

# Treatment of neovaginal prolapse: case report and systematic review of the literature

Mathias Neron<sup>1</sup> · Gwenaël Ferron<sup>2</sup> · Pierre Vieille<sup>1</sup> · Vincent Letouzey<sup>1</sup> ·  
Brigitte Fatton<sup>1</sup> · Renaud de Tayrac<sup>1</sup>

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## Abstract

**Introduction and Hypothesis** Neovaginal prolapse (NP) is a rare event as few cases have been reported in the literature. Its management is complex and depends on the initial pathology, the vaginoplasty technique and the patient's history. We present a review the literature on this rare event.

**Methods** We describe the case of a 72-year-old woman who presented with NP 1 year after pelvic exenteration and radiotherapy for recurrent cervical carcinoma associated with vaginal reconstruction by shaped-tube omentoplasty. She had undergone two previous surgical procedures (posterior sacrospinous ligament suspension and partial colpocleisis), but NP recurred each time within a few months. We performed an anterior approach to the sacrospinous ligament and inserted a mesh under the anterior wall of the neovagina, with the two mesh arms driven through the sacrospinous ligament in a tension-free manner (Uphold Lite® system). The MEDLINE, Cochrane Library, ClinicalTrials and OpenGrey databases were systematically searched for literature on the management of NP following bowel vaginoplasty, mechanical dilatation, graciloplasty, omentoplasty, rectus abdominis myocutaneous flap and the Davydov procedure.

**Results** The postoperative course in the patient whose case is described was uneventful and after 1 year of follow-up, the anatomical results and patient satisfaction were good. The

systematic search of the databases revealed several studies on the treatment of NP using abdominal and vaginal approaches, and these are reviewed.

**Conclusions** Overall, sacrocolpopexy would appear to be a good option for the treatment of prolapse after bowel vaginoplasty, but too few cases have been reported to establish this technique as the standard management of NP.

**Keywords** Neovagina · Omentoplasty · Pelvic Exenteration · Prolapse · Sacrospinous ligament · Uphold

## Introduction

Various techniques for vaginal reconstructions have been developed for vaginal aplasia or for use following procedures such as pelvic exenteration [1]. Neovaginal prolapse (NP) is a rare complication of these techniques that detracts from their functional results. Its incidence in all procedures is so far unknown, as the literature does not contain a sufficiently large number of reports on reconstructions. However, the incidence of NP after sigmoid vaginoplasty is known to be 2.3 % [2]. NP can occur in the absence of fixation to the vaginal wall or because of deficiencies in the apical and lateral support [2]. Due to its low incidence, no consensus has emerged for the surgical repair of NP. Therefore we carried out a systematic review of the literature on this topic, and we report a case of the surgical repair of NP.

## Methods

The MEDLINE, Cochrane Library, ClinicalTrials and OpenGrey databases were searched from January 1985 through April 2015. All types of studies and techniques of

✉ Mathias Neron  
mathias.neron@orange.fr

<sup>1</sup> Centre Hospitalier Universitaire de Nîmes, 4 Place du Pr Robert Debré, 30029 Nîmes, France

<sup>2</sup> Institut Claudius Regaud, Institut Universitaire du Cancer de Toulouse, 1 Av. Irène Joliot-Curie, 31059 Toulouse, France

vaginoplasty were included. The main inclusion criterion was the inclusion of a description of the NP. No language restrictions were applied. Studies concerning transsexualism surgery were excluded. We used the following search terms: “prolapse” combined with “pelvic exenteration”, “neovagina”, “omentoplasty”, “rectus abdominis myocutaneous flap”, “graciloplasty OR gracilis flap”, “sigmoid vaginoplasty” and “davydov” to identify case reports on NP. We also searched the references cited in the retrieved articles to identify further studies. The literature search process is summarized in Fig. 1, and was performed by one of the authors (N.M.). The data were analysed by two of the authors (M.N. and R.de T.). Because only a small number of cases were found, it was impossible to perform a quantitative analysis. A descriptive analysis is therefore presented.

