Current Status of Surgical Treatment for Hemorrhoids -Systematic Review and Meta-analysis

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Hemorrhoids are one of the most common anorectal disorders. Conventional hemorrhoidectomy is the most commonly practiced surgical technique. Stapled hemorrhoidectomy (procedure for prolapse and hemorrhoids [PPH]) and Ligasure hemorrhoidectomy are newly developed methods for the surgical management of hemorrhoids. The objective of this study was to compare the effectiveness and safety of these two novel techniques with that of conventional hemorrhoidectomy. From the MEDLINE data-base, we obtained papers published between January 2000 and September 2009 and retrospectively studied randomized, controlled clinical trials that compared PPH versus conventional hemorrhoidectomy or Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy. Both PPH and Ligasure hemorrhoidectomy were superior to conventional hemorrhoidectomy with regard to operation time, early



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postoperative pain, urinary retention, and time to return to normal activity. However, skin tags and recurrent prolapse occurred at higher rates in the PPH group. Although both new techniques have short-term benefits, especially in reducing extreme postoperative pain, more powerful clinical studies with long-term follow up and larger sample sizes should be conducted for further evaluation of outcomes. (*Chang Gung Med J 2010;33:488-500*)

Key words: hemorrhoid, hemorrhoidectomy, stapled hemorrhoidectomy, PPH, Ligasure hemorrhoidectomy

Hemorrhoids, cushions of vascular tissue in the anus, are one of the most common anal disorders. Etiologic factors for hemorrhoidal disease include constipation, diarrhea, prolonged straining, pregnancy, heredity, erect posture, increased intraabdominal pressure with obstruction of venous return, aging, and internal sphincter abnormalities. Patients with hemorrhoids may complain of bright red bleeding from the rectum, anal pain, anal masses and protrusion, difficulties with perianal hygiene, and cosmetic deformities. Patients with symptomatic hemorrhoids who have failed nonoperative treatments may require surgery. Conventional surgical hemorrhoidectomy involves excision of the hemorrhoidal cushions and is the most effective treatment for hemorrhoids. The Milligan-Morgan (open) and Ferguson (closed) hemorrhoidectomy are the most commonly used techniques worldwide.^(1,2) However, there are a

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few common complications associated with conventional hemorrhoidectomies, such as urinary retention, postoperative bleeding, significant pain, anal stenosis, and incontinence. Several modifications have been proposed to improve the postoperative outcome, and especially to reduce postoperative pain.

Stapled hemorrhoidectomy and Ligasure hemorrhoidectomy

In 1998, to minimize postoperative discomfort following conventional surgery, Longo proposed a new technique – stapled hemorrhoidectomy (also known as procedure for prolapse and hemorrhoids [PPH]) – for treating hemorrhoids.⁽³⁾ PPH is performed with a specially designed stapling device to excise a complete ring of mucosa above the dentate line. The crucial characteristic of this procedure is the absence of any perceived perianal wounds, which therefore should be less painful than conventional hemorrhoidectomy.

In addition, the Ligasure vessel sealing system (Valleylab; Boulder, CO, U.S.A.) is another recently introduced instrument consisting of a bipolar,⁽⁴⁾ electrothermal, hemostatic device that ensures complete coagulation of vessels up to 7 mm in diameter with minimal surrounding thermal spread and limited tissue charring. This instrument could be an ideal tool for hemorrhoidectomy because it enables effective, bloodless excision of hemorrhoids with minimal tissue trauma, and hence, possibly reduces postoperative pain and wound healing time.

The goal of this review was to compare the effectiveness and safety of the two new techniques with that of conventional hemorrhoidectomy (Milligan-Morgan or Ferguson hemorrhoidectomy) based on a systematic review of prospective, randomized, controlled trials.

Search strategy from MEDLINE

All original, randomized, controlled, clinical trials that compared stapled hemorrhoidectomy versus conventional hemorrhoidectomy or Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy for the treatment of symptomatic hemorrhoids were identified. The analysis included papers published between January 2000 and September 2009 that were identified in a MEDLINE search. The search terms were as follows: hemorrhoid, hemorrhoidectomy, stapled hemorrhoidectomy, PPH, Ligasure hemorrhoidectomy, prospective, randomized controlled trial.

Inclusion criteria and data analysis

Only prospective, randomized, controlled trials comparing PPH versus conventional hemorrhoidectomy, or Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy were included in further meta-analysis. Comparative studies (nonrandomized and retrospective), case series, and case reports were not included. Studies published in languages other than English were excluded. All letters, abstracts, and personal communications were also excluded.

The present review focused on comparing PPH versus conventional hemorrhoidectomy and Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy with regards to operating time, postoperative pain, length of hospital stay, time to return to normal activity, residual external skin tags, and postoperative complications. Data were extracted independently from each study and differences were analyzed. The meta-analysis and forest plots were conducted by the Review Manager 5 software tool of the Cochrane Collaboration.

