

Modified Hanley Procedure for Management of Complex Posterior Horseshoe Anal Fistula

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ABSTRACT

Background: An anorectal fistula is a connection that is not normal among the epithelialized surface of the anal canal and most commonly the skin of the perianal region or the perineum. Surgery is the mainstay therapy aiming to drain local infection, to eliminate the fistulous tract and to avoid its recurrence while maintaining the function of the sphincter.

Aim: This study aimed to evaluate the treated patients with horseshoe fistula of cryptoglandular origin utilizing a modified Hanley method involving a hybrid cutting one-stage approach.

Methods: This prospective trial was done on twenty cases with chronic horseshoe fistula. All patients were subjected to preoperative PR examination to check for sphincter tone, preoperative MRI to demonstrate the extent of fistula and the deep post-anal space affection.

Results: Regarding type of fistula, 3 (15%) persons had high trans-sphincteric fistula & 17 (85%) patients had low trans-sphincteric fistula. Seven (35%) patients had external opening from the anal verge within three centimetres and 13 (65%) patients had external opening from the anal verge beyond 3 cm. Out of the total number of individuals, three individuals (15%) had an internal opening located at the dentate line, while the remaining 17 individuals (85%) had an internal opening situated above the dentate line. Four (20%) patients had recurrence. Complete healing was achieved in all cases at 12 weeks post-operative period.

Conclusions: The modified Hanley operation is effective and conservative surgical procedure that eliminates the disadvantage of keeping the seton for a long period and preserve the sphincter function.

Keywords: Modified Hanley procedure, Complex posterior horseshoe anal fistula, Anorectal abscess.

INTRODUCTION

Anorectal fistula refers to an inflammatory pathway or improper link that connects the epithelialized surface of the anal canal and typically, the perianal skin or perineum ⁽¹⁾.

The paths and scope of the fistulas and the accompanying acute infections are determined by their origin in the cryptoglandular complex and the involvement of the anatomically defined perirectal areas. Both structures establish communication with the ischioanal fossa, so creating a pathway for the development of a horseshoe abscess. Operation may result in several consequences for example urine retention, thrombosed piles, bleeding, stool incontinence, faecal impaction, anal stenosis, as well as delayed wound healing. The use of fecal diversion as the sole treatment for horseshoe fistula did not successfully resolve the condition ⁽²⁾.

Hanley, 1965 reported his original procedure for horseshoe fistula which involved complete division of the posterior 12 o'clock sphincter mechanism down to the deep post-anal space. Counter drains were placed through each lateral extension and were removed several weeks after wards. Note surprisingly this aggressive procedure obliterated the source of the fistula but at the inevitable price of high incidence of anorectal incontinence. This was followed by the modified Hanley procedure 1990, in which the posterior sphincter was divided gradually by using a cutting hybrid seton placed around the 6 o'clock sphincter mechanism, this seton was serially tightened until the posterior sphincter was divided and it was tethered by resulting scar tissue ⁽²⁾.

It often evolves from a spontaneously draining anorectal abscess. The presence of perianal fistula illness greatly affects the patient's quality of life, as it can lead to various complications for instance mild pain, social embarrassment because of hygiene issues, as well as severe sepsis ⁽³⁾.

The therapy of anorectal fistula is a complex & contentious issue in the field of colorectal surgery ⁽⁴⁾. Surgery is the mainstay of therapy with the aim of draining local infection eradicating the fistulous tract and prevention of recurrence while preserving native sphincter function ⁽⁵⁾. The surgical approach is influenced by several factors such as the aetiology, location, type & duration of the fistula besides previously performed procedure and preoperative sphincter function ⁽⁶⁾.

