Total Laparoscopic Hysterectomy *versus* Vaginal Hysterectomy at the University Hospital of the West Indies: A 5-year Retrospective Study

V DaCosta[1], A McIntosh[2], S Wynter[1], J Harriott[1], L Christie[1], S Frederick-Johnston[1], M Bailey[3], J Frederick[1], C McKenzie[4]

ABSTRACT

Objective: *To compare the outcomes of total laparoscopic hysterectomy (TLH), a relatively new procedure, with vaginal hysterectomy (VH), a well-established procedure, in a university teaching hospital.*

Subjects and Methods: *A retrospective chart review of all patients who underwent TLH at the University Hospital of the West Indies between January 2007 and December 2011 was conducted. Chart review was also conducted of a group of patients who underwent VH during this time period. The groups were compared with respect to demographic data and intraoperative and postoperative outcomes. Statistical analysis was undertaken using the SPSS software, version 12.0 (SPSS, Chicago, IL). The Student unpaired t-test was used to analyse continuous variables, and the Chi-square test and Fisher exact test for categorical variables, when appropriate. A p-value of < 0.05 was considered statistically significant.*

Results: *Ten patients underwent TLH, and were compared with 22 women who underwent VH. There was no statistically significant difference between groups in uterine weight, estimated blood loss, postoperative analgesic requirement, or length of hospitalization. Total laparoscopic hysterectomy took significantly longer to perform (209.9 vs 145.6 minutes, $p = 0.004$). One patient in the TLH group had to be brought back to the operating theatre after three months because of bowel prolapse secondary to vault dehiscence. With the exception of one case of bladder injury in the VH group, there were no significant differences between the groups in terms of intraoperative and postoperative complications.*

Conclusion: *Total laparoscopic hysterectomy, notwithstanding its learning curve, is as safe as VH. However, TLH was associated with a significantly longer operative time.*

Keywords: Total laparoscopic hysterectomy, University of the West Indies, vaginal hysterectomy

Total Laparoscopic Hysterectomy *versus* Vaginal Hysterectomy at the University Hospital of the West Indies: A 5-year Retrospective Study

V DaCosta[1], A McIntosh[2], S Wynter[1], J Harriott[1], L Christie[1], S Frederick-Johnston[1], M Bailey[3], J Frederick[1], C McKenzie[4]

ABSTRACT

Objective: *To compare the outcomes of total laparoscopic hysterectomy (TLH), a relatively new procedure, with vaginal hysterectomy (VH), a well-established procedure, in a university teaching hospital.*

Subjects and Methods: *A retrospective chart review of all patients who underwent TLH at the University Hospital of the West Indies between January 2007 and December 2011 was conducted. Chart review was also conducted of a group of patients who underwent VH during this time period. The groups were compared with respect to demographic data and intraoperative and postoperative outcomes. Statistical analysis was undertaken using the SPSS software, version 12.0 (SPSS, Chicago, IL). The Student unpaired t-test was used to analyse continuous variables, and the Chi-square test and*

From: [1]Department of Obstetrics and Gynaecology, The University of the West Indies, Kingston 7, [2]Cornwall Regional Hospital, St James, [3]May Pen Hospital, Clarendon, and [4]Hugh Wynter Fertility Management Unit, The University of the West Indies, Kingston 7, Jamaica.

Correspondence: Dr V DaCosta, Department of Obstetrics and Gynaecology, The University of the West Indies, Kingston 7, Jamaica. E-mail: ved111@hotmail.com

Fisher exact test for categorical variables, when appropriate. A p-value of < 0.05 was considered statistically significant.

Results: *Ten patients underwent TLH, and were compared with 22 women who underwent VH. There was no statistically significant difference between groups in uterine weight, estimated blood loss, postoperative analgesic requirement, or length of hospitalization. Total laparoscopic hysterectomy took significantly longer to perform (209.9 vs 145.6 minutes, p = 0.004). One patient in the TLH group had to be brought back to the operating theatre after three months because of bowel prolapse secondary to vault dehiscence. With the exception of one case of bladder injury in the VH group, there were no significant differences between the groups in terms of intraoperative and postoperative complications.*

Conclusion: *Total laparoscopic hysterectomy, notwithstanding its learning curve, is as safe as VH. However, TLH was associated with a significantly longer operative time.*

