based on our experience, several key points should be considered when performing this procedure. First, the surgeon must carefully explore all possible fistula tracts or abscess cavities

and distinguish the true from the pseudo fistulas. Tissue in true fistula is characteristically red and floating, whereas tissue in pseudo fistula is usually whitish and not floating [11]. Recently, Waniczek et al. [29] reported a new diagnostic method based on direct MRI fistulography using a mixture of hydrogen peroxide and gadolinium as a contrast medium, and it exhibited a high diagnostic value in determining the course of the fistula tracts. The combination of this method and VAAFT may further improve the efficacy of surgery. Second, the fistula walls must be completely fulgurated from the inside out. As the working channel is located below the fistuloscope, a rotatory or vertical movement is required to facilitate the fulguration of the side or superior wall. Additionally, fulguration may cause collateral thermal damage to some normal tissue, which may lead to postoperative bleeding or delayed healing [30]. In the present study, 3 patients suffered from postoperative bleeding simply because of empyrosis of the rectal mucosa. After reviewing our experience, a power output setting of 40 W was considered appropriate. Third, currently, there are four primary methods to close the internal opening, including stapler, TAFR, over-the-scope clip (OTSC) system (Ovesco AG, Tübingen, Germany) [31] and absorbable suture. Some studies have indicated that, in cases involving fibrotic internal opening, secure closure was not easy to achieve with either stapler or OTSC clip. In addition, patients complained of a continuous foreign body sensation in the anal canal postoperatively [11,27]. In our study, we found that suture combined with fibrin glue could achieve the desired result of complete closure with limited side effects. Fourth, adequate drainage of the fistula tract is another critical point in VAAFT. In the initial two cases of our study, we completely filled the fistula tract with biomedical fibrin glue. However, we found that the patients complained of swelling of the buttock after operation. Then, we just sprayed the fibrin glue behind the suture to ensure that the opening was completely closed and that the tract had adequate drainage. Last but not least, as the submucosal tissue around the internal opening is loose, the operation should be performed gently to prevent the formation of iatrogenic fistula. In addition, fistula irrigation under pressure may result in the spread of infectious material into normal tissue, which may also be a cause of delayed recurrence [29]. As a result, shortening operation time, lowering irrigation pressure, and avoiding fistula formation are conducive to decreasing the risk of postoperative perianal sepsis and recurrence.

## Conclusions

Our study results suggest that VAAFT is a safe and minimally invasive technique for the treatment of complex anal fistula while preserving anal sphincter function. However, the sample of patients in this study was small. Larger studies with longer-term follow-up are warranted to more fully evaluate this technique.

## Conflicts of interest

The authors declare no potential conflicts of interest.

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