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Urinary catheterisation management after laparoscopic hysterectomy: a national overview and a nurse preference survey

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ABSTRACT

The aim of this study was to evaluate the catheterisation regimes after a laparoscopic hysterectomy (LH) in Dutch hospitals and to assess the nurses' opinion on this topic. This was particularly relevant as no consensus exists on the best moment to remove a urinary catheter after an LH. All 89 Dutch hospitals were successfully contacted and provided information on their catheterisation regime after LH: 69 (77.5%) hospitals reported removing the catheter the next morning after the LH, while nine hospitals (10.1%) removed it directly at the end of the procedure. The other 11 hospitals had different policies (four hours, up to two days). Additionally, all nurses working in the gynaecology departments of the hospitals affiliated to Leiden University were asked to fill in a self-developed questionnaire. Of the 111 nurses who completed the questionnaire (response rate 81%), 90% was convinced that a direct removal was feasible and 78% would recommend it to a family member or friend.

IMPACT STATEMENT

- **What is already known on this subject?** Although an indwelling catheter is routinely placed during a hysterectomy, it is unclear what the best moment is to remove it after an LH specifically. To fully benefit from the advantages associated with this minimally invasive approach, postoperative catheter management, should be, amongst others, optimal and LH-specific. A few studies have demonstrated that the direct removal of urinary catheter after an uncomplicated LH is feasible, but the evidence is limited.
- **What the results of this study add?** While waiting for the results of the randomised trials, this present study provides insight into the nationwide catheterisation management after an LH. Despite the lack of consensus on the topic, catheterisation management was quite uniform in the Netherlands: most Dutch hospitals removed the urinary catheter one day after an LH. Yet, this was not in line with the opinion of the surveyed nurses, as the majority would recommend a direct removal. This is interesting as nurses are closely involved in the patients' postoperative care.
- **What are the implications of these findings for clinical practice and/or further research?** Although randomised trials are necessary to determine an optimal catheterisation management, the findings of this present study are valuable if a new urinary catheter regime has to be implemented.

KEYWORDS

Urinary catheter; laparoscopic hysterectomy; direct catheter removal; national overview; nurse survey; minimally invasive gynaecology

Introduction

Compared with an abdominal hysterectomy, a laparoscopic hysterectomy (LH) is associated with many well-known advantages, including a quicker hospital discharge and a faster return to normal activities (Aarts et al. 2015). To fully benefit from the advantages associated with this minimally invasive approach, the post-operative patient care, including the post-operative catheter management, should be optimal and LH-specific. Although an indwelling catheter is routinely placed during a hysterectomy, for an LH it is unclear what the best moment is to remove it after the surgery. The clinical practice guidelines on LH such as the ones published by the American Association of Gynecologic Laparoscopists (AAGLs) or the National Institute for Health and Care Excellence (NICE) do not formulate any recommendations on when to remove the urinary catheter after an LH (NICE 2007; AAGL 2011, 2012, 2014). The hysterectomy patient leaflet of the Royal College of Obstetrics and Gynaecology (RCOG) only mentions that the urinary catheter is usually in place for up to 24 hours and the Dutch Society of Obstetrics and Gynaecology (NVOG) states that it will be removed 'after a certain amount of time' (NVOG 2005; RCOG 2015). Looking at the literature, a few studies have demonstrated that the direct removal of urinary catheter after an uncomplicated LH is feasible, but the

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Supplemental data for this article can be accessed here.

evidence is limited (Alessandri et al. 2006; Liang et al. 2009; Chai and Pun 2011; Ahmed et al. 2014). As such, a randomised controlled trial (RCT) is currently being conducted in six hospitals in The Netherlands comparing the direct versus the delayed removal of a urinary catheter after an LH (MUCH trial, registration number at Clinicaltrials.gov: NCT02742636).