Keywords: Total laparoscopic hysterectomy, University of the West Indies, vaginal hysterectomy

West Indian Med J 2012; 61 (9): 866

INTRODUCTION

Hysterectomy is a commonly performed gynaecological procedure. It is the second most frequent gynaecological operation, after Caesarean section (1). In France, it is performed in 60 000 women per year (2); a similar rate is seen in Canada (3). In the United States of America (USA), almost 30–40% of women younger than 65 years have undergone a hysterectomy (4, 5); and in Italy, the rate of this operation for patients between 40 and 70 years old is 15% (6). About 70% of hysterectomies are performed for benign indications, which include menorrhagia, uterine leiomyomata, and uterine prolapse (7). Whereas approximately 70–80% of hysterectomies have traditionally been performed by laparotomy (4, 8), increasing numbers of hysterectomies are now performed laparoscopically (9). In the last decade, several published studies demonstrated that laparotomic hysterectomy, compared with both vaginal and laparoscopic hysterectomy, has a higher incidence of complications, a longer hospital stay, and longer convalescence (10, 11). As a consequence, in Western countries, a reduction of 38% of laparotomic hysterectomy was observed, with an increase in laparoscopic and vaginal operations (12, 13).

Choosing between abdominal, vaginal and laparoscopic approaches to hysterectomy in Jamaica is generally based on the indications for surgery, surgeon's training and preference, uterine size, presence and absence of associated pelvic pathologies and patient's choice.

Harry Reich performed the first laparoscopic hysterectomy in 1989, which has become a widely accepted technique in managing uterine pathology. Several modifications to a laparoscopic hysterectomy have been described, depending on the extent of surgery carried out *via* the laparoscope (14, 15). These include laparoscopic supracervical hysterectomy, laparoscopic assisted vaginal hysterectomy (LAVH) and total laparoscopic hysterectomy (TLH). The latter is technically the most difficult laparoscopic technique and is performed entirely by the laparoscope without any vaginal component.

The intention of a laparoscopic hysterectomy is to convert an abdominal hysterectomy (AH) to a minimally invasive laparoscopic/vaginal procedure, rather than to replace an otherwise feasible VH. Vaginal hysterectomy has been prospectively compared with LAVH. Soriano found significantly increased operating times in the LAVH group, with similar reported blood loss, duration of hospital stay and postoperative analgesic requirements (16). Richardson also found significantly increased operating times and estimated blood loss in the LAVH group with similar mean hospitalization time, postoperative analgesic needs and intraoperative complications compared to the VH group (17). Both authors concluded that LAVH has no advantages over VH (16, 17). In cases in which VH is not technically possible, TLH appears to offer benefits as compared with abdominal hysterectomy (18). A recent Cochrane review on benign hysterectomy concluded that as a group, laparoscopic hysterectomies were slower and associated with more bleeding than VH. However, a subanalysis of TLH *versus* VH found no significant differences, although it included only two trials (19).

As experience with TLH increases, gynaecologists have begun to debate the role of TLH in women otherwise suitable for VH (20). Total laparoscopic hysterectomy facilitates better anatomical views, allows performance of concomitant surgery, and is suitable for larger uteri and those with little or no descent, which may prove difficult to remove vaginally. Several recent randomized trials comparing TLH with VH have been published, with conflicting conclusions (21–24). These two modalities were also retrospectively compared in a 2008 trial (25), which concluded that TLH was associated with significantly longer operative time and shorter hospital stay than VH with a trend toward more intraoperative and postoperative complications in the TLH group.

The aim of this current trial was to determine whether or not the learning curve of a new procedure (TLH) was associated with a higher complication rate than a well-

established procedure (VH) and to see how our TLHs compare with centres with greater laparoscopic experience.

SUBJECTS AND METHODS

During the study period, between January 2007 and December 2011, 10 patients underwent TLH, with the vast majority performed during the latter year of the study period. Twenty-two VH cases were selected for comparison with the aim of matching them on the basis of age, parity, body mass index (BMI) and previous surgical history. All TLH procedures were performed by senior gynaecologists at the Hugh Wynter Family Planning and Fertility Unit. The VH procedures were performed by senior staff gynaecologists in the Department of Obstetrics and Gynaecology.

