

FINHYST 2006—national prospective 1-year survey of 5 279 hysterectomies

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BACKGROUND: In Finland, the number of hysterectomies during one decade has decreased by 34%. The national prospective FINHYST study in 1996 showed abdominal hysterectomy (AH) as being most common: 58%. In Finland since 2002, vaginal hysterectomy (VH) has been most preferred, with laparoscopic hysterectomy (LH) surpassing AH in 2005.

METHODS: FINHYST 2006 is a national prospective hysterectomy study in which all hospitals collaborated from 1 January to 31 December 2006. Questionnaires, completed by gynaecologists, covered their experience, patient characteristics and surgical data.

RESULTS: The 5279 hysterectomies distributed by approaches were 44% VHs, 32% LHs and 24% AHs. Less than 2% were subtotal. The main indications for hysterectomy were myomas (33%), uterine prolapse (28%) and menorrhagia (21%). The main indication for VH was not related to uterine prolapse in 39%. Bilateral salpingo-oophorectomy was performed in 36% of AHs, 32% of LHs and 2% of VHs. Antibiotic prophylaxis was used in 97%, and thrombosis prophylaxis in 65%. Haemorrhage was least and operation time shortest with VH, and hospital stay and sick leave were shortest after LH.

CONCLUSIONS: In Finland, less invasive approaches comprise 76% of hysterectomies. This trend has resulted nationally in shortening of hospital stay and of convalescence time.

Key words: hysterectomy / salpingo-oophorectomy / epidemiology / experience / laparoscopy

Introduction

Hysterectomy remains the third most common operation for women in Finland after cataract surgery and Caesarean section (National Institute for Health and Welfare, 2009). In the USA, 610 000 hysterectomies were performed in 2004, the overall rate had decreased slightly during 2000–2004 from 540 to 510 per 100 000 women (Whiteman *et al.*, 2008). In France around 72 000, and in the UK up to 100 000 hysterectomies are performed annually (Vessey *et al.* 1992; Cosson *et al.* 1997). In the Nordic countries, age-standardized rates from 2006 reveal hysterectomy to be most commonly performed in Iceland: 315 per 100 000 women; corresponding figures in Finland were 266, in Denmark 218, in Norway 212 and in Sweden 190 (Nordic Medico Statistical Committee, 2008).

In Finland, hysterectomies for benign disease declined from 10 110 in 1996 to 6669 in 2006, by 34% (National Institute for Health and

Welfare). The national prospective FINHYST study in 1996 showed abdominal hysterectomy (AH) as being the most common procedure at 58% of all hysterectomies (Mäkinen *et al.*, 2001). Since 2002, vaginal hysterectomy (VH) has been the preferred hysterectomy type, and laparoscopic hysterectomy (LH) exceeded AH in 2005 (Brummer *et al.*, 2008).

The aim of this FINHYST 2006 study was to observe trends for hysterectomy performed for benign causes in a prospective national setting and to analyse indications for hysterectomy, antibiotic and thrombosis prophylaxis, conversions, concomitant procedures, operation time, hospital stay and sick leave as well as the experience of the gynaecological surgeons.

Materials and Methods

The study period was limited from 1 January to 31 December 2006, and 53 Finnish hospitals participated. Collaboration by the municipal (public)

hospitals where hysterectomies are performed was complete; 46 hospitals collaborated: 5 university hospitals, 1 of them containing 3 different units (tertiary hospitals), 16 central (secondary hospitals) and 23 local hospitals (primary hospitals). Municipal hospitals refer to hospitals financed by the state but organized by local municipal authorities. Finland is divided in hospital districts, each comprising local (primary) hospitals usually situated in smaller towns and central (secondary) hospitals in larger towns. Difficult cases can be centralized to university (tertiary) hospitals situated in the five largest cities (Helsinki, Turku, Tampere, Kuopio and Oulu). Medical care included in the Finnish social security system is a universal entitlement, meaning that people are entitled to services without any special insurance coverage; only minor affordable fees are charged. In addition to public hospitals, 9 out of the 10 private clinics where hysterectomies are performed in Finland expressed willingness to collaborate, and 7 reported on surgeries. Hysterectomies undertaken post-partum or due to any cancer were excluded. The study protocol was approved by the Finnish Ministry of Social Affairs and Health and by the hospital ethics committees and was included in the ClinicalTrials.gov protocol registration system supported by the Food and Drug Administration and the National Institutes of Health. Written consent was obtained from each patient. A pilot study early in 2005 was performed in Helsinki University Central Hospital to test the feasibility of the questionnaires.

