

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/20380> holds various files of this Leiden University dissertation.

Author: Twijnstra, Dries

Title: Laparoscopic hysterectomy : predictors of quality of surgery

Date: 2013-01-09

Chapter four

Laparoscopic hysterectomy: eliciting preference of performers and colleagues via conjoint analysis

Twijnstra ARH

Stiggelbout AM

de Kroon CD

Jansen FW



Abstract

Background

Aim of this study is to compare preferences for laparoscopic hysterectomy (LH) over abdominal hysterectomy (AH) by gynecologists who perform LH (group 1), their colleagues (group 2), and gynecologists employed by a hospital that does not provide LH (group 3), and to estimate boundary values of patient characteristics that influence preference for mode of hysterectomy. Differences in referral tendencies between groups 2 and 3 are compared.

Materials and Methods

Group comparison study (Canadian Task Force classification II-2). Nationwide conjoint preference study in groups 1, 2, and 3 by a web-based choice-based conjoint analysis questionnaire.

Results

In general, group 1 preferred LH significantly more often (86.3%; 95% confidence interval [CI], 81.6–91.0) than did group 2 (70.9%; 95% CI, 63.4–78.4). Group 3 preferred LH significantly less frequently (50.3%; 95% CI, 35.7–64.9). Increases in body mass index, estimated uterus size, and number of previous abdominal surgeries caused a significant drop in shares of preferences in all groups.

Discussion

The presence of a gynecologist who performs LH positively influences the referral behavior of colleagues. The effect of an increased body mass index seems to be a restrictive parameter for choosing LH according to both referring gynecologists and those who perform LH. Level of experience does not influence preference of laparoscopists. The observed discrepancy between reported and simulated referral behavior in group 3 demonstrates that practical impediments significantly decrease referral tendencies, consequently hampering implementation of this minimally invasive approach.

Introduction

Despite the introduction of alternative nonsurgical therapies, hysterectomy for benign indication remains the number one major surgery in gynecology, preferably, but not actually, via the vaginal approach.^{1,2} If vaginal hysterectomy (VH) is not achievable, laparoscopic hysterectomy (LH) has several advantages over conventional abdominal hysterectomy (AH).^{3,4} Potential disadvantages of LH such as higher rates of urinary tract lesions and a supposedly longer learning curve have been studied thoroughly.^{5,9} These studies have demonstrated that the aforementioned disadvantages of LH are absent in skilled hands. Other studies disprove possible limitations of LH with regard to body mass index (BMI) and uterine size.¹⁰⁻¹³ Notwithstanding this evidence, AH still prevails as the approach of choice, in some countries.¹⁴⁻¹⁶ These findings are in striking contrast with the distinct preference of optimally counseled patients, who strongly prefer LH over AH.¹⁷

Dutch gynecologists mention insufficient laparoscopic skills training during residency as a major obstacle to mastering advanced laparoscopic procedures such as LH.¹⁸ In the Netherlands, standardized teaching in LH during residency is not provided. Gynecologists willing to master LH must learn the techniques during a fellowship or a mentored traineeship.⁶ Candidate patients for LH must be referred by colleagues from the same hospital or by gynecologists employed in a hospital that does not provide the option of LH. It is conceivable that despite knowledge of the advantages of LH over AH, there exists a discrepancy between this knowledge and daily practice in preference for LH and referral of candidate patients.

Only a few studies have been performed that elicited clinician preference for mode of hysterectomy. A recent US survey revealed that most gynecologists would prefer VH or LH for themselves or their spouse.¹⁹ Yet US gynecologists, as well as Danish gynecologists, seem to opt for AH in most hysterectomy candidates, and Australian colleagues, willing to increase the percentage of LH procedures, report lack of hospital equipment and lack of support from colleagues as major limiting factors.^{15,20-22} Other studies have discussed teaching hospital status as affecting gynecologist preference.^{23,24} However, all of these studies failed to explore preference boundaries, and did not properly assess various patient factors. In addition, referral tendencies for LH have not been investigated. Exploration of preference boundaries and patient factors, combined with referral tendencies, will likely provide answers to the origin of the observed hampered implementation of LH.

