

Original Article

Submucosal Electrocoagulation for Prolapsed Hemorrhoids: A New Operative Approach to Hemorrhoidal Varices

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The results of submucosal electrocoagulation (SEC), a new radical operation for prolapsed hemorrhoids, in 403 patients with third- or fourth-degree hemorrhoids are reported. After resecting the anal skin tags that coexisted with prolapsed hemorrhoids, the hemorrhoidal varices could be resected and electrically coagulated through the wound without cutting the anal canal epithelium by using a fine needle-type electric knife. The results of this series indicated that SEC could dramatically reduce the incidence of the postoperative complications that sometimes occur after conventional hemorrhoidectomy, such as severe anal pain, massive anal bleeding and anal stenosis. Moreover, SEC could ensure that operated patients make an early return to social activities and have a satisfactory quality of life. Relapse of prolapsed hemorrhoids after SEC was rare.

Key words: submucosal electrocoagulation method (SEC), hemorrhoids, hemorrhoidectomy

In conventional hemorrhoidectomy or stapled hemorrhoidopexy (a procedure for prolapsing hemorrhoids (PPH)), which are currently the main methods used for third- and fourth-degree hemorrhoids, the hemorrhoidal varices are resected by cutting the anal canal epithelium. As a result, patients suffer from intense postoperative anal pain. In addition, moderate or severe hemorrhage sometimes occurs postoperatively due to disruption of the sutured incision site within the anal canal at defecation, requiring surgical treatment or blood transfusion. Furthermore, after the incision site has healed, some patients experience sequelae including iatrogenic anal stricture or anal deformity resulting in lasting constipation, discomfort at defecation, and even soiling. These sequelae may make the quality of life for some

patients worse than that of prolapsed hemorrhoids patients. Submucosal electrocoagulation for prolapsed hemorrhoids (SEC) is a new operative approach for treating hemorrhoidal varices without cutting the anal canal epithelium. It can dramatically reduce the incidence of these complications, and ensure that patients who are suffering from prolapsed hemorrhoids can make an early return to social activities and have a satisfactory quality of life.

Patients and Methods

Patient. SEC was performed on 403 patients with prolapsed hemorrhoids during the period between January 2000 and December 2008. The mean age of patients was 60.4 years (range: 23 to 89); 192 of the patients were male and 211 were female. In terms of hemorrhoid degree, there were 334 patients with third-degree and 69 patients with fourth-degree hemorrhoids (Table 1). Eleven of the 403 patients had

relapsed hemorrhoids after former operations by the ligation-excision method [1-3].

Surgical method. The main pathological state of prolapsed hemorrhoids involves the protrusion of enlarged hemorrhoidal varices covered with the anal canal epithelium outside the anus, and the presence of skin tags developed due to the prolapse. Hence, our surgical method is focused on the treatment of the skin tags and hemorrhoidal varices. The concept of SEC is to perform resection of the skin tags first, and then to perform resection and coagulation of the hemorrhoidal varices that lie in between the anal epithelium and the internal anal sphincter (Fig. 1).

Table 1 Patients' operative characteristics, n = 403

Mean age (yrs)	60.4 (23-89)
Male: female ratio	192 : 211
Hemorrhoid degree (Grade 3/4)	334/69
Mean operation time for a hemorrhoid (min)	4.8 (2-14)
Mean duration of hospitalization (days)	3.9 (1-9)
Postoperative return to job (days)	7.1 (1-15)

