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TAMIS-flap technique: full-thickness advancement rectal flap for high perianal fistulae performed through transanal minimally invasive surgery

Presentata da: Matteo Rottoli

Coordinatore Dottorato **Supervisore**

Prof. Annalisi Patrizi **Prof. Gilberto Poggioli**

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Short title: TAMIS-flap for high anal fistulae

Matteo Rottoli, MD

Abstract

Introduction

The formation of an advancement rectal flap could be technically demanding in the presence of high perianal of rectovaginal fistula, and the outcomes could be frustrated by inadequate view, bleeding and a poor exposure through the standard transanal approach. The application of the transanal minimally invasive surgery (TAMIS) to the advancement rectal flap procedure could overcome these difficulties.

Technique

In lithotomy position, a partial fistulectomy and a curette of the internal orifice were performed. The internal opening was closed on the anal sphincter plane. The dissection of the full thickness flap commenced through the classic transanal approach. The TAMIS port was inserted and the mobilization of the flap was continued proximally for as long as required. The laparoscopic visualization allowed a perfect view, a proper orientation of the flap and an accurate hemostasis. In order to avoid an excessive traction to the sutures, the length of the flap should be approximately twice as long as the distance of the internal orifice from the dentate line.

Results

Since November 2015, four patients with a recurrent high perianal fistula (median distance from the dentate line was 4.8 cm) underwent a TAMIS-flap procedure. The operation was performed at a median time from the diagnosis of 19 months. The

median operative time was 115 minutes (range 90-150). No complications were recorded.

Conclusions

The TAMIS-flap procedure seems a promising technique to perform a safe dissection when a long advancement rectal flap is necessary to treat a high perianal or rectovaginal fistula. The use of laparoscopic instruments and the continuous pneumorectum allow to maintain an adequate visualization and to avoid complications that could negatively affect the outcomes of the procedure.

Introduction

High anorectal fistulae are a specific complication of perianal Crohn's disease, which involve a great portion of the anal sphincter. Given the risk of postoperative incontinence and the lower healing capacity of tissue in Crohn's disease, a laying open of the fistula is not recommended. In the last century, several procedures have been proposed to treat complex fistulae. The endorectal advancement flap was first described in 1902 and, soon, confirmed to be an effective procedure, also in patient affected by Crohn's disease.[1-3]

In the next decades, the endorectal advancement flap was proven to be associated with a high, although variable, success rate.[4-7]

However, in the presence of very high fistula, presenting with an internal orifice sited at over 4 or 5 cm from the dentate line, more struggles arise. In the attempt of avoiding tension on the flap, the tissue mobilization should be extended proximally for an adequate length. In these case, the classic technique, using standard transanal retractors, can be frustrated by inadequate view and bleeding, and a less than ideal exposure could jeopardize the outcome of the procedure.

In 2009, in order to overcome similar difficulties during other procedures (in particular polipectomies and transanal excisions of early rectal cancers), transanal minimally invasive surgery (TAMIS) was developed.[9] The technique showed indisputable advantages, such as a better visualization due to the continuous

pneumorectum, the possibility of using advanced laparoscopic instruments, and an improved exposure of the rectum up to the upper part.[10]

We hypothesized that these benefits could easily be replicated using the same approach during the advancement rectal flap procedure for high anorectal fistulae, where the risk of bleeding, inadequate shaping of the flap and higher tension of the suture increase, and are associated to a greater chance of intraoperative complications and poor outcomes.

Methods

Since November 2015, all patients who presented with a high anorectal or rectovaginal fistula were prospectively considered. The definition of high fistula varies in the literature. For the purpose of the study, the procedure was proposed to the patients whose examination showed an internal orifice at a distance from the dentate line which, at the surgeon's opinion, would make technically difficult an optimal proximal mobilization of the flap (usually at 4, 5 cm). Idiopathic, Crohn's related, iatrogenic and post-obstetric fistulae were included.

The presence of active sepsis or secondary abscess extensions of the fistula would require an examination under anesthetic, the drainage of the abscess and the insertion of a seton in order to gain control of the infection. In these cases, the elective procedure would be postponed for as long as necessary.

Exclusion criteria was the presence of a substenosis of the anal canal, that would not allow the insertion of the TAMIS port (which is 4 cm in diameter).

The study was approved by the Institutional Ethical Committee and the patients were carefully consented for all the possible surgical options.