The three main approaches to hysterectomy are abdominal (AH), laparoscopic (LH) and vaginal (VH). AH can be total (TAH) or subtotal (SAH), depending upon whether the cervix is being removed, and LH can also be subtotal (LSH). LH is determined by which point the operation is continued vaginally: before the division of the uterine arteries as in laparoscopically assisted vaginal hysterectomy (LAVH), or after it, abbreviated as LH(a) (Clayton, 2006; Johnson et al., 2006). Total laparoscopic hysterectomy (TLH) refers to a procedure in which suturing of the vaginal vault is done laparoscopically (Reich, 2007). VH includes operations with or without concomitant colpoperineoplasty.

The data were collected by the performing gynaecological surgeons, either residents or specialists. Their prior experience in the particular approach for hysterectomy was indicated as below 10, 10 to 30 or over 30 operations ever performed. Surgery-related variables included the main approaches as abdominal (TAH or SAH), laparoscopic (LH(a), LAVH or LSH) or vaginal, and any conversions. The surgeons were requested to report a single main preoperative indication for hysterectomy defined as myoma, menorrhagia, dysmenorrhoea, endometriosis, uterine prolapse, adnexal mass or other, with a description and a code from the international classification of diseases (ICD-10). Operation time (min) was

defined from the first incision to the final suture. The uterus was weighed post-operatively without any adnexa. Haemorrhage (ml) was estimated by standard operating room routines: usage of suction and surgical sponges. Usage of antibiotics was defined as no prophylaxis, cefuroxime or metronidazole or both, or other with description. Thrombosis prophylaxis was defined as no prophylaxis, low-molecular-weight heparin (LMWH) or other with description. Concomitant procedures were defined as unilateral salpingo-oophorectomy (USO) or bilateral salpingo-oophorectomy (BSO), vaginal procedures anterior or posterior colporrhaphy or both, repair of enterocele and urinary incontinence operations. BSO was further analysed by age. In addition, adhesiolysis and other concomitant procedures with description were noted. The difficulty of the operation was rated by the surgeons on a verbal five-point scale: very easy, easy, ordinary, difficult or very difficult. Post-operative hospital stay was ascertained in fractions of days, based on the date of surgery and the date of discharge.

Statistical significance was set at $P < 0.05$. Categorical data were analysed by χ^2 test or Fisher's exact probability test, continuous variables by univariate analysis of variance ANOVA, with *post hoc* testing by Tukey. In pair testing, the *t*-test for normally distributed variables was used. All statistical calculations were performed with SPSS 15.0.

Results

The number of patients recruited to FINHYST 2006 was 5279, accounting for 79.4% of all hysterectomies performed nationally for benign indications ($n = 6669$) in 2006. The total number of hysterectomies including malignancies was 7534 for that year (National Institute for Health and Welfare, 2009).

The main indications for hysterectomy are presented in Table I. Other indications included endometrial hyperplasia (3.1%), cervical premalignancy (1.8%), abdominal pain, familial history of cancer, adenomyosis, benign pelvic tumour, endometrial polyposis, pelvic inflammatory disease, transsexualism, prior breast cancer, haematometra, urinary symptoms, dyspareunia and migraine (each $< 0.5\%$). Additionally, single cases were of adhesions, perforation in hysteroscopy, premenstrual syndrome, bilateral sactosalpinx and varicose veins of the uterus.

Characteristics of the patients are presented in Table II. Patients' mean age was 52.1 years (range 21–94, $SD \pm 10.5$). Indication influenced age at undergoing hysterectomy: endometriosis at a mean of

Table I Main indications for hysterectomy by approach

	All		AH		LH		VH	
	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Myomas	33	1751	58	743	39	646	15	362
Menorrhagia	21	1113	15	185	30	504	18	424
Dysmenorrhoea	3	145	2	26	4	73	2	46
Endometriosis	2	130	6	78	3	49	0	3
Uterine prolapse	28	1486	0	1	3	52	61	1433
Adnexal mass	6	294	12	153	8	141	0	0
Other	7	396	7	87	13	221	4	88
Total		5315		1273		1686		2356

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy. Some patients may have had more than one indication reported.