The systematic literature search identified 30 randomized, controlled trials, 19 comparing PPH versus conventional hemorrhoidectomy and 11 comparing Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy.⁽⁵⁻³⁴⁾ The baseline characteristics of patients in the trials included in the metaanalysis are summarized in the Table 1. We focused on the following outcomes: operation time, early postoperative pain, major postoperative hemorrhage, time to return to normal activity, postoperative anal stenosis, postoperative incontinence, residual skin tags, and recurrent prolapse.

Outcome – operation time

Compared with conventional hemorrhoidectomy, significantly shorter operation times were reported for PPH (Fig. 1A; p < 0.00001) and Ligasure hemorrhoidectomy (Fig. 1B; p < 0.00001).

Outcome – early postoperative pain

The assessment of postoperative pain varied for each study and was complicated by varying stages of recovery. A visual analog scale (0 indicating no pain and 10 indicating severe pain) was the most commonly used scoring method. The pain scores, either

Study	Year	Country	Group	No. of patients	Mean age	M/F
PPH vs. Conventiona	al hemorrhoidecto	omy				
Mehigan	2000	U.K.	PPH	20	57.1	6/14
			Milligan-Morgan	20	55.7	11/9
Rowsell	2000	U.K.	PPH	11	52.7	7/4
			Milligan-Morgan	11	58.2	6/5
Но ҮН	2000	Singapore	PPH	57	44	29/28
		0 1	Milligan-Morgan	6		
Ganio	2001	Italy	PPH	50	47	
		5	Milligan-Morgan	50	48	
Shalaby	2001	Egypt	PPH	100	44.1	60/40
		-07 F	Milligan-Morgan	100	49.1	64/36
Ortiz	2002	Spain	РРН	27	48.6	15/12
oni	2002	opum	Milligan-Morgan	28	46.6	17/11
Correa-Rovelo	2002	Mexico	РРН	42	43 7	22/20
	2002	MEXICO	Ferguson	42	46.6	19/23
Pavlidie	2002	Greece	ррн	40	45	25/15
1 aviidis	2002	Gleece	Milligan-Morgan	40	49	22/18
Hotzor	2002	Switzerland	DDU	20	50.4	15/05
TIEtZEI	2002	Switzenand	Ferguson	20 20	44.8	16/4
K - h - h - h - h	2002	E'alaad	DDU	20	47	12/17
Kairaluoma	2003	Finland	PPH Milligan-Morgan	30 30	47 48 5	13/17
	2002		DDU	15	10.5	10/5
Cheetham	2003	U.K.	PPH Milligan Morgan	15	37	10/5
			winingan-wiorgan	10	59.5	12/4
Palimento	2003	Italy	PPH Milligen Mensen	37	51	24/13
			winngan-worgan	57	33	23/14
Bikhchandani	2004	India	PPH	42	46	34/8
			Milligan-Morgan	42	48.6	36/6
Senagore	2004	U.S.A.	PPH	75	51	49/26
			Ferguson	77	48	58/19
Ortiz	2005	Spain	PPH	15	47	8/7
			Milligan-Morgan	16	49	11/5
Gravie	2005	France	PPH	63	51	
			Milligan-Morgan	63	44	
Ho KS	2006	Singapore	PPH	29		14/15
			Ferguson	21		8/13
Huang	2007	Taiwan	PPH	300	46.5	165/135
-			Ferguson	296	45.6	166/130
Wong	2008	Hong Kong	PPH	21	53	13/8
Ø		00	Milligan-Morgan	20	47	13/7

Table 1. Baseline Characteristics

 Table 1. Baseline Characteristics (Continued)

Study	Year	Country	Group	No. of patients	Mean age	M/F
Ligasure hemorrh	oidectomy vs. Conve	entional hemorrhoidec	ctomy			
Palazzo	2002	U.K.	Ligasure	18	44	6/12
			Milligan-Morgan	16	49	6/10
Jayne	2002	U.K.	Ligasure	20	48	11/9
			Milligan-Morgan	20	43	10/10
Milito	2002	Italy	Ligasure	29	52	13/16
			Milligan-Morgan	27	48.2	17/10
Thorbeck	2002	Spain	Ligasure	56		
			Milligan-Morgan	56		
Chung	2003	Taiwan	Ligasure	30	47.1	18/12
			Ferguson	31	44.9	12/19
Franklin	2003	U.K.	Ligasure	17		
			Ferguson	17		
Wang	2006	Taiwan	Ligasure	42	47.1	20/22
			Ferguson	42	47.5	21/21
Muzi	2007	Italy	Ligasure	125	47.1	60/65
			Milligan-Morgan	125	47.5	53/72
Altomare	2008	Italy	Ligasure	146	49	80/66
			Milligan-Morgan	127	48	76/51
Bessa	2008	Egypt	Ligasure	55	33	36/19
			Milligan-Morgan	55	31.9	40/15
Tan	2008	Singapore	Ligasure	22	36.6	13/9
			Milligan-Morgan	22	43.3	9/13

Abbreviations: PPH: Procedure for Prolapse and hemorrhoids; M: male; F: female; U.K.: United Kingdom; U.S.A.: United States of America.

at 24 hours after surgery or during the first bowel movement, were collected for further analysis from each study. Significantly less postoperative pain was experienced by patients in the PPH (Fig. 2A; p < 0.00001) and Ligasure groups (Fig. 2B; p < 0.0001) than those in the conventional groups.