Surgical Technique

The patient was usually placed in lithotomy position. In the presence of a rectovaginal fistula, the jack-knife position was adopted in order to obtain a better exposure of the surgical field.

The first passages of the procedure replicated the standard steps of a classic advancement rectal flap.

The skin was incised circumferentially around the external orifice and a cone-like partial fistulectomy was performed in order to excise the fistula tract deep to the anal sphincter plane. (Fig. 1)

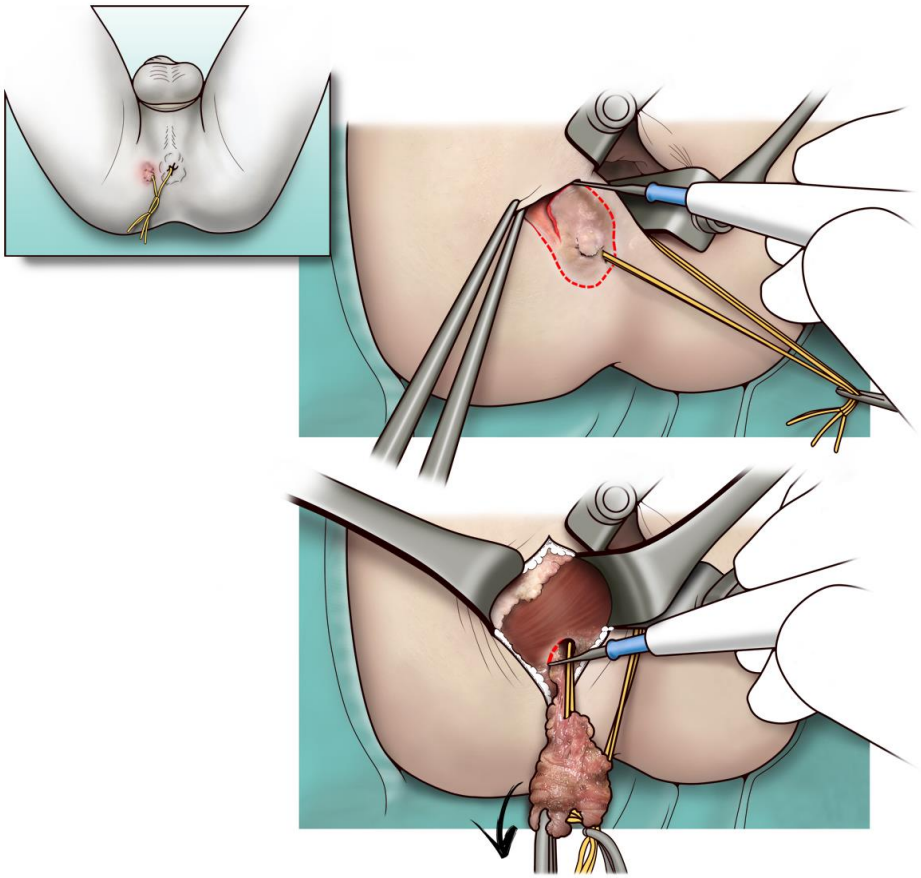

Figure 1. *Cone-like excision of the external tract of the fistula, extended to the plane of the anal sphincters.*

Once the muscle was reached, the inflammatory fibrotic tissue within the fistula was curetted and removed using a Volkmann spoon.

A Lone Star® (Cooper Surgical, Trumbull, CT, USA) or a Parks retractor was inserted in the anus.

The internal orifice of the fistula was visualized, and the fibrotic mucosa around it was removed with electrocautery. The tract was de-epithelialized and the internal opening was closed using adsorbable, monofilament U-stitches on the muscle. (Fig. 2)