With the introduction of choice-based conjoint analysis techniques, it is possible to obtain an accurate view of preference boundaries over multiple patient factors while applying a concise set of cases. The main characteristic differentiating choice-based conjoint analysis from other types of conjoint analysis is that the respondent expresses preferences by choosing concepts (ie, mode of hysterectomy) from sets of concepts rather than by rating or ranking them. Choice-based conjoint analysis is a well-established web-based analytic tool used for learning about respondent preferences for the combinations of features that compose products or therapies. Market simulators that result from choice-based conjoint analysis enable researchers to

test numerous product formulations and competitive scenarios. Use of this innovative and sophisticated technique enables assessment of the preference for LH by gynecologists who perform the procedure vs those who do not. A secondary objective of the present study was to estimate boundary values of patient characteristics that influence preference for mode of hysterectomy. Differences in referral tendencies are compared and discussed.

Materials and Methods

To define a realistic set of patient characteristics, a panel of 6 gynecologists consisting of 3 experienced laparoscopists and 3 gynecologists who do not perform advanced laparoscopy was provided with a list of the top 10 discriminating factors for choice of mode of hysterectomy, based on a search of the literature. This list included estimated uterus size, uterine prolapse, number of vaginal deliveries, number of previous laparoscopic abdominal surgeries, obesity, procedure cost, risk of urinary tract injury, duration of surgery, recovery time, and cosmetic aesthetics. Consensus was reached on 3 factors: estimated uterine size, previous abdominal surgery (either via laparotomy or laparoscopy), and BMI. These 3 characteristics were presumed to have a major effect on the choice of mode of hysterectomy. Each parameter, hereafter called “attribute,” was assigned a distinct set of levels (Table 1). With respect to risk of adhesion formation, laparotomy, and major laparoscopy were considered trigger events.²⁵

To provide a limited number of hypothetical cases while gaining sufficient information to precisely assess each respondent’s preference, choice-based conjoint analysis (Sawtooth Software, Sequim, WA) was used. In the present study, 18 hypothetical pair wise choices, each consisting of variants of all 3 attributes, were needed to assess preference. Each pair wise choice represented a hysterectomy candidate for AH on the left side of the screen and a different hysterectomy candidate for LH on the right side (Fig. 1). Because VH is the criterion standard, each respondent was told that in the hypothetical cases, VH was contraindicated because of insufficient descensus or accompanying adnexal disease, and consequently was excluded as a surgical treatment option in each pair wise choice. Responding gynecologists who did not perform LH were asked to opt for the LH alternative in the choice task if they preferred referring this case to an LH-performing colleague rather than performing AH on the other patient. Consequently, referral tendencies could be measured.

Next to the 18 pair wise choices, a concise number of demographic questions was introduced including sex, number of years as a specialist, performing LH or not, working in a hospital where LH is performed or not, experience with laparoscopy in general, and, if applicable, total number of LH procedures performed as the primary surgeon. To evaluate possible learning curve bias, gynecologists who perform LH were subdivided for overall number of LH procedures performed. Although hard evidence on completion of the LH learning curve is still lacking, it was decided to

Which of the two subsequent cases do you prefer? Please make a choice by picking one case	
An indication for hysterectomy is assessed in a 45-years old woman with a BMI of 20 and an estimated uterus size of 16 weeks . Her medical history reveals no previous (laparo)abdominal surgery . An abdominal hysterectomy is planned.	An indication for hysterectomy is assessed in a 45-years old woman with a BMI of 35 and an estimated uterus size of 10 weeks . Her medical history reveals one previous (laparo)abdominal surgery . A laparoscopic hysterectomy is planned.

Figure 1 Example of a pairwise choice-based conjoint case.

use a cut-point of 30 LH procedures, as reported in the literature.^{6,7,26,27} Therefore, gynecologists were classified into subgroups of those who were progressing along the learning curve (<30 LH procedures performed), those who had accomplished the learning curve (>30 LH procedures), and those who had mastered the learning curve twice (>60 LH procedures).

Insofar as preferred LH techniques, 3 subtypes were identified: laparoscopic-assisted vaginal hysterectomy (LAVH), supracervical laparoscopic hysterectomy (SLH), and total laparoscopic hysterectomy (TLH).²⁸ In addition, for gynecologists not performing LH, 1 multiple-choice question assessed preference insofar as possible referral for LH to determine self perception of referral behavior.