While waiting for the results of the trial, it is valuable to get insight into the nationwide catheterisation management after an LH. This is particularly interesting since Hakvoort et al. published in 2009 a nationwide survey regarding the catheterisation regimes after a vaginal prolapse surgery and demonstrated a high practice variation amongst hospitals due to the insufficient evidence (Hakvoort et al. 2009). Furthermore, the opinion of nurses on this topic is also relevant to study, as nurses are closely involved in patients' postoperative care. Being aware of the national policies and the attitude of the nurses is valuable if a new policy has to be widely implemented. In this light, the aim of this study was first to evaluate the catheterisation regimes after LH in all Dutch hospitals and second to survey all of the nurses working in one of the hospitals participating in the MUCH trial regarding the best time to remove a urinary catheter after an LH.

Materials and methods

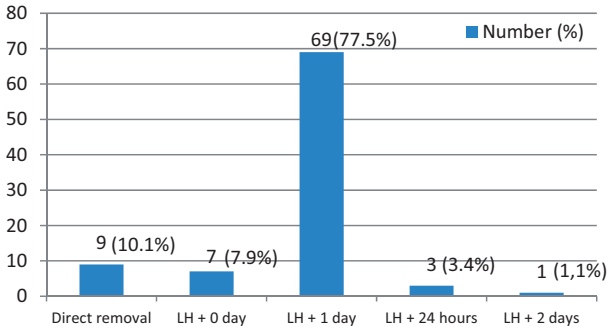
Telephone consultation

All of the Dutch gynaecology inpatient departments were contacted by phone. One of the chief nurses was asked to provide information on the urinary catheter regime after an LH in their hospital. The nurse was also asked whether their catheter policy was written in a guideline.

Nurse preference survey

All nurses working at a gynaecology department in one of the six hospitals participating in the MUCH trial, all affiliated to Leiden University, were asked to anonymously fill in a self-developed questionnaire. The survey was developed by the gynaecologic department of the Leiden University Medical Centre (LUMC), together with the department of Medical Decision Making and included 19 questions (six open questions and 13 multiple-choice). A pilot study was performed at the gynaecology department of LUMC by asking five nurses to fill in the questionnaires. The questions were reviewed and adapted afterwards if necessary. The topics covered in the survey were the baseline characteristics of the responding nurses, the current catheter management in their hospital and their personal opinion regarding the direct or the delayed removal of the catheter. To put their answers into context, the nurses were also asked to estimate the overall incidence of urinary tract infections and urinary retention after LH. In Supplementary Appendix 1, a summary of the topics which were covered in the survey can be found, as well as the questionnaire (translated from Dutch into English).

The survey was available online (using the program NetQ https://www.netqhealthcare.nl/) or on-paper. The questionnaire was sent out to all nurses by e-mail via the chief nurse in each hospital. Paper-based copies were also available in the nurses' stations at the different hospitals. Two and four weeks after the first request, a reminder was sent out by e-mail.



LH=laparoscopic hysterectomy

LH+0: the urinary catheter is removed on the same day as LH but with a delay of 4 to 6 hours.

Figure 1. Overview of catheterisation management after laparoscopic hysterectomy in Dutch hospitals.

Statistics

The data analysis was performed using SPSS 23 (SPSS Statistics UK, SPSS Inc., Chicago, IL). Continuous data were expressed as a median with range (minimum to maximum), while the categorical data were expressed as numbers and percentages (%). We qualitatively analysed all open-ended responses from our survey and arranged these answers into thematic groups. A sub-analysis by age and experience was performed using the independent *t*-test. A p value $< .05$ was considered as significant.

Ethical approval

Due to the nature of the study, an Institutional Review Board (IRB) approval did not apply.

Results

Telephone consultation

All 89 Dutch hospitals, including eight academic hospitals, 34 teaching hospitals and 47 non-teaching hospitals, were contacted by phone. All of the hospitals provided us with information on their urinary catheter management after LH (response rate 100%). As can be seen in Figure 1, a total of 69 hospitals (77.5%) reported removing the catheter the next morning after surgery, while nine hospitals (10.1%) removed the catheter directly at the end of the operation. Seven hospitals (7.9%) removed the catheter on the same day but with a delay of four to six hours after surgery. Three hospitals (3.4%) removed the catheter 24 hours after operation. One hospital (1.1%) left the catheter in place up to two days after the procedure, based on their guidelines for a vaginal hysterectomy.

Table 1. Baseline characteristics of the responding nurses.