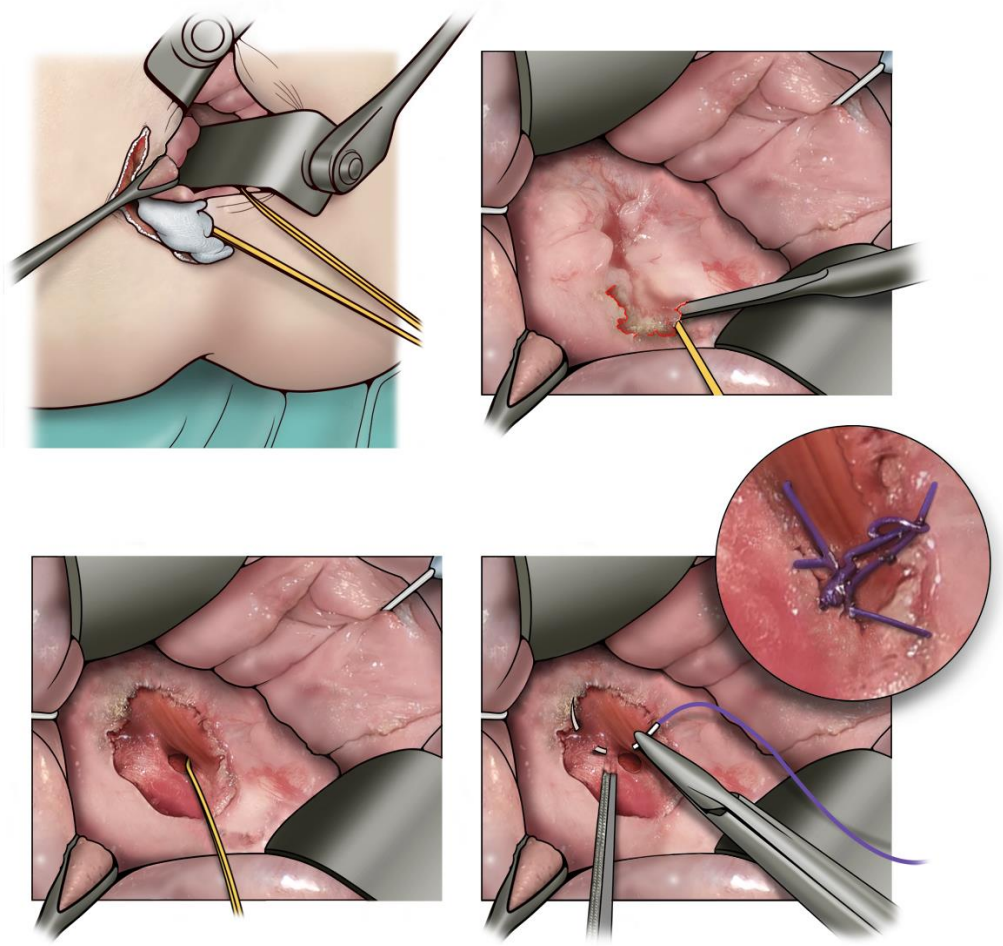

Figure 2. *Dissection of the internal orifice, including the fibrotic surrounding mucosa, and closure of the tract using interrupted sutures on healthy muscle*

After injection of 1:50,000 epinephrine diluted with saline deep into the submucosa, the full thickness dissection of the flap began. In few cases the mobilization was found to be sufficient through the standard transanal approach, and the flap was sutured to the dentate line according to the classic technique.

Otherwise, the flap would be mobilized as proximally as allowed by the exposure through the Parks retractor. At this point a multichannel TAMIS port was inserted in the anus. (Fig. 3)