Each gynecologist in the Netherlands who performed LH (n = 110 laparoscopists, group 1) was asked to fill out the web-based CBC questionnaire. For each laparoscopist, a colleague employed in the same hospital and who performed only AH and VH was asked to fill out the questionnaire as well (n = 115, group 2). At each hospital where LH was not provided (n = 22), 2 randomly assigned gynecologists were requested to fill out the questionnaire (group 3). In the Netherlands, during residency, all gynecologists are trained in both AH and VH.

The local institutional review board exempted the study from review because the survey was executed by physicians.

Global analysis was performed using commercially available software (SPSS version 16.0; SPSS, Inc, Chicago, IL). Differences between groups were assessed using the χ^2 test for proportions and the t test for continuous variables. One-way analysis of variance was used to assess differences between the 3 groups, and 95% confidence interval (CI) and standard deviation were calculated. Statistical significance was considered at $p < .05$. Choice-based conjoint analysis was performed using Sawtooth software, in which Market simulations were run with choice-based conjoint-hierarchical Bayes (www.sawtoothsoftware.com/education/techpap.shtml).

Market simulations provide mean utility values and importances. Mean utility values quantify respondent preferences for each level of each attribute. The importance of an attribute was defined as its weight, or the maximum influence it can have on product levels as defined in the study. Shares of preferences were calculated using SMRT analysis (Sawtooth Software, Inc), thus providing proportions of preferences (for LH) for each conceivable hypothetical patient. To estimate part-worth utility coefficients per subgroup for each level, hierarchical Bayes analysis was performed. Differences in decline of shares of preferences between groups for optimal vs worst case scenario were calculated using multivariate analysis of variance (SPSS, Inc).

Results

Two hundred of 268 gynecologists (response rate, 75%) completed the web-based questionnaire. Response rates for the subgroups (groups 1, 2, and 3) were 89%, 60%, and 77%, respectively, with no significant differences. Responses were obtained from 77 of 78 LH-performing hospitals (99%) and 19 of 22 conventional hospitals (86%). Mean (SD) duration after registration was 12.6 (9.4) years and did not differ between groups ($p = .19$). Eleven respondents (5%) did not complete the questionnaire after starting, and were, therefore, excluded from choice-based conjoint analysis. Thus, 189 questionnaires were available for evaluation. The choice-based conjoint questionnaire was conducted over 3 months, launched in August 2009 and closed in November 2009, after sending 2 reminder e-mails.

In group 1, nearly 43% of gynecologists were still progressing along the learning curve (<30 LH procedures performed). The remaining gynecologists had accomplished the learning curve once (27%) or twice (30%). Approximately half of the responding laparoscopists had been practicing LH for less than 5 years. An increasing trend was observed (Figure 2).

Insofar as the various LH techniques, TLH was performed in 50% of cases, followed by LAVH in 23% and SLH in 17%. Ten percent of laparoscopists stated they performed TLH, SLH, and LAVH equally. Experienced laparoscopists tended to perform TLH more often than LAVH, compared with laparoscopists who were still progressing along the learning curve ($p = .001$) (Figure 3).

Market simulation analysis provided mean utility values for each attribute and level (Table 1). In the "Total" column, representing mean utility values for all respondents together, there was a tendency toward preference for LH in patients with BMI 20 kg/m², normal uterine size, and no previous laparoscopic abdominal surgery. Insofar as mean importances of the given attributes, all gynecologists seemed to consider uterine size and BMI as factors with major effect on decision making about mode of hysterectomy (Table 2).