Characteristics	
Gender	
Male	2 (1.8)
Female	109 (98.2)
Age (years)	34.0 (19–61)
Graduated	
Yes	95 (85.6)
No	16 (14.4)
Work experience (years)	
As a nurse	7 (0–41)
On a gynaecology ward	2 (0–37)
Hours per week at work	32 (16–36)

Data are presented as median (range) or as number (%).

All of the hospitals affirmed that they possessed a protocol describing when to remove the urinary catheter after an LH. In 75 hospitals (84.2%), this was a standard postoperative care guideline used after all types of gynaecological surgical interventions and was not specifically designed for LH. In 14 hospitals (15.7%), a specific guideline for LH existed with information on post-operative catheter management.

Nurse preference survey

The survey was sent to 137 nurses working at one of the six gynaecological inpatient departments of the included hospitals. These included one academic hospital (LUMC), four teaching hospitals and one non-teaching hospital. A total of 111 nurses completed the entire questionnaire (response rate of 81%). The response rate varied per hospital from 57.6% up to 90.9%.

Table 1 presents the baseline characteristics of the responding nurses. The nurses working in one of the five non-academic hospitals reported that before the trial a urinary catheter was usually left in place until the next morning. In the academic hospital, the policy was to directly remove the catheter after the surgery.

As demonstrated in Table 2, most of the nurses (90.1%) believed that it was feasible to directly remove the catheter after the procedure. Eighty-seven nurses (78.4%) mentioned that if a friend or family member would undergo an LH, they would advise a direct removal. For both questions, the sub-analysis by age demonstrated that the nurses favouring the direct catheter removal were significantly younger than the group who preferred a delayed removal ($p = .022$ and $p = .008$, Table 2). Similarly, the group of nurses who believed in the direct removal had significantly less working experience on a gynaecological ward compared to the nurses preferring a delayed removal ($p = .008$ and $p \leq .001$, Table 2). The age of the nurses and their working experience were directly correlated (person correlation 0.9, $p < .001$). Of note, an additional sub-analysis for these questions revealed no significant difference in the answers given by the nurses working in the LUMC where before the trial a direct catheter removal policy was in place, compared to the nurses from the other hospitals.

A total of 42.3% of the nurses believed that a direct removal was in all cases better, whereas 57.7% thought that in specific situations a direct removal might be contra-indicated. The specific factors against the direct removal were the age of the patient (>65 years) (34.2%); a BMI >30 (19.8%); physical difficulties (13.5%) or the general well-being of the patient (7.2%). Other mentioned criteria included the level of activity of the service (4.5%), the level of severity of the procedure (e.g. adhesions) (3.6%) and the use of an epidural as an analgesic (2.7%).

The nurses reported that compared to a delayed removal, a direct removal was associated with advantages such as a decreased risk of urinary tract infections (75.7%), an earlier post-operative mobilisation (73.9%) and a faster hospital discharge (58.6%) (Table 3). Regarding the risk of urinary retention, the opinion was divided: 45.9% reported that a direct removal was associated with an increased risk, 28.8% thought the moment of catheter removal was not of influence on the risk of urinary retention and 25.2% said that a direct removal decreased the risk. While the majority of the nurses reported that a direct removal had no influence on postoperative pain (56.8%) or on their own workload (52.3%), more than one-third thought that the direct removal of the catheter did negatively affect these outcomes (31.5% and 38.7%). The nurses reporting that a direct removal was associated with a higher workload had significantly more working experience (mean 8.8 (11.2) years versus 3.9 (6.5) years, $p = .007$) but were not significantly older than the nurses reporting no difference in workload (mean 38.6 (13.3) versus 34.7 (12.8), $p = .142$).

Finally, the nurses estimated that an overall 10.5% (12.6) of the women undergoing an LH in their hospital would have urinary retention and that 9% (13.5) would get a urinary tract infection.

