Human Reproduction vol 11 no.10 pp 2122–2126, 1996

Hysterectomy for patients without previous vaginal delivery: results and modalities of laparoscopic surgery

Charles Chapron[1], Jean-Bernard Dubuisson and Yann Ansquer

Service de Chirurgie Gynecologique (Pr Dubuisson), Clinique Universitaire Baudelocque, C.H.U. Cochin Port-Royal, 123, Boulevard Port-Royal, 75014 Paris, France

[1]To whom correspondence should be addressed

The great majority of hysterectomies in nulliparous patients have been carried out via laparotomy. The purpose of this study was to establish whether laparoscopic surgery can be of use in an attempt to reduce the number of laparotomies when hysterectomy is indicated in patients without previous vaginal delivery. A retrospective study was carried out on 66 women who had not had a previous vaginal delivery who underwent hysterectomy from January 1993 to May 1995. Laparotomy was required for only 19.7% of cases (13 patients). For the 53 patients (80.3%) who underwent laparoscopic hysterectomy, the average duration of the operation was 152.24 ± 45.7 min, and the average weight of the uterus was 238.3 ± 154.1 g. The duration of the laparoscopic operation was correlated in a statistically significant fashion with the weight of the uterus (P = 0.0005), the necessity of associated procedures during the hysterectomy (P = 0.01) and the surgeon's experience (P = 0.01). These results demonstrate that laparoscopic surgery decreases the number of laparotomies necessary for patients with no previous vaginal delivery who require hysterectomy. When vaginal access is poor, simple laparoscopic preparation is inadequate and the only possibility of avoiding laparotomy is to carry out the hysterectomy entirely via the laparoscopic route.

Key words: hysterectomy/nulliparous patients/operative laparoscopy/total laparoscopic hysterectomy

Introduction

The first case of laparoscopic hysterectomy was reported by Reich *et al.* in 1989. Since then, several teams have reported their experience with this operation (Summitt *et al.*, 1992; Daniell *et al.*, 1993; Reich *et al.*, 1993; Chapron *et al.*, 1994), thus demonstrating that it can be reproduced. Now that the operation has been proved to be feasible, the question arises as to what the indications should be for it to be performed. Hysterectomy by the vaginal route is more difficult to perform when vaginal access is poor and uterine mobility limited. These unfavourable conditions are often found in patients with no previous vaginal delivery. Previous reports (Boike *et al.*, 1993; Bronitsky *et al.*, 1993; Howard and Sanchez, 1993; Nezhat *et al.*, 1994) have compared the operating times, blood loss, postoperative pain, duration of hospital stay and recovery period according to whether the hysterectomy was carried out via laparotomy, by the vaginal route or via laparoscopy. Our study deliberately centred on the indications for laparoscopic surgery for hysterectomy. The aim was to establish whether laparoscopic surgery enabled the number of laparotomies to be reduced for patients who had no previous vaginal delivery, because hysterectomy is currently carried out by the abdominal route in the vast majority of these cases (Chapron and Dubuisson, 1996a).

Material and methods

We performed a retrospective study to analyse the methods by which total hysterectomy was carried out in patients without previous vaginal delivery.

Surgical procedure

Although nulliparity does not constitute a formal contraindication to vaginal hysterectomy, for patients who had never had a vaginal delivery we performed this operation in our department by laparotomy until 1992. Thus, all hysterectomies in this series were carried out either by laparotomy or by laparoscopic surgery, the latter having been performed in our department since 1993. All laparoscopic hysterectomies were performed by two surgeons (C.C. and J.B.D.). The laparoscopic procedure has been described previously (Chapron and Dubuisson, 1996b). In our opinion, the important points in this technique are that all instruments are re-usable and that all haemostasis are carried out by bipolar coagulation. In every case the entire hysterectomy, from the adnexal procedure to the colpotomy, was carried out laparoscopically (Reich *et al.*, 1989). No patient had simple laparoscopically assisted vaginal hysterectomy (LAVH), in which haemostasis of the uterine vessels is achieved by the vaginal route. For extraction of the uterus, if it was voluminous or out of proportion to the vagina, techniques to reduce the uterine volume (morcellation, hemisection, enucleation of myoma, intramyometrial coring, etc.) were required. After extraction of the uterus, the vagina was sutured. The operation systematically finished with laparoscopic inspection of the peritoneal cavity. Normal saline at 40°C was used and enabled haemostasis and the ureters to be checked. We did not repentonize and used no drains.