In all 3 groups, market simulation revealed a preference for LH over AH in identical cases (mean share of preference, 75.6%; 95% CI, 71.2–80.0). Group 1 opted significantly more often for LH (86.3%; 95% CI, 81.6–91.0) in comparison with group 2 (70.9%; 95% CI, 63.4–78.4), and group

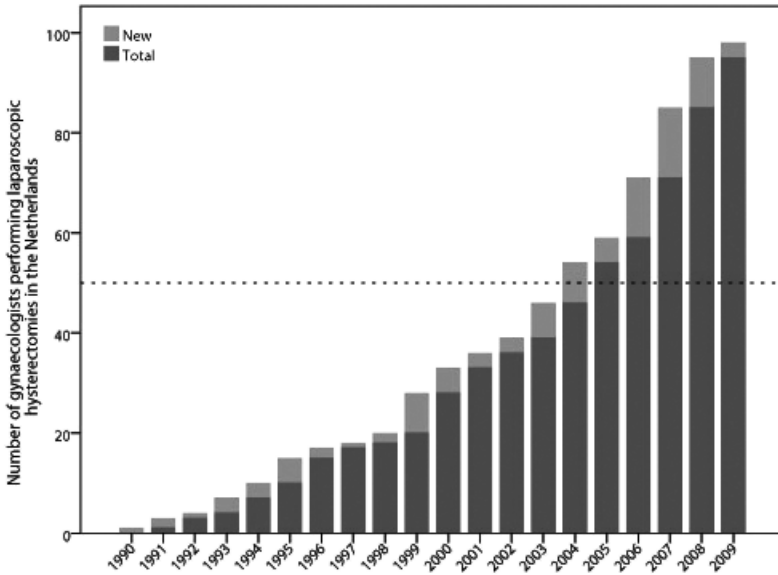


Figure 2 Trend in number of gynecologists performing laparoscopic hysterectomies in the Netherlands, 1990 – 2009.

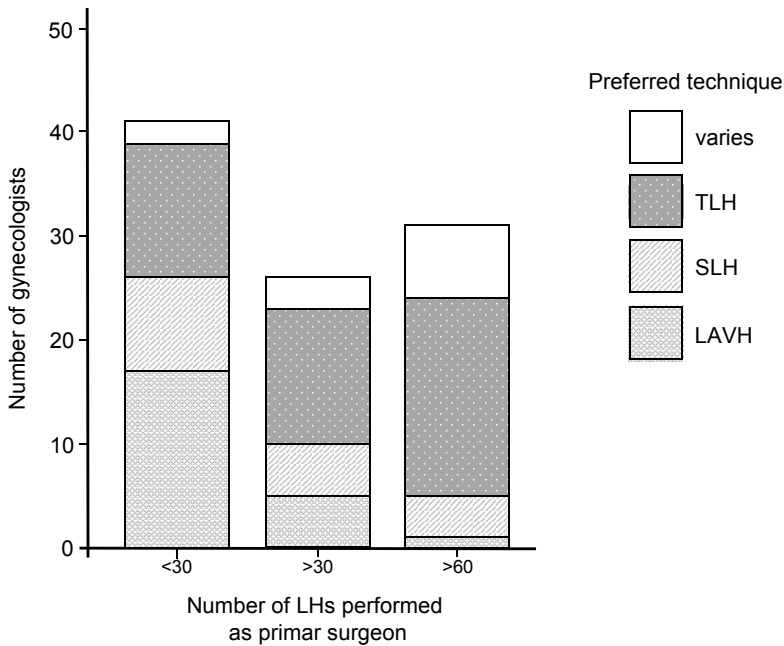


Figure 3 Distribution of preferred laparoscopic hysterectomy (LH) techniques for laparoscopists progressing along the learning curve (<30 LH procedures) and those who completed the learning curve once (>30 procedures) or twice (>60 procedures). (TLH = Total Laparoscopic Hysterectomy; SLH = Supracervical Laparoscopic Hysterectomy; LAVH = Laparoscopic Assisted Vaginal Hysterectomy).

Table 1 Average utility values for each attribute and level, for all respondents and subdivided per group.

Attribute	Level	Total	Group 1	Group 2	Group 3
BMI (kg/m ²)	20	23.35	21.86	29.01	16.38
	25	18.11	14.36	20.26	24.30
	30	1.86	2.47	-0.54	3.82
	35	3.64	5.95	1.53	1.25
	40	-46.96	-44.62	-50.27	-45.75
Uterus size (weeks gestation)	normal	7.65	17.86	4.89	-19.48
	10 wks	12.67	22.71	3.56	-2.05
	12 wks	5.81	5.58	2.08	13.40
	14 wks	1.57	-8.43	9.62	18.85
	16 wks	-27.70	-37.72	-20.14	-10.72
Surgery	none	12.20	7.24	23.60	1.29
	1 procedure	9.10	7.41	7.62	18.19
	2 procedures	-21.30	-14.65	-31.22	-19.48
Modus	AH	-52.04	-79.75	-35.71	2.68
	LH	52.04	79.75	35.71	-2.68

AH = abdominal hysterectomy; LH = laparoscopic hysterectomy; Group 1= LH-performers; Group 2 = colleagues of LH-performers; Group 3 = gynecologists employed in a hospital where LH is not provided.