Discussion

Telephone consultation

The national overview of the catheter management after LH presented in this study demonstrated that the majority of Dutch hospitals (78%) have the policy to leave the urinary catheter in place until the next morning. Despite the lack of evidence-based recommendations on this topic, it is interesting to observe that the practice variation regarding catheter management was minimal in the Netherlands. This is in discordance with previous studies which showed that without a convenient standard of care, doctors are more prone to adopt their own medical practices that are based on personal experience (Mercuri and Gafni 2011; Hlatky and DeMaria 2013). How the hospitals guidelines on urinary catheterisation were developed and by which evidence they were supported, is unclear though.

Reviewing the literature, only a few studies have been published in the best moments to a remove urinary catheter after a hysterectomy and most do not differentiate between the different types of approaches (open, vaginal and laparoscopic) (Alessandri et al. 2006; Liang et al. 2009; Chai and Pun 2011; Ahmed et al. 2014). Despite the limited evidence, the available studies all favour a direct catheter removal after the different types of hysterectomy as it is found to be associated with a lower risk of urinary tract infections, a quicker mobilisation and an earlier hospital discharge (Alessandri et al. 2006; Liang et al. 2009; Chai and Pun 2011; Ahmed et al.

Table 2. The opinion of nurses on timing of urinary catheter removal after LH.

	Number (%)	Mean age ± SD (years)	*p* value	Mean working experience on gynaecologic ward ± (years)	*p* value
Is direct removal feasible?					
Yes	100 (90.1)	35.4 ± 12.6	.022	5.0 ± 7.6	.008
No	11 (9.9)	44.7 ± 12.8		12.4 ± 14.9	
Recommendation to family or friend					
Direct removal	87 (78.4)	34.4 ± 12.3	.008	3.8 ± 5.7	<.001
Delayed removal	21 (18.9)	42.7 ± 13.7		11.7 ± 14.2	
Other	3 (2.7)				
Age dependent	2 (1.8)				
Patient health	1 (0.9)				
Situations where it would be better not to remove the catheter directly					
In all cases direct removal is better	47 (42.3)	–	–	–	–
The level of activity of the service	5 (4.5)				
Patient with BMI >30	22 (19.8)				
Patient age >65 years	38 (34.2)				
Other	30 (27.0)				
Physical difficulties	15 (13.5)				
General well-being	8 (7.2)				
Epidural use	3 (2.7)				
Level of severity of the procedure	4 (3.6)				

BMI: body mass index. Statistics: independent *t*-test. Data are presented as mean ± standard deviation (SD) or as number (%).

Table 3. Influence of timing of urinary catheter removal on several outcomes, according to the nurses.

	No influence	Increases	Decreases
Influence of direct removal (compared with delayed removal)			
Risk of urinary tract infections	14 (12.6)	13 (11.7)	84 (75.7)
Risk of urinary retention	32 (28.8)	51 (45.9)	28 (25.2)
Post-operative pain	63 (56.8)	35 (31.5)	13 (11.7)
Workload of the nurses	58 (52.3)	43 (38.7)	10 (9.0)

	No influence	Later	Earlier	Too early
Influence of direct removal (compared to delayed removal)				
Mobility	20 (18.0)	7 (6.3)	82 (73.9)	2 (1.8)
Discharge	41 (36.9)	5 (4.5)	65 (58.6)	0 (0)

Data are presented as number (%).

2014). The only RCT that exclusively included 150 LHs concluded that women in the direct catheter removal group had a significantly lower risk of urinary infection (4% versus 18%, $p = .034$) (Liang et al. 2009). Another RCT comparing the direct versus the delayed catheter removal, including 16 LHs, 43 vaginal hysterectomies and 37 abdominal ones, demonstrated a reduced mean ambulation time ($p < .05$), a shorter hospital stay of nearly 19 hours (36.5 hours versus 55.2 hours, $p \leq .05$) and a lower but non-significant risk for urinary tract infection (3.1% versus 15.6%, $p =$ NS) (Ahmed et al. 2014). Though, in this study, no specific sub-analysis was performed for the types of approach.

The most important argument against a direct urinary catheter removal is the potential of an increased risk of urinary retention after the surgery (Alessandri et al. 2006; Ghezzi et al. 2007; Liang et al. 2009; Chai and Pun 2011; Ahmed et al. 2014). In the RCT by Liang et al., the rate of urinary retention after LH was found to be 34% in the direct removal group compared to 12% in the group where catheter was removed the next day (Liang et al. 2009). Ghezzi et al. demonstrated in their prospective study with 142 LHs, that there was a urinary retention rate of 14% when directly removing a catheter after the laparoscopic procedure (Ghezzi et al. 2007).

