ORIGINAL ARTICLE

Total laparoscopic hysterectomy for endometrial neoplasia

Mark Roberts · Carlota Rosales · Poornima Ranka

Abstract Total laparoscopic hysterectomy and bilateral salpingo-oophorectomy (TLH) offers an alternative and potentially more favourable procedure for women with early endometrial neoplasia. This cohort review presents the first 66 consecutive cases of TLH for endometrial neoplasia from one surgical team in a large teaching hospital. Data were collected for all women undergoing hysterectomy for suspected endometrial cancer, grade 1–2 adenocarcinoma, carcinoma in situ or severe atypical hyperplasia over 4 years using a prospectively kept theatre database. A total of 95 hysterectomies were identified, 66 (69%) underwent TLH, 18 (19%) underwent laparoscopically assisted vaginal hysterectomy (LAVH) and 11 (12%) had total abdominal hysterectomy (TAH) procedures. The mean age and body mass index of the patients in each group were similar, and average blood loss was lower in the TLH group (129 ml) compared to LAVH (185 ml) or TAH (247 ml). Total theatre time for TLH (113 min) was similar to LAVH (112 min) and less than the TAH group (127 min). Conversion rate from TLH to TAH was 0%. There were no major complications in the TLH group. These data report our early experience with a TLH and demonstrate a satisfactory record during its introduction. This new procedure offers a safe alternative to TAH for many women with no increased morbidity in agreement with recent literature. Although this paper reports a non-randomised series, we hope that it will serve to show that these techniques can be adopted safely by a new unit.

Declaration of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

M. Roberts (✉) · C. Rosales · P. Ranka
Women's Services, Royal Victoria Infirmary,
Newcastle upon Tyne NE1 4LP, UK
e-mail: mroberts.home@sky.com

Background

In 2009, one of the largest studies of the surgical approach to treat endometrial cancer was published [1]. The conclusions did not support routine systemic pelvis lymphadenectomy outside of clinical trials. Discussion highlighted the morbidity consequences of this radical approach without proven benefit; however, no suggestion is made on how to improve surgical outcome. It is worth noting that 93% of women underwent open hysterectomy, with the default approach being a mid-line incision, and the remaining 7% underwent laparoscopic hysterectomy.

Laparoscopic assisted vaginal hysterectomy with bilateral salpingo-oophorectomy (LAVH) has been described as an alternative to open hysterectomy with bilateral salpingo-oophorectomy (TAH) for suspected stage 1 endometrial cancer [2–4]. When compared, LAVH is associated with longer operating times and similar blood loss but less pain and shorter hospital stay. In deciding on the route of surgery, surgeons may consider findings such as obesity, which can compromise recovery because of the large abdominal incision required for TAH, or adequate vaginal access and cervical descent which would aid safe removal of the uterus with the main vaginal approach of LAVH. Such clinical findings are often seen in women with endometrial cancer, as common risk factors for the disease include obesity, nulliparity and increased age.

Total laparoscopic hysterectomy and bilateral salpingo-oophorectomy (TLH) offers an alternative and potentially more favourable procedure for these women. It has been shown in specialist centres to be an acceptable alternative to

TAH to treat women with endometrial pathology with no evidence of increased recurrence or impact on survival [5, 6]. Its benefits have included reduced hospital stay, shorter recovery time, fewer complications and less blood loss [7, 8]. The feasibility of a total laparoscopic approach for low grade endometrial cancer has improved since the ASTEC trial [1] has shown that routine pelvic lymphadenectomy is not necessary for grade 1 and 2 endometrial cancer. GOG-LAP2, a randomised controlled trial of more than 2,600 patients with early endometrial cancer comparing laparoscopy with laparotomy, also reported shorter hospital stay and fewer complications with a laparoscopic approach [9]. However, this study involved surgical staging and lymphadenectomy which is not supported by the ASTEC study [1]. In this large multi-centred study, there is limited surgeon or procedure quality control. These factors may explain the high laparoscopy conversion to laparotomy rate seen at 14.6%, reasons being mentioned including poor exposure, excessive bleeding and equipment failure.

We were obliged as part of local clinical governance protocol to confirm that the benefits described by others were achievable and realistic when TLH was introduced into our unit.

