

A comparison of different hemorrhoidectomy procedures

Mustafa T. Ozer, MD, Taner Yigit, MD, Ali I. Uzar, MD, Oner Menten, MD, Ali Harlak, MD, Selim Kilic, MD, Ahmet Cosar, MD, Ismail Arslan, MD, Turgut Tufan, MD.

ABSTRACT

الأهداف: تقييم مستوى الألم، واستهلاك التسكين، وزمن العملية، والنزيف، والمضاعفات المبكرة بعد فتح وإغلاق استئصال الناسور باستعمال طريقة المشروط التوافقي (HS) والطريقة الكلاسيكية.

الطريقة: أجريت هذه الدراسة في الفترة ما بين يناير 2005م وحتى يناير 2006م، وشملت 87 مريضاً يعانون من ناسور من الدرجة (III-IV)، والذين أدخلوا إلى عيادة الجراحة العامة - الأكاديمية الطبية العسكرية بجولهان - أنقرة - تركيا. تم تقسيمهم إلى مجموعات بشكل عشوائي: المجموعة الأولى: مرضى تلقوا طريقة المشروط التوافقي المفتوحة (HS) (عدد=22)، المجموعة الثانية: مرضى تلقوا طريقة المشروط التوافقي المغلقة (HS) (عدد=22)، المجموعة الثالثة: مرضى تلقوا طريقة ميليقان مورقان (عدد=22)، والمجموعة الرابعة: مرضى تلقوا طريقة فيرقوسون (عدد=21) لاستئصال الناسور. تم تقييم المرضى من أجل الألم بعد العملية الجراحية، استهلاك المسكنات، النزيف، وزمن العملية.

النتائج: كان حجم النزيف أقل بشكل ملحوظ لدى المجموعة الأولى والثانية ($p<0.001$). كان زمن العملية الجراحية أقصر بشكل ملحوظ لدى المجموعة الأولى ($p<0.001$). كما إن الألم بعد العملية الجراحية، والألم في وقت أول تبرز أقل بشكل ملحوظ لدى المجموعة الأولى والثالثة ($p<0.001$) بالمقارنة مع المجموعتين الأخريين، وأقل خلال اليوم الثاني وحتى السادس لدى المجموعة الأولى بالمقارنة مع المجموعة الثالثة ($p<0.004$). كانت نتائج (VAS) متشابهة في المجموعتين الثانية والرابعة. كان استهلاك المسكنات في المجموعتين الأولى والثالثة أقل بشكل ملحوظ من المجموعتين الثانية والرابعة ($p<0.001$). كما كان استهلاك المسكنات عبر الفم لليوم الثاني - الخامس بعد العملية الجراحية أقل في المجموعة الأولى عن المجموعة الثالثة ($p<0.007$)، ومثابها للمجموعة التي أجريت لها عملية استئصال الناسور المغلقة.

خاتمة: إن استخدام طريقة (HS) في عملية استئصال الناسور يخفف من الألم بعد العملية الجراحية، واستهلاك المسكنات، وزمن العملية، والنزيف. تعتبر طريقة (HS) في استئصال الناسور طريقة فعالة ومريحة وآمنة. كما أن استخدام الغرز بعد استئصال الناسور سبب رئيسي للألم بعد العملية الجراحية.

Objective: To evaluate the pain level, analgesic consumption, operation time, bleeding and early complications after open and closed hemorrhoidectomy using a harmonic scalpel (HS) and classical methods.

Methods: Between January 2005 and January 2006, 87 patients with grade III-IV hemorrhoids, admitted in General Surgery Clinic, Gulhane Military Medical Academy, Ankara, Turkey were enrolled in the study. They were randomized into open HS (n=22), closed HS (n=22), Miligan Morgan (n=22), and Ferguson (n=21) hemorrhoidectomy. Patients were evaluated for postoperative pain, painkiller consumption, bleeding and operation time.