Thus, the usual horseshoe fistula consists of paired exterior apertures connected by a deep post-anal connection in the posterior midline, resulting in a U or horseshoe-shaped arrangement ⁽⁷⁾. Individuals suffering from horseshoe fistula typically undergo several drainage procedures as well as unsuccessful surgeries before receiving a proper diagnosis and therapy ⁽⁸⁾. Persons with horseshoe fistula are typically recommended an operation for their condition. Several surgical procedures are available for the treatment of fistulas, including fistulotomy, cutting seton placement, fibrin glue injection, fistula plug insertion, as well as endorectal advancement flap ⁽⁹⁾. Our hypothesis is that the modified Hanley approach remains an effective &

well-tolerated treatment strategy for individuals with these intricate fistulae.

The purpose of the research was to record our clinical observations in treating patients with horseshoe fistula of cryptoglandular origin utilizing a modified Hanley method involving a hybrid cutting one-stage approach.

PATIENTS AND METHODS

This prospective trial was performed on twenty persons with chronic horseshoe fistula with age ranged from 19-73 years and both sexes were included. It was conducted through the period amongst January 2021 to June 2023 at Damanhur Medical National Institute, Elbehiera, Egypt.

Inclusion criteria: Patients with posterior horseshoe complex fistula defined as fistulas that had multiple tracts with a single or multiple external opening. The deep post-anal space affection was demonstrated by digital rectal examination and by preoperative MRI.

Exclusion criteria: Patients with low and superficial fistulas, Patients with no deep postanal space affection and patients with fistula secondary to other pathology rather than cryptoglandular anal infection (Carcinoma, IBD, trauma and radiation). Individuals with certain illnesses like as tuberculosis, as well as people whose fistula has been managed using other methods like incision/drainage only, fistulotomy, collagen plug, or advancement flap only.

Surgical procedures: Each participant received a swift phosphosoda enema for complete bowel preparation, as well as were also administered a single-dose of prophylactic antibiotics.

The procedures were conducted under spinal anesthesia, with the patient positioned in the prone jackknife posture. Hydrogen peroxide was administered via the external holes, while the internal opening was inspected using a Hill-Ferguson retractor.

The deep postanal space was reached by making a surgical cut in the posterior midline mucocutaneous area, located between the coccyx & the internal aperture at the posterior dentate line. The dissection was extended further beyond the sphincter complex by traversing the anococcygeal ligament and entering the deep postanal region, so displacing the exposed sphincter complex towards the front. The internal aperture was evaluated using a gentle, blunt probe, taking extra precautions to avoid the formation of a misleading passage.

The internal fistula hole was surgically cut along with a small portion (2-3 mm) of the internal anal sphincter (IAS). The outermost parts of the lateral tracts were removed, and more delicate instruments were used to explore the previously revealed deep postanal area in order to fully understand the illness progression (Figure 1).



Figure (1): Intraoperative photo for modified Hanley technique.

All patients were subjected to the following preoperative measures:

Full history taking, thorough and full clinical examination including PR examination to check for sphincter tone and preoperative MRI to demonstrate the extent of fistula and to demonstrate the deep post anal space affection.

Routine preoperative laboratory investigations included: a. All patients were prepared preoperatively by fasting and enema the night before surgery. All operations were done with cases in the lithotomy position & under general anesthesia or spinal anesthesia because of contraindication to GA. The fistulous tract was delicately probed with a short, malleable metal probe that had a blunt tip during the procedure. To make the hybrid seton, the thick sleeve along with thin circular strip of a surgical glove were taken off. The categorization was employed to evaluate postoperative continence in accordance with the Wexner score for fecal incontinence and according to Browning and Park's classifications in which categories were: a) continent for both liquid & solid waste, as well as flatus (for instance and regular continence), b) continent for both the solid also liquid phases of defecation, c) continent for solid stool with no control over and d) with continued fecal leakage. The individuals undergoing surgery were made aware of the rubber prosthesis after the operation in addition to advice for gentle cleansing of anal region after each bowel motion.

Patients were in the hospital for a minimum of 5 days and treated with antibiotics, analgesics, and sitz baths. The cases were followed up weekly for the first month and then once in a month for 6 months. In the event that a patient experienced any issues, especially a recurrence, or noticed that the seton dropped, they were instructed to get in touch with us. Within thirty days, all of the patients had fully recovered.