Table II Characteristics of hysterectomy patients by approach to hysterectomy

	AH (n = 1255)		LH (n = 1679)		VH all (n = 2345)		Vaginal main indication, prolapse (61%)		Vaginal main indication, other (39%)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	50.1	(8.8)	49.2	(8.6)	55	(11.8)	60.2	(11.4)	46.9	(6.8)
BMI	27.2	(5.4)	26.1	(4.6)	26.5	(4.4)	26.5	(4.0)	26.4	(5.0)
%BMI ≥30	24.8		18.8		18.3		18.1		18.8	
%BMI ≥40	2.7		0.8		1.2		0.6		2.3	
Parity	1.6	(1.3)	1.8	(1.4)	2.4	(1.5)	2.6	(1.6)	2.3	(1.2)
Vaginal deliveries	1.3	(1.3)	1.6	(1.4)	2.3	(1.5)	2.5	(1.6)	2.1	(1.3)
Percentage of having at least one vaginal delivery	59.8		70.5		91.1		93.4		87.5	
Prior abdominal operations*	0.87	(1.2)	0.94	(1.2)	0.60	(0.9)	0.51	(0.8)	0.74	(1.0)
Percentage of having at least one caesarean section	17.1		16.2		8.8		6.1		13.0	
Percentage of having at least one prior laparotomy	28.5		25.4		21.0		23.0		18.0	
Percentage of having at least one prior laparoscopy	17.9		30.2		19.7		13.0		30.4	

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

Characteristics of patients in age, BMI, parity, vaginal births or prior abdominal operations in between the three different hysterectomy groups (AH, LH and VH all) resulted in significant differences in ANOVA (*post hoc* testing: age tested in LH versus AH $P = 0.046$; other pairs, $P < 0.001$), with two exceptions: BMI tested in LH versus VH ($P = 0.057$) and prior abdominal operations tested in AH versus LH ($P = 0.250$).

*Including Caesarean sections, prior laparotomies (other than Caesarean section) or laparoscopies.

Table III Distribution of hysterectomies by type of hospital.

Hospital type	University (tertiary) (N = 7)	Central (secondary) (N = 16)	Local (primary) (N = 23)	Private (N = 7)
Number of patients (%)	1930 (36.6)	2057 (39.0)	1243 (23.5)	49 (0.9)
Mean number of hysterectomies per hospital type (SD)	276 (112)	129 (62)	54 (38)	7 (7)
Range of hysterectomies per hospital type	156–442	34–235	4–158	2–22
AH performed (n/N)	7/7	16/16	22/23	
VH performed (n/N)	7/7	16/16	23/23	
LH performed (n/N)	7/7	15/16	17/23	

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

Collaboration by the public hospitals where hysterectomies are performed in Finland was complete. University (tertiary), central (secondary) and local (primary) hospitals refer to different types of public hospitals.

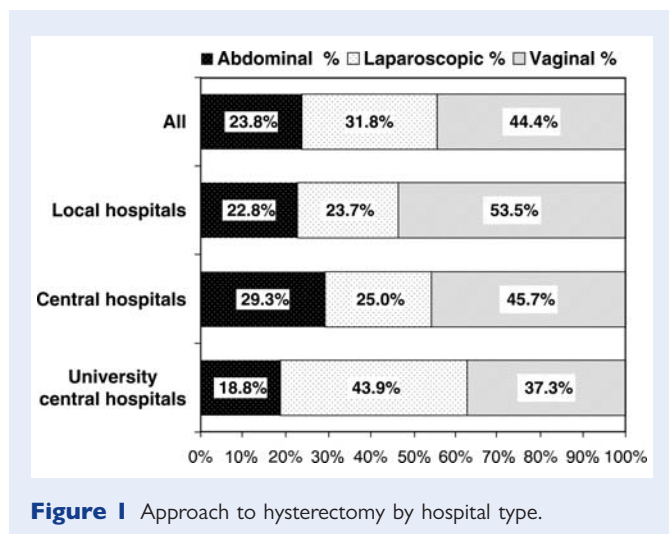
41.9 (± 6.7), dysmenorrhoea 43.1 (± 5.2), menorrhagia 46.0 (± 5.9), myomas 49.2 (± 6.2), adnexal mass 57.8 (± 10.2) and uterine prolapse 60.2 (± 11.4) years. The majority of the patients were overweight [55.3%, body mass index (BMI) ≥ 25]. Obesity was more common among those having endometrial hyperplasia as the main indication for hysterectomy (32.7% versus other indications 17.7–20.3%).