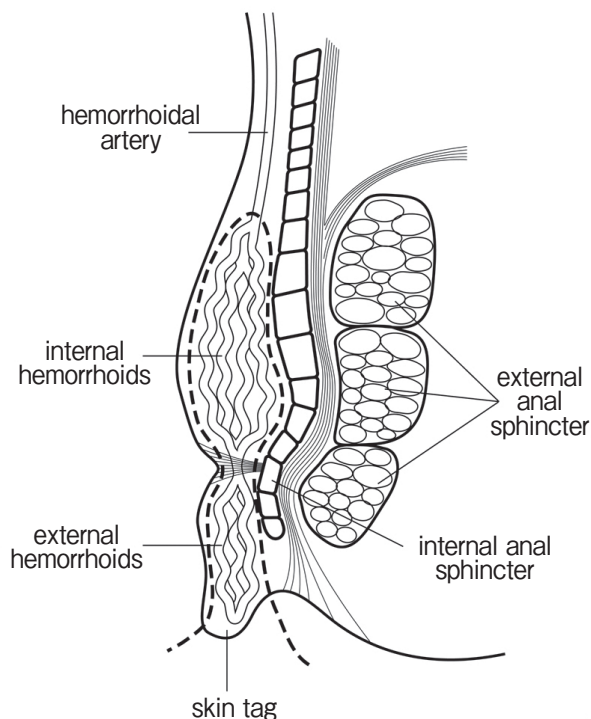


Fig. 1 Hemorrhoidal varices accompanied by skin tags exist in between the anal epithelium and internal anal sphincter. The dotted line indicates the operative approach.

All patients were anesthetized by spinal saddle block, and the operation was performed in the jack-knife position. Third- and fourth-degree internal hemorrhoids are always accompanied by skin tags. The number and the extent of hemorrhoids can be observed by holding and pulling on these tags and stretching the anus using an anoscope (Fig. 2A, B).

A fine-needle-type electric knife is used for the operation. Once the lifted skin tag is resected (Fig. 3A, B), the hemorrhoidal varices connected to the skin tag are resected on the surface of the internal anal sphincter while hemostatic treatment is performed by electric coagulation (Fig. 4A, B). Next, resection of the submucosal hemorrhoidal varices, which can be seen through the anorectal epithelium, is performed. Leaving most of the varices on the mucosal side, resection and hemostatic treatment using electrocoagulation are repeated toward the oral end (Fig. 5A, B). The resection of varices should not go too far toward the oral end, and should be excised around the midpoint (Fig. 6A, B). At this point, the resected edge of the varices should be coagulated electrically.

Next, the hemorrhoidal varices remaining under the mucosa and oral side are treated. The remaining varices that can be seen from the incision site are gradually pulled toward the surgeon and coagulated electrically using an electric knife. At this time, attention is required to apply short-term repeated electrical currents so that the mucosa is not coagulated (Fig. 7A, B). Accessory hemorrhoids can be coagulated from this incision site in the same way (Fig. 8A, B). Once the electric coagulation of varices is completed, the incision site made by resecting the skin tag and varices is left as a drainage opening without being sutured. Surgical cotton is placed on the wound to prevent postoperative bleeding (Fig. 9A, B). There is very little bleeding during the operation.

The above operation can be performed for 1 or 2 other prolapsed hemorrhoids as well. At the end of the operation, the surgeon can confirm by digital examination that anal function has remained mostly intact, as no surgical incision was made inside the anal canal. In the present series, the mean operation time was 4.8 (SD \pm 1.2) minutes for one hemorrhoid (Table 1).

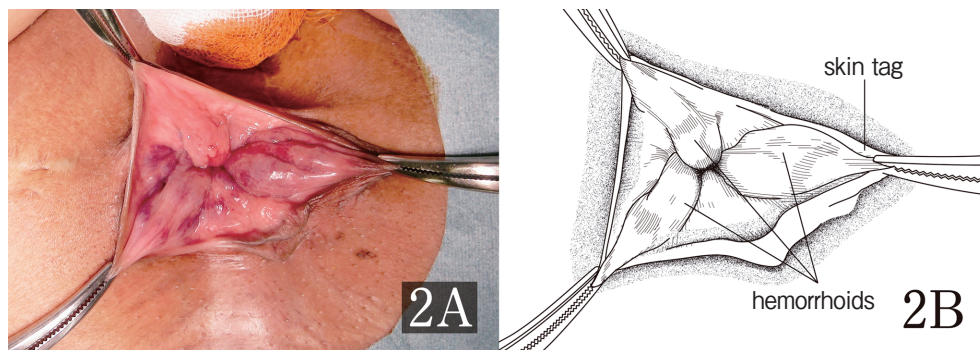


Fig. 2 Hemorrhoids prolapse when skin tags are pulled.