Patient demographic data, operative time (from incision to placement of the final abdominal or vaginal closure suture), mass of the surgical specimen (calculated from the dimensions recorded on the pathology report), estimated blood loss, number of doses of postoperative analgesia and length of hospital stay (defined as the total number of inpatient hospital days excluding the day of admission) were recorded. Intraoperative and immediate postoperative complications were defined as complications occurring during surgery and within 24 hours after surgery, respectively. Complications were defined using the criteria modified from the eVALuate study (26).

Major complications included haemorrhage requiring transfusion or re-operation, haematoma requiring transfusion or surgical drainage, visceral injury (to bladder, bowel, or ureter), unintended laparotomy, pulmonary embolism and major anaesthesia problems. Minor complications included infection or temperature of more than 38 °C on two occasions six hours apart (excluding the first 24 hours after surgery), haematoma not requiring transfusion or surgical drainage, deep vein thrombosis and minor anaesthesia problems. Delayed postoperative complications (more than 24 hours after surgery), return visits to the emergency room and hospital readmissions were recorded. The postoperative follow-up period ranged from six months to five years.

The histopathology reports did not record the weight of the uterus; consequently, this had to be calculated indirectly using the prolate ellipsoid formula: 0.5236 x L x W x AP; where (L) is the length, (W) width and (AP) the anteroposterior diameter of the corpus. The uterine weight in grams was then calculated from this volume by the formula: 50.0 + 0.71 x volume (cm^3). Positive correlation has been shown between the estimated uterine weight and actual uterine weight by utilizing these formulae (27).

Statistical analysis was undertaken using the SPSS software version 12.0 (SPSS, Chicago, IL). The Student unpaired *t*-test was used to analyse continuous variables and the Chi-square test and Fisher exact test for categorical variables, when appropriate. A *p*-value of < 0.05 was considered statistically significant.

RESULTS

There were no significant differences between groups in BMI, parity, or in the number of previous Caesarean sections. However, patients in the TLH group had significantly more previous pelvic surgeries than the VH group. Patients in the VH group were significantly older than those in the TLH group (Table 1). The indications for hysterectomy for both groups are shown in Table 2.

Table 1: Baseline characteristics

Characteristic	TLH (n = 10)	VH (n = 22)	*p*-value
Age (years)			0.01
Range	32–55	41–86	
Mean ± standard deviation	42.7 ± 6.5	54.5 ± 11.3	
Parity			
Mean ± standard deviation	2.20 ± 1.32	3.73 ± 2.59	0.09
Body mass index (kg/m^2)			
Mean ± standard deviation	28.2 ± 7.8	28.04 ± 6.8	0.94
Previous Caesarean section	1 (10.0)	5 (22.7)	0.64
Previous pelvic surgery	5 (50.0)	2 (9.1)	0.02

Data are expressed as range, mean ± standard deviation, or n (%). TLH – total laparoscopic hysterectomy, VH – vaginal hysterectomy

Table 2: Indications for surgery

Indications	TLH (n = 10)	VH (n = 22)
Uterine fibroids	1 (10.0)	3 (13.6)
Pelvic organ prolapse	1 (10.0)	16 (72.7)
Dysfunctional uterine bleeding	1 (10.0)	0 (0.0)
Endometriosis	4 (40.0)	0 (0.0)
Adenomyosis	0 (0.0)	2 (9.1)
Endometrial hyperplasia	1 (10.0)	0 (0.0)
Pre-invasive cervical lesion	0 (0.0)	1 (4.5)
Others	2 (20.0)	0 (0.0)

Data are expressed as n (%). TLH – total laparoscopic hysterectomy, VH – vaginal hysterectomy

Patients in the TLH group had significantly longer mean operative time than patients in the VH group (209.9 *vs* 145.6 minutes; $p = 0.004$). Both groups were similar with respect to uterine weight, estimated blood loss and duration of hospital stay. Although not significantly different, patients in the TLH group tended to spend on average a shorter duration of time in hospital [mean difference of 0.46 days] (Table 3).

