

# Challenges of laparoscopic hysterectomy: a 10-year experience in UK hospitals

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**Abstract** This retrospective study was conducted on cases of laparoscopic hysterectomy performed over the duration of 10 years in two UK hospitals by the same surgeon. The aim was to evaluate the outcome and outline the factors which had an influence on the results. The study involved 270 cases of laparoscopic hysterectomy performed between 1993 and 2004. The majority of cases (257) were completed laparoscopically; 13 cases were converted to conventional abdominal hysterectomy for various reasons. Most of the patients had either total laparoscopic hysterectomy (141 cases) or laparoscopic hysterectomy (103 cases). Laparoscopic-assisted vaginal hysterectomy was performed in 13 cases only. The patients were selected according to certain criteria to optimise the outcome. The total complication rate was towards the lower limit reported by previous studies. The return to theatre rate, conversion to laparotomy rate and duration of hospital stay were comparable to the best results obtained before. The current study showed that good outcome could be achieved by proper selection of cases, appropriate indication and good surgical skills.

**Keywords** Laparoscopic hysterectomy · Techniques · Outcome

## Introduction

Hysterectomy is one of the most commonly performed operations in developed countries. Traditionally there were two routes for hysterectomy, abdominal and vaginal. Harry Reich in 1989 [1] described the first laparoscopic hysterectomy. The procedure has evolved since then. It is currently indicated for a wide range of benign gynaecological conditions. The three main subcategories of laparoscopic hysterectomy are: laparoscopic-assisted vaginal hysterectomy (LAVH), laparoscopic hysterectomy (LH) and total laparoscopic hysterectomy (TLH) [2]. Minimal access surgery has also been used for the treatment of endometrial and cervical malignancies by TLH and laparoscopic radical hysterectomy, respectively [3].

Laparoscopic hysterectomy is an expensive, time-consuming procedure and could be associated with an increased risk of urinary tract injuries [2]. This is usually balanced by shorter hospital stay, quicker recovery and high level of patient satisfaction [4]. The future role of this procedure in gynaecological practice will depend to a great extent on identifying the factors which help in achieving a good outcome.

## Aim of the study

The present study was planned to evaluate a 10-year experience in performing different types of laparoscopic hysterectomies and outline the factors which have an effect on the outcome.

## Patients and methods

This is a retrospective cohort study of 270 cases of laparoscopic hysterectomy performed between 1993 and

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2004 in two different UK hospitals by one surgeon. The majority of cases (257) were completed laparoscopically; 13 cases had to be converted to conventional abdominal hysterectomy. The total number of hysterectomies performed through other routes by the surgeon during this period was 997 (209 vaginal hysterectomies and 788 abdominal ones). The policy used for counselling patients requiring hysterectomy was to offer vaginal hysterectomy as the first choice provided that the patient had utero-vaginal descent. If it was not suitable and the entry criteria for laparoscopic hysterectomy were met the patient was fully counselled about both the laparoscopic and abdominal approaches and given the choice. Those who did not meet the entry criteria for the laparoscopic route and were not suitable for the vaginal approach were recommended for abdominal hysterectomy.

The case notes of the patients who underwent laparoscopic hysterectomies were thoroughly examined and the following data were extracted onto a proforma and transferred to an electronic spread sheet:

- Age.
- Body weight and body mass index (BMI).
- Indication for hysterectomy.
- Type of operation.
- Duration of the surgical procedure and anaesthesia.
- Intraoperative findings and complications.
- Length of hospital stay.
- Histology results.
- Postoperative complications.
- Statistical analysis was performed using SPSS programme.

The three subcategories of laparoscopic hysterectomy performed in the present study are:

- Laparoscopic-assisted vaginal hysterectomy (LAVH) where the infundibulopelvic ligaments are divided laparoscopically and the rest of the operation is completed via the vaginal route.
- Laparoscopic hysterectomy (LH) which involves laparoscopic division of all the pedicles but the vagina is not opened laparoscopically.
- Total laparoscopic hysterectomy (TLH) which means that all the surgical manipulations, including incision of the vaginal vault, are carried out laparoscopically. Suturing of the vaginal vault was done vaginally to save time.

In the preoperative counselling the risks and potential complications were discussed in detail and patients consented to laparotomy should it become necessary in the course of the operation. An information leaflet which includes a description of the procedure and advice regarding potential surgical complications was given to all patients.

