

Case Series

Gracilis muscle flap reconstruction as a surgical alternative in anorectal pathology: a report of three cases at ISSEMYM Medical Center

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ABSTRACT

Recurrent anovaginal and rectovesical fistulas, and recurrent rectal prolapse, remain challenging for colorectal and reconstructive surgeons because of high recurrence rates, fibrosis from prior surgery, impaired sphincter function, and poor local tissue quality. The pedicled gracilis muscle flap is a versatile option, used as an interposition flap for complex fistulas or as static graciloplasty to support the sphincter complex and pelvic floor in selected prolapse cases. We describe the characteristics, management, and early outcomes of three patients who underwent gracilis reconstruction at ISSEMYM Medical Center between 2025 and 2026: two with complex fistulas and one with recurrent rectal prolapse. The first, with a history of radical prostatectomy, developed a persistent rectovesical fistula treated by fistula takedown and gracilis interposition after failed primary repair. The second, a 59-year-old woman with a recurrent low rectovaginal fistula, underwent resection of fibrotic tissue and gracilis interposition after failed fistulectomy and sphincter repair, later showing persistent recurrence. The third, an 81-year-old woman with recurrent rectal prolapse after prior rectopexy, underwent static graciloplasty with a Thiersch ring; her course was complicated by wound dehiscence, intestinal obstruction requiring colostomy, and hospital-acquired pneumonia, but she achieved a favorable outcome with no recurrence. The pedicled gracilis flap is a safe, reproducible option for complex fistulas and static graciloplasty in recurrent rectal prolapse, particularly after failed conventional treatment. It delivers well-vascularized tissue, reinforces tissue barriers, and supports the sphincter complex, though success depends on lesion etiology, fibrosis, prior surgeries, tissue quality, and patient selection.

Keywords: Gracilis muscle flap, Rectovaginal fistula, Rectovesical fistula, Rectal prolapse, Graciloplasty, Perineal reconstruction, Case series

INTRODUCTION

Low rectovaginal and rectovesical fistulas represent one of the most technically challenging complications in colorectal and reconstructive surgery, owing to their high recurrence rates, the substantial impairment in quality of life they produce, and the technical difficulty involved in

achieving definitive repair. These lesions may result from obstetric trauma, inflammatory bowel disease, pelvic surgery, radiotherapy, infectious processes, or malignant neoplasms. Smoking, Crohn's disease, and more than two prior repairs have been identified as risk factors for treatment failure, whereas fecal diversion has been associated with improved outcomes.¹ Interposition of the

gracilis muscle for the treatment of rectovaginal fistula was first described by Gorenstein et al in 1988, and it has since become an increasingly common treatment for complex rectovaginal or vesicorectal fistulas.^{1,2} Persistent inflammation, secondary fibrosis, and reduced local vascularity favor recurrence, so conventional procedures yield variable results, particularly in patients undergoing repeat surgery.^{1,3}

Full-thickness rectal prolapse is a pelvic floor disorder characterized by circumferential protrusion of all layers of the rectum through the anal canal. Its incidence is higher in older women, and it is commonly associated with fecal incontinence, constipation, pain, bleeding, and significant deterioration in quality of life. Treatment is currently predominantly surgical, with multiple abdominal and perineal approaches available; none has proven superior in every clinical scenario, so the choice of procedure must be individualized.⁴⁻⁶

In patients with recurrent rectal prolapse, particularly those with substantial damage to the sphincter mechanism or failure of previous procedures, conventional techniques may be insufficient to restore continence or prevent further recurrence. In these cases, static graciloplasty represents a salvage reconstructive alternative that consists of transposing the gracilis muscle around the anal canal to create a passive neosphincter, providing additional support to the pelvic floor and reinforcing the sphincter complex.⁴⁻⁷

Although most of the published experience currently corresponds to dynamic graciloplasty, developed by Baeten and colleagues, which incorporates chronic electrical stimulation to transform the gracilis muscle into a fatigue-resistant muscle, static graciloplasty remains a valid option in carefully selected patients, particularly when stimulation systems are unavailable or when the primary goal is to provide mechanical support rather than restore sphincteric function.^{8,9}