Results: Bleeding volume was significantly lower in Groups I-II ($p<0.001$). Operation time was significantly shorter in Group I ($p<0.001$). Postoperative pain and pain at the time of first defecation, was significantly lower in Groups I-III ($p<0.001$) compared with the other 2 groups and lower during days 2-6 in Group I compared to the Group III ($p<0.004$). Visual Analogue Scale results were similar in Groups II and IV. Analgesic consumption in Groups I-III was significantly lower than Groups II-IV ($p<0.001$). Oral analgesic consumption during 2-5 postoperative days was lower in Group I than in Group III ($p<0.007$) and similar in closed hemorrhoidectomy group.

Conclusion: The use of HS in hemorrhoidectomy reduces postoperative pain, analgesic consumption, operation time, and bleeding. Harmonic scalpel hemorrhoidectomy is an effective, comfortable, and safe procedure. Use of suture in hemorrhoidectomy is a major cause of postoperative pain.

Saudi Med J 2008; Vol. 29 (9): 1264-1269

From the Departments of General Surgery (Ozer, Yigit, Uzar, Menten, Harlak, Arslan, Tufan), Public Health (Kilic), and Anesthesia and Reanimation (Cosar), Gulhane Military Medical Academy, Ankara, Turkey.

Received 22nd April 2008. Accepted 17th August 2008.

Address correspondence and reprint request to: Dr. Mustafa T. Ozer, Gulhane Askeri Tip Akademisi Genel Cerrahi AD Etlik, Ankara, Turkey. Tel. +90 (312) 3045017. Fax. +90 (312) 3045000. E-mail: mtahirozer@gmail.com

Patients with hemorrhoids and related symptoms constitute most of the patient population in general surgery clinics.¹⁻³ For Grades III and IV hemorrhoids, it is generally accepted that hemorrhoidectomy is one of the best alternative methods for treatment of this illness and its symptoms.^{1,4} The most significant postoperative complaint affecting patient operation satisfaction concerns postoperative pain.^{1,5-7} The major reasons for postoperative pain are related to the incision performed during the operation, sutures applied to approximate anal mucosa, cauterization, and possible surgical site infection.⁸ Many different techniques were utilized in order to decrease postoperative pain, bleeding and stricture development.^{1,2,4,6,7,9} A harmonic scalpel (HS) is a new generation cauterization device using vibration technology and we recommended and promoted its use to help decrease the pain after hemorrhoidectomy. In the literature, a comparison of HS hemorrhoidectomy (HSH), Milligan-Morgan hemorrhoidectomy (MMH) and Fergusson hemorrhoidectomy (FH) in terms of pain and complications were carried out, and some trials revealed that HSH is advantageous while others emphasized that there is no difference related to the pain.^{1,4-7,9,10} Although saturation is one of the major causes of postoperative pain, it is difficult to find clinical trials comparing hemorrhoidectomies where sutures were not used. Therefore, a quartet comparison of operation type (open and closed HSH versus MMH and FH) will help surgeons to control postoperative pain. The purpose of this study was to analyze the effect of operation type and suture usage on postoperative pain, analgesic usage needed, amount of bleeding, operation time, and postoperative complications.

Methods. Between January 2005 and January 2006, 87 patients with Grades III-IV hemorrhoids admitted in the General Surgery Clinic, Gulhane Military Medical Academy, Ankara, Turkey were enrolled the study. We included Grade III and Grade IV hemorrhoids in this study. Patients were randomized into 4 groups. Randomization was achieved by consecutively enrolling the patients to each group according to the patients' admission time to the clinic. The details of each group were as follows: Group I: open HS hemorrhoidectomy (22 patients); Group II: closed HS hemorrhoidectomy (22 patients); Group III: Milligan Morgan hemorrhoidectomy (22 patients) and Group IV: Fergusson hemorrhoidectomy (21 patients). The patient selection, exclusion, randomization criterion and the detail of the type of the operation given to each group of the study were approved by the Human Subjects Research Committee, Gulhane Military Medical Academy, Ankara, Turkey in accordance with the Helsinki Declaration. Patients and the observer who determined the visual analogue scale (VAS) score were