Outcome – early postoperative urinary retention

Both the PPH groups and Ligasure groups had lower incidences of acute urinary retention after surgery than the conventional hemorrhoidectomy groups (Fig. 3).

Outcome – major postoperative hemorrhage

Major postoperative hemorrhage was defined as

bleeding requiring surgical intervention or warranting hospital re-admission. The incidence of major postoperative hemorrhage was low and comparable in each treatment group as shown in Fig. 4A (PPH versus conventional hemorrhoidectomy, p = 0.15) and Fig. 4B (Ligasure hemorrhoidectomy versus conventional hemorrhoidectomy, p = 0.19).

Outcome - time to return to normal activity

On average, the time to return to normal activity was shorter for the PPH groups than for the conventional hemorrhoidectomy groups (Fig. 5A; p < 0.0001). Likewise, based on limited available documents, the Ligasure groups resumed normal activities faster than the conventional groups (Fig. 5B; p < 0.0001).

		PPH		Cor	nventio	nal		Mean Difference			Mean Diff	ference	
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year		IV, Fixed,	95% CI	
Mehigan	18	4.1	20	22	5.2	20	1.5%	-4.00 [-6.90, -1.10]	2000				
Ho YH	17.6	2.3	57	11.4	2.1	62	19.9%	6.20 [5.41, 6.99]	2000			-	
Shalaby	9	2.7	100	19.7	4.7	100	11.1%	-10.70 [-11.76, -9.64]	2001				
Correa-Rovelo	11.9	3.1	42	46.4	10.4	42	1.2%	-34.50[-37.78, -31.22]	2002				
Ortiz 2002	19	3.2	27	33.5	5.3	28	2.4%	-14.50 [16.80, -12.20]	2002				
Hetzer	30	4.5	20	43	5.2	20	1.4%	-13.00 [-16.01, -9.99]	2002				
Pavlidis	23	5	40	35	10	40	1.0%	-12.00[-15.46, -8.54]	2002				
Palimento	25	4.3	37	30	5.4	37	2.5%	-5.00 [-7.22, -2.78]	2003				
Kairaluoma	21	3.6	30	22	3.7	30	3.7%	-1.00 [-2.85, 0.85]	2003			ł	
Bikhchandani	24.28	4.25	42	45.21	5.36	42	2.9%	-20.93 [-23.00, -18.86]	2004		-		
Senagore	31	5.8	77	35	6.1	79	3.6%	-4.00 [-5.87, -2.13]	2004		-		
Ortiz 2005	24	4.2	15	39	6.5	16	0.9%	-15.00 [-18.83, -11.17]	2005				
Gravie	21	4.2	63	31	6.3	63	3.6%	-10.00 [-11.87, -8.13]	2005		-		
Ho KS	14.1	1	29	18.5	1.9	21	15.8%	-4.40 [-5.29, -3.51]	2006				
Huang	22.41	3.74	300	42.36	4.72	296	26.8%	-19.95 [-20.63, -19.27]	2007				
Wong	25	4.5	21	25	4.3	20	1.7%	0.00 [-2.69, 2.69]	2008		-	╞	
Total (95% CI)			920			916	100.0%	-8.51 [-8.87, -8.16]					
Heterogeneity: $Chi^2 = 30$	66.09, df =	: 15 (p <	< 0.0000	1); $I^2 = 1$	100%					-50	-25	25	50
Test for overall effect: Z	= 47.10 (p	< 0.000	01)							Favours	PPH	Favours Co	nventional

B

	Li	gasure		Con	ventio	nal		Mean Difference		Mean Difference
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year	IV, Fixed, 95% CI
Palazzo	5.1	2.2	18	9.2	4.5	16	1.0%	-4.10 [-6.53, -1.67]	2002	
Milito	9.2	3.4	29	12.1	3.6	27	1.8%	-2.90 [-4.74, -1.06]	2002	
Jayne	10	2.2	20	20	5.1	20	1.0%	-10.00 [-12.43, -7.57]	2002	
Franklin	6	2.1	17	11	3.2	17	1.8%	-5.00 [-6.82, -3.18]	2003	
Chung	15	5.4	30	21.2	8.2	31	0.5%	-6.20 [-9.67, -2.73]	2003	
Wang	11.3	0.4	42	34.2	1.3	42	35.0%	-22.90 [-23.31, -22.49]	2006	•
Muzi	11.5	1.9	125	20	2.1	125	24.0%	-8.50 [-9.00, -8.00]	2007	-
Altomare	30	2.5	146	31	2.6	127	16.1%	-1.00 [-1.61, -0.39]	2008	-
Tan	9.4	2.1	22	18.2	3.5	22	2.0%	-8.80 [-10.51, -7.09]	2008	-
Bessa	8	1.2	55	18	1.9	55	16.8%	-10.00 [-10.59, -9.41]	2008	•
Total (95% CI)			504			482	100.0%	-12.39 [-12.64, -12.15]		1
Heterogeneity: $Chi^2 = 4400$	0.24, df =	9 (p <	0.00001); $I^2 = 10$	0%					-20 -10 0 10 20
Test for overall effect: $Z =$	99.80 (p <	< 0.000	01)							Favours Ligasure Favours Conventional

Fig. 1 Operation time (minutes): (A) PPH vs. conventional hemorrhoidectomy; (B) Ligasure vs. convention hemorrhoidectomy.