The selection of cases was based on the following exclusion criteria: patients with previous multiple abdominal laparotomies especially when bowel surgery was performed, high suspicion of ovarian malignancy, diagnosed endometrial cancer, uterine size more than 16 weeks gestation, BMI over 35 (one case had a BMI of 37) and presence of utero-vaginal prolapse.

The technique used over a 10-year period evolved as new equipment and recommendations became available. The main steps of the surgical technique were as follows:

- All the operations were performed under general anaesthesia and the patients received a prophylactic dose of antibiotics with induction.
- A Foley catheter was fixed in the bladder and a uterine cannula used to allow positioning of the corpus.
- A 12-mm trocar and cannula was inserted sub-umbilically, after insufflating the peritoneal cavity, to place the laparoscope. This trocar size was used only in the first 2 years until the 5-mm scope was available in the two hospitals.
- A brief inspection was carried out to assess the feasibility of the laparoscopic procedure and to identify the course of the ureter on both sides.
- Two more 12-mm ports were inserted, one in each iliac fossa after carefully identifying the inferior epigastric vessels. These ports were equipped with a reducing adaptor allowing a 5-mm instrument to be used through them. Occasionally an additional 5-mm port was placed suprapubically to be used for suction irrigation. The 12-mm port was used in the lateral entry points until early 1997. The reason was that until then we depended on the ENDO GIA, of which only a 12-mm version was available, but after that we acquired the disposable bipolar electrosurgical desiccating and cutting forceps.
- The ureters were identified before and after securing every pedicle.
- Between 1993 and 1997, the identification of the anterior aspect of the vagina was done by inserting a swab soaked in a blue dye in the anterior fornix. The vaginal wall was then opened laparoscopically short of the cardinal ligaments and the incision was completed vaginally. After 1997 the RUMI manipulator and Koh colpotomiser system [5] were used instead and the whole circumference of the vagina was opened laparoscopically.
- Haemostasis was secured using bipolar diathermy. The pelvis was inspected for any bleeding points with and without abdominal gas pressure using a C-shaped retractor to suspend the abdominal wall at desufflation.
- The integrity of the urinary bladder was tested by passing 50 ml of dye through the catheter and observing for leakage.

**Table 1** Demographic data. *SD* standard deviation

Parameter	Minimum	Maximum	Mean	SD
Age	27	68	44	±7.2
Weight(kg)	45	93	66	±13.12
BMI	18	37	25	±5.1
Duration of the procedure	45	180	97	±28.4
Estimated blood loss	50	700	170	±70
Weight of excised uterus	56	361	155	±74.5

- All trocar sites were inspected laparoscopically and a J-shaped needle was used to close the 12-mm port sites.

## Results

The total number of hysterectomies performed by the surgical team during the duration of the study was 1,254: 209 cases (16.67%) were done vaginally, 788 (62.84%) abdominally and the remaining 257 cases (20.5%) were performed laparoscopically. The total number of patients who were originally booked for laparoscopic hysterectomy was 270 cases; 13 of them (4.8%) had to be converted to conventional abdominal hysterectomy due to extensive pelvic adhesions from previous surgery (8 cases), equipment failure (4 cases) or limited access to the pedicles due to uterine myomata (one case). The detailed analysis will focus on the 257 cases completed laparoscopically.

The patients were divided into three groups according to the technique used in performing the operation. The largest group (141 cases, 54.86%) had total laparoscopic hysterectomy followed by the group of laparoscopic hysterectomy (103 cases, 40.07%) and finally a small cohort of 13 cases

**Table 2** Demographic data according to the technique of the operation. *TLH* total laparoscopic hysterectomy, *LH* laparoscopic hysterectomy, *LAVH* laparoscopic-assisted vaginal hysterectomy

Parameter	TLH ( <i>n</i> =141)		LH ( <i>n</i> =103)		LAVH ( <i>n</i> =13)	
	Mean	SD	Mean	SD	Mean	SD
Weight	66	±12.15	67	±11.13	66	±14.1
Duration of procedure	99	±30.5	96	±29.1	90	±25.4
Estimated blood loss	170	±60	180	±80	160	±70
Weight of excised uterus	155	±75	163	±64	150	±72
Hospital stay (days)	4	–	4	–	4	–

**Table 3** Indications for hysterectomy

Indication	<i>n</i>	%
Menstrual disorders	162	63.04
Endometriosis and pelvic pain	65	25.3
Uterine fibroids	15	5.84
Benign neoplastic conditions <sup>a</sup>	12	4.66
Uterine prolapse	3	1.16
Total	257	

<sup>a</sup> Benign neoplastic conditions: cervical intraepithelial neoplasia (CIN), endometrial hyperplasia

(5.05%) who had laparoscopic-assisted vaginal hysterectomy. Salpingo-oophorectomy was performed in 117 cases (45.52%) according to the clinical indication and consent.