The national distribution of hysterectomies by approach was AH for 24% ($n = 1255$), LH for 32% ($n = 1679$) and VH for 44% ($n = 2345$), by hospital type presented in Table III. LH was most common in university hospitals and VH in local and central hospitals (Fig. 1). AH was never the most commonly performed. LH(a) was the most common laparoscopic approach with 77%. The rates for subtotal procedures

were 6.8% for the abdominal and 0.2% for the laparoscopic approach (Table IV).

Of all hysterectomies, 3832 (72%) were performed by specialists and 1145 (22%) by residents; whether the surgeon was a resident or a specialist was left unidentified in 302 (6%) operations. Surgeons' experience and verbal responses concerning the difficulty of the operation are presented in Table V. Surgeons' experience in 195 operations (3.7%) and the difficulty in 200 (3.8%) remained unknown.

Antibiotic prophylaxis was used in 97% of the operations. Cefuroxime in combination or alone was given in 75% of AHs, 87% of LHs and 81% of VHs, and metronidazole in 57, 53 and 50%, respectively. Antibiotic prophylaxis was given to 93% of subtotal hysterectomies (SAH and LSH). Thrombosis prophylaxis was used in 65% of operations and



defined as LMWH in 97%, as other in 1%, and left undefined in 2%; LMWH was further defined as enoxaparine in 32% and dalteparine in 20%, but was left undefined in 48%. The use of thrombosis prophylaxis became more prevalent by increase in BMI, length of the operation and age. The length was a mean of 3.4 days (SD 2.9), but in 58% of cases it remained unreported.

Among the three main approaches, the mean operation time was shortest for VH, 30 min less than that for LH and 15 min less than that for AH (Table IV). Similarly, the mean haemorrhage rate was lowest in VH, 67 ml less than that in LH and 152 ml less than that in AH. Furthermore, in VH, the mean weight of the uterus was lowest, 79 g lower than that in LH and 302 g lower than that in AH. In AH, cervical conservation did not lead to significantly increased mean operation time or haemorrhage, but the extracted uteruses were significantly heavier in TAH. LH(a) compared with LAVH was significantly faster to perform and resulted in less haemorrhaging, yet a non-significant difference emerged between uterine weights. In comparison of LH(a) versus VH not related to prolapse as an indication, non-significant differences appeared in the mean haemorrhage and uterine weight, but VH was significantly faster to perform. Among the uteruses successfully removed by LH, 67 (4.2%) weighed 500 g or more, but in VH 38 (1.6%). The largest uterus successfully removed by LH weighed 1100 g and by VH 1070 g, with severe haemorrhage of 2700 ml related to the latter. Blood transfusions were given, overall, to 248 patients (4.7%), in AH to 94 (7.5%), in LH to 73 (4.2%) and in VH to 81 (3.5%). The patients received a mean of 3.2 red blood cell units, with a non-significant difference between the groups. Morcellation of the uterus was performed in 115 (6.9%) of the LHs and 109 (4.7%) of the VHs. In LH the mean weight of the vaginally removed morcellated uterus was 391 g compared with 193 g if not morcellated, in VH, 292 and 120 g, respectively. The post-operative hospital stay and sick leave were significantly shorter, favouring LH versus AH, and likewise LH versus VH (both $P < 0.001$). Similarly, a comparison of LH(a) versus VH not related to prolapse resulted in a shorter sick leave after LH(a), although the mean hospital stay was equal (Table IV).

Problems with instrumentation were reported in 25 (1.5%) of LH, and 5 (0.2%) of VH, whereas in AH they were absent. The most

recently introduced haemostatic methods such as the ultrasound scalpel (ULS) was used in LH for 35% ($n = 584$), and as a single haemostatic method alone for 20% ($n = 335$). Ligasure[®] was used in AH for 5.4% ($n = 68$), in LH for 3.6% ($n = 61$) and in VH for 7.4% ($n = 174$), and alone in VH for 3.3% ($n = 77$). The surgery-related data in LH were analysed in comparison with the usage of bipolar alone versus ULS alone: no difference emerged in operation time or uterine weight, but lower blood loss did favour bipolar (226 versus 270 ml with ULS, $P = 0.012$).