Outcome – postoperative anal stenosis and incontinence

There were no detectable differences between the PPH and conventional groups, or between the Ligasure and conventional groups in the incidence of postoperative anal stenosis and incontinence.

Outcome - residual skin tags

The incidence of residual anal skin tags was significantly greater in the PPH groups than that in the conventional groups (Fig. 6; test for overall effect: Z = 2.61; p = 0.009). Documented data about residual skin tags from studies comparing Ligasure groups with conventional groups were not available.

Outcome – recurrent prolapse

On average, there was better control of recurrent prolapse in the conventional groups than PPH groups (Fig. 7; p < 0.0001), although there was statistical heterogeneity between the studies (Chi = 10.66, p = 0.30, $I^2 = 16\%$).

		PPH		Cor	iventio	nal		Mean Difference			Mean Di	fference		
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year		IV, Fixed	, 95% CI		
Mehigan	2.1	2.2	20	6.5	2.5	20	0.6%	-4.40 [-5.86, -2.94]	2000					
Ho YH	3	0.6	57	3	0.7	62	23.1%	0.00 [-0.23, 0.23]	2000			•		
Shalaby	2.5	1.3	100	7.6	0.7	100	15.1%	-5.10 [-5.39, -4.81]	2001		•			
Pavlidis	2.5	2.2	40	3.4	2.5	40	1.2%	-0.90 [-1.93, 9.13]	2002			ł		
Hetzer	2.7	2.2	20	6.3	4	20	0.3%	-3.60 [-5.60, -1.60]	2002					
Correa-Rovelo	2.8	1.4	42	5.5	1.4	42	3.5%	-2.70 [-3.30, -2.10]	2002					
Kairaluoma	1.8	0.7	30	4.3	1.1	30	5.8%	-2.50 [-2.97, -2.03]	2003					
Palimento	3	0.9	37	5	1.3	37	4.9%	-2.00 [-2.51, -1.49]	2003					
Cheetham	4.5	4.2	15	9	3.8	16	0.2%	-4.50 [-7.33, -1.67]	2003		-			
Bikhchandani	3.64	1.79	42	6.36	1.44	42	2.6%	-2.72 [-3.41, -2.03]	2004					
Senagore	4.9	1.7	77	6.6	1.8	79	4.2%	-1.70 [-2.25, -1.15]	2004					
Gravie	2.66	1.1	63	4.2	1.3	63	7.1%	-1.54[-1.96, -1.12]	2005		-			
Ho KS	5.7	1.4	29	8.2	1.5	21	1.9%	-2.50 [-3.32, -1.68]	2006					
Huang	5.85	1.49	300	7.51	1.07	296	29.1%	-1.66 [-1.87, -1.45]	2007					
Wong	4.1	2.5	21	5.7	2.8	20	0.5%	-1.60 [-3.23, 0.03	2008					
Total (95% CI)			893			888	100.0%	-1.95 [-2.06, -1.84]			1			
Heterogeneity: $Chi^2 = 773.0$)79, df =	14 (p <	< 0.0000	1); $I^2 = 9$	08%					-10	-5	0	5	10
Test for overall effect: $Z = 3$	34.04 (p ·	< 0.000	01)							Favours	PPH	Favour	s Convei	ntional

B

	L	igasure		Con	ventio	nal		Mean Difference			Mean	Diffe	erence		
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year		IV, Fix	ed, 9	5% CI		
Milito	4.7	2.8	29	5.2	3	27	0.6%	-0.50 [-2.02, 1.02]	2002		-	- †			
Palazzo	5.2	2.8	18	4.6	3.1	16	0.4%	0.60 [-1.40, 2.60]	2002			\rightarrow	-		
Thorbeck	2.3	0.8	56	6.9	0.8	58	16.7%	-4.60 [-4.90, -4.30]	2002		-				
Jayne	5	3.2	20	7	3.1	20	0.4%	-2.00 [-3.95, -0.05]	2002			- 1			
Chung	6.5	0.5	30	8	0.5	31	23.3%	-1.50 [-1.75, -1.25]	2003			•			
Wang	5.1	0.5	42	7.2	0.5	42	32.1%	-2.10 [-2.31, -1.89]	2006						
Muzi	1.5	0.9	125	3.3	1.1	125	23.6%	-1.80 [-2.05, -1.55]	2007			•			
Bessa	4.4	2	55	7.1	1.8	55	2.9%	-2.70 [-3.41, -1.99]	2008						
Total (95% CI)			375			372	100.0%	-2.30 [-2.43, -2.18]			•				
Heterogeneity: $Chi^2 = 304$	4.08, df = 7	p < 0	.00001);	; I ² = 989	6					20	-10	0	1	0	20
Test for overall effect: Z =	= 37.28 (p <	< 0.000	01)							Favour	s Ligasure		Favours Co	nventi	ional

Fig. 2 Early postoperative pain: (A) PPH vs. conventional hemorrhoidectomy; (B) Ligasure vs. conventional hemorrhoidectomy.