Reconstruction using a pedicled gracilis muscle flap interposition constitutes one of the most widely used alternatives for the treatment of complex perineal fistulas. Its main advantage is that it delivers well-vascularized tissue to a surgical bed that has previously been operated on, allowing separation of neighboring anatomical structures, obliteration of dead space, and promotion of healing of the primary repair.^{1,10,11} Because of its constant anatomy, length, arc of rotation, and minimal functional impact at the donor site, the gracilis muscle has become one of the flaps of choice for the management of rectovaginal, rectourethral, and recurrent rectovesical fistulas, and even for neosphincter procedures.¹⁰⁻¹² The gracilis is a thin, superficial adductor muscle that originates from the pubic symphysis and inferior pubic ramus and inserts on the medial tibial condyle at the pes anserinus; its dominant vascular pedicle, typically the descending branch of the medial circumflex femoral artery, enters the muscle approximately 8-10 cm below the

pubic tubercle, a constant anatomical relationship that underlies the reliability of the flap.¹³

Systematic reviews published over the last decade have demonstrated overall success rates between 70% and 80%, particularly in patients with failure of previous procedures, with a low incidence of donor-site complications.^{1,10} Likewise, several authors consider that gracilis muscle interposition should be regarded as an early reconstructive strategy in patients with multiple failed repair attempts, pelvic radiotherapy, or extensive fibrosis, where the delivery of vascularized tissue significantly increases the likelihood of definitive fistula closure.^{1,2,11,14} After a first failed repair attempt, a simple fistula becomes classified as a complex fistula, and the probability of success of subsequent repairs decreases significantly.¹⁵

Despite the favorable outcomes described in the literature, most publications correspond to retrospective studies and case series with a limited number of patients, so evidence remains scarce regarding the application of this technique in different types of complex perineal fistulas.^{1,10} The aim of the present study is to describe our experience in the treatment of one rectovesical fistula, one recurrent anovaginal fistula, and one recurrent rectal prolapse managed with pedicled gracilis muscle flap reconstruction, with emphasis on the usefulness of this technique as a reconstructive procedure in repeat surgery.

CASE SERIES

Patients and methods

A retrospective review was performed of two patients with a diagnosis of complex perianal fistulas, as well as one patient with complex recurrent rectal prolapse, treated at Centro Médico ISSEMyM Toluca between 2025 and 2026. Cases were evaluated in a multidisciplinary fashion by the coloproctology and plastic and reconstructive surgery services. Data were collected regarding age, sex, medical and surgical history, etiology, reconstructive procedures performed, and clinical course. All patients provided informed consent for surgical treatment and for the use of clinical information and images for academic purposes. This report was prepared following the Case Report (CARE) guidelines for the reporting of clinical cases.¹⁶

The series included three patients with complex fistulas and rectal prolapse of different etiologies. The first case involved a male patient with a history of laparoscopic radical prostatectomy for prostate adenocarcinoma, who developed a persistent rectovesical fistula following initial surgical treatment. Because of failure of the primary repair, he underwent repeat surgery that included takedown of the fistulous tract and interposition of a pedicled gracilis muscle flap to reinforce the separation between the urinary tract and the rectum.

The second case involved a female patient with a long-standing anovaginal fistula and multiple previous surgical

procedures. After persistence of the fistulous tract was documented following a primary repair, a second surgical intervention was performed, consisting of resection of fibrotic tissue and interposition of a pedicled gracilis muscle flap to reinforce the repair. During follow-up she developed recurrence of the fistulous tract, reflecting the substantial biological and surgical complexity of these lesions, particularly in the setting of extensive fibrosis and repeat surgery; however, a fistulotomy was subsequently performed, with a favorable clinical course.

The third case involved an 81-year-old female patient with a history of recurrent rectal prolapse, previously treated with rectopexy two decades earlier. Because of recurrence of the prolapse and failure of conventional treatment, transposition of a pedicled right gracilis muscle flap was performed, associated with placement of a Thiersch ring, with the aim of reinforcing the sphincter complex and providing support to the pelvic floor. In the postoperative period she developed wound dehiscence, complicated by intestinal obstruction, which required a protective colostomy and two surgical washouts with negative-pressure wound therapy. During her hospital course she developed hospital-acquired pneumonia, which prolonged her hospital stay; nonetheless, following multidisciplinary treatment she had a satisfactory clinical course, with no evidence of recurrence of the rectal prolapse, confirming adequate integration of the gracilis muscle transposition as a salvage reconstructive procedure.