Ethical consideration: The research approval of the study was obtained from Institutional Review Board (IRB) of Damanhur Medical National Institute, Elbehiera before starting the study. The researcher clarified the objective and aim of the study to the subjects included in the study. The researcher

assured maintaining anonymity and confidentiality of subject's data. Subjects were informed that they were allowed to choose to participate or not in the study and that they had the right to withdraw from the study at any time without giving any reasons. Ethics, values, culture and beliefs of subjects were respected. The consent of participants to share in the study was obtained. This work was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The statistical analysis was performed employing SPSS version 26 (IBM Inc., Armonk, New York, USA). The means and standard deviations (SD) of the quantitative parameters have been offered to the audience. The frequency & percentage (%) of the qualitative characteristics have been incorporated in the presentation. In order to make a prediction regarding the recurrence of fistula, multivariate regression analysis was utilized. A two-tailed P-value of less than or equal to 0.05 was considered statistically significant.

RESULTS

Regarding demographic data of the participated cases, age ranged from 20 to 66 years with a mean of 45.6 ± 15.73 years. There were 15 (75%) males and 5 (25%) females. Regarding comorbidities, 7 (35%) patients were diabetic and 6 (30%) patients were hypertensive (Table 1).

Table (1): Demographics & comorbidities of the patients who were studied

		n=20
Age (years)	Mean ± SD	45.6 ± 15.73
	Range	20 - 66
Sex	Male	15 (75%)
	Female	5 (25%)
Diabetes mellitus		7 (35%)
Hypertension		6 (30%)

Data is presented as mean ± SD, range, frequency and percentage.

Regarding history and clinical investigations of the studied patients, duration of symptoms ranged from 22 to 28 weeks with a mean of 24.6 ± 2.24 weeks, 3 (15%) patients had previous surgery, 12 (60%) patients had anal sepsis. Regarding type of fistula, 3 (15%) persons had high trans-sphincteric fistulas & 17 (85%) patients had low trans-sphincteric fistulas. Seven (35%) patients had external opening from the anal verge within 3 cm and 13 (65%) patients had external opening from the anal verge beyond three cm. Three (15%) individuals had internal opening at dentate line and 17 (85%) cases had internal opening above dentate line. No cases had stool or gas incontinence symptoms (Table 2).

Table (2): History also clinical investigation of the studied patients

		n=20
Duration of symptoms (Weeks)	Mean ± SD	24.6 ± 2.24
	Range	22 - 28
Previous surgery		3 (15%)
Baseline stool or gas incontinence symptoms		0 (0%)
Anal sepsis		12 (60%)
Type of fistula	High	3 (15%)
	Low	17 (85%)
External opening from the anal verge	Within 3 cm	7 (35%)
	Beyond 3 cm	13 (65%)
Internal opening	At dentate line	3 (15%)
	Above dentate line	17 (85%)

Data is presented as mean ± SD, range, frequency and percentage.

Regarding type of anesthesia used in the studied patients, 16 (80%) patients had general anesthesia and 4 (20%) patients had spinal anaesthesia. The majority of participants were capable to endure the tightening session with only a small amount of diclofenac ampoule for pain relief. It was given daily or as needed bases (Table 3).

Table (3): Type of anesthesia used in the studied patients.

		n=20
Type of anesthesia	General	16 (80%)
	Spinal	4 (20%)

Data is presented as frequency and percentage

Regarding follow-up and outcomes of the studied patients, the follow-up duration ranged from 6 to 7 months with a mean of 6.5 ± 0.51 months. The Full recovery was attained for all persons in a duration spanning from 10 to 12 weeks with a mean of 12 ± 0.83 weeks. 4 (20%) patients had recurrence. There were no instances of wound infection, premature dislodgement, bleeding, or sliding of seton among the participants (Table 4).