Conclusions

Indications for surgical hemorrhoidectomy include symptomatic hemorrhoids too extensive for nonoperative management, failure of medical treatment, and concomitant conditions, such as anal fissures or ulcers, that require surgery. Conventional hemorrhoidectomy, including open and closed methods, is accepted as the gold-standard for surgical treatment of hemorrhoids worldwide. However, the main drawback of conventional hemorrhoidectomy is extreme postoperative pain, especially when defecating. The complications of conventional hemorrhoidectomy are usually minor, including urinary retention, bleeding, infection, stenosis, and incontinence.

In 1998, Longo introduced an alternative method, PPH, for the surgical treatment of hemorrhoids using a circular stapling instrument which removes a ring of redundant rectal mucosa or expanded internal hemorrhoids. The goal is to pull the prolapsed hemorrhoid tissue back up into its normal position within the anal canal as well as to disrupt the arterial inflow that traverses the excised segment. In this method, skin tags and enlarged external

	PI	PH	Convent	tional		Odds Ratio		Odds Ratio
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year	M-H, Fixed, 95% CI
Ho YH	1	57	0	62	0.3%	3.32 [0.13, 83.12]	2000	
Mehigan	1	20	1	20	0.6%	1.00 [0.06, 17.18]	2000	
Ganio	3	50	5	50	3.0%	0.57 [0.13, 2.55]	2001	
Shalaby	7	100	14	100	8.4%	0.46 [0.18, 1.20]	2001	
Hetzer	0	20	1	20	0.9%	0.32 [0.01, 8.26]	2002	<
Correa-Rovelo	1	42	3	42	1.9%	0.32 [0.03, 3.18]	2002	<
Ortiz 2002	6	27	10	28	4.9%	0.51 [0.18, 1.69]	2002	
Kairaluoma	2	30	0	30	0.3%	5.35 [0.25, 116.31]	2003	
Palimento	5	37	8	37	4.4%	0.57 [0.17, 1.93]	2003	
Cheetham	0	15	0	16		Not estimable	2003	
Senagore	10	77	6	79	3.3%	1.82 [0.63, 5.27]	2004	—
Bikhchandani	5	42	7	42	4.0%	0.68 [0.20, 2.33]	2004	
Gravie	14	63	24	63	12.0%	0.46 [0.21, 1.01]	2005	
Ortiz 2005	0	0	0	0		Not estimable	2005	_
Huang	42	300	95	296	52.8%	0.34 [0.23, 0.52]	2007	
Wong	4	21	6	20	3.2%	0.55 [0.13, 2.34]	2008	
Total (95% CI)		901		905	100.0%	0.49 [0.37, 0.64]		•
Total events Heterogeneity: $Chi^2 = 1$ Test for overall effect: 2	101 13.22, df = 1 Z = 5.22 (p <	3 (<i>p</i> = 0.43 3 (0.00001)	180 3); I ² = 2%					0.05 0.2 1 5 20 Favours PPH Favours Conventional

B

	PF	РΗ	Conven	tional		Odds Ratio		Odds	Ratio
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year	M-H, Fixe	d, 95% CI
Palazzo	0	18	1	16	6.9%	0.28 [0.01, 7.36]	2002 ←	•	•
Milito	1	29	1	27	4.5%	0.93 [0.06, 15.62]	2002		
Chung	1	30	2	31	8.5%	0.50 [0.04, 5.82]	2003		†
Wang	2	42	5	42	21.3%	0.37 [0.07, 2.02]	2006	-	†
Muzi	1	125	2	125	8.9%	0.50 [0.04, 5.54]	2007		-
Bessa	2	55	5	55	21.5%	0.38 [0.07, 2.03]	2008		<u> </u>
Tan	0	22	0	22		Not estimable	2008		
Altomare	1	146	6	127	28.5%	0.14 [0.02, 1.17]	2008 ←		t
Total (95% CI)		467		445	100.0%	0.35 [0.16, 0.77]		•	
Total events	8		22						
Heterogeneity: $Chi^2 = 1$.38, df = 6 (p = 0.97);	$I^2 = 0\%$				0.02	0.1	1 10 50
Test for overall effect: Z	Z = 2.58 (p =	0.010)					Fa	avours Ligasure	Favours Conventional

Fig. 3 Early postoperative urinary retention: (A) PPH vs. conventional hemorrhoidectomy; (B) Ligasure vs. conventional hemorrhoidectomy.

hemorrhoids are not removed, which undoubtedly contributes to the reduced pain scores. This was confirmed in this systematic review. The advantages of PPH were a shorter operation time, less postoperative pain, less postoperative urinary retention, and a quicker return to normal activity. Although there are several short-term benefits, the long-term outcome is relatively poor compared with that of conventional hemorrhoidectomy, mainly considering the rate of residual skin tags and recurrent prolapse. Accordingly, PPH should not be recommended for patients who have symptomatic external hemorrhoids.