The results obtained support the use of the gracilis muscle as a versatile reconstructive tool for the treatment of complex perineal defects, both through its interposition in low rectovaginal and rectovesical fistulas and through static graciloplasty in selected cases of recurrent rectal prolapse. The use of well-vascularized tissue promotes healing, reinforces surgical repairs, and provides additional support to the sphincter complex and pelvic floor. Nevertheless, the success of the procedure continues to depend on factors such as the etiology of the lesion, the number of previous interventions, tissue quality, the presence of fibrosis or local infection, and an appropriate multidisciplinary approach that allows selection of the most suitable reconstructive strategy for each patient.

Case 1 - rectovesical fistula

An 81-year-old male patient with a history of type 2 diabetes mellitus, systemic arterial hypertension, and acinar adenocarcinoma of the prostate, treated with laparoscopic radical prostatectomy in 2025. He subsequently developed a rectovesical fistula, for which he underwent exploratory laparotomy, primary closure of the rectum, and ileostomy.

During postoperative follow-up, in April 2026 he presented with dehiscence of the surgical wound with passage of urine through the anus, requiring hospitalization. In May 2026, percutaneous nephrostomy placement was performed, and although passage of urine

through the rectum subsequently resolved, drainage of fluid through the surgical wound persisted.

Because of the persistence of the fistula and failure of previous treatment, repeat surgery was indicated. After takedown and closure of the fistula by the coloproctology service, the plastic and reconstructive surgery service performed interposition of a pedicled right gracilis muscle flap, transposed to the perineal region to reinforce the repair of the defect and separate the planes between the urinary tract and the rectum (Figure 1). No recurrence or evidence of rectovesical fistula was observed thereafter.

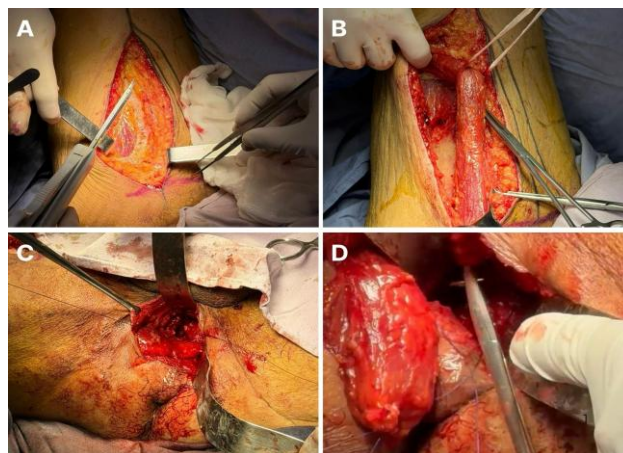


Figure 1: Surgical technique of gracilis muscle interposition for rectovesical fistula in case 1 (A) dissection and identification of the gracilis muscle along the medial aspect of the right thigh, in the interval between the adductor longus and adductor magnus muscles, (B) release and preservation of the muscle's dominant vascular pedicle, typically the descending branch of the medial circumflex femoral artery, which enters the muscle approximately 8-10 cm below the pubic tubercle 13, (C) perineal approach with identification of the rectovesical fistulous tract after takedown of the primary repair, and (D) transposition and fixation of the gracilis muscle at the recipient site, interposed between the rectum and the bladder to reinforce the repair and separate the two structures with well-vascularized tissue.

Case 2 - recurrent anovaginal fistula

A 59-year-old female patient with a history of drainage of a Bartholin's gland abscess approximately 25 years before her current condition. She denied chronic degenerative diseases. Her surgical history was notable for a cesarean section performed in 2007 for preterm pregnancy and an anovaginal fistulectomy performed in December 2024. Her gynecologic-obstetric history included four pregnancies, three vaginal deliveries, one cesarean section, and three episiotomies. She denied a history of fecal incontinence, diarrhea, or constipation.

The patient's condition began in 2016, with occasional passage of fecal material through the vagina, associated

with recurrent vaginal infections. She was first evaluated in the coloproctology service in August 2024. On physical examination, an area of fibrosis was identified 1.5 cm from the anterior anal margin, with a millimetric fistulous orifice communicating with an orifice located in the vaginal introitus wall, establishing the diagnosis of anovaginal fistula and leading to scheduling of surgical treatment.

The first surgical intervention was performed in December 2024. Intraoperatively, an anovaginal fistula approximately 3 mm in length was identified. Radial fistulotomy was performed with repair of the deep planes and reconstruction of the anal sphincter, without intraoperative complications and with minimal bleeding.

During postoperative follow-up, the patient continued to have symptoms. At evaluation by the coloproctology service in August 2025, persistence of the fistulous communication was confirmed, and a diagnosis of persistent anovaginal fistula was made, leading to the decision to perform a further surgical intervention.