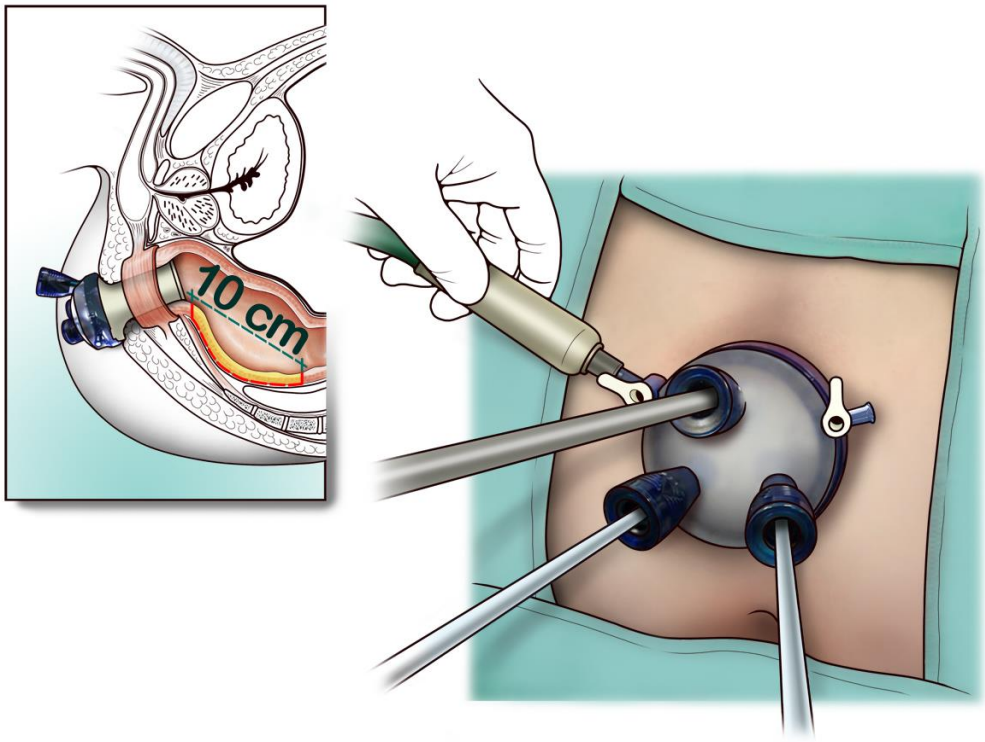

Figure 3. *Insertion of the TAMIS port and anticipated proximal extension of the dissection of the flap*

During the first two procedures a GelPOINT Path (Applied Medical, CA, USA) was used, while subsequently the TEO® platform (Transanal Endoscopic Operations, Karl Storz, Tuttlingen, Germany) was preferred. The latter has few advantages, as it is reusable, more stable and it can be easily repositioned during surgery as it is fixed to a mobile arm.

A pneumorectum was established at the pressure of 15 mmHg. The Trendelenburg position was required in order to reduce the peristaltic movement of the rectal wall. The dissection of the flap continued proximally maintaining a correct orientation, either using a monopolar hook or an advanced energy device (Thunderbeat®, Olympus Medical, Japan) which allowed to obtain a better control of the hemostasis. (Fig. 4)

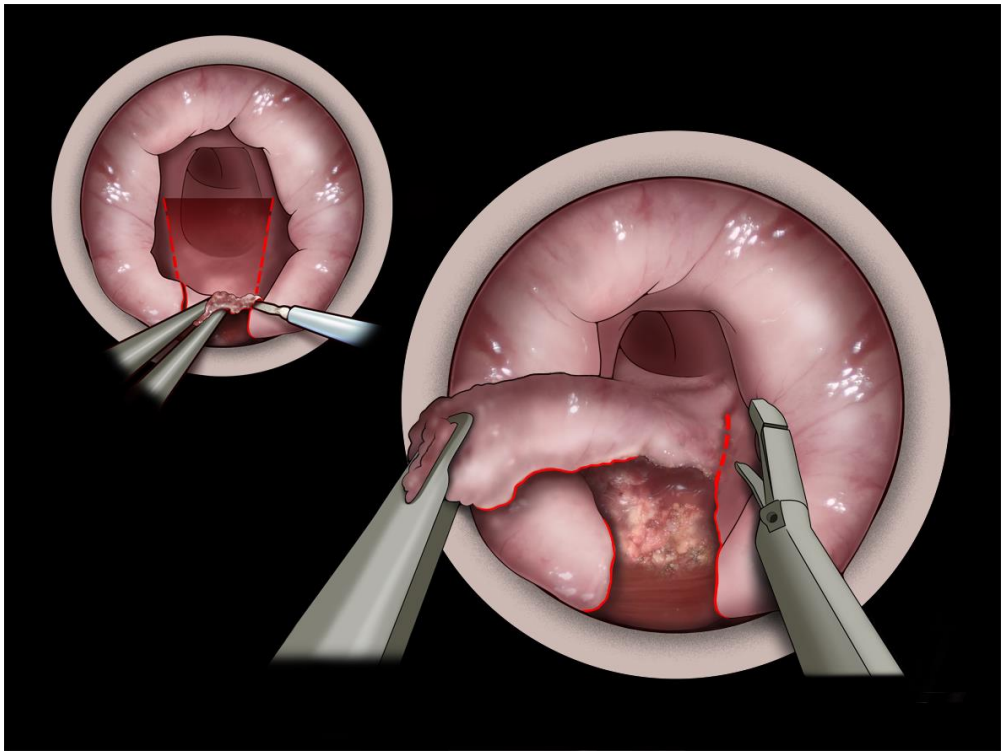

Figure 4. *View through the TAMIS port. The pneumorectum allows a proper visualization, and the use of advanced energy device might improve the hemostasis.*

The injection of epinephrine and saline could be easily performed using an endoscopic syringe kept within the jaws of a grasper.