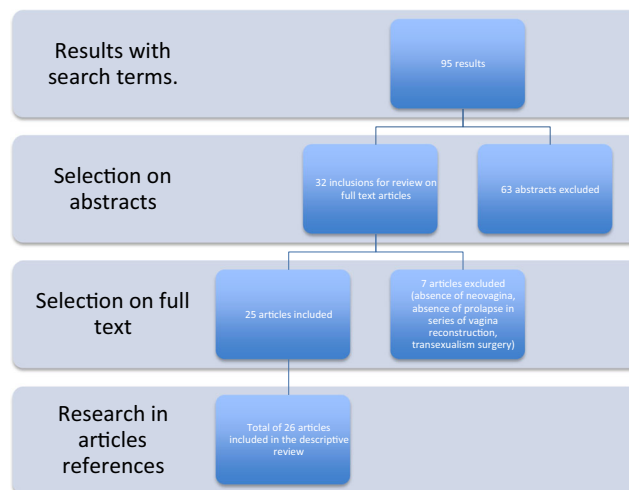
We also report a case of NP after vaginoplasty by shaped-tube omentoplasty. The patient’s consent was obtained for the use of the photographs.

## Case Report

We report the case of a 72-year-old woman who underwent laparoscopic supralelevator anterior and middle pelvic exenteration with urinary diversion by Miami pouch at the age of 67 years for cervix neoplasm relapse after external beam radiotherapy with chemotherapy and vaginal brachytherapy. Shaped-tube omentoplasty was used for vaginal reconstruction. It is an original technique of vaginoplasty tested by G.F. and then aborted due to a high frequency of NP during follow-up. This surgical treatment was successful and the patient at the time of reporting was still in complete remission.

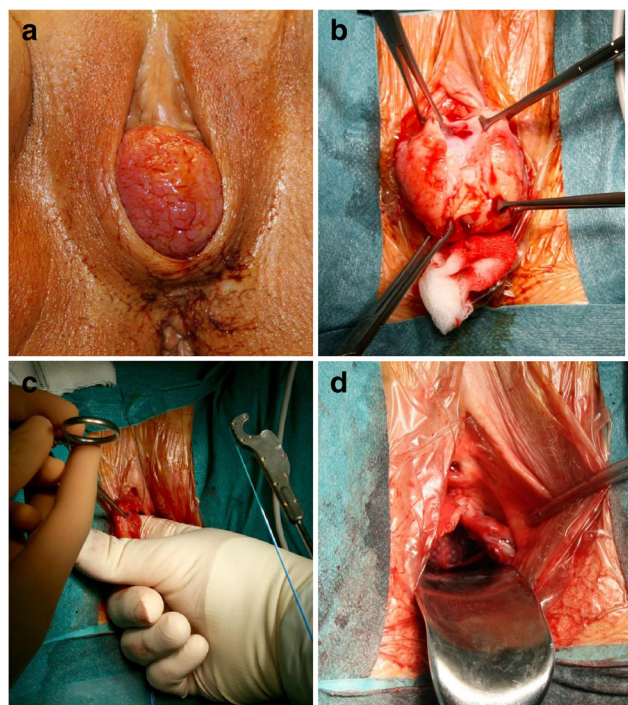
One year after the reconstruction, she complained of NP characterized by a fundic colpocele POP-Q stage 4 (−3, −3, +6, x, −3, −3, 4, 2, 8). Eversion of the neovagina was noted (Fig. 2a). The patient did not complain of anal incontinence and was perfectly autonomous with her Miami pouch. She was sexually active with her husband but reported physical and psychological discomfort due to her NP. Before consulting our team, the patient underwent two surgical procedures. The first procedure consisted of unilateral posterior sacrospinous ligament fixation with polyamide non-absorbable thread was performed. The prolapse recurred within 3 months. The second procedure consisted of partial colpoceleisis using polyglactin absorbable suture, but the prolapse recurred within 1 month. The surgeon’s choice of absorbable suture was doubtless based on extensive experience in pelvic surgery and radiotherapy.