This cohort review presents the first 66 consecutive cases of TLH for endometrial neoplasia from one surgical team in a large teaching hospital. Cancers that are grade 1–2 endometrial malignancies and severe atypical hyperplasia are treated in this unit, whilst higher grades of cancer and endometrial sarcoma are referred to the local cancer centre. In the first year following introduction of TLH, a number of women were still offered LAVH or TAH, but by the fourth year of study, nearly all cases were treated with TLH. The study was primarily to look at the safety of the introduction of a new surgical method, and oncologic considerations were not the primary outcome of the study.

Methods

Data were collected from all women undergoing hysterectomy for endometrial cancer or severe endometrial atypia from January 2005, when TLH was first introduced to the unit, until December 2008. All surgery was undertaken or supervised by one gynaecological surgeon who had a caseload of 150–200 hysterectomies/year, which included other indications such as advanced endometriosis, ovarian masses and fibroids/menstrual disorders. All three surgical routes discussed in this paper were regularly used.

Diagnosis of severe atypical hyperplasia or grade 1–2 adenocarcinoma prior to surgery had been confirmed by Pipelle® endometrial biopsy or local anaesthetic hysteroscopy and direct biopsy. Severe atypia was taken as architectural and cytological atypia equivalent to carcinoma

in situ, and guideline management was the same as for low grade endometrial invasive cancer. Diagnostic and treatment methods were in line with the North of England Cancer Network Gynaeoncology Guidelines 2009. All cases were clinically FIGO stage I pre-operatively pending post-hysterectomy final staging. Any pre-operative FIGO stage II–IV and grade 3 malignancies were referred to the cancer centre for treatment and therefore are not included. A total of 95 hysterectomy and salpingo-oophorectomies were identified from a prospectively collected 'in theatre' database. Outcomes were further checked by retrospective review of all case notes and theatre records.

Surgical methods

All surgery was performed under general anaesthetic, and all patients received prophylactic antibiotics, low molecular weight heparin and TED® support stockings as standard.

TLH refers to hysterectomies performed entirely through laparoscopic ports but with vaginal removal of the specimen. A 10-mm trans-umbilical port is sited through which the laparoscope is inserted. In the right iliac fossa, a 5-mm port is placed for use by an assistant using a grasper. In the left iliac fossa, two 5-mm ports are placed as far apart as possible for use by the surgeon. Placement of the two ports in this position is to aid the surgical approach for suturing of the vaginal vault. At the start of the procedure, the cervix is inspected and peritoneal washings taken for cytology. Bipolar diathermy and incision are used to divide the infundibulo-pelvic ligaments and ovarian blood supply (Fig. 1), the round and the broad ligaments. The bladder is reflected from the anterior surface of the cervix using monopolar scissors until the outline of the vaginal probe (McCartney Tube® or VCare®) is delineated (Fig. 2). This identifies the cervico-vaginal margin and distal extent of dissection required to complete the hysterectomy. The uterine vessels are cauterised with bipolar diathermy (Fig. 3), and the vagina is opened with a monopolar hook by circumcising the cervix using the vaginal probe as a guide (Fig. 4). The uterus is removed via the vagina and the vaginal vault is closed using 2/0 PDS sutures which also re-align the uterosacral ligaments (Fig. 5). The procedure is completed after a careful check of haemostasis (Fig. 6).

Early on in the series, a McCartney Tube® was used as the vaginal probe. This is a hollow tube pushed up into the vagina to delineate the vaginal fornices and maintain pneumoperitoneum after the vagina is opened. Latterly, the VCare® uterine manipulator was used. This appeared to define the vaginal fornices much better for laparoscopic dissection. The tip of the VCare® is held in position by a small inflated balloon placed in the lower uterine cavity. Initially, we were concerned about uterine instrumentation with such a device, but after initial assessment in cases
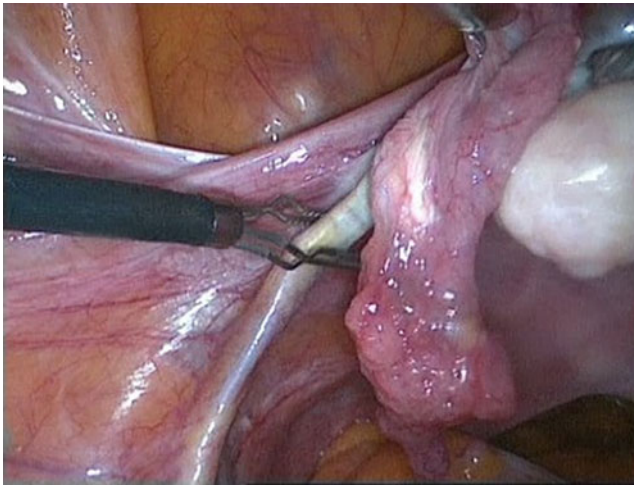
Fig. 1 Division of the left infundibulo-pelvic ligament

without malignancy and subsequently with, we confirmed that histopathological assessment of the cervix/uterus was not impaired, there were no uterine perforations and none of the 66 cases had vaginal vault recurrence during the 1–5-year follow-up. We also did not experience tumour spillage into the vagina during surgery which is sometimes a problem when the uterus is manipulated during a TAH with difficult access.