Patients

Between January 1, 1993 and May 31, 1995, all patients who had no previous vaginal delivery and who required total hysterectomy were included in this study. No patient presented a prolapsus or a pelvic floor relaxation. No patient suffered from urinary stress incontinence. Attention was given to the method of hysterectomy, age of the patient, weight of the uterus, past surgical history and surgical procedures associated with the hysterectomy. In addition, the charts of all women undergoing laparoscopic hysterectomy were examined to determine

Table I. Surgical procedure for total hysterectomy

	No (%) of patients for each surgical procedure		
	Total	Laparotomy	TLH
1993	23	5 (21 7)	18 (78 3)
1994	24	6 (25 0)	18 (75 0)
1995	19	2 (10 5)	17 (89 5)
Total	66	13 (19 7)	53 (80 3)

TLH = total laparoscopic hysterectomy

Table II. Indications for hysterectomy in 53 patients who had a total laparoscopic hysterectomy (TLH) and 13 patients who underwent laparotomy[a]

Indication	No (%) of patients for each procedure	
	TLH	Laparotomy
Abnormal uterine bleeding	23 (43 4)	10 (76 9)
Enlarging uterine leiomyomas	31 (58.5)	11 (84 6)
Adnexal mass	8 (15 1)	4 (30 7)
Chronic pelvic pain	14 (26 4)	7 (53 8)

[a]Certain indications can be associated in the same patient.

the length of the operation, estimated blood loss, resumption of normal bowel function, length of hospital stay and complications Data were analysed with the χ^2 test and Student's *t*-test.

Results

From January 1, 1993 to May 31, 1995, 66 patients with no previous vaginal delivery underwent total hysterectomy. This hysterectomy was carried out by laparoscopy in 80.3% of cases (53 patients) whereas for 13 patients (19.7%) we had to use laparotomy. The details of the surgical procedures for each year are listed in Table I. The indications for hysterectomy, with more than one indication sometimes occurring in the same patient, are given in Table II.

The mean age of the patients did not differ significantly between the two procedures: 47.1 ± 5.7 years (range 37–67) for laparoscopy versus 44 7 ± 5.3 years (range 36–55) for laparotomy. The mean weight of the uterus, however, was significantly greater ($P < 0.05$) for patients undergoing laparotomy: 374.4 ± 246.9 g (range 40–810) compared with only 238.3 ± 154.1 g (range 40–840) for patients who had laparoscopy.

The indications for the 13 laparotomies were the following. In six cases, the laparotomies were decided directly. In two cases hysterectomies were indicated in a context of severe endometriosis for which the patients had undergone previous surgery. One of the patients suffered from endometriosis involving the bowel which required a specific rectal resection procedure. In two cases, at the beginning of the series, the patients had previous Caesarean section, twice for one patient and three times for the other. The uterine weights for these patients were respectively 140 and 90 g In the two remaining cases laparotomy was indicated by disproportion between the uterine volume and the narrowness of the genital tract. The uterine weights for these two patients, who also had a past history of polymyomectomy via laparotomy, were respectively 690 and 580 g. The decision to perform laparotomy was made for two of the patients after laparoscopic diagnosis without any laparoscopic procedure being carried out Both patients had received previous abdominopelvic surgery and possessed a large myomatous uterus (respectively 470 and 810 g). Diagnostic laparoscopy revealed in the two cases the existence of severe pelvic adhesions. In the five other cases we started with laparoscopic surgery and then converted to laparotomy. This conversion was due in every case to difficulties with the laparoscopic procedure, although no preoperative complication had been observed. In four cases the conversion was indicated because of dense adhesions, and in the fifth case a 6 cm fibroid developing laterally prevented satisfactory exposure of the uterine pedicles.