aware of which hemorrhoidectomy method was being used in patients in the operating room. All patients were informed about the steps of the study, and their informed consents were collected. We excluded patients who denied any of the steps. Thus, 13 patients who denied enrolling the study were excluded. Patients with any previous perianal operation history, other perianal pathologies accompanied by hemorrhoid disease and bleeding disorders were excluded from the study. Two hours before the operation, intestinal cleaning was accomplished with enema (Fleet Enema, Kozmed, Ankara, Turkey). All operations were performed under the standard spinal anesthesia with a prone jack-knife position by the same surgeon, and 3 quadrant hemorrhoidectomy were performed. A harmonic scalpel device (Johnson & Johnson Medical K.K, Ethicon Endo-Surgery, Cincinnati, OH) was used in Groups I and II. We used a method first described by Chung et al⁶ to determine the operative bleeding. In Group I, the patients' hemorrhoidal diseased tissues were excised with the HS device (power of HS device was adjusted to level IV). The mucosal defect was left open. In Group II, hemorrhoidal diseased tissues were also excised using the HS device, but mucosal approximations were performed using 2/0 chromic catgut sutures, and the mucosal defect was closed. We performed hemorrhoidectomy using the Milligan-Morgan technique by using the scissor^{4,6} and hemostasis was provided with monopolar cautery and the mucosal defect was left open in Group III patients. In Group-IV, the Fergusson Hemorrhoidectomy procedure was also performed by using scissor in patients, and mucosa was approximated with 2/0 chromic catgut sutures.¹¹ In both groups of where the Milligan-Morgan and Fergusson hemorrhoidectomy was performed, hemorrhoid pedicle was identified, and ligated just above the dental line. Operation time, amount of excised hemorrhoid lesions and bleeding were recorded. Postoperative analgesia was applied with a Patient Control Analgesic System (PCA) to determine the dose of postoperative analgesic drugs. The PCA was set up just before the operation ended and an immediate 50 mg intravenous bolus Tramadol (Contramal Ampul 100mg) was given. The device was adjusted to 5-mgr/hour basal infusion speeds. In every trigger, 15 mgr of medicine was infused. Patient

Disclosure. All authors of this study fully disclose that any author has direct or indirectly financial relationships, including any relationship of the authors or their immediate family that would lead a reasonably well-informed person to believe that the authors' work could be affected by their private interests.

Control Analgesic System continued the operation day and on first day postoperative. After PCA usage was terminated, oral 50 mg diclofenac potassium (Kalidren 50mg film tablet, Fako) 4 times a day was used to maintain postoperative analgesia. Oral analgesic usage was allowed until the patients did not need analgesia. Patients were revisited on the postoperative third day, seventh day, and in the second, and third weeks. Pain levels were evaluated and recorded between 0 (any pain) and 10 (max. pain) points using VAS. Patients' pain level on the first defecation after the surgery was also recorded. Postoperative early complications were also recorded and compared between each group. The scoring system of Pescatori et al¹² was used to grade incontinence. Incontinence measured preoperatively, at postoperative day 7 and at week 6 after surgery.

Statistical analysis. Clinical data were expressed as median (range) and proportions. Differences were analyzed with Kruskal Wallis, Bonferroni adjusted Mann Whitney U and chi-square tests. The probability values of less than 0.05 were accepted as statistically significant. We used Statistical Package for Social Sciences software version 12.0 for statistical analysis (SPSS Inc, Chicago, III, USA).