The incidence of complications was uncommon and was similar in each group. No bowel or ureteric injury was reported. One patient in the VH group had a 2 cm accidental cystotomy that was successfully repaired. A patient in the TLH group had to return to the operating theatre to have closure of a 5 cm vault defect causing bowel prolapse three

Table 3: Surgical data and clinical outcomes

Variable	TLH (n = 10)	VH (n = 22)	*p*-value
Uterine weight (g)			
Mean ± standard deviation	140.0 ± 62.8	132.3 ± 90.8	0.81
Range	88.7–276.7	65.2–403.5	
Operative time (minutes)			
Mean ± standard deviation	209.9 ± 57.7	145.6 ± 53.2	0.004
Range	113–282	77–295	
Estimated blood loss (mL)			
Mean ± standard deviation	290.0 ± 270.6	273.6 ± 294.4	0.88
Range	50–800	50–1500	
Hospital stay (days)			
Mean ± standard deviation	2.7 ± 1.3	3.4 ± 1.1	0.13
Range	1–6	2–6	
Total analgesia required			
Mean ± standard deviation	7.2 ± 4.6	9.2 ± 3.5	0.19
Range	3–19	5–21	
Intraoperative complications			
Conversion to laparotomy	0	0	
Visceral injury	0	1 (4.5)	
Blood transfusion	0	0	
Anaesthetic	0	0	
Postoperative complications			
Infection	0	0	
Return to operating theatre	1 (10.0)	0	
Pulmonary embolism	0	0	
Deep vein thrombosis	0	0	
Bladder atony	0	0	

Data are expressed as range, mean ± standard deviation, or n (%). TLH – total laparoscopic hysterectomy, VH – vaginal hysterectomy

months after the primary surgery. There were no differences in the estimated blood loss or in the number of doses of analgesia consumed. However, the trend was towards a greater consumption in the VH group (7.2 *vs* 9.2 doses). There was no need for blood transfusion, or to convert to an abdominal approach.

DISCUSSION

There is now a general consensus that, where possible, hysterectomy for benign indications should be approached vaginally (28). Previous studies have not shown that laparoscopic hysterectomy confers benefit compared with VH (19, 26). However, many of these studies are older and as the experience of TLH among gynaecologists has grown, the superiority of VH over laparoscopic hysterectomy, particularly TLH, has begun to be challenged (20). Several retrospective studies have already examined this issue. A small German study in 2007 found TLH was slower than VH but associated with (nonsignificant) reductions in analgesic use and postoperative stay (29). Subsequently, in a 2008 Canadian series comparing these two approaches, it was reported that TLH took longer and was associated with a nonsignificant increase in complications (21, 25). Another series compared surgical approaches in 250 women with uteri greater than 300 g and found that complication rates were similar, although VH was quicker and more cost effective (30).

A real learning curve effect has been demonstrated in TLH, which has not always received sufficient attention in studies on surgical approach to hysterectomy. Complications are reported to be significant in surgeons with 30 or fewer procedures performed (31). One series demonstrated reduced febrile morbidity, conversion to laparotomy and operating time for surgeons with more than 30 TLH compared with the first 29 procedures by the same surgeons, although the rate of serious complications was unchanged (32). This was not demonstrated in our series. However, this may be due to the very small sample size.

The major objective of this current series was to compare these two approaches for hysterectomy in the index setting where there is relatively limited experience with TLH – evident by the small number of cases – with the results from centres with a greater level of experience. The study was, however, limited by its retrospective nature and by the small number of patients. Therefore, the risks of rare complications could not be definitively established.

An above normal BMI, increased uterine size (width greater than 10 cm) and adhesions from previous abdominopelvic surgeries have been suggested as predictive factors for conversion to a laparotomic approach (33). However, other series have not shown a relationship between BMI and conversion rates (25, 34). There was no conversion to a laparotomy in our series.

The increased operating time we identified in the TLH group has been shown in other studies (16, 17, 25, 26). The TLH group had a greater proportion of patients who have had a previous pelvic surgery. Whether this may have contributed to the longer operative time in this group is unclear as there was no indication in the patient's note of any intraoperative difficulty secondary to adhesions. Also, despite the performance of additional procedures (anterior and posterior colporrhaphy), the VH group had shorter operative times. Patients in the TLH group trended toward a shorter period of hospitalization; this was, however, not statistically significant. Other larger series have shown a significant difference in the length of hospital stay, with the TLH group having a shorter period (25).