The past history of surgery of the patients was as follows, bearing in mind that simple appendectomy has not been taken into account. Of the 53 patients who underwent laparoscopic hysterectomy, 24 (45.3%) had already had surgery. Of these 24, 14 had been operated once only, eight had been operated

Table III. Past surgical history[a]

Previous operations	No of patients receiving laparotomy	
	Pfannenstiel	ML
For patients who underwent TLH		
+ Tuboplasty	3	–
+ Myomectomy	7	1
+ Adnexectomy for benign ovarian cyst	2	2
+ Ectopic pregnancy	1	–
+ Peritonitis	1	1
+ Occlusion	–	1
+ Caesarean section	16	1
Total	30	6
For patients who had hysterectomy via laparotomy		
+ Tubal microsurgery	1	–
+ Myomectomy	8	–
+ Occlusion	1	–
+ Adnexectomy for benign ovarian cyst	–	1
+ Salpingectomy	1	–
+ Caesarean section	6	2
Total	17	3

[a]A past history of simple appendectomy has not been taken in to account. ML = midline laparotomy, TLH = total laparoscopic hysterectomy

Table IV. Surgical procedures associated with the hysterectomies in 53 patients who had a total laparoscopic hysterectomy (TLH) and 13 patients who underwent laparotomy

	No (%) of patients		Statistical results
	TLH	Laparotomy	
Lysis	14 (26.4)	10 (76 9)	$P < 0.01$
Adnexectomy	15 (28.3)	5 (38 4)	P = NS
Age	6 (11 3)	2 (15 4)	
Benign ovarian cyst	9 (17.0)	3 (23 0)	
Reduction procedures by the vaginal route[a]	29 (54 7)	—	
One procedure only	8 (15 1)		
Several procedures	21 (39 6)		

[a]Morcellation, bivalving, coring, etc

Table V. Nulliparous patients: modalities of hysterectomy

Reference	No (%) patients having a hysterectomy			
	Total	Abdominal	Vaginal	Laparoscopic
Before 1989[a]				
Leventhal and Lazarus (1951)	108	103 (95.4)	5 (4 6)	—
Dicker *et al.* (1982a)	178	170 (95.5)	8 (4.5)	—
Kovac (1986)	46	30 (65 2)	16 (34.5)	—
Total	332	303 (91.3)	29 (8 7)	—
After 1989[a]				
Boike *et al* (1993)	29	16 (55 2)	3 (10 3)	10 (34 5)
Bronitsky *et al.* (1993)	17	7 (41.2)	3 (17.6)	7 (41 2)
Total	46	23 (50.0)	6 (13 0)	17 (37.0)

[a]Year in which the first total laparoscopic hysterectomy was reported (Reich *et al.*, 1989).

twice and two patients had a past history of three laparotomies, giving a total of 36 previous operations by laparotomy (Pfannenstiel, 30 cases; midline laparotomy, 6 cases; Table III). Of the 53 patients who underwent laparoscopic hysterectomy, 10 (18.9%) had previously received Caesarean section (n = 1–3). All the 13 patients who underwent hysterectomy via laparotomy had already had surgery (100%). One of these patients suffered bowel endometriosis and had received laparoscopic surgery twice previously. The 12 other patients (92.3%) had undergone at least one previous laparotomy. Six of them had been operated once only, four had been operated twice and two patients had a history of three laparotomies, giving a total of 20 previous operations via laparotomy (Pfannenstiel, 17 cases; midline laparotomy, 3 cases; Table III). Of the 13 patients who underwent hysterectomy via laparotomy, five (38.5%) had previously received 1–3 Caesarean sections.

The surgical procedures associated with the hysterectomy are reported in Table IV. In the 53 patients who had laparoscopic hysterectomy, lysis was required in 26.4% of cases (14 patients). Adnexectomy was associated with laparoscopic hysterectomy in 28 3% of cases (15 patients). This was indicated because of the patient's age (>50 years) in six cases, and in nine cases it was performed for a non-suspicious ovarian cyst according to a previously described management (Chapron *et al.*, 1996). When extraction of the uterus was via the vaginal route, it was necessary to reduce its size in over half the cases (54.7%, 29 patients) because of disproportion between this size and the narrowness of the vagina. When this procedure was required, several uterine volume reduction techniques had to be employed in order to extract the uterus in 74.2% (21/29) of cases.