By comparison, LAVH is maybe defined as a hysterectomy whereby a laparoscopic approach is used to mobilise the ovaries and obtain peritoneal washings and the rest performed vaginally. In this study, TAH is defined as an abdominal hysterectomy via a transverse suprapubic incision. Lymphadenectomy was not performed.

Data collected included age, body mass index (BMI), parity, procedure undertaken and hospital stay. Blood loss was determined by measurement of surgical swab weight after use and any aspirated blood. Theatre time was obtained from theatre records and was defined as time into

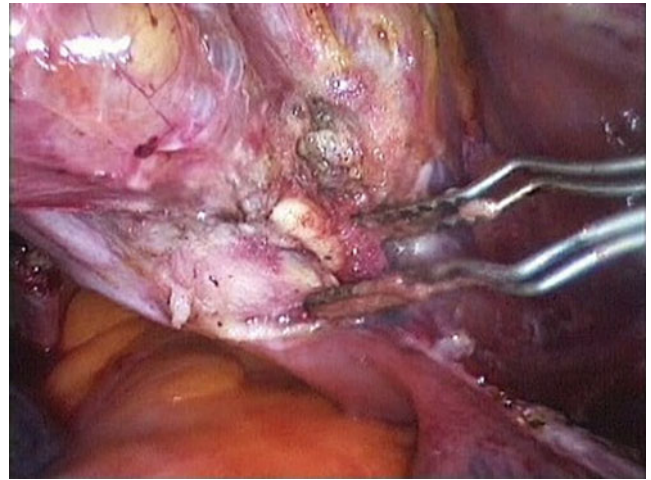
Fig. 2 Reflection of bladder

Fig. 3 Division of right uterine artery

theatre to time out of theatre and as such includes time taken to transfer the patient to the operative table, positioning and preparation of the patient, cleaning at the end of the procedure and waking up from the anaesthetic. Hospital stay is defined as the number of post-operative nights spent in the hospital.

Findings

Of the 95 hysterectomies for endometrial neoplasia identified since the introduction of this new approach in 2005, a total of 66 (69%) underwent TLH, 18 (19%) underwent LAVH and 11 (12%) had TAH procedures. The surgical approach was decided on an individual patient basis following examination and discussion; however, the number of LAVH and TAH procedures declined each year with experience (Fig. 7). A higher proportion of TAH cases were nulliparous compared with TLH and LAVH. The chosen
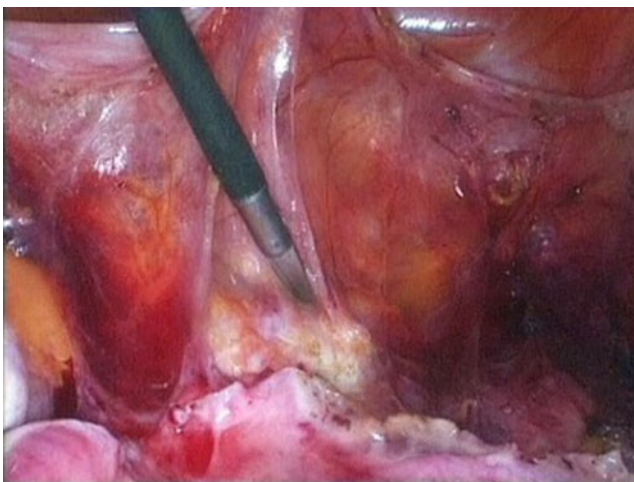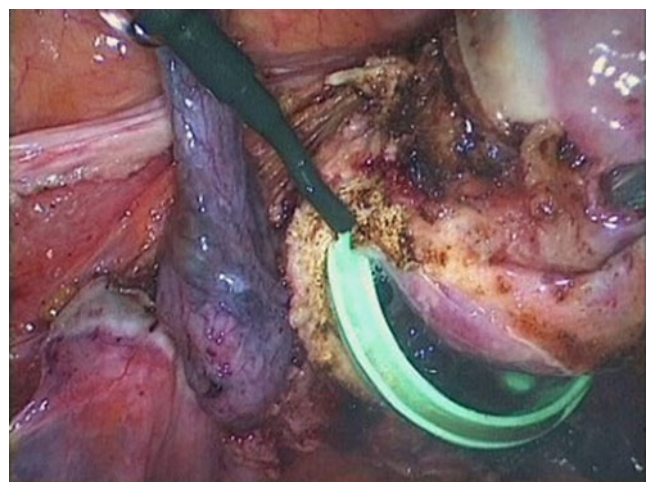