One patient in the TLH group had vault dehiscence three months after the primary surgery. Vault closure in the index sitting represents a significant bottle-neck in TLH. Most of the time is expended suturing the vaginal vault. Therefore as experience is accrued in this respect, shorter operative times are anticipated. Apart from this complication and the bladder injury in one patient in the VH group, there were no significant differences between the groups in terms of intraoperative and postoperative complications. Consistent results were shown in other series (25). The case of accidental cystotomy in the VH group highlights the commonly held notion of better visualization of the bladder in TLH, with the clear identification and division of adhesions, especially in patients with previous Caesarean section, thus minimizing the risk of bladder injury. It has been suggested

that patients who undergo TLH may have less requirement for analgesia than those who undergo VH (35). Although not statistically significant, patients in the TLH group in the current series trended toward a lower number of doses of analgesia.

The study did show that with proper supervision, the learning curve of a new procedure does not have to be associated with a higher complication rate. However, the main limitations of this study are the small patient number and the retrospective design of the trial. Nevertheless, the dearth of level I evidence examining the role of TLH compared with VH greatly demands a large prospective randomized trial to look at issues such as patient satisfaction and return to work or to baseline functional activity; issues that cannot be adequately addressed in a retrospective trial.

REFERENCES

1. Lepine LA, Hillis SD, Marchbanks PA, Koonin LM, Morrow B, Kieke BA et al. Hysterectomy surveillance – United States, 1980–1993. MMWR CDC Surveill Summ 1997; **46:** 1–15.
2. Cosson M, Querleu D, Crepin G. Hysterectomies for benign disorders. In: Gynecology. Masson. Paris: Williams and Wilkins; 1997: 160.
3. Millar W. Hysterectomy, 1981/82 to 1996/97. Statistics Canada – Health Reports. Vol 12; No 2. Ottawa: Statistics Canada; 2000. Available from http://www.statcan.gc.ca/pub/82-003-x/2000002/article/5514-eng.pdf
4. Wilcox LS, Koonin LM, Pokaras R, Strauss LT, Xia Z, Peterson HB. Hysterectomy in the United States, 1988–1990. Obstet Gynecol 1994; **83:** 549–55.
5. Ryan MM. Hysterectomy: social and psychological aspects. Baillieres Clin Obstet Gynecol 1997; **11:** 23–36.
6. Van Keep PA, Wildemeersch D, Lehert P. Hysterectomy in six European countries. Maturitas 1983; **5:** 69–74.
7. Whiteman MK, Hillis SD, Jamieson DJ, Morrow B, Podgornik MN, Brett KM et al. Inpatient hysterectomy surveillance in the United States, 2000–2004. Am J Obstet Gynecol 2008; **198:** 34.e1–7.
8. Gimbel H, Zobbe V, Andersen BM, Filtenborg T, Gluud C, Tabor A. Randomised controlled trial of total compared with subtotal hysterectomy with one year follow up results. BJOG 2003; **110:** 1088–98.
9. Wu JM, Wechter ME, Geller EJ, Nguyen TV, Visco AG. Hysterectomy rates in the United States, 2003. Obstet Gynecol 2007; **110:** 1091–5.
10. Kovac SR. Guidelines to determine the route of hysterectomy. Obstet Gynecol 1995; **85:** 18–23.
11. Summitt RL Jr, Stovall TG, Steege JF, Lipscomb GH. A multicenter randomized comparison of laparoscopically assisted vaginal hysterectomy and abdominal hysterectomy in abdominal hysterectomy candidates. Obstet Gynecol 1998; **92:** 321–6.
12. Gimbel H, Settnes A, Tabor A. Hysterectomy of benign indications in Denmark 1988–1998. A register based trend analysis. Acta Obstet Gynecol Scand 2001; **80:** 267–72.
13. Boukerrou M, Lambaudie E, Collinet P, Crepin G, Cosson M. Previous Caesarean section is an operative risk factor in vaginal hysterectomy. Gynecol Obstet Fertil 2004; **32:** 490–5.
14. Reich H, DiCaprio J, McGlynn F. Laparoscopic hysterectomy. J Gynecol Surg 1989; **5:** 213–6.