Table (4): Follow-up and outcomes of the studied patients

		n=20
Follow-up (Months)	Mean ± SD	6.5 ± 0.51
	Range	6 - 7
Complete healing (Weeks)	Mean ± SD	12 ± 0.83
	Range	10 - 12
Recurrence		4 (20%)

Data is presented as mean ± SD, range, frequency and percentage.

On multiple regression analysis, type of fistula and diabetes mellitus were significant predictors of fistula recurrence (P<0.001) (Table 5).

Table (5): Multivariate analysis for prediction of fistula recurrence

Independent variables	Coefficient	Std. Error	t	P	r_{partial}	$r_{\text{semipartial}}$
Type of fistula	0.6667	0.1328	5.02	<0.001*	0.7638	0.7638
Diabetes mellitus	0.8	0.1089	7.348	<0.001*	0.866	0.866

DISCUSSION

The configuration, depth, as well as degree of sphincter involvement made it a complex and demanding therapeutic entity ⁽¹⁰⁾. No surgeon found an easier or more successful approach to handle an anal fistula. Anal fistulas were typically surgically treated by laying the fistula tract open or entirely excising it, then allowing it to mend by open granulation ⁽¹¹⁾. Due to the involvement of anal sphincters, total excision is not possible in cases with high anal fistula, including horseshoe type ⁽²⁾. Inflammation of the perianal gland, which is located midline posteriorly causes horseshoe fistulas, a complicated kind of trans-sphincteric fistulas. Before draining into the perianal skin, this infection can go through the deep postanal area to the ischioanal fossa, which can be on either side of the anal canal. When a perianal fistula partially encircles the anus & emerges on either side of the anus, it is called a horseshoe fistula ⁽¹²⁾. A horseshoe abscess or fistula can be difficult to treat since it often has a main entrance in the back midline, extends beyond the sphincter to the deep postanal area & involves both ischioanal fossae on both sides. Still, this subset of fistula-in-ano has a shockingly low number of published reports ⁽¹³⁾.

The majority of individuals with a horseshoe fistula recommended operation as a solution to their condition. Several procedures are available, for instance fibrin glue injection, endorectal advancement flap, cutting seton, fistula plug, as well as fistulotomy ⁽⁹⁾. The fact that the fistula always seems to return means that these treatments are only band-aids at best. Bleeding, thrombosed pile, fecal impaction, incontinence of stool, anal stenosis, delayed wound healing, as well as urine retention are just a few of the many issues that might arise after surgery. When fecal diversion was the only method of treatment for horseshoe fistula, the condition persisted ⁽²⁾. Ten years after publishing his seminal work on the subject, Hanley summarized the results of treating 41 cases with horseshoe abscesses and fistulae, arguing for a less invasive surgical technique that would be better tolerated by removing the responsible cryptoglandular complex with sufficient drainage. The standard treatment for abscesses and fistulas, which involves draining the pus as well as closing the internal opening, is reinforced when Hamilton steps support this procedure. Even though the initial series failed to detect the risk, the original Hanley surgery, which transected a significant piece of the posterior sphincter complex, could have impaired sphincter function. Later on, there was an adjustment that had to do with a cutting seton (the "modified Hanley procedure") that allowed the inflammation as well as scar formation to maintain the anal & sphincter configuration over a longer duration (staged slow-motion fistulotomy/sphincterotomy) ⁽¹⁴⁾.

From January 2021 through June 2023, we studied the surgical outcomes of utilizing a single stage modified Hanley's method to handle horseshoe fistulas in all of the individuals we treated. Internal openings were observed in the posterior midline, at the level of the dentate line, in all of the individuals who were part of this research. This implied the existence of a deep post anal abscess. The single most critical step in surgically closing a horseshoe fistula was draining the abscess that had formed around it. The presence of horseshoe fistula in this study was diagnosed by the nature of disease, history of discharge and the physical examination only. The patients had purulent, often blood-stained perianal discharge from the two or more external opening in the ischia rectal fossa and also having intermittent pain. MRI, contrast fistula graph and ultrasound for delineating the collection of pus were used as per the need. MRI was mainly used for patients having recurrence of fistula and the complex course. In our observation the MRI was superior to contrast fistula graphy. Techniques that do not compromise the sphincters' structural integrity have evolved through time. Although fibrin glue was utilized to repair horseshoe fistulas, it has been discovered to have low healing rates when applied to complicated fistulas ⁽¹⁵⁾. Extrasphincteric fistulectomy with internal fistula opening closure using endorectal or endoanal flap procedures or direct suture yielded acceptable outcomes, as demonstrated by the work of **Koehler and collaborators** ⁽¹⁶⁾.