Conversions to laparotomy were performed in 87 LHs (5.2%) and 14 VHs (0.6%). LH conversions were most commonly performed due to adhesions (Table VI). In VH, in addition to the 14 laparotomies, 3 laparoscopies were performed to secure haemostasis and 1 due to a bladder perforation. If the conversion to laparotomy was performed to secure haemostasis, the mean total haemorrhage in LH was 3657 ml (SD 7538 ml) and in VH 2950 ml (SD 2101 ml). If the conversion was reported due to uterus volume, the mean weight of the uterus in LH was 522 g (SD 179 g) and in VH 532 g (SD 313 g). In LH, problems with instrumentation were somewhat more common in operations resulting in conversion but non-significantly (3.4 versus 1.4%, $P = 0.136$). Surgical release of adhesions was reported in 99 (5.9%) of all LH operations. When adhesiolysis occurred, a significant 13.1% resulted in conversion, but if adhesions were absent the figure was 4.7% ($P = 0.002$).

Concomitant procedures were performed in 60.2% of AH, 51.3% of LH and 63.7% of VH. Adnexal surgery was most common and performed in 51.5% of AHs, 43.4% of LHs and 4.9% of VHs. It comprised uni- and bilateral ovarian resection, parovarial cyst resection, broad ligament fibroid excision, ovarian cyst aspiration, salpingectomy and salpingo-ooforectomy. USO was performed on 5.9% and bilateral (BSO) on 19.8% of the patients, most commonly in AH (36.2%) and in LH (32.3%). After obvious indications for ooforectomy such as adnexal mass, transsexualism, prior breast cancer and familial history of cancer were excluded as main indications for surgery, BSO was analysed by age and by approach. Consequently, it seemed the vaginal approach was the determinant not to perform BSO (Table VII).

Colpoperineoplasty was most often performed in VH (54.6%), including enterocele repairs and anterior or posterior colporrhaphies or both, with or without meshes. Sacrospinous fixation was performed on 1.5% in VH. Vaginal incontinence surgery was performed in 2.1% of VHs and 0.5% of LHs. Endometriosis-related bowel resections were performed in 0.6% in AHs and 0.2% in LHs. Appendectomies were performed in 3.7% of AHs and in 0.2% of LHs, and bowel resections unrelated to endometriosis in 0.2% of AHs. Also single cases of bladder and ureter resections due to endometriosis were reported. Finally, other sporadic concomitant procedures comprised cholecystectomies, umbilical and inguinal hernia repairs, vulvar procedures, breast operations and omentectomies. Additionally, single cases of an anal sphincter repair, plastic repair of a scar, closure of a sigmoidostomy, excision of a benign tumour of the pelvic wall and inguinal and para-aortal lymphadenectomy occurred.

Discussion

FINHYST 2006 is a powerful prospective nationwide study with a large cohort of unselected cases. In addition, a similar national

Table IV Surgery-related outcome, postoperative hospital stay and sick leave (days) by approach, mean values (\pm SD)

	n	Operation time		Haemorrhage		Uterine weight		Postoperative hospital stay		Sick leave	
		min	SD	ml	SD	g	SD	days	SD	days	SD
TAH	1170	93	(37)	353	(352)	439**	(431)	3.8	(1.9)	32.2	(4.7)
SAH	85	88	(38)	380	(457)	351**	(341)	3.9	(1.4)	32.5	(4.9)
AH all	1255	93*	(37)	355*	(360)	433*	(425)	3.8*	(1.8)	32.2*	(4.6)
LH(a)	1289	103***#	(41)	222***	(233)	207	(142)	1.8	(1.3)	20.9#	(5.8)
LAVH	300	122***	(40)	303***	(282)	203	(134)	2.2	(1.2)	24.7	(6.2)
LSH	3	85	(30)	68	(55)	242	(127)	1.0	(0.0)	14.0	(0.0)
LH conversion	87	143	(55)	859	(2679)	293	(205)	3.7	(2.0)	30.8	(4.4)
LH all	1679	108*	(43)	270*	(669)	210*	(146)	2.0*	(1.4)	22.0*	(6.2)
VH indication other than prolapse	900	69#	(31)	225	(253)	198	(130)	1.8	(1.1)	25.0#	(5.9)
VH indication prolapse	1431	83	(33)	178	(191)	86	(59)	2.7	(1.6)	34.2	(7.3)
VH conversion	14	145	(43)	1462	(1737)	313	(226)	3.6	(1.4)	32.0	(3.3)
VH all	2345	78*	(34)	203*	(269)	131*	(110)	2.3*	(1.5)	29.4*	(8.0)

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

TAH, total abdominal hysterectomy; SAH, subtotal abdominal hysterectomy; LH(a), laparoscopic hysterectomy with laparoscopic division of the uterine arteries; LAVH, laparoscopically.