Table 1 shows the demographic data of the patients and gives an idea about the selection criteria as well. The mean weight of the group was 66 kg, mean BMI was 25 and the mean weight of the excised uterus was 155 g. Tables 1 and 2 give some indication about the level of experience of the surgeon from the average duration of the procedure and the estimated blood loss. There was no difference in the demographic characteristics when comparing the different techniques used (Table 2).

All the patients were operated on for a primary diagnosis of benign gynaecological condition (Table 3). Menstrual disorders were the main indication (63.04%) followed by endometriosis and pelvic pain (25.3%). Uterine fibroids and benign neoplastic conditions represented only about 12% of the indications. As shown in Table 4 the histology results confirm the benign nature of the underlying gynaecological problems.

The overall complication rate in the present study was 4.67%. The commonest complications were injuries to the inferior epigastric vessels (1.95%) and ureteric injuries (1.17%) (Table 5). The injuries to the inferior epigastric took place in the first 9 months of the study and by early 1994 there was none. This was partly related to the curve of experience and mainly to attempts by the surgeon to seek and follow the recommendations which were becoming

**Table 4** Histological findings

Diagnosis	<i>n</i>	%
Uterine fibroids	97	37.74
Adenomyosis	50	19.46
Chronic cervicitis	77	29.96
Benign neoplastic disease <sup>a</sup>	7	2.72
Uterine polyps	10	3.89
No pathological abnormality	16	6.23
Total	257	

<sup>a</sup> Benign neoplastic disease: cervical intraepithelial neoplasia (CIN), ovarian teratoma, endometrial hyperplasia with no atypia

**Table 5** Operative complications

Complication	TLH ( <i>n</i> =141)		LH ( <i>n</i> =103)		LAVH ( <i>n</i> =13)		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Ureteric injury	3	2.13	0	—	0	—	3	1.17
Bladder injury	1	0.71	0	—	1	7.7	2	0.78
Inferior epigastric injury	1	0.71	3	2.91	1	7.7	5	1.95
Bowel injury	0	—	0	—	0	—	0	—
Vaginal cuff bleeding	0	—	1	0.97	1	7.7	2	0.78
Total	5	3.55	4	3.88	3	23.1	12	4.67
Return to theatre	4	2.84	3	2.91	2	15.4	9	3.5

more available. Further analysis showed that the majority of urinary tract injuries (bladder and ureter) were associated with TLH (four cases), whereas the majority of the inferior epigastric vessel injuries occurred with LH (three cases). There were two cases of vaginal cuff bleeding; both of them had vaginal surgery beside the hysterectomy.

The return to theatre rate was 3.5%, a total of nine cases which were distributed as follows:

- Four cases had a second-look laparoscopy to check bleeding from the trocar site.
- Two cases had vaginal examination and haemostatic sutures placed.
- Three cases had laparotomy: two for bleeding from the vaginal vault and one bleeding from the trocar site.

Although the highest number of cases taken to theatre followed TLH (4 cases), the highest percentage of cases were seen in patients having LAVH (2/13, 15.4%), which reflects the effect of the learning curve as it was the first type of laparoscopic hysterectomy performed by the surgeon.

About 30% of the patients stayed in the hospital for 2–3 days and the rest of the group were discharged home on the fourth or the fifth day.

## Discussion

Laparoscopic hysterectomy is currently accepted as a safe and efficient way to manage benign uterine pathology in selected patients [6]. However, the challenges and limitation of this procedure are still debatable [3]. The outcome of laparoscopic hysterectomy and the technique used in performing the operation well depend on various factors, such as the indication for hysterectomy, associated comorbidity, surgeon's experience and availability of the necessary equipment.

Roman [7] identified a high-risk population for laparoscopic hysterectomy on the basis of previous multiple abdominal surgery, chances of malignancy and uterine size. Presence of adhesions or previous abdominal surgery was a

significant risk factor for bowel injuries [8, 9] and together with uterine size were independent factors for conversion to laparotomy [10]. In the current study all the patients were carefully selected. The indications for the operations were limited to benign conditions (Tables 3 and 4), the maximum BMI was 35 except for one case and the mean uterine weight was 155 g (Tables 1 and 2). Previous laparotomy not involving the bowel was allowed as well as caesarean sections. The demographic data did not have a significant impact on the choice of the operative technique (Table 2); it depended mainly on the indication and the stage of experience of the surgeon who started by doing LAVH and moved quickly to LH and TLH (94.75% of cases).