Once the flap was properly mobilized (this could be confirmed by being able to pull the flap through the TAMIS port without excessive tension) the port was removed, and the distal edge of the flap sutured to the margins of the dissection at the dentate line using interrupted, adsorbable polyfilament sutures which were sloppily tied in order to avoid ischemia. Subsequently, other interrupted sutures were positioned on the lateral margins of the flap. (Fig. 5)

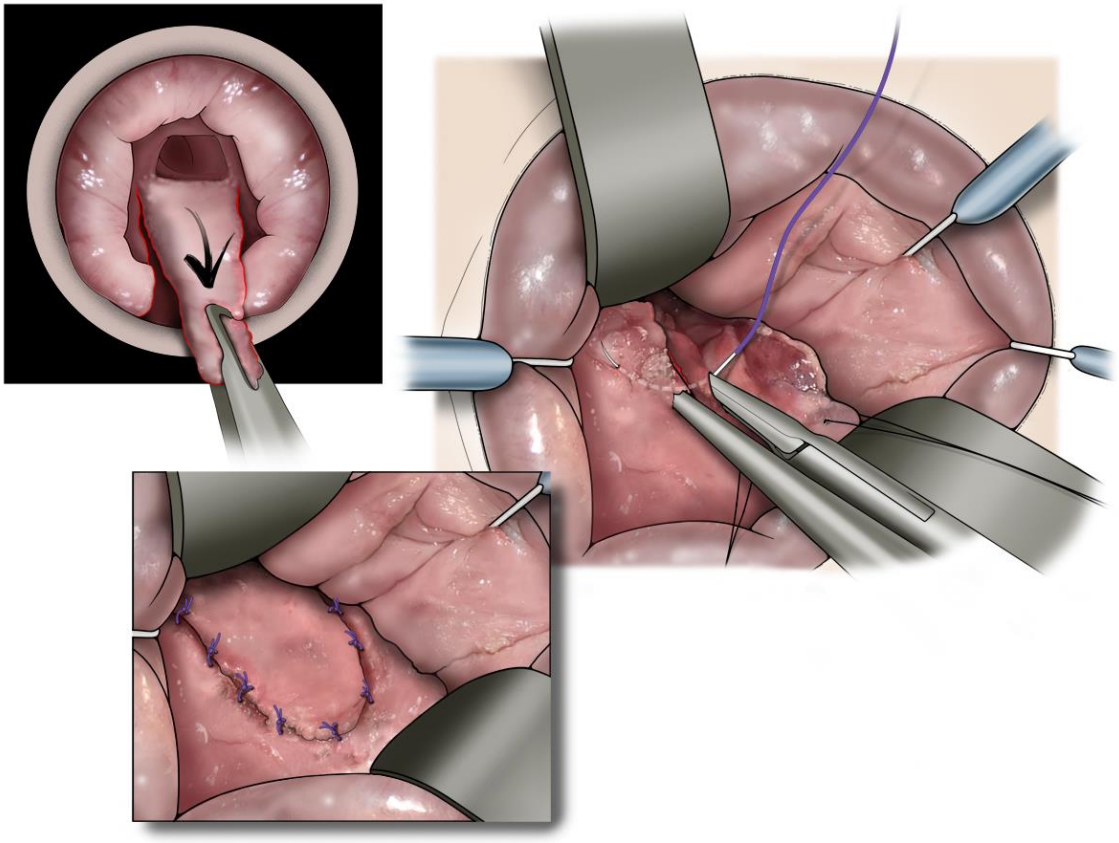

Figure 5. *Once a proper mobilization of the flap is obtained, the port is removed and the flap is sutured to the edge of the dissection tissues using interrupted sutures.*

Our experienced confirmed that, in order for the suture to be properly tension free, the length of the proximal dissection of the flap should be at least twice as long as the distance of the internal orifice from the dentate line.

Results

Since November 2015, 9 patients underwent surgery with an indication to a TAMIS-flap procedure. Five of them did not proceed with the operation. In three patients the flap was feasible using the classic approach, while in other 2 the anal canal was

fibrotic and substenotic, and the insertion of the TAMIS port was not possible. These patients had a fistula related to Crohn's disease.