*Surgery-related outcome in each category, in between the three different hysterectomy groups (AH, LH and VH), resulted in significant differences in ANOVA and in *post hoc* testing of all hysterectomy pairs ($P < 0.001$).

**TAH versus SAH $P = 0.034$.

***LH(a) versus LAVH $P < 0.001$.

#LH(a) versus VH not related to prolapse $P < 0.001$.

Table V Gynaecological surgeons, their experience and the difficulty of the operation

	AH	LH	VH
Hysterectomies performed by specialists, n (%)	912 (72.7)	1296 (77.2)	1624 (69.3)
Hysterectomies performed by residents, n (%)	275 (21.9)	285 (17.0)	585 (21.7)
Unidentified, n (%)	68 (5.4)	98 (5.8)	136 (5.8)
Experience more than 30 operations ever performed			
Percentage of hysterectomies performed by specialists*	94.6	88.3	95.1
Percentage of hysterectomies performed by residents*	12.0	10.2	28.2
Percentage of hysterectomies all gynaecological surgeons	75.0	73.3	76.2
The difficulty of the operation			
Percentage of hysterectomies considered easy or very easy	16.4	15.2	29.1
Percentage of hysterectomies considered difficult or very difficult	33.7	33.6	16.0

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

The difficulty of the operation is rated by the surgeon on a verbal five-point scale: very easy, easy, ordinary, difficult or very difficult, and presented by gynaecological surgeons as a whole.

*The experience of 2.4% specialists and 1.5% residents was unknown.

survey was performed 10 years earlier (Mäkinen *et al.*, 2001). Simultaneous with the number of hysterectomies diminishing by 34% over a decade, and the mean size of the removed uterus, by all approaches, has increased. The popularity of AH declined from 58% in 1996 to 24% in 2006, demonstrating a tendency towards less invasive surgery; nowadays AH is reserved for large uteruses. Although the size of the extracted uterus increased, the mean operation time nationally has fallen for both LH and VH, indicating a learning curve in minimally invasive surgery. The greater size of the extracted

uteruses also suggests that generally the indications are more carefully considered.

Myoma has been the most common indication for hysterectomy in Finland throughout the years: 47% in 1987, 45% in 1992 (Vuorma *et al.*, 1998), 54% in 1993–1994 (Härkki-Sirén *et al.*, 1997), and 52% or more in 1996 (Mäkinen *et al.*, 2001). One reason for the reduction in hysterectomies in Finland can be other forms of treatment of menorrhagia, the proportion of which as the main indication has diminished from 1996 to 2006 in AH from 30 to 15% and in LH

from 47 to 30%. One treatment option is the levonorgestrel-releasing intrauterine system (LNG-IUS), which has been proved a long-term satisfactory and effective treatment for menorrhagia (Hurskainen et al., 2004). LNG-IUS received marketing authorization as early as

in 1990 in Finland (National Agency for Medicines, 2009) and sales increased from 1996 to 2006 by 74% (Bayer Schering Pharma Finland). Similarly, in England in 2003, the number of hysterectomies for menorrhagia had fallen to 36% of the number a decade before (Reid and Mukri, 2005).

A Cochrane meta-analysis on hysterectomy suggests VH as being the first and LH the second choice in avoidance for AH (Johnson et al., 2006). This is the current practice in Finland, where VH represented 44%. Not only was VH most popular, but also considered the easiest to perform. In Finland, the status of LH has been solid for over a decade. In this development, the role of the teaching hospitals has been essential; by 1996, 33% of hysterectomies in university hospitals were laparoscopic (Mäkinen et al., 2001) and in 2006 as many as 44% (Fig. 1). Finnish surgeons' subjective view on the difficulty of the hysterectomy suggests also that LH, 14 years after its introduction in Finland (Mäkinen and Sjöberg, 1994) and 7 years after a national learning curve plateau (Brummer et al., 2008), is still considered more difficult than VH. Indeed, the difficulty scale for LH resembles the one for AH, reserved to larger uteruses and cases with adhesions. Surgeons' general subjective view on hysterectomy difficulty, to our knowledge, thus far received no attention. The experience level among our specialists is high; in AH and VH 95% and in LH 88% are being performed by surgeons with experience of more than 30 operations. Yet this does not mean that the Finnish residents were superseded in operating rooms, because nearly a quarter of these operations were performed by residents. This might be a Finnish phenomenon: learning gynaecological surgery is an active goal from the beginning. We need many competent surgeons, considering our geographical conditions. This sparsely inhabited country forces us to perform surgery all over Finland so that patients receive treatment within a reasonable distance from their homes. Residents are trained to manage all approaches to hysterectomy, but not all gynaecologists continue surgical work as specialists. Particularly in LH, training can be more challenging due to the learning curve of laparoscopy itself, hence the wide implementation of laparoscopy in other procedures has been an advantage.