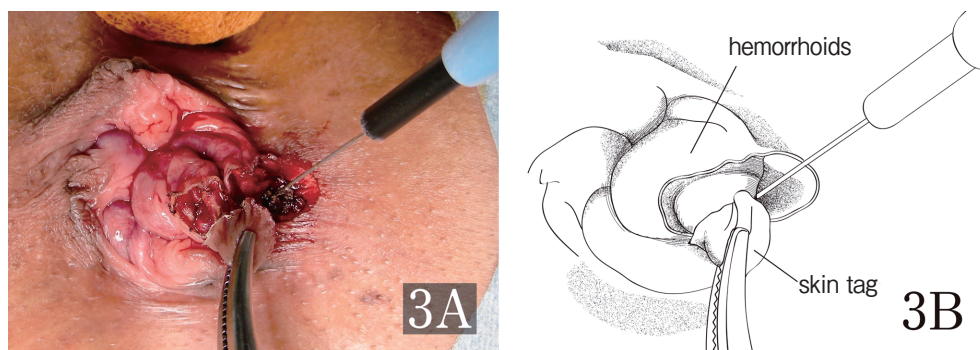


Fig. 3 The skin tag is resected while being pulled.

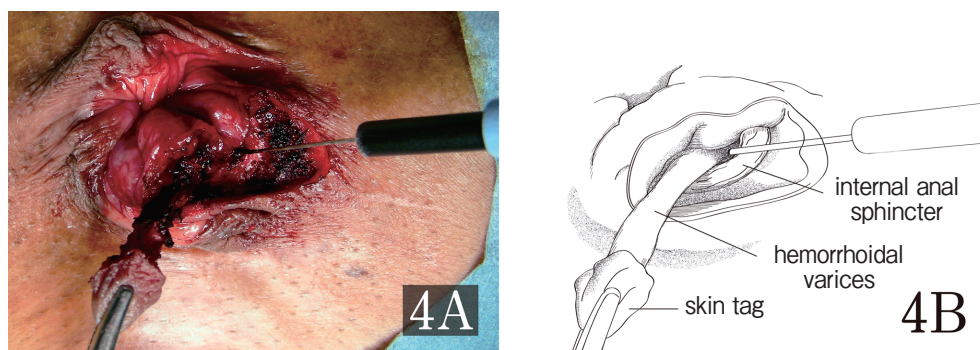


Fig. 4 The internal anal sphincter and hemorrhoidal varices are separated with an electric knife.

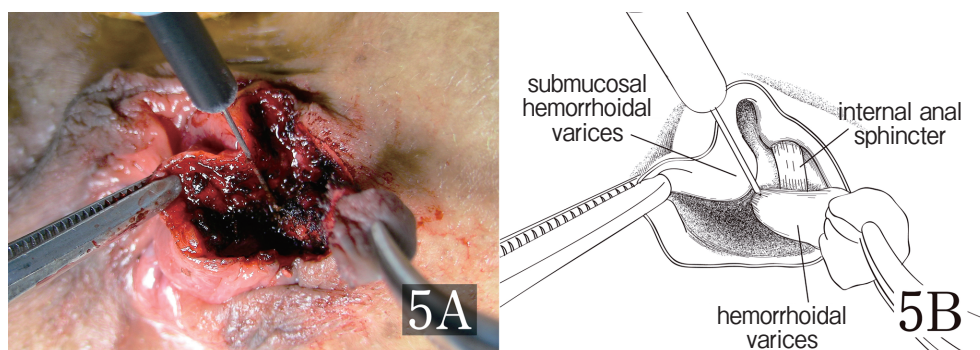


Fig. 5 The skin tag and hemorrhoidal varices are partially resected, leaving the varices under the mucosa and at the oral side.