For the 13 patients who had hysterectomy by laparotomy, lysis was necessary in 76.9% of cases (10 patients). Adnexectomy was associated with the hysterectomy via laparotomy in five cases (38.4%): in two cases adnexectomy was indicated due to the patient's age (>50 years) and in three cases for non-suspicious ovarian cysts.

For the patients who had laparoscopic hysterectomy, the mean operative time was 152.24 ± 45.72 min (range 60–290). The length of time was closely correlated to uterine weight, the surgeon's experience and whether other laparoscopic procedures were associated with the hysterectomy or not. In the study by Kovac (1995), the mean weight of the uterus for patients who had vaginal hysterectomy was 144 g. Therefore, we chose this limit for our study in order to analyse the operative time relative to uterine weight. The operative time significantly increased as uterine weight increased, being 105 0 ± 20.1 min in patients whose uterus weighed <144 g and 161.6 ± 44.4 min in patients whose uterus weighed >144 g (P = 0.0005). When it was necessary to carry out associated laparoscopic surgery procedures during the laparoscopic hysterectomy (lysis etc.), the increase in operative time was statistically significant (P = 0.01), being 128.8 ± 36.1 min when no associated procedure was necessary and 162.6 ± 46.7 min when associated procedures had to be carried out. The operative time decreased significantly (P = 0.01) as the surgeon's experience increased. During the first year (1993), the mean operative time was 172.2 ± 48 3 min but it dropped to 141.7 ± 14.3 min during the last 18 months of the study.

For patients who had laparoscopic hysterectomy the estimated blood loss was an average of 1.37 + 0.8 g Hg/100 ml (range 0.1–3.6) and the mean length of hospital stay was 3.5 ± 1.7 days (range 2–13). When there were no complications, this mean hospital stay dropped to 3.1 ± 0.5 days (range 2–4). No patient had to be operated again or re-hospitalized. No patient required transfusion. No haemorrhage complications were observed at the time of the surgery or later. Although there were no complications involving the ureters, unfortunately there was one bladder injury (Chapron *et al.*, 1995). The per-operative diagnosis of this bladder injury enabled it to be repaired during the same operation by the laparoscopic route. The urinary catheter was left in place for 7 days and the postoperative course was uncomplicated. Finally, there were three minor complications involving hyperthermia at 38°C for over 24 h. One of the cases was of pyelonephritis, which was treated without difficulty. For the two other cases, the symptoms regressed under antibiotic treatment, with no cause being found. One of these patients remained in hospital for 13 days.

Discussion

These results confirm that it is perfectly possible to carry out a total hysterectomy entirely via laparoscopy (Summitt *et al.*, 1992; Daniell *et al.*, 1993; Reich *et al.*, 1993; Chapron *et al.*,

1994). Only one major complication, a bladder injury, was observed in this series. There were no serious complications requiring re-operation and no transfusion was necessary. These encouraging results should not mask the fact, however, that this is a difficult operation requiring considerable skill in laparoscopic surgery. It is a recently introduced technique and even though the complications associated with this operation have already been addressed (Liu and Reich, 1994; Jones, 1995; Nezhat *et al.*, 1995), larger studies, both with respect to the number of patients and the length of follow-up, are necessary so that the real risk of complications can be properly assessed.