Traditionally, mesh is contraindicated in a radiated field due to the increased risk of mesh exposure and infection. Moreover in this patient, the surgical dissection of the NP could have been particularly challenging. In order to use a mesh, it is necessary to find a dissection plane in which the



**Fig. 1** Systematic review flow chart

mesh can be fixed. This condition can be particularly difficult in an omental graft. The solidity of the omental flap cannot be guaranteed, so its safety as a support for the mesh is uncertain. However, surgery is more likely to be successful if mesh is used. We suggested that the patient should undergo a second surgical procedure involving posterior sacrospinous suspension using non-absorbable thread to lessen the risk of mesh exposure and infection, but the patient insisted on the fitting of an anterior vaginal mesh fixed bilaterally to the sacrospinous

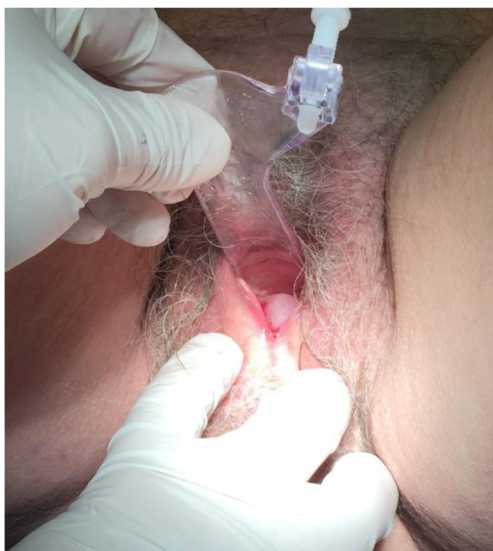


**Fig. 2** a Initial prolapse of the neovagina after shaped-tube omentoplasty. b Colpotomy and lateral dissection to the sacrospinous ligament. c Mesh attachment by the anterior approach to the sacrospinous ligament using a Capiro® system. d Appearance of the mesh in place at the end of surgery and before colpoorrhaphy

ligament in order to maximize the probability of surgical success. Informed consent was obtained for the procedure.

This procedure was performed under spinal anaesthesia in the lithotomy position. After local infiltration of saline and median sagittal colpotomy, a dissection plane was found beneath the neovagina. It was marked by an inflammatory reaction and extended up to the sacrospinous ligament on two sides by the anterior space (Fig. 2b). A peritoneal breach was made during the dissection of an enterocele and immediately closed to maintain the mesh in the extraperitoneal space. The mesh (Uphold Lite®; Boston Scientific, Voisins Le Bretonneux, France) was attached to the sacrospinous ligament bilaterally via the anterior approach using a Capio® system (Fig. 2c) and to the anterior wall of the neovagina using polypropylene 2.0 thread (Prolene®; Ethicon, Issy-les-Moulineaux, France). The mesh was adjusted to its final position by pulling on the two arms. The neovagina was closed by suturing with poliglecaprone 3.0 (Monocryl®, Ethicon; Fig. 2d). The postoperative course was uneventful, and the patient was allowed to return home on day 4.

Three weeks after surgery, physical examination showed a synechia on the anterior wall of the neovagina which was removed in the clinic. No prolapse was noted at this time, but mid-vaginal shrinkage was evident due to the synechia (POP-Q –3, –3, –8, x, –3, –3, 2, 5, 2, 8). One year after surgery, the patient was very satisfied with the result and considered herself healthy as based on the SF-36 questionnaire. Examination revealed a shorter vagina and a posterior colpocele of POP-Q stage 2 (–3, –3, –5, x, –2, –1, 3, 2, 5) which did not bother her (Fig. 3). No mesh-related complications were noted. Sexual function was evaluated using the PISQ-IR questionnaire. The patient complained of decreased desire but was satisfied with her sexual life despite the absence



**Fig. 3** Examination 1 year after surgery showing the presence of a posterior colpocele

of vaginal intercourse. The couple had tried penetration, but the patient felt uncomfortable and a little painful, and they did not try again, even with lubrication. Indeed, the patient reported that she was apprehensive of penetration and the couple had had to modify their sexual relations to adjust to this. Overall, in this patient, the benefit of surgery was mostly psychological, with improved quality of life and satisfaction with sexuality but without vaginal intercourse.

## Results

The search of MEDLINE using the selected search terms found a total of 96 articles. In all, 30 articles corresponding to the objectives of the study were included in the analysis. The searches of the Cochrane Library, ClinicalTrials.gov and OpenGrey revealed no articles. The results for each vaginoplasty technique are detailed below. The articles included are mostly case reports and small retrospective studies; therefore the evidence level is low.