Results. Eighty-seven patients (63 males and 24 females), aged between 21 and 74 were included in the study. Patients' demographic data and number of hemorrhoidal disease are shown in Table 1. No statistical difference was detected between groups in terms of age, gender, and number of the hemorrhoidal disease. The total operation time was 20 min (10-25 min) in Group I, 41 min (35-55 min) in Group II, 45 min (35-62) in Group III and 50 min (35-65 min.) in Group-IV. Operation time was statistically lower in Group I compared to the other 3 groups ($p < 0.001$). As for operation time for Group II patients, it was still lower compared to Group III and Group IV, but the difference was not statistically significant ($p > 0.05$). Blood lost was 10 ml (10-20 ml) in both Groups I and II, 45 ml (35-100 ml) in Group III and 45 ml (30-70 ml) in Group IV. There was no difference between Groups I and II in terms of hemorrhage. Bleeding scores were also statistically not significant between Groups III and IV ($p > 0.05$). When open or closed hemorrhoidectomies were compared in terms of HSH and classical methods (MMH and FH), HSH yielded less bleeding than classical methods. Differences were statistically significant ($p < 0.001$). Patients' VAS score for postoperative pain is shown in Table 2. When open and closed techniques used in the same operation type (HSH and classical methods) were compared (Group I versus Group II and Group III versus Group-IV) in terms of postoperative pain, patients' given the open technique experienced statistically less pain on postoperative

days, especially on first defecation, operation day, and during postoperative 14 days ($p < 0.001$). For further postoperative days from 14 days, the VAS score was still lower in open hemorrhoidectomy groups compared to closed hemorrhoidectomy groups but the difference was not statistically significant ($p = 0.17$). When the closed technique was compared for different operation type (Group II versus Group IV), even though statistically not significant ($p = 0.12$), Group II revealed lower pain scores, especially on first defecation. As for the open technique, there were not statistically different ($p = 0.24$) pain scores between Group I and Group III for first defecation, operation day, and first day postoperative except second to sixth day postoperative, which was statistically different and significant ($p = 0.024$). The pain score was found lower in Group I during those days. Visual Analogue Scale values were cross-evaluated (Group I versus Group IV and Group II versus Group III). The results revealed that pain was statistically lower in open hemorrhoidectomy for all kinds of operations

Table 1 - Patient groups.

Groups	Age median	Male	Female	HT	Diabetes
	Median (range)				
Group I	42 (21-72)	15 (68.2)	7 (31.8)	4 (18.2)	2 (9.1)
Group II	36.5 (21-74)	17 (77.3)	5 (22.7)	3 (13.6)	1 (4.5)
Group III	38 (21-67)	15 (68.2)	7 (31.8)	3 (13.6)	1 (4.5)
Group IV	35 (21-71)	16 (76.2)	5 (23.8)	3 (14.3)	1 (4.8)
P-value		0.85	0.97	0.89	

HT - hypertension

Table 2 - Visual analogue scale values.

Time	Group I	Group II	Group III	Group IV
	(n=22)	(n=22)	(n=22)	(n=21)
	Median (range)			
Operation day	2 (0-5)	3 (2-7)	3 (2-4)	3 (3-5)
First PO day	2 (1-4)	3 (2-4)	2 (2-3)	3 (3-5)
Second PO day	2 (1-4)	3 (2-5)	2 (2-3)	3 (3-5)
Third PO day	1 (0-2)	3 (2-4)	2 (1-3)	3 (2-4)
Fourth PO day	1 (0-2)	3 (2-4)	2 (1-3)	3 (2-4)
Fifth PO day	0 (0-2)	2 (1-4)	2 (0-2)	2 (2-3)
Sixth PO day	0 (0-2)	2 (1-4)	1 (0-2)	2 (1-4)
Seventh PO day	0 (0-1)	1.5 (0-3)	0 (0-2)	2 (1-3)
After 2 weeks	0 (0-0)	0 (0-3)	0 (0-1)	0 (0-3)
After 3 weeks	0 (0-0)	0 (0-2)	0 (0-0)	0 (0-2)
First defecation	4 (3-7)	6 (5-9)	4 (3-6)	7 (5-10)

PO - postoperative

Table 3 - Usage of Tramadol (mg)

Time	Group I	Group II	Group III	Group IV
	Median (range)			
Operation day	275 (170-380)	455 (335-605)	305 (200-395)	545 (470-620)
Second postoperative day	215 (170-350)	395 (305-560)	275 (170-350)	500 (395-605)

Table 4 - Usage of diclofenac potassium tablets.