Table 2 Average importances of each attribute by group.

Attribute	Total	Group 1	Group 2	Group 3
BMI	25.17	22.18	28.99	25.99
Uterine size	24.74	22.51	26.30	28.51
Previous surgery	15.68	12.44	19.60	17.18
Mode of hysterectomy	34.42	42.87	25.11	28.33

Group 1 = LH performers; Group 2 = colleagues of LH performers; Group 3 = gynecologists employed in a hospital where LH is not provided.

2 significantly more frequently chose LH in comparison with group 3 (50.3%; 95% CI, 35.7–64.9). This finding was confirmed in that, with respect to reported referral behavior based on the multiple-choice task in the questionnaire, group 2 claimed to more often refer candidates for LH in comparison with group 3 (Figure 4).

Increased BMI, estimated uterine size, or number of previous abdominal surgeries caused a drop in shares of preferences for LH in the Market simulator in all 3 groups (Figure 5). Multivariate analysis of variance yielded a significant difference in decline in shares of

preference for LH between the 3 groups when comparing the optimal scenario with scenarios with the highest BMI, largest estimated uterine size, and greatest number of previous abdominal surgeries (3 times; $p < .001$). Post hoc analysis revealed that the shares of preferences in group 1 were significantly less affected by decreasing BMI, uterine size, or number of previous abdominal surgeries, compared with both groups 2 and 3. The preference of referring gynecologists is primarily influenced by increase in BMI, and much less by increase in uterine size.

In group 1, no significant differences in change in shares of preferences for LH were observed between the subgroups of laparoscopists who were progressing along the learning curve (<30 LH procedures performed), had accomplished the learning curve (>30 LH procedures), or mastered the learning curve twice (>60 LH procedures).

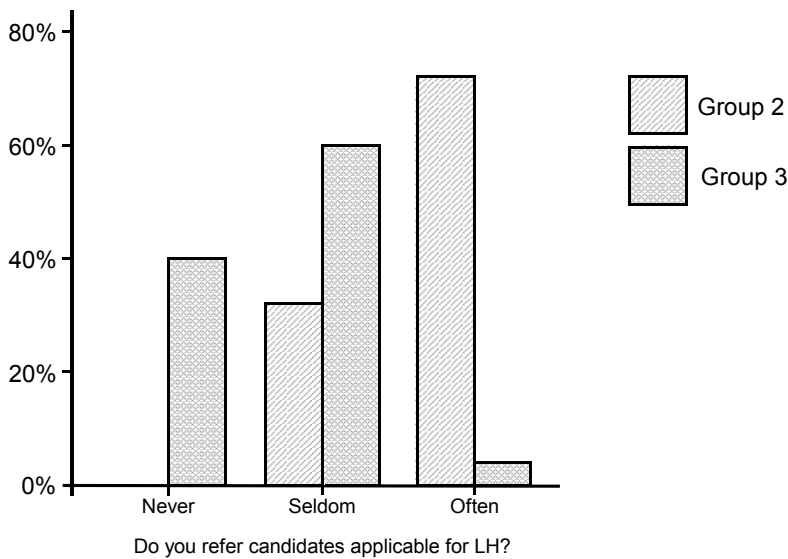


Figure 4 Reported actual referral behavior among gynecologists employed in hospitals that provide laparoscopic hysterectomy (LH) (group 2) and gynecologists employed in hospitals that do not provide LH (group 3).