Another interesting subject concerns whether PPH is superior to other less invasive procedures, such as rubber band ligation of hemorrhoids. Rubber band ligation is a well-accepted procedure and is supposed to be safe and effective for symptomatic

	PI	PH	Conven	tional		Odds Ratio		Odds	Ratio
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year	M-H, Fixe	ed, 95% CI
Mehigan	0	20	1	20	5.6%	0.31 [0.01, 8.26]	2000	+	
Rowsell	0	0	0	0		Not estimable	2000		
Ho YH	2	57	0	52	1.7%	5.63 [0.26, 119.82]	2000		→
Ganio	3	50	3	50	10.7%	1.00 [0.19, 5.21]	2001		+
Shalaby	1	100	2	100	7.5%	0.49 [0.04, 5.55]	2001		
Ortiz 2002	0	27	1	28	5.5%	0.33 [0.01, 8.55]	2002	• • •	
Correa-Rovelo	1	42	0	42	1.8%	3.07 [0.12, 77.59]	2002		
Pavlidis	3	40	2	40	7.0%	1.54 [0.24, 9.75]	2002		-
Hetzer	2	20	0	20	1.7%	5.54 [0.25, 123.08]	2002		
Palimento	2	37	1	37	3.6%	2.06 [0.18, 23.72]	2003		
Kairaluoma	2	30	0	30	1.7%	5.35 [0.25, 116.31]	2003		→
Cheetham	2	15	0	16	1.6%	6.11 [0.27, 138.45]	2003		
Bikhchandani	1	42	1	42	3.7%	1.00 [0.06, 16.53]	2004		1
Senagore	7	77	4	79	13.6%	1.88 [0.53, 6.68]	2004	_	
Gravie	1	63	0	63	1.9%	3.05 [0.12, 76.26]	2005		→
Ortiz 2005	0	0	0	0		Not estimable	2005		
Ho KS	3	29	2	21	7.9%	1.10 [0.17, 7.22]	2006		
Huang	5	300	5	296	18.8%	0.99 [0.28, 3.44]	2007		•
Wong	0	21	1	20	5.7%	0.30 [0.01, 7.87]	2008	•=	
Total (95% CI)		970		966	100.0%	1.44 [0.87, 2.36]			•
Total events	35		23					├───∤	ļı
Heterogeneity: $Chi^2 = C$	7.61, df = 16	(p = 0.96)	; $I^2 = 0\%$					0.02 0.1	1 10 50
Test for overall effect: 2	Z = 1.43 (p =	= 0.15)						Favours PPH	Favours Conventional

B

	Lig	asure	Conven	tional		Odds Ratio			Odds I	Ratio	
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year		M-H, Fixed	l, 95% CI	
Jayne	1	20	1	20	6.5%	1.00 [0.06, 17.18]	2002			ł	
Milito	1	29	2	27	13.6%	0.45 [0.04, 5.23]	2002	_	•		
Palazzo	0	18	1	16	10.5%	0.28 [0.01, 7.36]	2002	•	•	ł	
Chung	3	30	3	31	18.1%	1.04 [0.19, 5.59]	2003			•	
Wang	1	42	1	42	6.6%	1.00 [0.06, 16.53]	2006			-	
Muzi	1	125	2	125	13.5%	0.50 [0.04, 5.54]	2007		-	ł	
Altomare	1	146	2	127	14.4%	0.43 [0.04, 4.81]	2008			<u>+</u>	
Bessa	0	56	2	55	16.8%	0.19 [0.01, 4.11]	2008	•			
Total (95% CI)		465		443	100.0%	0.57 [0.24, 1.33]			-	+	
Total events	8		14								
Heterogeneity: Chi ² =	1.56, df = 7 (p = 0.98);	$I^2 = 0\%$					0.02	0.1	1 10	50
Test for overall effect:	Z = 1.30 (p =	= 0.19)						Fav	ours Ligasure	Favours Cor	nventional

Fig. 4 Major postoperative hemorrhage: (A) PPH vs. conventional hemorrhoidectomy; (B) Ligasure vs. conventional hemorrhoidectomy.

internal hemorrhoids. However, hemorrhoids recur in approximately one-third of patients who receive rubber band ligation which is much higher than that for PPH (8.7% in this review).⁽³⁵⁻³⁹⁾

PPH is technically demanding, and placement of the purse-string at the correct height and depth is

critical. Of particular note, serious complications following PPH have been reported, including rectal perforation, pelvic sepsis, rectovaginal fistula, intraabdominal bleeding, and Fournier's gangrene.⁽⁴⁰⁻⁴⁷⁾ Further surgery, either an exploratory laparotomy or diverting stomy, was done in these cases. In addition,