Despite all the advantages of vaginal surgery over laparotomy (Dicker *et al.*, 1982b), the majority of hysterectomies indicated for benign pathologies are carried out by laparotomy. Multicentre studies, which provide a good representation of the means by which hysterectomies are carried out, show that only 30% of the operations use the vaginal route (Dicker *et al.*, 1982b; Wilcox *et al.*, 1994). For hysterectomies carried out on non-prolapsed uteri, the results reported demonstrate that on average only 27% are carried out by the vaginal route (Chapron and Dubuisson, 1996a). These results alone justify the statement that there is a place for laparoscopic surgery for hysterectomy in order to reduce the number of laparotomies. Nulliparous patients are very representative of the population of patients for whom vaginal surgery rarely presents under the best conditions for surgeons with average training in vaginal surgery. It may indeed be possible for highly experienced surgeons to carry out a vaginal hysterectomy in a nulliparous patient (Campbell, 1946; Heaney, 1934), but the numbers of nulliparous patients reported to have had vaginal hysterectomy are very low (Chapron and Dubuisson, 1996a). A more significant point than retrospective analysis of rates of nulliparity in the vaginal hysterectomy series concerns the study of methods by which hysterectomies are carried out in nulliparous patients. Although few studies can be analysed for this, the results presented in Table V show that before 1989, when the first laparoscopic hysterectomy was reported (Reich *et al*, 1989), on average <10% of hysterectomies in nulliparous patients were carried out via the vaginal route (Leventhal and Lazarus, 1951; Dicker *et al.*, 1982a; Kovac, 1986). The possibility of carrying out the operation via laparoscopy has enabled the rate of laparotomy in this context to be reduced by nearly 50% (50 versus 91.3%) (Boike *et al.*, 1993; Bronitsky *et al.*, 1993) (Table V). In these series (Leventhal and Lazarus, 1951; Dicker *et al.*, 1982a; Kovac, 1986; Boike *et al.*, 1993; Bronitsky *et al.*, 1993), the rate of vaginal surgery has remained stable at ~10%, but the significant drop in the rate of hysterectomies via laparotomy is due to the fact that, in the studies reported since 1989 (Boike *et al*, 1993; Bronitsky *et al.*, 1993), almost 40% of hysterectomies in nulliparous patients used laparoscopic surgery. Our results are in line with this evolution because we now perform <20% of hysterectomies via laparotomy. One reason for this is the laparoscopic surgery technique we use for hysterectomy Whereas certain authors (Boike *et al.*, 1993) perform simple LAVH, we used total laparoscopic hysterectomy (Chapron and Dubuisson, 1996b) for all the patients in the series reported here. For certain patients, simple LAVH may be enough to avoid laparotomy, but in others with very poor vaginal accessibility the only alternative to laparotomy is to carry out total hysterectomy exclusively via the laparoscopic route (Chapron and Dubuisson, 1995). The important role played by vaginal accessibility when establishing the indication for total laparoscopic hysterectomy has already been underlined in certain series in which nearly half the patients (48.4%) who underwent laparoscopic hysterectomy were nulliparous (Chapron *et al.*, 1994). Poor vaginal accessibility in nulliparous patients is also the reason why, despite the use of laparoscopy, we had to use uterine volume reduction procedures in this series for over half the cases (54.7%, 29 patients). When the use of reduction techniques was essential, several procedures (morcellation, bivalving, coring, etc.) were combined in 72.4% of the cases (21 patients). For these patients, laparoscopic surgery should not be considered 'a waste of time' (Richardson *et al.*, 1995), but rather as the only solution to enable them to avoid laparotomy (Chapron and Dubuisson, 1995).

In conclusion, the feasibility of laparoscopic hysterectomy is now definitely accepted. It is perfectly possible to carry out this operation using very simple, re-usable equipment. Laparoscopic surgery is not an alternative to vaginal surgery when the latter can be carried out under good conditions. Nulliparous patients, who are the women who most often present with poor vaginal accessibility, constitute a group of patients for whom laparoscopic surgery is particularly advantageous when hysterectomy is indicated. In certain situations, when the conditions are very much against the vaginal approach, total laparoscopic hysterectomy is the only way to avoid laparotomy.

References

Boike, G M, Elfstrand, E P, DelPriore, G *et al* (1993) Laparoscopically assisted vaginal hysterectomy in a university hospital: report of 82 cases and comparison with the abdominal and vaginal hysterectomy *Am. J Obstet Gynecol*, **168,** 1690–1701

Bronitsky, C, Payne, R J, Stuckey, S and Wilkins, D (1993) A comparison of laparoscopically assisted vaginal hysterectomy vs traditional total abdominal and vaginal hysterectomies. *J Gynecol. Surg*, **9,** 219–225

Campbell, Z.B (1946) A report on 2798 vaginal hysterectomies *Am. J Obstet Gynecol*, **52,** 598–609

Chapron, C and Dubuisson, J B (1995) Laparoscopic hysterectomy [Letter] *Lancet*, **345,** 592