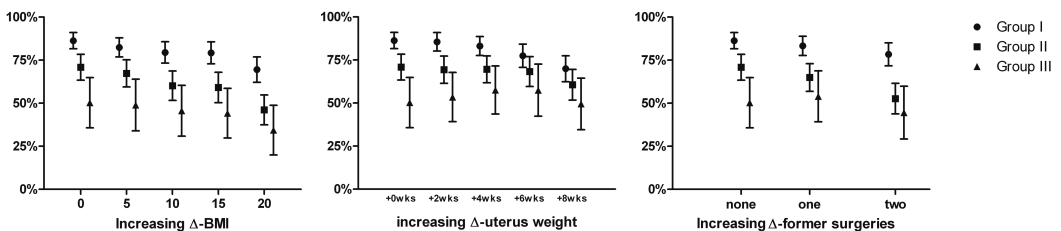


Figure 5 Differences in shares of preferences for laparoscopic hysterectomy (LH). Group 1 = gynecologists who perform LH; group 2 = colleagues of group 1; and group 3 = gynecologists employed in hospitals that do not provide LH, plotted for different scenarios.

Discussion

The present study demonstrates that preference for the minimally invasive approach in hysterectomy depends heavily on its availability and knowledge about the advantages of this approach. Using conjoint analysis, we observed that the presence of a gynecologist who performs LH significantly improves referral behavior of colleagues. In addition, it was observed that LH seems to be increasingly adopted by gynecologists in the Netherlands. Furthermore, more than half of the laparoscopists stated that they had been performing LH for less than 5 years, with 40% claiming to be still progressing along the learning curve of 30 procedures. These data demonstrate that with growing popularity of this procedure, a steady state of implementation of this advanced laparoscopic procedure has yet not been reached. However, the level of experience (expressed in number of LH procedures performed) does not significantly influence LH performers' opinion of BMI, estimated uterus size, and previous abdominal surgery as restrictive characteristics for the laparoscopic approach.

The finding of increased BMI as a restrictive factor for choosing LH, according to both referring gynecologists (groups 2 and 3) and performers (group 1) at CBC analysis, is intriguing. From evidence-based data, it has been proved that obesity is not a contraindication for the laparoscopic approach.¹⁰⁻¹³ Minimally invasive techniques facilitate a more rapid recovery and a shorter hospitalization, both advantageous aspects of major importance, especially in the high-risk obese patient. Assuming proper knowledge of the literature regarding high-risk obese patients, it is worrisome that gynecologists apparently would rather continue to perform hysterectomy using the conventional approach than change their practice according to the evidence. Possible explanations may be fear of litigation, difficulties in performing laparoscopy in obese women, or perverse reimbursement incentives.^{15;23;24} Apparently, estimated uterine size affects the referring gynecologist's preference much less than does change in BMI.

Gynecologists who do not have a colleague who performs LH stated that they still prefer to refer a problematic candidate patient (i.e., BMI 40 kg/m², estimated uterus size 16 weeks' gestation, and 2 previous abdominal surgeries) for LH in nearly 40% of cases. This is in striking contrast with their self-perceived referral behavior because all of these gynecologists claim to seldom refer candidate patients for LH in daily practice. Other researchers have also observed this attitude.^{20;22-24} The observed discrepancy between reported (ie, daily practice) and simulated (ie, this choice-based conjoint study) referral behavior in group 3 is interesting. Apparently, striving to provide the minimally invasive approach seems to be present in gynecologists employed in hospitals that do not provide LH. However, possibly because of practical impediments, honorary consequences, or long-lasting physician-patient relationships, gynecologists in group 3 tends to not refer patients in daily practice. In the Netherlands, gynecologists are salaried and not paid for number of performed surgical procedures on an individual basis. However, at the department level, income and reimbursement depend highly on annual surgical volume contracted for by the insurance companies. This volume-dependent compensation at the department level may hamper referral to other gynecologic departments. An alternative explanation for this discrepancy could be that although group 3 claims to be willing to refer candidate patients,

covertly they prefer AH. A third possible explanation for the observed discrepancy between simulated and actual referral behavior could have its origin in the extensive process of decision making involved in the many (benign) indications for hysterectomy. After having tried many (outpatient department) alternatives, patients probably prefer to undergo surgery performed by someone they know and trust rather than being referred to someone who may perform a more ideal surgical procedure but whom they do not know. In this light, we are convinced that patient preference is heavily influenced by completeness of information about all alternatives. Although we did not assess actual decision making by both physician and patient, we deduce from the outcomes that suboptimal counseling results in suboptimal implementation of LH.