FINHYST 2006 cohort consists of unselected—not randomized—cases, distributed into different approaches within indications and preferences defined by their gynaecologist surgeons. Therefore, differences on surgery-related data presented in Table IV may well

Table VI Conversions to laparotomy during hysterectomy: A, indications; B, by gynaecological surgeons' experience in LH

	LH		VH	
	n	%	n	%
A. Indications				
Adhesions	30	34.5	—	—
Myoma location or size	19	21.8	1	7.1
Haemorrhage	11	12.6	5	35.7
Uterus volume	10	11.5	4	28.6
Bladder perforation	6	6.9	1	7.1
Visualizing, non-specific	5	5.7	—	—
Obesity-related cause	3	3.4	—	—
Tumours	2	2.3	—	—
Bowel perforation	1	1.1	—	—
Retrocervical endometriosis	—	—	3	21.4
All (n)	87	—	14	—
	Conversion (%)	—	Mean weight of the uterus (g)	—
B. Conversions in LH by surgeons' experience				
Specialist surgeon	5.4	—	280	—
Resident surgeon	5.3	—	364	—
P-value*	0.925	—	0.213	—
Surgeon with more than 30 operations ever performed	5.0	—	268	—
Surgeon with less or equal to 30 operations ever performed	5.8	—	376	—
P-value*	0.581	—	0.054	—

AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

Data on VH was underpowered.

* χ^2 for categorical pairs, t-test for equality of means.

Table VII Adnexal removal by approach to hysterectomy and age (adnexal mass, prior breast cancer, familial history to cancer and transsexualism as indication for hysterectomy excluded)

Age	AH			LH			VH		
	n	BSO (n)	BSO (%)	n	BSO (n)	BSO (%)	n	BSO (n)	BSO (%)
<40	82	8	9.8	135	6	4.4	129	0	0.0
40–44	194	13	6.7	308	8	2.6	342	2	0.6
45–49	353	50	14.2	492	50	10.2	454	13	2.9
50–54	275	117	42.5	297	122	41.1	355	10	2.8
55–59	98	64	65.3	138	102	73.9	310	10	3.2
≥60	95	80	84.2	133	111	83.5	754	16	2.1
Total	1097	332	30.3	1503	399	26.5	2344	51	2.2

BSO, bilateral salpingo-ooforectomy; AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy.

lie open to confounders and be affected by co-morbidities, differences in population and other factors remaining unclear. Comparisons of these unlike groups on the postoperative hospital stay and sick leave can similarly be affected by co-morbidities; nevertheless, these results represent real-life practice. Data in the approach to hysterectomy in LH were somewhat incomplete, because the number of cases where the vaginal vault is being sutured laparoscopically remains unknown; TLH was not a questionnaire option. The main teaching in Finland has been a technique in which the vagina is sutured vaginally, and may be one of the reasons why LH has become popular and accessible to many surgeons: suturing laparoscopically is still considered to require higher surgical expertise. LAVH, representing only 18% of LHs, may be the choice of surgeons with more vaginal and less laparoscopic expertise, probably explaining the smaller blood loss and shorter operation time observed in LH(a) versus LAVH. In many hospitals nowadays, admission in the morning of the operation instead of the day before is routine, but the frequency of this practice remains unknown with no data collected; the postoperative hospital stay was ascertained on the basis of the date of discharge. Nevertheless, comparing the total hospital stay in 1996 to the post-operative hospital stay in 2006, particularly in VH, the period more than halved (5.9 versus 2.3 days), and at the same time the number of hysterectomies declined 34%, and the popularity of VH rose from 18 to 44%, resulting in a notably shorter hospitalization for Finnish gynaecological patients.