Chapron, C and Dubuisson, J B (1996a) Total hysterectomy by laparoscopy advantage for the patient or only surgical gimmick? *J Gynecol. Surg*, **12,** 75–78

Chapron, C and Dubuisson, J B (1996b) Total hysterectomy for benign uterine pathologies with reusable instruments a safe, reproducible and cost-effective procedure *Gynaecol Endosc.*, **5,** 9–14

Chapron, C, Dubuisson, J B, Aubert, V *et al.* (1994) Total laparoscopic hysterectomy preliminary results *Hum. Reprod.*, **9,** 2084–2089

Chapron, C, Dubuisson, J.B, Ansquer, Y *et al.* (1995) Bladder injuries during total laparoscopic hysterectomy diagnosis, management and prevention *J Gynecol Surg*, **11,** 95–98

Chapron, C, Dubuisson, J B, Fritel, X and Rambaud, D (1996) Management of organic ovarian cysts Place and modalities for laparoscopy *Hum. Reprod. Update*, in press

Daniell, J F, Kurtz, B.R, McTavish, G *et al.* (1993) Laparoscopically assisted vaginal hysterectomy. The initial Nashville, Tennessee, experience *J. Reprod. Med*, **38,** 537–542

Dicker, R C, Greenspan, J R, Strauss, L T. *et al.* (1982a) Complications of abdominal and vaginal hysterectomy among women of reproductive age in the United States *Am J Obstet Gynecol.*, **144,** 841–848

Dicker, R.C , Scally, M.J , Greenspan, J.R *et al* (1982b) Hysterectomy among women of reproductive age. Trends in the United States, 1970–1978. *J Am. Med Assoc.*, **248,** 323–327.

Heaney, N S (1934) A report of 565 vaginal hysterectomies performed for benign diseases *Am. J. Obstet Gynecol.*, **28,** 751–755

Howard, F M. and Sanchez, R (1993) A comparison of laparoscopically assisted vaginal hysterectomy and abdominal hysterectomy *J Gynecol. Surg* , **9,** 83–90.

Jones, R.A (1995) Complications of laparoscopic hysterectomy 250 cases *Gynaecol Endosc* , **4,** 95–99.

Kovac, S.R (1986) Intramyometrial coring as an adjunct to vaginal hysterectomy. *Obstet Gynecol.*, **67,** 131–135.

Kovac, S R (1995) Guidelines to determine the route of hysterectomy *Obstet Gynecol* , **85,** 18–23

Leventhal, M.L and Lazarus, M.L (1951) Total abdominal and vaginal hysterectomy. A comparison *Am J. Obstet Gynecol.*, **61,** 289–299

Liu, C Y and Reich, H (1994) Complications of total laparoscopic hysterectomy in 518 cases *Gynaecol. Endosc.*, **3,** 203–208.

Nezhat, C., Bess, O , Admon, D *et al* (1994) Hospital cost comparison between abdominal, vaginal, and laparoscopy-assisted vaginal hysterectomies *Obstet Gynecol* , **83,** 713–716

Nezhat, F , Nezhat, C.H., Admon, D *et al.* (1995) Complications and results of 361 hysterectomies performed at laparoscopy *J Am. Coll. Surg* , **180,** 307–316

Reich, H., DeCaprio, J and McGlynn, F (1989) Laparoscopic hysterectomy *J Gynecol Surg* , **5,** 213–216

Reich, H., McGlynn, F and Sekel, L (1993) Total laparoscopic hysterectomy *Gynaecol Endosc* , **2,** 59–63.

Richardson, R.E., Bournas, N and Magos, A.L. (1995) Is laparoscopic hysterectomy a waste of time? *Lancet*, **345,** 36–41

Summitt, R L , Stovall, T G., Lipscomb, G H and Ling, F.W (1992) Randomized comparison of laparoscopy-assisted vaginal hysterectomy with standard vaginal hysterectomy in an outpatient setting *Obstet Gynecol* , **80,** 895–901

Wilcox, L.S , Koonin, L M , Porkas, R *et al.* (1994) Hysterectomy in the United States, 1988–1990 *Obstet Gynecol* , **83,** 549–555

Received on November 13, 1995, accepted on July 12, 1996