		PPH		Cor	iventio	nal		Mean Difference]	Mean Difference	e	
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year	Ι	V, Fixed, 95% C	I	
Rowsell	8.1	1.53	11	16.9	2.33	11	1.7%	-8.80 [-10.45, -7.15]	2000				
Mehigan	17	2.2	20	34	3.5	20	1.4%	-17.00 [-18.81, -15.19]	2000				
Ho YH	17.1	1.9	57	22.9	1.8	62	10.3%	-5.80 [-6.47, -5.13]	2000		-		
Shalaby	8.2	1.9	100	53.9	5.8	100	3.2%	-45.70 [-46.90, -44.50]	2001	~			
Ganio	5	1.6	50	13	2.1	50	8.6%	-8.00 [-8.73, -7.27]	2001				
Correa-Rovelo	6.1	1.5	42	15.2	2.1	42	7.5%	-9.10 [-9.88, -8.32]	2002				
Ortiz 2002	23.1	2.8	27	26.6	3.1	28	1.9%	-3.50 [-5.06, -1.94]	2002		-		
Hetzer	6.7	2.1	20	20.7	4.3	20	1.0%	-14.00 [-16.10, -11.90]	2002				
Pallmento	28	4.1	37	34	4.5	37	1.2%	-6.00 [-7.96, -4.04]	2003				
Cheetham	10	2.6	15	14	2.7	16	1.3%	-4.00 [-5.87, -2.13]	2003				
Kairaluoma	8	2.1	30	14	2.6	30	3.2%	-6.00 [-7.20, -4.80]	2003		-		
Bikhchandani	8.12	2.48	42	17.62	5.59	42	1.3%	-9.50 [-11.35, -7.65]	2004				
Gravie	14	10	63	24	13	63	0.3%	-10.00 [-14.05, -5.95]	2005		1		
Huang	7.88	2.15	300	10.16	1.32	296	55.7%	-2.28 [-2.57, -1.99]	2007		-		
Wong	7	2.5	21	12.5	3.4	20	1.4%	-5.50 [-7.33, -3.67]	2008		-		
Total (95% CI)			835			837	100.0%	-5.85 [-6.06, -5.63]					
Heterogeneity: $Chi^2 = 520$	4.96, df =	= 14 (p <	< 0.0000	1); $I^2 = 1$	100%					-50 -2	25 0	25	50
Test for overall effect: $Z =$	effect: $Z = 53.52 \ (p < 0.00001)$									Favours PPF	I Favo	ours Conve	ntional

B

		PPH Con						Mean Difference		Mean Difference	
Study or subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	Year	IV, Fixed, 95% CI	
Milito	8.3	3.6	29	18.3	6	27	0.3%	-10.00 [-12.62, -7.38]	2002	-	
Wang	12.3	2.1	125	16.4	3.2	125	3.9%	-4.10 [-4.77, -3.43]	2006	<u> </u>	
Muzi	8.8	0.2	42	13.7	0.4	42	95.8%	-4.90 [-5.04, -4.76]	2007		
Total (95% CI)			196			194	100.0%	-4.88 [-5.01, -4.75]			
Heterogeneity: $Chi^2 = 20.0$ Test for overall effect: Z =	0, df = 2 72.26 (p <	(<i>p</i> < 0.0 < 0.000	00001); 1 01)	[² = 90%						-20 -10 0 10 20 Favours Ligasure Favours Convent	ional

Fig. 5 Time to return to normal activity (days): (A) PPH vs. conventional hemorrhoidectomy; (B) Ligasure vs. conventional hemorrhoidectomy.

Cheetham et al. reported that 31% of patients experienced severe pain and fecal urgency,⁽⁴⁸⁾ which persisted for up to 15 months after PPH. This may result from placing the purse-string suture too close to the dentate line with unintentional stapling of the sensitive anoderm and sphincters. An important caveat is that misapplication of the purse-string suture, at either an inadequate level (too high or too low) or inadequate depth (too deep or too superficial), may result in serious postoperative complications.

The Ligasure system is another recently introduced device which allows accurate application of bipolar diathermy to vascular structures with minimal thermal spread and limited tissue charring. Technically, it is simple and easy to learn because the new technique is a modified conventional hemorrhoidectomy which offers excellent hemostatic control and avoids the need to ligate the pedicles. Improved hemostasis may also offer better visibility and therefore a more accurate dissection. From this systematic review, Ligasure hemorrhoidectomy is superior to conventional hemorrhoidectomy in terms of operation time, postoperative pain, urinary retention and time to return to normal activity. Although early functional and symptomatic outcomes have been satisfactory, long-term follow-up of patients following Ligasure hemorrhoidectomy is necessary.

Although both new techniques, PPH and Ligasure hemorrhoidectomy, provide short-term benefits, especially in reducing extreme postoperative pain, more clinical research should be conducted to evaluate long-term outcomes.