Among the four patients who eventually underwent a TAMIS-flap, two had a cryptoglandular fistula, one a post-obstetric rectovaginal fistula, and one had Crohn's disease. All fistulae were suprasphincter.

All patients underwent previous attempts of fistula repair, which failed, and had a seton in situ at the time of surgery.

The median distance of the internal orifice from the dentate line was 4.8 cm (range 4-5). The median age was 44 years (range 25-52) and the surgery was performed at a median time from the diagnosis of the fistula of 19 months (range 10-26).

The median operative time was 115 minutes (range 90-150), and no intraoperative or 30-day postoperative complications were recorded.

The visualization of the surgical field and the control of the hemostasis were judged optimal during the TAMIS procedure by the surgeon. The mobilization of the flap allowed a tension free suture in all cases. The median length of the flap was 9 cm (8-10).

The median hospital stay was 4 days (range 3-5).

At a median follow-up time of 11 months (range 6-14) the fistula reoccurred in one case after 2 months from surgery.

At the last follow-up visits, the three patients who had a successful repair did not report any change in their bowel habits, in particular no gas or stool incontinence was highlighted. One patient referred the onset of temporary urgency which settled after 2 months from surgery.

Discussion

The principles of the treatment of anal fistulae include few paramount points: the identification of the fistula tract and the possible secondary extensions, the accurate drainage of sepsis, the removal of the inflammatory tissue and the closure of the internal opening. While a low fistula could be safely and effectively cured by a laying open of the tract, when a longer portion of the sphincter is involved the risk of postoperative incontinence has to be taken into consideration. Several techniques have been developed, especially in the last years, and a varying range of results has been reported in the literature.[11]

The advancement rectal flap remains one of the preferred operations among experienced colorectal surgeons.[6,8,12,13-15]

Some etiologies, such as Crohn's disease and obstetric injuries, are known to be associated with a higher chance of fistula recurrence.[7] One of the reasons of the disappointing outcomes of flaps performed in these cases is likely to be found in the unusually higher location of the internal orifice.

The first step of the classic transanal procedure allows the surgeon to properly assess the gap that needs to be covered after the excision of the internal tract and the surrounding fibrotic mucosa. The dissection usually removes the tissue from about 1 cm caudally to the opening down to the dentate line. Based on our experience, in order for the suture to be without tension, the flap should more or less twice as long as the length of the dissected plane.

The exposure obtained through a standard anal retractor can't possibly allow the dissection of the flap above few centimeters from the dentate line, even in expert

hands. Therefore, the necessity of a further mobilization is limited by a poor view, the frequent onset of bleeding and the need of an excessive traction that might damage the flap.

The TAMIS approach overcomes all these struggles. The pneumorectum maintains an optimal view throughout the procedure, especially in the more proximal part of the rectum where mistakes are more likely to happen, in particular the misshape of the flap and a poor hemostasis. The base of the flap should be larger than the tip in order to avoid a lack of blood flow to the distal tissues while, as important, a spiral excision should be avoided.

A full thickness dissection was preferred for few reasons. A thicker, healthy tissue is supposed to provide a better repair on the internal opening, and the vascularization is more likely to be preserved by this technique. Moreover, taking into consideration the length of the flap (up to 10 cm), the risk of causing lesions by traction should be reduced by the augmented consistency of a full thickness flap. As observed by other authors,[8] a full thickness dissection did not seem to negatively affect the postoperative continence in our experience.

The technique has an unavoidable learning curve, especially caused by the different view, the limited space provided by the transanal port and the need of mastering the laparoscopic instruments. As the indication to the technique is usually limited to complex, recurrent fistulae, the procedure should be performed only in tertiary center for advanced colorectal and proctologic surgery.

The technique might have a precise indication especially in patients affected by recurrent, high perianal fistulae associated with Crohn's disease. These patients are likely to undergo several procedures for relapse of the fistula during their lifetime,

each of them possibly frustrated by failure, due to the atypical location of the internal orifice and the presence of scar tissue (due both to the disease and the previous surgery). The TAMIS technique could allow to perform a flap using healthy rectal wall, and to perform a tension-free advancement flap.

Conclusions

Complex, high perianal fistulae represent a disabling conditions for patients. The standard transanal approach has technical limitations which could result in bad outcomes. The use of the TAMIS platform could provide a solution and allow the performance of a long, healthy and tension-free flap. Future trials will be required to confirm the preliminary findings of this promising technique.

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