Recurrence occurred in 26% of patients, despite the fact that half of the individuals had seton insertion in the fistula tract as an initial stage. 4 distinct methods were employed to aid in internal closure, as well as were notable reductions in manometric resting & squeeze pressures. There had been no news of any other series that takes cues from their method. There were only 4 (20%) cases with recurrence during the time of the research. Complete healing was achieved in all patients at 12 weeks post-operative period. No cases had stool or gas incontinence symptoms. This comes in line with **Jayalal et al.** ⁽²⁾ who made a study looking into the future of 25 individuals twenty men & five females with a mean age of 41 years and presenting with a posterior horseshoe anal fistula underwent a modified Hanley surgery. After ten to twelve weeks, they discovered that the patients were fully recovered. A minimum of six months of follow-up was conducted on all patients. Bleeding, premature dislodgement, wound infection, or slippage of seton were not experienced by any of the participants. Recurrence was found in three patients (10.7%). The causes of recurrence were high type horseshoe fistula, recurrent fistula and diabetic patients. **Noori et al.** ⁽¹⁷⁾ in 28 individuals (mean age: 41 years)

with posterior horseshoe anal fistulas (in 20 men & 8 women) had a modified Hanley operation. Within three months following surgery, all 25 individuals had fully healed. Only three patients had recurrences discovered during the six-months follow-up. Postoperative discomfort was minor and manageable, and all patients were discharged on the fifth day after surgery. None of them needed to be readmitted. After being discharged, narcotic analgesics were no longer necessary. Each person was capable of to resume their regular activities and return to work within two to three weeks of the treatment, and they completely recovered thereafter. No serious complications or severe pain were observed during the use of the hybrid seton, as well as no patients required narcotic analgesics following discharge.

It is quite likely that the seton's elastic & pliable properties alleviate any pain or discomfort that may occur after surgery. Furthermore, no extra procedure or modification, whether done by the patient or the surgeon, is required, as the straightforward one-stage technique was utilized in the present research removes this potential source of unnecessary pain. Instead of a staged process, a primary fistulotomy was achieved with a slow & stable cutting action on the sphincters. Pressure necrosis causes the contained sphincters' muscles to gradually transect in a cutting seton's intended manner, with the goal of keeping the ends of the incisions as close together as possible⁽¹⁸⁾. However, **Rosen et al.**⁽¹⁹⁾ observed a 28.6% recurrence rate after performing primary fistulotomy in addition to counter drainage on twenty-four people diagnosed with horse shoe fistula. The incidence of recurrence dropped to 18.1% when 11 patients were treated with seton fistulotomy & counter drainage. The author advocated this approach as the surgical procedure of choice for horseshoe abscess fistulas. **Pezim**⁽²⁰⁾ documented successful outcomes for 24 patients with posterior horse shoe fistulas after seton unroofing the deep post-anal region and dividing the overlying external sphincter muscle. His series had a 92% success rate and a recovery time of three to five months. **Hammoud & coworkers**⁽²¹⁾ stated that in a series of twenty-nine individuals, siliastic seton was tightly knotted around the sphincter, and that all of them healed with just five percent experiencing slight incontinence.

CONCLUSIONS

A safe and successful way to preserve sphincter function, the modified Hanley surgery did away with the drawback of having to keep the seton in place for an extended length of time.

- **Consent for publication:** I attest that all authors agreed to submit the work.
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- **Competing interests:** None
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