497 Jinn-Shiun Chen, et al

Review of hemorrhoidectomy

	PI	PPH Conventional		tional		Odds Ratio		Odds Ratio				
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year	M-H, Fixed, 95% CI				
Ho YH	11	57	10	62	23.3%	1.24 [0.48, 3.20]	2000		-			
Mehigan	4	20	1	0	2.4%	4.75 [0.48, 46.91]	2000					
Shalaby	4	100	1	100	2.9%	4.13 [0.45, 37.57]	2001					
Correa-Rovelo	5	42	2	42	5.3%	2.70 [0.49, 14.79]	2002					
Ortiz 2002	7	27	7	28	15.3%	1.05 [0.31, 3.53]	2002		•			
Cheetham	3	15	0	16	1.1%	9.24 [0.44, 195.69]	2003			\rightarrow		
Kairaluoma	12	30	12	30	21.7%	1.00 [0.36, 2.81]	2003					
Bikhchandani	4	42	1	42	2.7%	4.32 [0.46, 40.35]	2004					
Gravie	6	63	7	63	19.1%	0.84 [0.27, 2.66]	2005	-	†			
Ortiz 2005	10	15	3	16	2.9%	8.67 [1.66, 45.21]	2005					
Ho KS	3	29	1	21	3.1%	2.31 [0.22, 23.89]	2006					
Total (95% CI)		440		440	100.0%	1.75 [1.15, 2.68]			•			
Total events	69		45					—				
Heterogeneity: $Chi^2 = 10.85$, $df = 10$ ($p = 0.37$); $I^2 = 8\%$ Test for overall effect: $Z = 2.61$ ($p = 0.009$)							0.05 0.2 Favours PPH	1 Favours	5 20 Conventiona			

Fig. 6	Residual skin tags: PPH	vs. conventional	hemorrhoidectomy
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	PPH		Conventional		Odds Ratio			Odds Ratio					
Study or subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	Year	M-H, Fixed, 95% CI					
Ganio	9	50	3	50	25.4%	3.44 [0.87, 13.65]	2001						
Shalaby	1	100	2	100	20.5%	0.49 [0.04, 5.55]	2001		-	-			
Correa-Rovelo	1	42	0	42	5.0%	3.07 [0.12, 77.59]	2002					→	
Pavlidis	0	40	0	40		Not estimable	2002						
Ortiz 2002	7	27	0	28	3.7%	20.85 [1.13, 386.05]	2002						
Hetzer	1	20	1	20	9.8%	1.00 [0.06, 17.18]	2002			1			
Kairaluoma	5	30	0	30	4.2%	13.16 [0.69, 249.48]	2003						
Cheetham	2	15	1	16	8.7%	2.31 [0.19, 28.47]	2003						
Gravie	3	63	0	63	4.9%	7.35 [0.37, 145.23]	2005			_	-	\rightarrow	
Ortiz 2005	8	15	0	16	2.3%	37.40 [1.90, 736.26]	2005					-+	
Wong	0	21	1	20	15.5%	0.30 [0.01, 7.87]	2008	+	-				
Total (95% CI)		423		425	100.0%	4.04 [2.06, 7.93]				-	•		
Total events	37		8							_			
Heterogeneity: $\text{Chi}^2 = 10.66$, $\text{df} = 9 \ (p = 0.30)$; $\text{I}^2 = 16\%$								0.05	0.2	1	5	20	
Test for overall effect: $Z = 4.07 (p < 0.0001)$								Favou	rs PPH	Favour	s Conve	entional	

Fig. 7 Recurrent prolapse: PPH vs. conventional hemorrhoidectomy.

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痔瘡外科手術治療的現況一文獻回顧和整合分析

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痔瘡是最常見的肛門疾病之一,傳統的痔瘡切除是最常被應用的外科手術治療。近幾年,痔瘡環狀切除手術和 Ligasure 痔瘡切除手術是比較新的外科技術,也漸漸的被推廣當中。本篇的目的就是想要比較這兩個新的技術和傳統的痔瘡切除手術間的差異和利弊。我們利用 MEDLINE 回溯分析,從 2000 年一月至 2009 年九月所有前瞻隨機性的研究,包含比較痔瘡環狀切除手術和傳統的痔瘡切除手術或 Ligasure 痔瘡切除手術和傳統的痔瘡切除手術的 研究。結果發現痔瘡環狀切除手術和 Ligasure 痔瘡切除手術兩者在降低手術時間、術後疼痛、術後排尿不順、以及恢復到正常活動的時間都比傳統痔瘡手術較好;但是痔瘡環狀切除 手術有較高比率的外在皮膚贅肉以及復發脱出的機率。雖然這兩種新技術都有短期的好處, 尤其是降低手術後的疼痛;此外,應該要有更多更好的臨床試驗不僅有長期追蹤的結果也有 較多的研究個案來確實評估最忠實的結果。(長庚醫誌 2010;33:488-500)

關鍵詞:痔瘡,痔瘡切除手術,痔瘡環狀切除手術,PPH,Ligasure痔瘡切除手術

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