Fig. 4 Vaginal vault opened
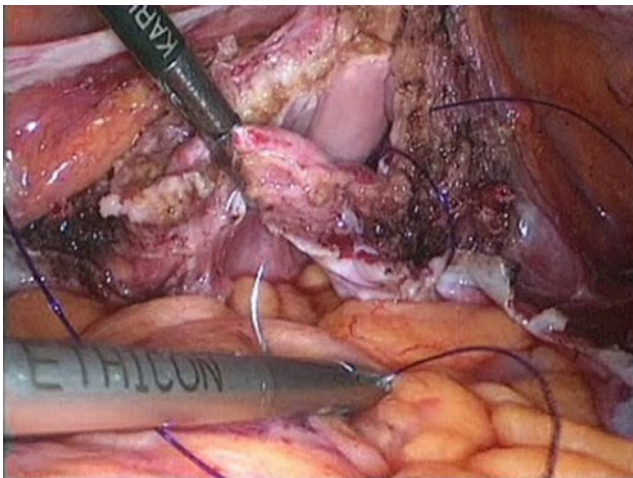
Fig. 5 Vaginal vault closed

Fig. 7 Route of surgery in the years 2005–2008

surgical route was influenced by the presence (size and number) of fibroids, which were more common in nulliparous women. An abdominal approach would be chosen for a uterus over 12-week size to ensure that the uterus could be removed intact for histopathological examination. All TLH procedures were completed as intended; however, early in the series, one LAVH was converted to laparotomy after laparoscopic assessment identified a large subserosal fibroid that had not been considered prior to surgery.

The following data were initially collected without randomisation as the intent was to audit safe introduction of TLH, so the comparison of outcomes between the different surgical approaches is limited (Table 1). Nevertheless, it can be noted that mean age and BMI of the patients in each group were similar, and with this in mind, it
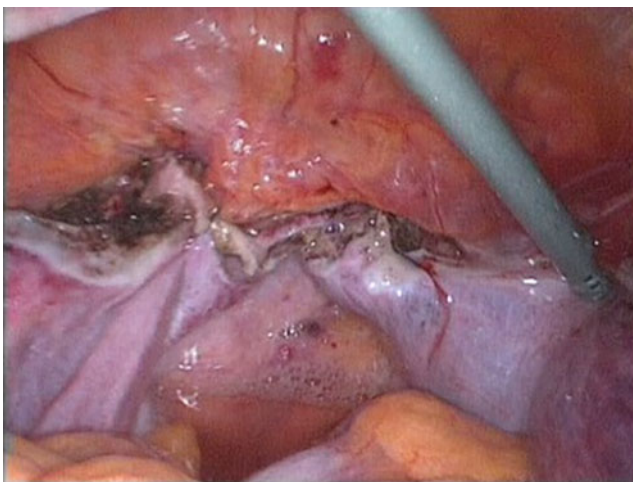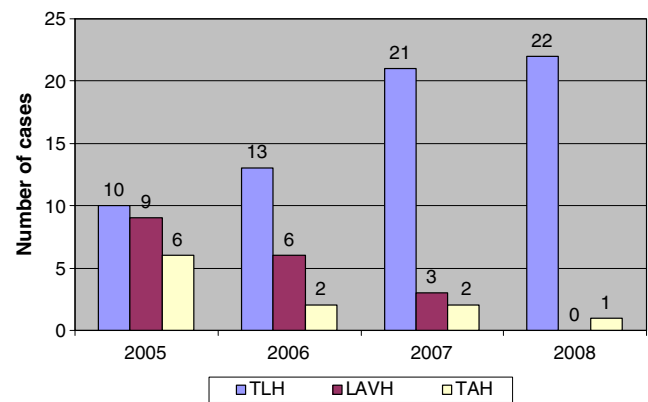

Fig. 6 Haemostasis check

is reassuring that measured blood loss and major haemorrhage (here taken as >1,000 ml) was actually lower in the TLH group (129 ml) compared to LAVH (185 ml) or TAH (247 ml).