We stress that the mentioned impediments and explanations are not solely applicable to the Netherlands. Hampered implementation of LH is a global problem, and many countries have far too many gynecologists without the inclination or ability to practice at the highest level and would rather continue to perform procedures that are less than ideal.^{14-16,19-24} Compared with similar studies, the present study has a high response rate (75%). Still, the outcomes of preference studies in general remain a rough estimate of actual decision making.¹⁹⁻²³ In addition, our choice-based conjoint analysis of LH-performing gynecologists and referral behavior of their colleagues has shortcomings. First, the concise set of 18 pair wise choices might seem insufficient to rely on. Nevertheless, after applying the choice-based conjoint analysis market simulator to the raw data, a complete spectrum of scenarios was provided (5760 simulated pair wise scenarios). Therefore, solid preference estimates of every imaginable scenario could be calculated. Second, the limited set of 3 patient characteristics (BMI, estimated uterus size, and previous abdominal surgery) covers only partially the complex patient in daily practice. However, the selection of discriminating factors by the expert panel seemed to be proper because each selected attribute significantly influenced the responding gynecologist's preference.

In conclusion, preference for the minimally invasive approach in hysterectomy depends heavily on its availability and on knowledge about the advantages of this approach. Assuming that the evidence about indication is well known by laparoscopists, more in-depth analysis is necessary to evaluate why their preferences for LH does not correspond to this evidence. Consequently, most patients who do not qualify for the vaginal approach are still offered AH despite its many disadvantages.² We believe that improvement in compliance with the indication for LH and correcting the applicability of the procedure, in addition to improved laparoscopic training during residency and a regional referral system, will optimize patient access to a minimally invasive approach in hysterectomy. Work is still needed to properly implement LH as a preferred procedure for surgical gynecologic indications when VH, the criterion standard, is not applicable.

Acknowledgements

We thank our colleague gynecologists in the Netherlands who participated in this preference study.