The second surgical intervention was carried out in December 2025. A transverse incision was made approximately 3 cm below the vaginal introitus, followed by complete fistulectomy and resection of fibrotic tissue in the rectal wall. Because of the recurrence of the fistula and the substantial tissue compromise secondary to the previous surgery, involvement of the plastic and reconstructive surgery service was required to perform reconstruction using interposition of a gracilis muscle flap. The gracilis muscle was identified along with its vascular pedicle, and distal dissection was carried out to the level of the tendon, which was divided to allow transposition of the muscle through the subcutaneous tissue to the site of the fistula, providing well-vascularized tissue to reinforce the repair (Figure 2).

At follow-up in May 2026, the patient reported persistent purulent drainage through the perineum. Directed physical examination, including rectal and vaginal digital examination, identified an outlet fistulous orifice in the anterior anal region and an inlet orifice in the vaginal wall, both draining purulent material, findings consistent with persistence and recurrence of the anovaginal fistula despite two reconstructive surgical procedures.

This case illustrates the complexity of managing recurrent recto- and anovaginal fistulas. The presence of fibrosis secondary to previous interventions, failure of the repair, and persistence of the fistulous tract required further repeat surgery, with a repeat fistulotomy being performed; the patient has since remained without evident signs of persistent anovaginal fistula.

Case 3 - recurrent rectal prolapse

An 81-year-old female patient with a 17-year history of systemic arterial hypertension and a 25-year history of

type 2 diabetes mellitus. Her relevant surgical history included rectopexy for rectal prolapse approximately 20 years earlier, with progressive recurrence of the clinical picture.

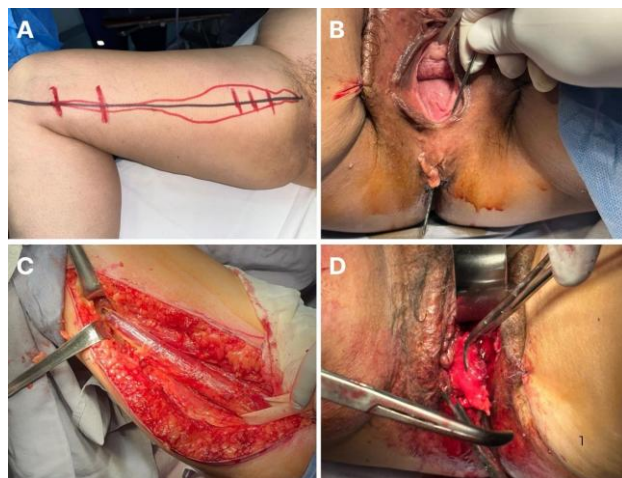


Figure 2: Gracilis muscle interposition technique in case 2 (A) preoperative marking of the course of the gracilis muscle over the medial thigh, outlining its path from its origin at the ischiopubic ramus to its insertion at the pes anserinus, with identification of the muscle's longitudinal axis to plan the incision and preserve the proximal neurovascular pedicle, (B) exposure of the perineal field with identification of the anovaginal fistulous tract prior to its resection and repair, (C) dissection and release of the gracilis muscle through a longitudinal approach on the medial thigh, preserving its main vascular pedicle for subsequent transposition, and (D) tunneling and transposition of the gracilis muscle to the perineal region, interposing it between the anterior rectal wall and the posterior vaginal wall as a biological reinforcement of the fistula repair.

Four months before admission she developed moderate-intensity anal pain (6/10 on the visual analog scale), associated with occasional episodes of rectal bleeding and recurrence of the rectal prolapse, and she continued follow-up with the coloproctology service. Because of the persistence of symptoms and the history of failure of previous surgical treatment, a diagnosis of complex recurrent rectal prolapse was established, and salvage surgical management was indicated.

In June 2026, in a joint procedure between the coloproctology and plastic and reconstructive surgery services, placement of a Thiersch ring was performed in association with transposition of a pedicled right gracilis muscle flap. The indication for this technique was based on the recurrence of the prolapse after a previous rectopexy and the need to provide dynamic reinforcement of the perineal tissues.

The gracilis muscle was mobilized and transposed around the anal canal to act as a static neosphincter, reinforcing

the sphincter complex and the pelvic floor (Figure 3), with the aim of reducing the risk of a further recurrence of the prolapse.