Theatre times were obtained from theatre records and as such were recorded as time into theatre and time out of theatre. This would reflect total theatre usage rather than just operative time alone. Total theatre time for TLH (113 min) was similar to LAVH (112 min) and less than the TAH group (127 min).

Considering major complications, one of the LAVH patients had a small bowel injury repaired laparoscopically, and there were no other recorded cases of visceral injury in any of the groups. In the LAVH group, one patient also required intravenous antibiotics for an infected pelvic collection, which went on to require vaginal evacuation under anaesthetic 8 days post-operatively and the patient was given a 3-unit blood transfusion. Another of the LAVH cases had a BMI of 63 and was transferred post-operatively to HDU followed by a medical ward for treatment, including CPAP, antibiotics and physiotherapy. There were no cases of venous thrombosis or incisional hernia in any group.

The minor complications were noted as follows. Of the TLH cases, one developed a 3-cm chronic haematoma identified on CT scan 5 months post-operatively, which resolved spontaneously. Another was discharged home with oral antibiotics for persistent low grade pyrexia of unknown origin, 7 days post-operatively. One of the TLH cases required some superficial skin sutures under local anaesthetic on the ward for a dehiscence of the umbilical port site day 1 post-operatively. Of the LAVH cases, one was readmitted 3 weeks post-operatively for 4 days with a vault infection. There was no evidence of collection on scan and she was successfully treated with oral antibiotics. Following a difficult procedure due to a BMI of 55, a large uterus and abdominal adhesions, one of the TAH patients developed a wound infection and was discharged home on

Table 1 Summary of results comparing TLH, LAVH and TAH

	TLH	LAVH	TAH
Number	66	18	11
Mean age in years (SD)	63 (11.6)	60 (9.5)	61 (7.9)
Mean BMI (SD)	32.9 (8.24)	30.7 (10.7)	32.7 (9.33)
Nulliparous (%)	16 (24%)	1 (6%)	4 (36%)
Mean theatre time in minutes (SD)	113 (23.7)	112 (28.5)	127 (25.4)
Mean estimated blood loss (SD)	129 ml (395)	185 ml (187)	270 ml (247)
Major haemorrhage, >1,000 ml (%)	2 (3%)	0 (0%)	1 (9%)
Mean hospital stay in days (SD)	2.27 (1.6)	4.11 (2.7)	5.91 (3.0)
Major complications—injury to other organs, return to theatre or admission to HDU (%)	0 (0%)	3 (17%)	0 (0%)
Minor complications, infection or other complication managed conservatively (%)	3 (5%)	1 (6%)	1 (9%)

oral antibiotics. She represented 23 days post-operatively with a complete superficial wound dehiscence which required further antibiotics, a vacuum suction dressing and added hospital stay of 20 days.

In all cases, hysterectomy was performed following pre-operative diagnosis of severe atypical hyperplasia or grade 1–2 adenocarcinoma on endometrial biopsy. Post-operative histology on the whole uterus confirmed this in the majority of cases. The following cases were upstaged or upgraded: Of the TLH group, there were four cases with stage 3a endometrial adenocarcinoma diagnosed post-operatively. There was also one case of stage 3a carcinosarcoma. Two of the TAH cases had carcinosarcomas diagnosed at stages 3c and 1b. All cases are discussed at a weekly multidisciplinary team meeting and those requiring adjuvant therapy are referred to the local cancer centre. None of the cases underwent further surgical staging.

Conclusions

These data report our early experience with a TLH and demonstrate a satisfactory record during its introduction to a new unit. This new procedure offers a safe alternative to TAH for many women with no increased morbidity in agreement with recent literature [2, 9]. There is an excepted bias in the reported cases as the route chosen was not randomised; however, since introducing TLH, it has become the default procedure for endometrial pathology, reserving TAH as the default procedure for a grossly enlarged uterus.

We report a TLH to TAH conversion rate of 0% compared to 14% seen in the GOG-LAP2 study [9] probably in part due to the fact that pelvic lymphadenectomy was not performed in our series. The LACE trial, a randomised multi-centre trial comparing the laparoscopic with the open approach in early stage endometrial cancer, has been started in Australia; however, this too involves lymphadenectomy. Given that lymphadenectomy is not supported by the ASTEC trial [1], our study better reflects current practice in Europe.