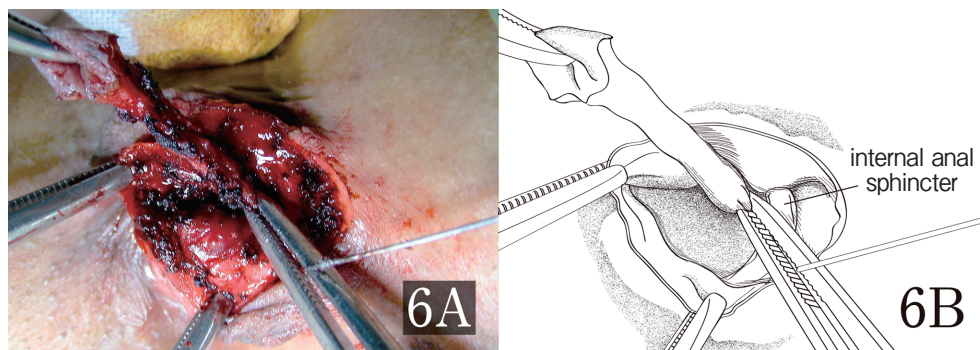


Fig. 6 The base of the hemorrhoid is cut after performing electrocoagulation.

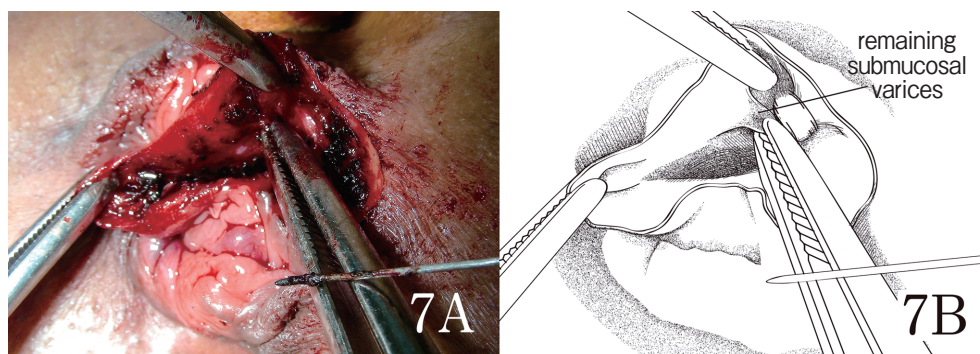


Fig. 7 Electrical coagulation is performed on the remaining submucosal and oral varices while pulling them from the incision site.

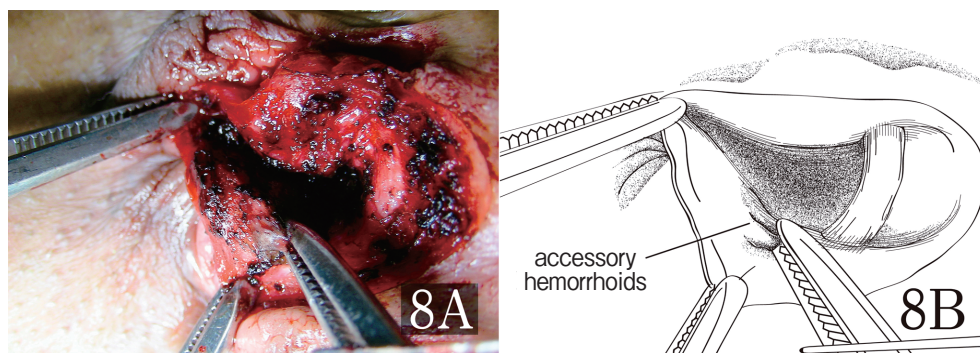


Fig. 8 Electrical coagulation is performed on the accessory hemorrhoids from the incision site.

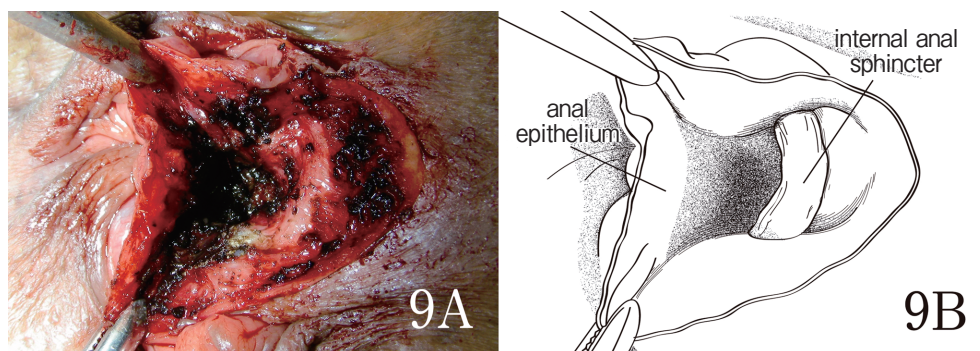


Fig. 9 The operation is completed.