Reference

- van Dongen H, van de Merwe AG, de Kroon CD, Jansen FW. The impact of alternative treatment for abnormal uterine bleeding on hysterectomy rates in a tertiary referral center. *J Minim Invasive Gynecol* 2009; 16(1):47-51.
- Nieboer TE, Johnson N, Lethaby A, Tavender E, Curr E, Garry R et al. Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev* 2009;(3):CD003677.
- Kluyvers KB, Johnson NP, Chien P, Vierhout ME, Bongers M, Mol BW. Comparison of laparoscopic and abdominal hysterectomy in terms of quality of life: a systematic review. *Eur J Obstet Gynecol Reprod Biol* 2008; 136(1):3-8.
- Garry R, Fountain J, Brown J, Manca A, Mason S, Sculpher M et al. EVALUATE hysterectomy trial: a multicentre randomised trial comparing abdominal, vaginal and laparoscopic methods of hysterectomy. *Health Technol Assess* 2004; 8(26):1-154.
- Brummer TH, Seppala TT, Harkki PS. National learning curve for laparoscopic hysterectomy and trends in hysterectomy in Finland 2000-2005. *Hum Reprod* 2008.
- Twijnstra AR, Blikkendaal MD, Kolkman W, Smeets MJ, Rhemrev JP, Jansen FW. Implementation of Laparoscopic Hysterectomy: Maintenance of Skills after a Mentorship Program. *Gynecol Obstet Invest* 2010; 70(3):173-178.
- Wattiez A, Soriano D, Cohen SB, Nervo P, Canis M, Botchorishvili R et al. The learning curve of total laparoscopic hysterectomy: comparative analysis of 1647 cases. *J Am Assoc Gynecol Laparosc* 2002; 9(3):339-345.
- Leonard F, Fotso A, Borghese B, Chopin N, Foulot H, Chapron C. Ureteral complications from laparoscopic hysterectomy indicated for benign uterine pathologies: a 13-year experience in a continuous series of 1300 patients. *Hum Reprod* 2007; 22(7):2006-2011.
- Donnez O, Jadoul P, Squifflet J, Donnez J. A series of 3190 laparoscopic hysterectomies for benign disease from 1990 to 2006: evaluation of complications compared with vaginal and abdominal procedures. *BJOG* 2009; 116(4):492-500.
- O'Hanlan KA, Dibble SL, Fisher DT. Total laparoscopic hysterectomy for uterine pathology: impact of body mass index on outcomes. *Gynecol Oncol* 2006; 103(3):938-941.
- Chopin N, Malaret JM, Lafay-Pillet MC, Fotso A, Foulot H, Chapron C. Total laparoscopic hysterectomy for benign uterine pathologies: obesity does not increase the risk of complications. *Hum Reprod* 2009; 24(12):3057-3062.
- Heinberg EM, Crawford BL, III, Weitzen SH, Bonilla DJ. Total laparoscopic hysterectomy in obese versus nonobese patients. *Obstet Gynecol* 2004; 103(4):674-680.
- Brezina PR, Beste TM, Nelson KH. Does route of hysterectomy affect outcome in obese and nonobese women? *JLS* 2009; 13(3):358-363.
- Garry R. The future of hysterectomy. *BJOG* 2005; 112(2):133-139.
- Jacoby VL, Autry A, Jacobson G, Domush R, Nakagawa S, Jacoby A. Nationwide use of laparoscopic hysterectomy compared with abdominal and vaginal approaches. *Obstet Gynecol* 2009; 114(5):1041-1048.
- Twijnstra AR, Kolkman W, Trimbos-Kemper GC, Jansen FW. Implementation of Advanced Laparoscopic Surgery in Gynecology: National Overview of Trends. *J Minim Invasive Gynecol* 2010.
- Kluyvers KB, Opmeer BC, Geomini PM, Bongers MY, Vierhout ME, Bremer GL et al. Women's preference for laparoscopic or abdominal hysterectomy. *Gynecol Surg* 2009; 6(3):223-228.
- Kolkman W, Wolterbeek R, Jansen FW. Implementation of advanced laparoscopy into daily gynecologic practice: difficulties and solutions. *J Minim Invasive Gynecol* 2006; 13(1):4-9.
- Einarsson JJ, Matteson KA, Schulkin J, Chavan NR, Sangi-Hagheykar H. Minimally invasive hysterectomies-a survey on attitudes and barriers among practicing gynecologists. *J Minim Invasive Gynecol* 2010; 17(2):167-175.
- Gimbel H, Ottesen B, Tabor A. Danish gynecologists' opinion about hysterectomy on benign indication: results of a survey. *Acta Obstet Gynecol Scand* 2002; 81(12):1123-1131.
- Bickell NA, Earp J, Evans AT, Bernstein SJ. A matter of opinion about hysterectomies: experts' and practicing community gynecologists' ratings of appropriateness. *Am J Public Health* 1995; 85(8 Pt 1):1125-1128.
- Englund M, Robson S. Why has the acceptance of laparoscopic hysterectomy been slow? Results of an anonymous survey of Australian gynecologists. *J Minim Invasive Gynecol* 2007; 14(6):724-728.
- Persson P, Hellborg T, Brynhildsen J, Fredrikson M, Kjolhede P. Attitudes to mode of hysterectomy--a survey-based study among Swedish gynecologists. *Acta Obstet Gynecol Scand* 2009; 88(3):267-274.
- Tu FF, Beaumont JL, Senapati S, Gordon TE. Route of hysterectomy influence and teaching hospital status. *Obstet Gynecol* 2009; 114(1):73-78.

25. Audebert A.J. The role of microlaparoscopy for safer wall entry, incidence of umbilical adhesions according to past surgical history. Modifications of the closed technique. *Gynaecol Endosc* [8], 363-367. 1999.
26. Altgassen C, Michels W, Schneider A. Learning laparoscopic-assisted hysterectomy. *Obstet Gynecol* 2004; 104(2):308-313.
27. Tunitsky E, Cital A, Ayaz R, Esin S, Knee A, Harmanli O. Does surgical volume influence short-term outcomes of laparoscopic hysterectomy? *Am J Obstet Gynecol* 2010.
28. Garry R, Reich H, Liu CY. Laparoscopic hysterectomy - definitions and indications. *Gynaecol Endosc* 1994; 3:1-3.