TLH is seen not only as a good alternative to TAH in terms of reduced blood loss and quicker recovery, but may also be advantageous over LAVH. It has been described that avoidance of the vaginal approach may reduce the risk of subsequent urinary incontinence and vault prolapse both of which are seen more often following vaginal rather than open hysterectomies [10–12]. Certainly, we found that routine post-operative indwelling bladder catheterisation is not required after TLH, perhaps because bladder dissection is minimised through use of the vaginal probe. This allows earlier mobilisation and more recently discharge home often on the first day following surgery.

Despite the fact that laparoscopy is usually associated with longer theatre times due to technical set up, our TAH theatre times were on average longer than the laparoscopic routes. This may reflect a more challenging case type, enlarged uterus, adhesions, high BMI and many co-morbidities.

Finally, it must be noted that the unit and surgical team investigated in this study is recognised for laparoscopic surgery, with these cases representing a small proportion of major and advanced laparoscopic procedures undertaken. In addition to this surgical expertise, it is likely that the cautious approach taken in establishing this new procedure may in part explain the satisfactory outcome data. Although this paper reports a non-randomised series, we hope that it will serve to show that these techniques can be adopted safely by a new unit. We demonstrate the ability to perform the majority of hysterectomies for endometrial cancer and severe atypical hyperplasia at a relatively low volume oncology unit. We await the results of the randomised multi-centred trial which is underway in the Netherlands [13], which is designed to include criteria for surgeons and is more applicable to practice in Europe.

References

1. ASTEC Study Group (2009) Efficacy of systematic pelvic lympha-denectomy in endometrial cancer (MRC ASTEC trial): a randomised study. Lancet 373(9658):125–136
2. Childers JM, Brzechffa PR, Hatch KD, Surwit EA (1993) Laparoscopically assisted surgical staging (LASS) of endometrial cancer. Gynecol Oncol 51(1):33–38
3. Eltabbakh GH, Shamonki MI, Moody JM, Garafano LL (2001) Laparoscopy as the primary modality for the treatment of women with endometrial carcinoma. Cancer 91(2):378–387
4. Hur M, Kim M, Kim JH, Moon JS, Lee JC, Seo DW (1995) Laparoscopically assisted vaginal hysterectomy. J Reprod Med 40 (12):829–833
5. Seracchioli R, Venturoli S, Ceccarin M, Cantarelli M, Ceccaroni M, Pignotti E et al (2005) Is total laparoscopic surgery for endometrial carcinoma at risk of local recurrence? A long-term survival. Anticancer Research 25(3c):2423–2428
6. Obermair A, Manolitsas TP, Leung Y, Hammond IG, McCartney AJ (2004) Total laparoscopic hysterectomy for endometrial cancer: patterns of recurrence and survival. Gynecol Oncol 92(3):789–793
7. O'Hanlan KA, Huang GS, Garnier AC, Dibble SL, Reuland ML, Lopez L et al (2005) Total laparoscopic hysterectomy versus total abdominal hysterectomy: cohort review of patients with uterine neoplasia. J Soc Laparoendosc Surg 9(3):277–286
8. Malzoni M, Tinelli R, Cosentino F, Perone C, Rasile M, Iuzzolino D et al (2009) Total laparoscopic hysterectomy versus abdominal hysterectomy with lymphadenectomy for early-stage endometrial cancer: a prospective randomized study. Gynecol Oncol 112(1):126–133
9. Walker JL, Piedmonte MR, Spirtos NM, Eisenkop JB, Barakat R (2009) Laparoscopy compared with laparotomy for comprehensive staging of uterine cancer: gynaecologic oncology group study LAP2. J Clin Oncol 27(32):5331–5336
10. Roovers JP, van der Bom JG, van der Vaart C Huub, Fousert DM, Heintz AP (2001) Does mode of hysterectomy influence micturition and defecation? Acta Obstet Gynecol Scand 80(10):945–951
11. Barrington JW, Edwards G (2000) Posthysterectomy vault prolapse. Int Urogynecol J Pelvic Floor Dysfunct 11(4):241–245
12. Zivkovic F, Tamussino K, Ralph G, Schied G, Auer-Grumbach M (1996) Long term effects of vaginal dissection on the innervation of the striated urethral sphincter. Obstet Gynecol 87(2):257–260
13. Bijen CBM, Briët JM, Bock GH, Arts HJG, Bergsma-Kadijk JA (2009) Total laparoscopic hysterectomy versus abdominal hyster-ectomy in the treatment of patients with early stage endometrial cancer: a randomized multi center study. BMC Cancer 9:23