Results

Anal hemorrhage was observed in almost all patients at defecation within 1-2 weeks after SEC operation. However, the amount of bleeding was extremely low, and no patients experienced a large amount of hemorrhage that would require surgical treatment or transfusion. Mild anal pain was reported in all cases postoperatively. However, pain control was mostly adequate through oral administration of NSAIDs 3 times a day, and only 20 patients (5.0%) required opioid injections (Table 2). Patients were discharged from the hospital within 1-9 days postoperatively, and the mean duration of hospitalization was 3.9 (SD \pm 0.2) days after the operation. All of the 11 patients who had relapsed hemorrhoids after former operations by the ligation-excision method, reported that the postoperative pain following these former operations had been more severe than that following SEC. Moreover, patients were able to return to their social activities 7.1 (SD \pm 1.8) days on average after the operation (Table 1).

Patients were advised to take magnesium oxide or sodium picosulfate for about one month postoperatively as a means of softening their stools, and to irrigate the anus with warm water after defecation. Also, as a long-term postoperative instruction for their daily life, they were told to avoid continuous straining at defecation. By providing thorough life-style instructions concerning defecation, relapse of prolapsed hemorrhoids was almost completely prevented. Relapse of prolapsed hemorrhoids was observed only in 3 patients, in the 14 to 33 month postoperative range, who had been making repeated and continuous efforts to produce stools during defecation after the operation in contradiction to the life-

style instructions. Therefore, SEC was performed again on these patients (Table 2).

After being discharged, the patients were seen in the outpatient clinic once every 1 or 2 weeks, and received examination of the incision sites and instructions for defecation. However, none of them required special treatment. At between 4 and 12 weeks postoperatively, once the wound was completely healed and the extensibility of the anus had returned to normal, proctoscopy was performed. It was confirmed in this examination that neither anal stricture nor anal deformity had developed in any patients (Table 2).

Furthermore, no patients developed anal infection, anal fissure, or anal fistula, since the anal canal epithelium was not damaged in SEC (Table 2). Development of small anal polyps was observed in 5 patients in the postoperative range of 9 months to 3 years, and resection was performed in these cases. In addition, development of anal skin tags was noted in 8 patients in the 6 month to 5 year postoperative range, and resection was performed (Table 2).

Discussion

Following the introduction of radical operation for prolapsed hemorrhoids—in which anoderm and hemorrhoidal varices are resected entirely in circular form—by Whitehead [4] in 1882, various modified methods have been performed [5, 6]. In these operations, however, a large incision is made within the anal canal. Hence, patients suffer from intense pain after the operation and often complain of a defecation disorder after the wound has healed. In addition, large amount of hemorrhage is sometimes seen.

In order to reduce these complications, Milligan *et al.* [1] introduced the ligation-excision method in 1937. This method continues to be the worldwide standard operational method for prolapsed hemorrhoids. However, there are three major postoperative problems with this method [7-9]. First, the wound made on the anal canal produces intense pain at defecation. Secondly, serious hemorrhage occurs and hemostatic treatment is required in several percent of patients until the wound on the anal canal heals. Third, postoperative anal stricture may occur in cases of multiple prolapsed hemorrhoids due to shortage of anal epithelium, since the anal epithelium is partially excised along with the internal hemorrhoids.

Table 2 Postoperative complications, n = 403

Treated bleeding	0 (0)
Pain (Injection of opioids)	20 (5.0)
Wound infection	0 (0)
Anal stricture	0 (0)
Anal fissure	0 (0)
Anal fistula	0 (0)
Anal polyps (Resected)	5 (1.2)
Skin tags (Resected)	8 (2.0)
Relapse of prolapsed hemorrhoids (SEC)	3 (0.7)

Data are numbers with percentages in parentheses.