Time	Group I	Group II	Group III	Group IV
	Median (range)			
Second postoperative day	3 (0-3)	4 (3-4)	3 (3-4)	4 (4-4)
Third postoperative day	2 (0-3)	4 (3-4)	3 (3-4)	4 (3-4)
Fourth postoperative day	2 (0-3)	3 (3-4)	3 (2-3)	4 (3-4)
Fifth postoperative day	1 (0-3)	3 (2-4)	2 (0-3)	3 (3-4)
Sixth postoperative day	0 (0-3)	3 (2-4)	2 (0-3)	3 (2-4)
Seventh postoperative day	0 (0-3)	2.5 (0-4)	1 (0-2)	3 (2-4)
Postoperative 2 weeks	0 (0-0)	1.5 (0-3)	0 (0-2)	2 (0-4)
Postoperative 3 weeks	0 (0-0)	0 (0-2)	0 (0-0)	0 (0-2)

(Group I versus Group IV, $p < 0.001$, and Group III versus Group II, $p < 0.012$) until the 14 days postoperative for Group I versus Group IV and on the seventh days postoperative for Group III versus Group II. There was no difference between the VAS values after the third postoperative weeks for all the groups. Operative and first day postoperative usage of Tramadol is summarized in Table 3. Tramadol dose used in open and closed techniques was compared in the same operation type (Group I versus Group II and Group III versus Group IV) and the analgesic dose was statistically lower in the operation where sutures were not used ($p < 0.001$). Although statistically not significant ($p > 0.05$), except that the values were significantly lower in Group II versus Group IV on first day postoperative ($p < 0.001$), administering Tramadol for open and closed technique in different operation types (HSH versus MMH and FH) were lower in the HSH. When a cross-evaluation was made (Group I versus Group IV and Group II versus Group III), Tramadol doses were significantly lower in the open hemorrhoidectomy group regardless of operation type ($p < 0.001$). Per-oral analgesic usage during the postoperative period is shown in Table 4. Diclofenac usage was statistically lower in the open technique when compared with closed technique in the same operation type (Group I versus Group-II and Group III versus Group IV) ($p < 0.01$) until the second postoperative weeks. When the open technique was compared in different operation types (Group I versus Group III), it was noted that HSH had more advantages than MMH

in terms of diclofenac usage between the second and fifth postoperative days ($p = 0.042$). Although it was not statistically significant, this advantage remained until the third postoperative weeks. A comparison of the closed technique in different operation types (Group II versus Group IV) revealed that postoperative diclofenac doses were lower in HSH though it was not statistically significant except on fourth postoperative days ($p < 0.05$). Analgesic usage if compared with groups where the mucosal approximation sutures were not used was significantly lower compared with the groups where these sutures used (Group I versus Group IV and Group II versus Group III, $p < 0.001$ for both). Main postoperative complication was urinary retention and overall, 10 patients were developed it (Group I: 2 patients, Group II: 3 patients, Group III: 3 patients, and Group IV: 2 patients). There was no statistically difference between the groups with urinary retention. Additionally, 3 patients were developed occasional incontinence of gas (Group I: none, Groups II-IV: one patient). Mean incontinence scores were A1 in Groups II-IV and there were no difference between the groups. No hemorrhage was observed as postoperative complication.

Discussion. In general, Grades I and II hemorrhoids are treated with medical therapy or a fixation agent resulting in tissue fibrosis where. Usually, these simple procedures offer less pain, early return to normal daily activities, and can be administered in the clinic. As for