Finnish gynaecological surgeons do not prefer cervical conservation: in comparison to 10% in Denmark on the same year (Hansen *et al.*, 2008), of 5279, only 88 (1.7%) chose a subtotal procedure. Earlier studies comparing TAH and SAH suggest that operating time and blood loss are significantly reduced in favour of SAH (Lethaby *et al.*, 2006); however, in FINHYST 2006, this went unconfirmed. Similar to FINHYST 2006, the eVALuate study, comprising 1346 hysterectomies from 30 centres, revealed LH more time consuming than AH or VH (Garry *et al.*, 2004). Different from FINHYST 2006, in the eVALuate study, the operation time in all approaches was shorter, and conversion rate in LH lower; these differences could result from the exclusion criteria of large myomas and major prolapses, due to randomization. Comparing LH and VH in the Cochrane meta-analysis showed no difference in hospital stay and return to normal activities (Johnson *et al.*, 2006), but FINHYST 2006 suggests that after LH both are shorter. In FINHYST 2006, the most common approach to LH was LH(a) by 77%, and unlike in the meta-analysis (Johnson *et al.*, 2006) operating time was not higher for LH(a) than for LAVH.

Current recommendations for prophylaxis suggest antibiotics prior to every hysterectomy and antithrombotic therapy to everyone, other than low-risk patients (ACOG, 2006, 2007). Antibiotics were widely used in FINHYST 2006; 97% of patients received prophylaxis but only 93% of those undergoing a subtotal procedure, possibly due to the absence of colpotomy. Thrombosis prophylaxis was most frequent in AH, requiring a longer hospital stay; hence immobilization is one requirement for prophylaxis, yet the longest mean operating time—in LH—should also call for efficient prophylaxis. Education has made prophylaxis more common; a decade ago, antibiotics were used in 82% and anti-thrombotics in 35% (Mäkinen *et al.*, 2001). Similarly in Denmark, in 2004, antibiotics were used in 32 to 100% of departments, and in 2006, the proportion rose to 92 to 100% (Hansen *et al.*, 2008).

Hysterectomy in itself, without oophorectomy, affects ovarian function, hastening menopausal age (Siddle *et al.*, 1987; Farquhar *et al.*, 2005) and symptoms (Halmesmäki *et al.*, 2004), and the risk for ovarian cancer is reduced (Hankinson *et al.*, 1993). The elimination of future ovarian cancer risk is the main reason for concomitant prophylactic oophorectomy (ACOG, 2008). A common view in the literature has been that the prophylactic procedure in the low-risk patient should be avoided before the age of 40, considered between 40 and 55 and routinely performed over the age of 55 (Olive, 2005). Higher mortality is associated with prophylactic BSO before the age of 45 (Rocca *et al.*, 2006). This association may not be confined to premenopausal patients alone, as higher mortality mainly from cardiovascular disease (CVD) has resulted in suggested ovarian conservation up to the age of 65 (Parker *et al.*, 2005). A need to remove the ovaries should not be considered a contraindication for VH (Davies *et al.*, 1996); nevertheless, the clinical practice observed in FINHYST 2006 shows that VH and concomitant BSO are rare (Table VII). Moreover, an age-related rise in BSO in AH and LH was clearly absent from VH. In LH and AH, a close examination showed, however, BSO as less common in the age group 40 to 44 than below 40, the latter most often operated on for endometriosis. The practice of concomitant BSO varies from country to country: in 1994 to 1995 in the UK, the rate was 43% (Maresh *et al.*, 2002), in 2001 in the USA, it was 57%, declining in 2004 to 50% (Whiteman *et al.*, 2008); in the same year in Norway, the rate was 31% (Oma, 2004), and in 2006 in Denmark, it was 16% (Hansen *et al.*, 2008). The 20% in FINHYST thus seems rather conservative. The fact that VH is the most common approach to hysterectomy in Finland since 2002 (Brummer *et al.*, 2008) may argue against concomitant BSO. Despite some negative outcomes that can be prevented by estrogen therapy, a recent review advises that in addition to reduced overall mortality and CVD, neurological, psychological and bone health benefits of ovarian conservation should also be carefully weighed against cancer-risk reduction (Shuster *et al.*, 2008).

This national survey, FINHYST 2006, is important, serving as a quality assessment of gynaecological surgery in Finland and also giving a better view of hysterectomy trends than do studies of single units or those comprising only university hospitals. It reveals development over time because a similar survey of hysterectomy in Finland took place a decade ago. Indications for hysterectomy for benign disease are more carefully considered nowadays, and menorrhagia as an indication has declined. Thrombosis and antibiotic prophylaxis have become more common. AH as the most common approach has been replaced by minimally invasive methods (VH and LH) comprising 76% of hysterectomies in Finland. These minimally invasive methods are more popular than AH in all hospital groups. This trend has resulted nationally in shortening of both hospitalization and convalescence. Further studies on complications from FINHYST 2006 will be presented in the future.

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