15. Reich H. Total laparoscopic hysterectomy: indications, techniques and outcomes. Curr Opin Obstet Gynecol 2007; **19:** 337–44.
16. Soriano D, Goldstein A, Lecuru F, Darai E. Recovery from vaginal hysterectomy compared with laparoscopy-assisted vaginal hysterectomy: a prospective, randomized, multicenter study. Acta Obstet Gynecol Scand 2001; **80:** 337–1.
17. Richardson R, Bournas N, Magos A. Is laparoscopic hysterectomy a waste of time? Lancet 1995; **345:** 36–41.
18. Walsh CA, Walsh SR, Tang TY, Slack M. Total abdominal hysterectomy versus total laparoscopic hysterectomy for benign disease: a meta-analysis. Eur J Obstet Gynecol Reprod Biol 2009; **144:** 3–7.
19. Nieboer TE, Johnson N, Lethaby A, Tavender E, Curr E, Garry R et al. Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database Syst Rev 2009: CD003677.
20. Candiani M, Izzo S. Laparoscopic versus vaginal hysterectomy for benign pathology. Curr Opin Obstet Gynecol 2010; **22:** 304–8.
21. Gendy R, Walsh CA, Walsh SR, Karantanis E. Vaginal hysterectomy versus total laparoscopic hysterectomy for benign disease: a meta-analysis of randomized controlled trials. Am J Obstet Gynecol 2011; **204:** 388.e1–8.
22. Candiani M, Izzo S, Bulfoni A, Riparini J, Ronzoni S, Marconi A et al. Laparoscopic vs vaginal hysterectomy for benign pathology. Am J Obstet Gynecol 2009; **200:** 368.e1–368.e7.
23. Drahonovsky J, Haakova L, Otcenasek M, Krofta L, Kucera E, Feyereisl J. A prospective randomized comparison of vaginal hysterectomy, laparoscopically assisted vaginal hysterectomy, and total laparoscopic hysterectomy in women with benign uterine disease. Eur J Obstet Gynecol Reprod Biol 2010; **148:** 172–6.
24. Ghezzi F, Uccella S, Cromi A, Siesto G, Serati M, Bogani G et al. Postoperative pain after laparoscopic and vaginal hysterectomy for benign gynecologic disease: a randomized trial. Am J Obstet Gynecol 2010; **203:** 118.e1–8.
25. Morton M, Cheung VY, Rosenthal DM. Total laparoscopic versus vaginal hysterectomy: a retrospective comparison. J Obstet Gynaecol Can 2008; 30:1039-44.
26. Garry R, Fountain J, Mason S, Napp V, Brown J, Hawe J et al. The eVALuate study: two parallel randomized trials, one comparing laparoscopic with abdominal hysterectomy, the other comparing laparoscopic with vaginal hysterectomy. BMJ 2004; **328:** 129–36.
27. Kung FT, Chang SY. The relationship between ultrasonic volume and actual weight of pathologic uterus. Gynecol Obstet Invest 1996; **42:** 35–8.
28. Falcone T, Walters M. Hysterectomy for benign disease. Obstet Gynecol 2008; **111:** 753–67.
29. Schindlbeck C, Klauser K, Dian D, Janni W, Friese K. Comparison of total laparoscopic, vaginal and abdominal hysterectomy. Arch Gynecol Obstet 2008; **277:** 331–7.
30. Kim HB, Song JE, Kim GH, Cho HY, Lee KY. Comparison of clinical effects between total vaginal hysterectomy and total laparoscopic hysterectomy on large uteruses over 300 grams. J Obstet Gynaecol Res 2010; **36:** 656–60.
31. Wattiez A, Soriano D, Cohen SB, Nervo P, Canis M, Botchorishvili R et al. The learning curve of total laparoscopic hysterectomy: comparative analysis of 1647 cases. J Am Assoc Gynecol Laparosc 2002; **9:** 339–45.
32. Tunitsky E, Citil A, Ayaz R, Esin S, Knee A, Harmanli O. Does surgical volume influence short-term outcomes of laparoscopic hysterectomy? Am J Obstet Gynecol 2010; **203:** 24.e1–6.
33. Leonard F, Chopin N, Borghese B, Fotso A, Foulot H, Coste J et al. Total laparoscopic hysterectomy: preoperative risk factors for conversion to laparotomy. J Minim Invasive Gynecol 2005; **12:** 312–7.
34. O'Hanlan KA, Lopez L, Dibble SL, Garnier AC, Huang GS, Leuchtenberger M. Total laparoscopic hysterectomy: body mass index and outcomes. Obstet Gynecol 2003; **102:** 1384–92.
35. Nascimento MC, Kelley A, Martitsch C, Weidner I, Obermair A. Postoperative analgesic requirements – total laparoscopic hysterectomy versus vaginal hysterectomy. Aust N Z J Obstet Gynecol 2005; **45:** 140–3.