The submucous hemorrhoidectomy introduced by Parks [10] in 1956 is a method designed to retain as much of the anal mucosa as possible. It is, therefore, superior in the sense that anal stricture occurs less frequently. However, since there are still wounds in the anal canal, patients suffer from intense pain at defecation after the operation, and a large amount of anal hemorrhage is sometimes observed as well [9].

Ferguson *et al.* [11] introduced the complete closure method in 1959 to achieve early healing of the wound and to prevent postoperative bleeding [2]. However, since the wounds still remain in the anal canal with this method, the two complications—the intense anal pain and anal stricture seen with the Milligan method—were not adequately reduced [12].

Recently, stapled hemorrhoidopexy, a procedure for prolapsing hemorrhoids (PPH) [13], has frequently been performed, since it has a lower incidence of postoperative complications than conventional hemorrhoidectomy. However, even with this method [14–16], intense pain and anal function disorder might develop postoperatively since the hemorrhoidal varices, as well as the anal canal epithelium, are resected in a

circular form as with the Whitehead method. There is thus a trade-off: if stapled hemorrhoidopexy is performed in the higher position so that these two complications are reduced, the number of patients who require further operations increases since the procedure is less radical [17, 18].

With the submucosal electrocoagulation method (SEC) suggested in this report, electrical coagulation is performed on the hemorrhoidal varices while making an approach from outside the anus to the submucosa without cutting the anal canal epithelium. In this way, postoperative anal pain and hemorrhage as well as stricture are dramatically reduced. This method is superior in that there is a lower incidence of the three major postoperative complications compared to any radical operations for prolapsed hemorrhoids that have been performed so far (Table 3). Therefore, the duration of incapacity to work after SEC [7.1 Days (SD±1.8)] was shorter than that after other radical operations [8.2 Days (SD±1.9)~53.9 Days (SD±5.8)] [8, 9].

The mean operation time for SEC is short, 4.8 (SD±1.2) min for one hemorrhoid, and the operation

Table 3 Comparison of postoperative complications

Year	Author (Method)	No. of patients	Bleeding (%)	Stenosis (%)	Fissure (%)	Relapse (%)
1936	Milligan-Morgan ^[1] (MMH)	*	*	*	*	*
1956	Parks ^[10] (SMH)	50	*	2	*	*
2001	Shalaby <i>et al.</i> ^[8] (MMH)	100	2	5	3	2
	(SH)	100	1	2	1	1
2002	Chen <i>et al.</i> ^[2] (FH)	2,880	0.9	*	*	*
2003	Kairaluoma <i>et al.</i> ^[17] (SH)	30	7	3	*	20
	(DH)	30	0	3	*	3
2004	Senagore <i>et al.</i> ^[19] (SH)	77	0	2.6	0	2.6
	(FH)	79	2.5	0	2.5	2.5
2008	Wang <i>et al.</i> ^[12] (FH)	738	2.2	0.7	0.4	0.4
2008	Raahave <i>et al.</i> ^[18] (SH)	258	4.7	0.8	0.8	12
2010	Present series (SEC)	403	0	0	0	0.7

MMH, Milligan-Morgan hemorrhoidectomy; FH, Ferguson hemorrhoidectomy; SMH, Submucos hemorrhoidectomy; SH, Stapled hemorrhoidectomy; DH, Diathermy hemorrhoidectomy; SEC, Submucosal electrocoagulation; * Unavailable.

method is simple as well. It is also advantageous in that no special devices other than an electric knife are required. On the other hand, since the hemorrhoidal artery is not ligated at the base with this operational method, prolapsed hemorrhoid relapse is a concern. However, relapse was observed only in three patients, since thorough instructions were provided to patients to avoid continuous straining at defecation (Table 2). Thus, it can be said that SEC is also superior in terms of curability (Table 3).

Conclusions. SEC is a new operative approach for prolapsed hemorrhoids, and is superior to traditional surgical methods in that it can reduce the incidence of postoperative complications while maintaining high curability.

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