### Bowel Vaginoplasty

Two types of prolapse were found for bowel vaginoplasty using the small bowel, caecum or sigmoid for vaginal reconstruction. The first was mucosal prolapse in which only the bowel mucosa was prolapsed. Seven studies included 20 patients with mucosal prolapse after sigmoid vaginoplasty [3–9]. One study included a patient with mucosal prolapse after caecal vaginoplasty [10]. All 21 patients were treated by surgical resection and sometimes fulguration, but outcomes were not reported. The second type of prolapse was full-thickness NP. Ten studies included a total of 13 patients, and these studies are summarized in Table 1 [2, 9–17]. The time from surgery to prolapse was reported in all patients and ranged from immediately to 33 years. Prolapse was seen in all intestinal segments: ileum, caecum and sigmoid. Sacrocolpopexy would appear to be a good option and was preferred for treating prolapse of bowel neovagina with no recurrence in recent cases.

### Mechanical Dilatation

Mechanical dilatation of the neovagina is a common technique used in Mayer-Rokitansky-Küster-Hausler (MRKH) syndrome. Our search found seven studies that included patients with NP after self-dilatation, as summarized in Table 2 [18–24]. Both vaginal and abdominal approaches were used in these patients with success.

**Table 1** Results of management of neovaginal prolapse after bowel vaginoplasty

| Reference | Patients | Bowel vaginoplasty technique used | Time from vaginoplasty to prolapse (years) | Type of prolapse                  | Surgical procedures for prolapse, if present (time to recurrence)   | Prolapse surgery technique used  | Mesh or suture used   | Recurrence (time to recurrence or follow up)  |
|-----------|----------|-----------------------------------|--|-----------------------------------|---|--|---|---|
| [11]      | 1        | Sigmoid                           | 0.5  | Full thickness                    | 1. Laparotomy, colpopexy to round and utero-ovarian ligament (2 months).<br>2. Vaginal excision (3 months).<br>3. Abdominal sacral colpopexy with autologous rectus fascia (3 months).<br>4. Vaginal full-thickness resection (1 day) | Left-sided sacrospinous ligament suspension with PDS   | PDS thread  | No (14 months)  |
| [12]      | 1        | Sigmoid                           | 26   | Full thickness                    | –   | Bilateral iliococcygeus fascia neovaginal apical suspension<br>Laparoscopic sacrocolpopexy   | Silk ligature no. 7<br>Polypropylene mesh, polyester thread | No (24 months)<br>No (6 months)   |
| [2]       | 1        | Sigmoid                           | 6  | Full thickness                    | 1. Open abdominal procedure with mesh (15 days). 2. Vaginal procedure with mesh (3 years). 3. Laparotomy: fixation of neovagina to round ligaments (1 day)  | –  | –   | –   |
| [13]      | 1        | Ileocecal                         | 0.1  | Anterior segment of the neovagina | –   | Laparoscopic sacropexy of the anterior wall and vault of the neovagina using polyester nonresorbable mesh<br>Open suspension using strips of the external oblique aponeurosis and neovaginal resection | Polyester mesh, polyamide thread<br>Suture material unknown | No (6 months)<br>Yes (4 years)  |
| [14]      | 2        | 1 Sigmoid                         | 3  | Full thickness                    | –   | –  | –   | –   |
|           | 2        | Sigmoid                           | 5  | Full thickness                    | –   | Laparotomy: extraction of sigmoid neovagina and second neovagina with paired vulvoperineal fasciocutaneous flaps   | Unknown   | No (13 months)  |
| [9]       | 1        | Sigmoid                           | ?  | Full thickness                    | –   | Laparotomy: fixation of neovagina to the pelvic floor  | Unknown   | ?   |
| [17]      | 1        | Ileocecal                         | 1.5  | Anterior segment of the neovagina | –   | Vaginal approach: resection of prolapsed ileal segment   | Not used  | No (7 months)   |
| [15]      | 1        | Sigmoid                           | 33   | Full thickness                    | –   | Open sacrocolpopexy  | Unknown   | No  |
| [10]      | 1        | Sigmoid                           | ?  | Full thickness                    | –   | Open sacrocolpopexy  | Unknown   | ?   |
| [16]      | 3        | 1 Sigmoid                         | 4  | Full thickness                    | –   | Abdominal suspension of the neovagina to the Cooper ligament   | Unknown   | No  |
|           | 2        | Sigmoid                           | 3  | Full thickness                    | –   | Abdominal suspension of the neovagina to the Cooper ligament   | Unknown   | Yes: abdominal sacropexy  |
|           | 3        | Sigmoid                           | Immediately                                | Full thickness                    | –   | Vaginal resection of redundant sigmoid   | Unknown   | Yes: abdominal suspension to the Cooper ligament and secondarily vaginal resection of redundant sigmoid |