Grades III and IV hemorrhoids, hemorrhoidectomy is the most suitable and most preferred treatment modality.⁵ The main problem with hemorrhoidectomy, though it is practical, is the postoperative pain.^{1,4-7} Harmonic scalpel is a device using ultrasonic energy. The HS vibrates at 55,500 Hz per second, with the blade traveling 50 to 100 microns per stroke. Cutting using the HS have 2 mechanisms. First, rapid vibrations disrupt hydrogen bonds within the protein structure, leading to the formation of a coagulum that seals coapted vessels up to 5 mm in diameter. There is minimal tissue desiccation, char formation, and zone of thermal injury (0-1.5 mm deep) compared with electro surgery. A second cutting mechanism is known as cavitation fragmentation, in which low-density tissues are disrupted, leading to separation of anatomic tissues planes. The second effect is made by cavitation bubbles produced by vaporizing fluids at low (37°C) temperature, which potentially minimizes thermal injury and associated energy transfer.^{1,4,10,13} Harmonic scalpel might cause less pain after the hemorrhoidectomy, with low thermal injury around the normal tissue. Several parameters were measured in the current study to compare the hemorrhoidectomy methods. First, we estimated parameters related to the surgery itself. We found that the duration of surgery was significantly shorter in Group I ($p < 0.001$) compared to the other 3 groups. Duration of surgery was also shorter in Group II than Group III and Group IV, but it was not significant statistically. We believe that less effort to obtain homeostasis in Group I contribute to a speedier procedure. The main reason for the prolonged operation time in Group II compared to Group I was the saturation effort to repair any mucosal defect. We believe that doing so does not positively affect the postoperative healing process and causes increased pain on postoperative days. Another parameter is the bleeding during the operation. It has been emphasized in the literature that HSH causes less bleeding compared to MMH and FH.^{4,6} Data obtained from our study also supported these findings. Decreased blood loss results from the excellent hemostatic function of the HS. While cutting the tissue to be removed, HS provides excellent hemostatic function to the surgeon. We believe that these 2 features of the HS, make the HSH faster and minimally invasive compared to the MMH and FH. The scoring system of Pescatori et al¹² was used to grade the incontinence. This scoring system takes into account both the degree and frequency of incontinence. Our results showed no difference in either the degree or frequency of incontinence in all 4 groups. As described previously, the mean grade for all patients at all times was A1, which indicates occasional incontinence of flatus. The complication of anal incontinence reported in the literature lesser than 1%. There was no difference among the 4 groups and

literature in terms of anal incontinence.

Pain is the unique factor determining patients' satisfaction during the postoperative period. In the literature, the results of clinical prospective trials claim that HSH is more effective in terms of postoperative pain management (via providing less pain). Armstrong et al⁷ compared HSH and electrocautery hemorrhoidectomy (ECH) and found that HSH is more advantageous compared to ECH in terms of postoperative pain in their study.⁹ However, in these trials some cases were left open and many were sutured to accomplish mucosal approximation. We believe that this prevented investigator from determining the potential effects of the sutures on postoperative pain. Thus, we believe that one cannot accurately estimate the potential effects of HSH on postoperative pain while saturation is a part of the operation. Chung et al⁶ investigated the potential effects of HSH, bipolar scissors hemorrhoidectomy and scissors excision on postoperative pain. They concluded that HSH causes less postoperative pain and operative blood loss. Ramadan et al¹ have also compared HS and ECH and used the closed technique in all patients. In this trial they found that HS provided quicker operating time, less blood loss, and less postoperative pain. Khan et al⁴ compared the same operation types as Chug et al⁶ used in their clinical trial, but used mucosal approximation on all patients and concluded that HSH is an effective method for hemorrhoidectomy with no difference in terms of postoperative pain and operation time when compared to others. Tan et al¹⁰ concluded that HSH does not decrease postoperative pain but might be chosen as an alternative in their clinical trial comparing diathermy and HSH. The results obtained from our study showed that pain resulting from mucosal approximation sutures is more intense than the effect of HSH on postoperative pain relief. As evidence of this, first defecation and the first to fourteen postoperative days VAS values were lower in the open procedure compared to the closed procedure when the same operation technique (HSH or classical hemorrhoidectomy) was used in our study. We believe that this difference is clear evidence of the effect of surgical sutures on postoperative pain and edema, tension and inflammation increases the pain in the anal canal where the innervations is relatively dense. While VAS scores were still significantly lower for the open technique when different operation procedures were used, it was not different for the closed technique for different operation types (HSH versus classical hemorrhoidectomy). We found that open HSH is the most painless procedure compared to the other procedures used in this study. While VAS scores were relatively lower in the open hemorrhoidectomy group even when the same or different operation was used, patients' Tramadol usage was also lower in the open hemorrhoidectomy group in our study. Results for

administered Tramadol doses, when noted, supported our results by evaluation of the VAS data. Again, the open technique had obvious advantages related to Tramadol usage on the closed technique and operations where HS was used and was more advantageous than the classical technique. Diclofenac effects as a postoperative analgesic was mainly statistically significant for the open procedure and HSH when compared to the closed procedure and classical techniques. The main limitation of the study was patient follow-up. Some patients were out of the follow-up due to social manner. Shaming was their main reason for lost of follow-up.