The experience of the laparoscopic surgeon is a crucial factor in defining the outcome. Shen et al. [11] considered that the average frequency of complications tended to plateau once a surgeon had performed 60 procedures. The learning curve for TLH was found to correlate directly with the complication rate [6]. The experience of the surgical team in the present study can be judged by the mean duration of the procedure, estimated blood loss, lack of excessive bleeding requiring blood transfusion beside the complication rate (Tables 1 and 5). The mean duration of surgery was well within the average reported by Wattiez et al. [6] and the average blood loss was less than that found in other studies [12]. The total complication rate in the current study was 4.67%. Injuries to the urinary tract (bladder and ureter) occurred in 1.95% of cases and a similar proportion had an injury to the inferior epigastric vessels. There were no cases of bowel injury or severe haemorrhage. There is a wide variation in the total complication rate reported in previous studies (1.26–15.6%) [6, 11, 13–15]. Even the most experienced surgeon was found to have a complication rate of 5.8–11.8% and a major complication rate of 2.2–2.7% after laparoscopic hysterectomy for benign pathology [16, 17]. The reported rate of urinary tract injuries varied between 0.55 and 2.5% [6, 11, 14, 15, 18, 19]. Bowel injuries were found in 0.16–0.33% [20, 21], severe haemorrhage in 1.9–4.6% [6, 14, 18] and blood vessel injury in 0.07–1.4% [6, 11].



The return to theatre rate in this study was 3.5% (nine cases). Three of them required laparotomy (1.16%) to control bleeding from trocar site or vaginal vault; the others (six cases) needed either second-look laparoscopy or vaginal examination. The return to theatre rate in previous studies ranged between 0.5 and 2.5% [12, 14]. The total rate of conversion to laparotomy in the present study was 4.8% (13/270), which is comparable to the rate reported by Wattiez et al. [6]. However, if we look in detail we will find that the actual rate was only 3.5% as there were four cases which could have been easily completed laparoscopically if not for the equipment failure. The major cause for conversion was pelvic adhesions (8/13). The primary cause of conversion in other studies was limited access to the pedicles because of obstructing leiomyomata [22, 23]. This cause accounted only for one case in our series.

The duration of hospital stay is considered by some [3, 9] as the compensating factor for the use of expensive equipment and the longer duration of surgery in laparoscopic hysterectomies. The average duration in the current study varied between 2 and 5 days which is comparable to the results of previous studies [6, 11, 12, 14].

Despite the fact that laparoscopic hysterectomy is a well-established procedure for the management of benign gynaecological conditions, it is still performed only by a few specialists mainly because of the surgical skills required, the longer operating time and the need for expensive equipment [3]. Some studies considered that laparoscopic hysterectomy should replace abdominal hysterectomy whenever possible because of shorter hospital stay, less tissue trauma and faster recovery [4, 24]. Others pointed to the fact that it was more expensive and associated with a higher complication rate compared to abdominal hysterectomy [14]. Lumsden et al. [25] even found that there was no difference in recovery time or patient's satisfaction between the two procedures.

Comparing laparoscopic hysterectomy with vaginal hysterectomy Ottosen et al. [12] found no obvious benefit for laparoscopic hysterectomy. Johnson et al. [2] considered vaginal hysterectomy as the best option to avoid the abdominal approach and recommended the use of laparoscopic hysterectomy if vaginal hysterectomy is not possible bearing in mind that the risk of urinary tract injury is a genuine concern in the laparoscopic route. On the other hand, Thiel and Kamenic [26] showed that TLH can be performed as a day case procedure with excellent results and less cost compared to vaginal hysterectomy.

The surgical team in the present study did manage to achieve a complication rate which is towards the lower limit reported by previous studies and a return to theatre rate, conversion to laparotomy rate and duration of hospital stay comparable to the best results obtained before. The study shows that a balance can be achieved between the

limitations and expectations of laparoscopic hysterectomy by proper selection of patients, appropriate indication and good surgical skills. Laparoscopic hysterectomy has an established role in gynaecological surgery; however, its practice will remain to be on a limited scale until we achieve an advance in technique and technology which will help in overcoming the main challenges facing this approach.

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