**Table 2** Results of management of neovaginal prolapse after mechanical dilatation

| Reference | Patients | Time from dilatation of neovagina to prolapse | Prolapse surgery technique used   | Mesh or suture used              | Recurrence (time to recurrence or follow up) |
|-----------|----------|---|---|----------------------------------|--|
| [18]      | 1        | 2 years                                       | Davydov procedure   | PDS thread                       | No (6 months)                                |
| [19]      | 1        | 7 years                                       | Laparoscopic sacrocolpopexy   | Y-shaped mesh and ProTack        | No (1,5 month)                               |
| [20]      | 1        | 5 months                                      | Right sacrospinous ligament suspension with absorbable suture                       | Two long-term absorbable sutures | No (20 months)                               |
| [21]      | 1        | 12 years                                      | Sacrospinous ligament suspension  | Cadaveric fascia lata bridge     | No (30 months)                               |
| [22]      | 1        | 10 years                                      | Open sacrocolpopexy with polyester mesh, Halban culdoplasty, and paravaginal repair | Polyester mesh                   | No (10 months)                               |
| [23]      | 1        | ?   | Open sacrocolpopexy   | Unknown                          | No (?)                                       |
| [24]      | 1        | 1 year  | Sacrospinous ligament suspension with mesh  | Unknown                          | No (6 months)                                |

### Vertical rectus abdominis myocutaneous flap

Isolated case reports of NP following different surgical procedures were found. Huffman et al. [25] described the cases of two patients who had received reconstructive surgery for pelvic exenteration using a vertical rectus abdominis myocutaneous (VRAM) flap. The first patient had prolapse of the perineal flap without a neovagina that occurred 1 year after surgery. The surgical procedure in this patient involved dissection of the flap and multiple columns of horizontal mattress sutures. The outcome after 6 months was good. The second patient had prolapse of the anterior edge of the VRAM vaginal flap that occurred 18 months after initial oncological surgery. The first procedure involving an attachment to the pubic arch was a failure. The prolapse recurred 1 year later and the prolapse extended 10 cm beyond the level of the introitus. The second procedure involved fixation of the flap using permanent sutures directly to the anterior longitudinal ligament of the sacrum. There was no recurrence within 2 years.

### Other procedures

Copeland et al. [26] in 1989 reported a series of 107 patients with gracilis myocutaneous vaginal reconstruction after total pelvic exenteration. Of 102 evaluable patients, 12 (12 %) developed severe prolapse. In two of these patients the neovagina was removed, and in the remaining ten the graft was trimmed or mechanically supported by suturing to the retropubic fascia. To reduce the incidence of NP, the surgical technique was modified by decreasing the size of the flap, systematically fixing the neovagina to the elevator fascia then also to the retropubic fascia, and sacrificing the main neurovascular pedicle to improve flap mobilization.

Only one case report of a patient with NP after McIndoe vaginoplasty for MRKH syndrome was found [22]. This prolapse occurred 27 years after vaginoplasty, with the vaginal vault prolapsed 1 cm beyond the hymen. The patient

underwent an open sacrocolpopexy procedure with polyester mesh, Halban culdoplasty, paravaginal repair, and Burch retropubic urethropexy. Perfect prolapse reduction was noted 2 months after surgery. Kuhn et al. [27] investigated the outcome in 43 patients who had received Shears neovagina surgery for MRKH syndrome. One patient developed an asymptomatic stage 2 rectocele that had not been surgically corrected.