In the postoperative period the patient developed wound dehiscence, complicated by intestinal obstruction, requiring a protective colostomy. She subsequently underwent two surgical washouts and dressing changes with negative-pressure wound therapy (VAC) for management of the perineal wound. During her hospital stay she developed hospital-acquired pneumonia, which responded favorably to medical treatment, although it resulted in a prolonged hospital stay.

Despite the postoperative complications, no recurrence of the rectal prolapse was documented during clinical follow-up, and adequate integration of the gracilis muscle transposition and stability of the perineal reconstruction were observed. This case illustrates the usefulness of static graciloplasty as a salvage procedure in patients with complex recurrent rectal prolapse, particularly when conventional procedures such as rectopexy have failed. Although its indication is currently uncommon, the technique may constitute a valid reconstructive alternative in carefully selected cases, providing additional support to the sphincter complex and favoring control of recurrence.

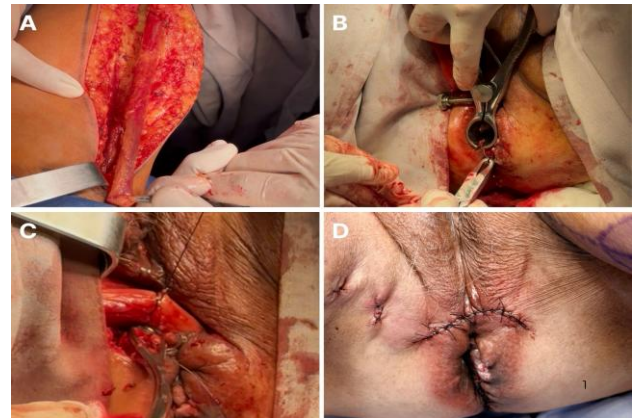


Figure 3: Surgical technique of static graciloplasty associated with a Thiersch ring for recurrent rectal prolapse in case 3 (A) dissection of the right gracilis muscle with preservation of its vascular pedicle, (B) placement and calibration of the Thiersch ring using an anoscope, (C) subcutaneous tunneling and circumferential transposition of the gracilis muscle around the anal canal to create a static neosphincter, and (D) final appearance after fixation of the muscle and closure of the surgical wounds, showing adequate reconstruction of the sphincter complex.

Table 1: Summary of clinical data of the cases studied.

Cases	Age (years)	Risk factors	Complications	Failure of primary procedure	Reintervention
Case 1	81	Radical prostatectomy (prostate adenocarcinoma)	NA	No	No
Case 2	59	Cesarean section; 3 episiotomies	Surgical site infection; fistula recurrence	Yes	Fistulotomy
Case 3	81	Recurrent rectal prolapse	Wound dehiscence; intestinal obstruction; pneumonia	No	No

DISCUSSION

Rectovaginal and rectovesical fistulas represent some of the most complex complications in colorectal and reconstructive surgery.² Their management remains challenging because of high recurrence rates, particularly in patients with multiple previous procedures, radiotherapy, inflammatory bowel disease, or chronic infectious processes.¹ In this context, interposition of vascularized tissue using a gracilis muscle flap has emerged as an effective reconstructive alternative to improve healing and reduce the risk of surgical failure.¹⁰

The biological rationale for the gracilis flap lies in the transfer of well-vascularized tissue to a bed frequently characterized by fibrosis, chronic inflammation, infection, or poor tissue perfusion. Muscle interposition creates a physical barrier between previously communicating anatomical structures and promotes local neovascularization, conditions that are essential to achieve definitive closure of complex fistulous tracts.^{10,15} These

characteristics explain why the gracilis flap has been widely used in recurrent low and high rectovaginal fistulas, rectourethral and rectovesical fistulas, and complex perineal defects following oncologic surgery or radiotherapy.^{2,10,15} As a type II muscle in the Mathes and Nahai classification of vascular anatomy, the gracilis has a single dominant pedicle with several minor pedicles, a constant relationship that underlies the reliability and reproducibility of the flap in these settings.¹³

In rectovaginal fistulas, the available evidence shows favorable outcomes. The systematic review by Hotouras et al, which included 106 patients with rectovaginal and anovaginal fistulas, found cure rates ranging from 60% to 100%, with relatively low morbidity.² More recently, Maspero et al analyzed 20 studies and 384 patients, reporting an overall closure rate of 64%, identifying smoking, Crohn's disease, and multiple previous repairs as factors associated with failure.¹ These findings are particularly relevant, since most candidates for gracilis muscle transposition correspond precisely to complex or

recurrent cases in whom conventional local techniques have failed.

