Introduction

Rectovaginal fistula (RVF) is a chronic gastrointestinal fistula defined as an epithelium-lined abnormal communication between the rectum and the vagina. The most common causes of RVFs are obstetric trauma, particularly during the postpartum period, local infection, and rectal surgery. Low anterior rectal resection is the most common cause of RVF secondary to rectal resection, with a frequency of up to 10% [1]. RVFs are usually managed both medically and surgically; however, there are no standard treatment approaches for cases that fail surgical treatment and are, thus, refractory.

Although a recent study reported on a patient with RVF who was satisfactorily managed with through-the-scope clips (TTSC) [2], there are no reports for endoscopic treatment of refractory RVFs. Recently, over-the-scope clips (OTSC) have been applied for closure of gastrointestinal defects. However, the rate of successful closure of fistulae is less than 50% and is affected by presence of induration or fibrosis [3]. Thus, there are no available treatments for refractory RVF. Here we present the case of a patient with refractory RVF after low anterior resection of rectal cancer who was successfully treated with endoscopic surgery in combination with pre-procedural creation of small holes around the fistula opening and clip insertion into the rectal wall.

Case report

A 71-year-old female was admitted to our hospital with anal bleeding in May 2013. She had a medical history of acute myocardial infarction in November 2009, hypertension, and psoriasis vulgaris. She underwent colonoscopy, which revealed a sessile polyp, approximately 2 cm in diameter, at the anterior wall of the upper rectum. Biopsy revealed presence of a well- to moderately-differen...
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nonoperative management, an initial endoscopic procedure,
one or more prior failed repairs[5]. In case presented here,
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repair is recommended [4]. Although primary surgical repair of
had a high and small RVF, for which an abdominal approach to
the tract lies somewhere in between. In this case, the patient
did not report any vaginal discharge. After 6 months,
January 2014 revealed a tiny slit-like opening in the anastomo-
tic stoma ( Fig.1 ). The patient was scheduled to undergo a
novel endoscopic procedure after she had provided written in-
formed consent. First, four mucosal pin holes were electrically
created on both sides of the fistula opening using a needle
knife. Next, similar to the previous endoscopic procedure, the
epithelium around the opening was electrocauterized via APC.
Clip prongs were inserted in the incisional holes across the
opening, and the opening was then carefully closed. The same
procedure was performed for all incisional holes, and the open-
ing was completely closed ( Fig.2a – d ). After treatment, the
patient did not report any vaginal discharge. After 6 months,
her ileostomy was subsequently closed and her recovery was
uneventful. At 13 months after successful closure of RVF, the
patient was free of colonic symptoms, and fistula healing was
diagonstically confirmed ( Fig.3 ).

Discussion

Although RVFs are usually managed both medically and surgi-
cally, the surgical approach is preferable. Management of RVFs
depends on their size, location, and cause; anal sphincter func-
tion; and the patient’s overall health status. RVFs can be classi-
fied as “low,” in which the tract is present between distal anal
canal (dentate line or below) and the inside of the vaginal four-
chette; “high,” in which the tract connects the upper vagina (at
the level of the cervix) with the rectum; and “middle,” in which
the tract lies somewhere in between. In this case, the patient
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repair is recommended [4]. Although primary surgical repair of
RVFs is associated with a success rate of 70 % to 97 %, outcomes
reportedly were worse in patients undergoing RVF repair after
one or more prior failed repairs [5]. In case presented here,
nonoperative management, an initial endoscopic procedure,
dorectal and transvaginal closure, and ileostomy were unsuc-
cessful. However, the endoscopic approach allowed for easy
and close visualization of the fistula, and the fistula opening
was very small. Because transabdominal surgery is a relatively
invasive approach for small fistulas, endoscopy was considered
as a viable minimally invasive approach.

In Japan, three distinct endoscopic approaches are used for
gastrointestinal leaks and fistulas, namely stent placement, clip
closure (TTSC and OTSCs), and injection of tissue sealants. Cur-
cently, OTSCs, which are larger and allow for application of
greater force, are preferred over TTSCs to close gastrointestinal
fistulas. Regarding colon perforation, small perforations (<10
mm) can be successfully closed with TTSCs, whereas larger per-
foration can be successfully closed with OTSCs. However, in-
duration and fibrosis associated with chronic fistulas might re-
sult in failure of adequate tissue apposition and consequent in-
ability to satisfactorily deploy OTSCs [6]. In case presented
here, the tissue around the RVF was indurate and stretched
tightly because of two surgical procedures and the fistula open-
ing was so small that neither anchor nor twin grasper could be
applied to close the fistula. Thus, even with OTCSs, closure of
RVF was difficult. A large, multicenter, retrospective study of
treatment of gastrointestinal defects using OTSCs revealed an
overall success rate of 60.2 %, but the rate for fistulas (42.9 %)
was worse than that for perforations (90 %) and leaks (73.3 %)
[7]. Regarding short-term outcomes of OTSCs for recurrent
RVFs, the success and healing rates were 26 % and 20 %, respec-
tively [3]. As mentioned above, other procedures are necessary
to firmly close recurrent RVF. In our case, to achieve a tight clo-
cure of the fistula with minimal damage to the tissue surround-
ning the opening, tiny mucosal holes were made electrically
using a needle knife to insert clip jaws on both sides of the fis-
tula opening, which was followed by electrocautery and clip

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Fig.1 Endoscopic examination revealing a small slit-like opening in the anastomotic stoma (arrows).
closure. This procedure was very effective in safe and permanent closure of the fistula without complications. The novel approach of electrocautery and clip closure of gastrointestinal fistulas with pre-procedural endoscopic creation of mucosal pin holes, which has not been previously reported, might have utility for refractory gastrointestinal fistulas with small fistula openings.

The utility of combined endoscopic cautery and clip closure for gastrointestinal fistulas recently has been reported [8, 9]. This technique, which combines conventional clip application with electrocautery via APC, has been shown to be successful in closure of several types of gastrointestinal fistulas. In an animal model, this approach was suggested to promote fusion of the apposed tissue better than that promoted by a simple closure without electrocautery [10]. Conversely, only one study has reported endoscopic closure of RVF using the Resolution clip [2], which was effective and less invasive but required two applications for permanent closure. Our novel endoscopic approach achieved complete closure of the fistula in a single session. Although simple clip closure without electrocautery may

![Fig.2 Endoscopic procedure. a Four mucosal pin holes on both sides of the fistula are created using a needle knife via electrocautery. b Epithelium around the fistula opening is electrocauterized via argon plasma coagulation. c Clip prongs are inserted in the incisional holes across the opening, which is carefully closed. d The process is performed twice to achieve complete closure of the fistula.](image)
be sufficient for closure of small gastrointestinal perforations, the combination procedure might be useful for small chronic gastrointestinal fistulas.

**Conclusion**

Our novel endoscopic procedure, which included pre-procedural endoscopic creation of mucosal pin holes in combination with electrocautery and endoscopic clipping, was safe, easy, and accessible for refractory post-surgical RVF and should be considered as a less invasive surgical approach for RVF based on the clinical condition of the patient.

**Competing interests**

None

**References**


▶Fig. 3 Fistula healing is endoscopically confirmed (arrows) at 13 months after the endoscopic procedure.