Coulon et al. [28] reported the case of a patient with NP 36 years after colpoptosis using a vascularized labia minor flap. Pelvic examination showed a stage 4 vaginal prolapse with stage 1 or 2 rectocele, but no enterocele or cystocele. Transperineal posterior intravaginal slingplasty was performed under spinal anaesthesia to correct the prolapse, and tension-free vaginal tape was used for stress urinary incontinence. The postoperative course was uneventful and the functional outcomes were good 15 months later.

Our literature search did not yield any results for omentoplasty or the Davydov procedure (transposition of the peritoneal colpoptosis).

### Discussion

To the best of our knowledge, this is the first case report of a patient with NP after shaped-tube omentoplasty. It is a novel case due to the vaginoplasty techniques and prolapse surgery employed. The vaginal approach was chosen given the patient's history of extensive pelvic surgery and the high risk of interposition of omentoplasty with abdominal sacrocolpopexy. Despite the risk of mesh exposure as a result of the fragility of the neovagina, mesh was nevertheless used because of two previous surgical failures, including a colpocleisis procedure, and the patient's insistence. Omentoplasty provides a neovagina with a thick wall and this decreases the risk of mesh complication.

One year after surgery, the NP had undergone substantial anatomical reduction. The grade 2 rectocele was

asymptomatic. The most anterior vaginal axis suggested that the anterior approach to the sacrospinous ligament in the Uphold procedure could have decompensated the posterior colpocele. However this was not described in the main series of 118 patients, perhaps because the surgery involved a posterior procedure in 66 % of patients [29]. Although the resumption of sexual activity with vaginal intercourse was not the primary goal of the surgery (the patient had previously undergone colpocele), functional outcomes were disappointing, as in the patient in the case reported by Zhu et al. [12]. On the other hand, the overall and psychological benefits of surgery were undeniable.

NP is a rare condition and its pathophysiology is still unclear. Normally, the vagina is a canal that extends from the cervix to the introitus. It has several different parts derived either from the müllerian ducts or from the urogenital sinus. The upper third of the vagina (level I) is suspended from the pelvic walls by vertical fibres of the paracolpium. In the middle third of the vagina (level II), the paracolpium attaches the vagina laterally to the arcus tendineus and fascia of the levator ani muscles. The vagina's lower third (level III) fuses with the perineal membrane [30]. The only point of attachment for the neovagina is often the perineum. This absence of fixation points in levels I and II may explain the NP. Several teams have attempted to prevent the occurrence of prolapse by suspending the neovagina during initial reconstruction [8, 9, 26]. This approach appears to be effective in gracilis myocutaneous vaginal reconstruction: the frequency of prolapse decreased from 65 % to 16 % in the series reported by Copeland et al. [26].

NP has been reported more frequently after bowel vaginoplasty and the nonsurgical method for managing MRKH syndrome. Because of the rarity of the event, no quantitative analysis was possible. The review of the literature on sigmoid NP by Kondo et al. [2] showed the incidence of postoperative sigmoid vaginal prolapse to be 2.3 %, but the distinction between full-thickness and mucosal prolapse was incorrect in one of the included studies [4]. The incidence of mucosal prolapse was in fact higher and was successfully treated by surgical resection and fulguration. Our systematic review found a total of 13 patients with full-thickness NP. The NP in five of these patients was successfully managed by sacrocolpopexy, which would appear to be the best option for sigmoid NP. This surgical procedure is now feasible by laparoscopy [13]. However, the vaginal route should not be neglected because sacrospinous fixation has been found to provide good anatomical correction of NP in patients in whom the abdominal approach is too complex. The presence of a pelvic kidney in MRKH syndrome, and failure of previous abdominal surgery, are good examples of the advantages sacrospinous fixation for managing prolapse following nonsurgical and surgical vaginoplasty [11, 21].

In conclusion, the vaginal approach with mesh appears to be a viable option for managing NP following shaped-tube omentoplasty. On the basis of our literature review, sacrocolpopexy appears to be a good choice for many types of neovagina, particularly bowel vaginoplasty. Vaginal procedures with good outcomes have also been reported in a few patients, and this surgical approach may therefore be employed if difficulties are encountered with the abdominal approach.

#### Compliance with ethical standards

**Conflicts of interest** Renaud de Tayrac is consultant for Boston Scientific.

Brigitte Fatton has accepted honoraria from Boston Scientific. The other authors declare that they have no conflicts of interest.

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