In rectovesical and rectourethral fistulas, the literature also supports the use of the gracilis muscle as a method of tissue reinforcement. The anatomical proximity between the urinary tract and the rectum favors persistence of the fistulous communication when only primary closure is performed. Iatrogenic rectourethral fistula is a rare but debilitating complication that may follow invasive treatment of prostate carcinoma.¹¹ Muscle interposition provides a permanent physical separation between both systems and decreases the risk of recurrence.^{3,10,11} Several series have shown that placement of a vascularized gracilis flap is especially useful in patients previously treated with radical prostatectomy, pelvic radiotherapy, or multiple repair attempts, scenarios in which local tissue is usually severely compromised.^{3,11}

Another important aspect is the usefulness of the gracilis flap in extensive perineal defects and in reconstructive procedures associated with complex rectal prolapse or radical colorectal resections. The muscle's capacity to fill dead space, provide vascularization, and reduce tension on suture lines has favored its incorporation into the reconstructive arsenal of advanced pelvic surgery.¹⁰ Although the evidence is more limited than for rectovaginal fistulas, several authors have described satisfactory outcomes in the reconstruction of complex perineal defects using pedicled muscle flaps.^{12,14,17}

The use of the gracilis muscle as a neosphincter was initially described through static graciloplasty and subsequently refined with the development of dynamic graciloplasty, a technique pioneered by Baeten and Chapman, who demonstrated that electrical stimulation of the transposed muscle significantly improved continence by inducing transformation of type II muscle fibers into fatigue-resistant fibers.⁶⁻⁹ However, the high technical complexity, device cost, and complication rate limited its widespread adoption. Although contemporary guidelines favor procedures such as laparoscopic ventral rectopexy or perineal approaches, there are complex situations in which these techniques may not offer satisfactory results, particularly in the presence of multiple previous surgeries, deterioration of the sphincter apparatus, or significant perineal fibrosis.^{4,18}

Complications associated with harvesting the gracilis muscle are generally acceptable. Most correspond to seromas, superficial infections, partial wound dehiscence, or donor-site discomfort, with little long-term functional impact given the muscle's limited biomechanical contribution to normal gait.^{1,10,15} The systematic review and meta-analysis by Garoufalia et al, which included 658 patients with complex perineal fistulas, reported an overall success rate of nearly 80%, a recurrence rate of 16.7%, and an early reintervention rate below 4%, confirming the safety and efficacy of the procedure in experienced centers.¹⁰

The cases presented in our series share several of the risk factors described in the literature for failure of primary repair, including previous surgeries, chronic inflammation, extensive fibrosis, and fistula recurrence. In both fistula scenarios, the decision to incorporate a gracilis muscle flap responded to the need to provide healthy, well-vascularized tissue to a surgical field that had previously been operated on. This strategy is consistent with current recommendations, which regard gracilis muscle transposition as a particularly valuable second- or third-line procedure in patients with recurrent disease.^{1,10}

Finally, it is important to emphasize that treatment success does not depend exclusively on the reconstructive technique employed. Appropriate patient selection, infection control, fecal or urinary diversion when indicated, and a multidisciplinary approach are fundamental elements to optimize functional outcomes and reduce recurrence.^{3,18-20}

CONCLUSION

The pedicled gracilis muscle constitutes a safe, versatile, and effective reconstructive tool for the treatment of anovaginal and rectovesical fistulas, as well as for complex or recurrent rectal prolapse managed through gracilis muscle transposition. Its main advantage lies in providing well-vascularized tissue to areas with fibrosis, chronic inflammation, or failure of previous procedures, promoting healing, reinforcing the repair of defects, and providing additional support to the sphincter complex and pelvic floor when used as a static neosphincter.

In our experience, the use of the gracilis muscle allowed satisfactory resolution of two cases of complex fistulas through its interposition, and one case of recurrent rectal prolapse through gracilis muscle transposition as a salvage procedure, representing a valuable reconstructive alternative in scenarios of high technical complexity and repeat surgery. These cases highlight the importance of a multidisciplinary approach between the coloproctology and plastic and reconstructive surgery services to optimize functional outcomes and reduce the risk of recurrence.

Nevertheless, because of the low frequency of these conditions, the heterogeneity of published series, and the scarcity of prospective comparative studies, studies with larger numbers of patients are needed to more precisely define the indications, functional outcomes, and prognostic factors associated with the success of gracilis muscle interposition and static graciloplasty in complex perineal reconstruction.

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