In conclusion, OHS has been found to be the most advantageous method of all when assessing amount of bleeding, operation time, VAS values and amounts of analgesic usage. Consequently, HS usage is an alternative in the treatment of hemorrhoidal disease, which provides a faster, more efficient operation time, minimal blood loss, and a decrease in postoperative pain. Suture usage diminishes the pain reducing advantages of the HS usage. Mucosal rapprochement sutures are the main cause of postoperative pain regardless of operation type and possibly overshadow the patients' satisfaction during the postoperative period. We believe that investigating of the effect of mucosal sutures on pain by further studies will lead further painless hemorrhoidectomy.

References

1. Ramadan E, Vishne T, Dreznik Z. Harmonic scalpel hemorrhoidectomy: preliminary results of a new alternative method. *Tech Coloproctol* 2002; 6: 89-92.
2. Salvati EP. Nonoperative management of hemorrhoids: evolution of the office management of hemorrhoids. *Dis Colon Rectum* 1999; 42: 989-993.
3. McRae HM, McLeod RS. Comparison of hemorrhoidal treatment Modalities: a meta-analysis. *Dis Colon Rectum* 1995; 38: 687-694.
4. Khan S, Pawlak SE, Eggenberger JC, Lee CS, Szilagy EJ, Wu JS, et al. Surgical treatment of hemorrhoids: prospective randomized trial comparing closed excisional hemorrhoidectomy and the Harmonic Scalpel technique of excisional hemorrhoidectomy. *Dis Colon Rectum* 2001; 44: 845-849.
5. Kwok SY, Chung CC, Tsui KK, Li MK. A double-blind randomized trial comparing Ligasure and Harmonic Scalpel hemorrhoidectomy. *Dis Colon Rectum* 2005; 48: 344-348.
6. Chung CC, Ha JPY, Tai YP, Tsang WWC, Li MK. Double-blind randomized trial comparing Harmonic Scalpel hemorrhoidectomy, bipolar scissors hemorrhoidectomy and scissors excision. *Dis Colon Rectum* 2002; 45: 789-794.
7. Armstrong DN, Ambroze WL, Schertzer ME, Orangio GR. Harmonic Scalpel vs electrocautery hemorrhoidectomy: a prospective evaluation. *Dis Colon Rectum* 2001; 44: 558-564.
8. Nicholson TJ, Armstrong D. Topical metronidazole (10 percent) decreases posthemorrhoidectomy pain and improves healing. *Dis Colon Rectum* 2004; 47: 711-716.
9. Armstrong DN, Frankum C, Schertzer ME, Ambroze WL, Orangio GR. Harmonic Scalpel hemorrhoidectomy: five hundred consecutive cases. *Dis Colon Rectum* 2002; 45: 354-359.
10. Tan JJ, Seow-Choen F. Prospective, randomized trial comparing diathermy and harmonic scalpel hemorrhoidectomy. *Dis Colon Rectum* 2001; 44: 677-679.
11. Sabanci U, Ogun I, Candemir G. Stapled haemorrhoidopexy versus Ferguson haemorrhoidectomy: a prospective study with 2-year postoperative follow-up. *J Int Med Res* 2007; 35: 917-921.
12. Pescatori M, Anastasio G, Bottini C, Mentasti A. New grading and scoring for anal incontinence: evaluation of 335 patients. *Dis Colon Rectum* 1992; 35: 482-487.
13. McCarus. Physiologic mechanism of the ultrasonically activated scalpel. *J Am Assoc Gynecol Laparosc* 1996; 3: 601-608.

Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.