The catheter management after an LH is an important topic to address in the field of minimally invasive gynaecology as in more and more hospitals throughout the world patients are being discharged on the same-day of surgery (Schiavone et al. 2012). A recent systematic review on this topic observed that one of the factors associated with a successful same-day discharge was a reduced time before voiding following a catheter removal (Korsholm et al. 2017). Interestingly, the inability to void was never a reason of re-admission (Korsholm et al. 2017). Assumptions can be made that voiding dysfunctions are in most cases detected during admission and that these patients are most probably not discharged on the same day. To start implementing a same-day discharge after LH, an optimal and LH-specific catheter policy is essential. With this in mind, it is notable to mention that most hospitals in The Netherlands did not have a specific protocol for LH, but rather used a general surgery protocol. By applying the policies of open surgery, the benefits associated with this minimally invasive approach might be undone. As such, we recommend a protocol specific for LH in every hospital regarding a urinary catheter policy.

Nurse survey

In the second part of this study, the opinion of the nurses regarding catheter management was assessed. Assessing their opinion is valuable as nurses do not decide when to remove

the urinary catheter but they do closely monitor the patients in the postoperative period and, as a result, have as much clinical experience on this topic. Furthermore, it seems relevant to study the attitude of the nurses when it comes to implementing the (new) evidence-based recommendations on catheter removal.

Although the results of the RCT are not yet available that compare the direct versus the delayed catheter removal after an LH (MUCH trial), it seems that the nurses deemed that there were clinical advantages with the direct removal regimen. From our survey, we observed that 90% of the surveyed nurses, all working on a gynaecological ward where both catheterisation policies were in place due to the MUCH trial, indicated that a direct removal was feasible (90%) and 78% would recommend it to a friend or family member.

Also, it was interesting to note that the nurses' opinion on a urinary retention and the timing of catheter removal varied. Almost half of the nurses reported that a direct removal was associated with an increased risk of urinary retention (45.9%) whereas the other half was convinced that that direct removal had no influence (25.2%) or even a decreased risk (28.8%) on a voiding dysfunction. This variety in responses should also serve as a general reflection in terms of education on this topic. Indeed, there is currently sufficient literature available demonstrating that a direct catheter removal is not associated with a decreased risk of urinary retention (Alessandri et al. 2006; Ghezzi et al. 2007).

Regarding the risk factors associated with a voiding dysfunction after a laparoscopic gynaecologic surgery, several studies have been published with varying results (Won et al. 2012; Kandadai et al. 2015). Although some characteristics such as diabetes and age have been appointed as risk factors after a hysterectomy, a study demonstrated that it was for an LH often unpredictable to determine which patient will develop a urinary retention (Won et al. 2012). As a result, it remains challenging to select the low-risk patients beforehand. In our survey, a total of 57.7% of the nurses appointed a specific criteria where the direct removal of a catheter might be contra-indicated, including (pre-operative) physical co-morbidities and complications.

Finally, the results of our survey also revealed that the nurses who had more experience, who appeared to be the older nurses, had a tendency to favour a delayed removal. Possible explanations for this could be the fact that they had been working with the policy for years with good outcomes. Also, the possible increased workload associated with the direct removal did seem to be influenced by experience, as shown in our sub-analysis. These findings are relevant to take into consideration when the implementing catheter removal policies in the future.

Limitations

One of the limitations of our study was that for the telephonic consultation we did not collect the protocols of each hospital but rather asked over the phone what the catheterisation management of that specific hospital was. Yet, as we interviewed the head nurses who were working according to those guidelines, we believe that our findings are reliable. Furthermore, we did not explicitly evaluate if all of the surgeons in one hospital followed the same protocol. As a result, individual differences within one hospital may be present. In addition, these national data should be compared with caution to the data of the nurse survey as the latter was limited to six hospitals. Finally, as the MUCH trial was being conducted at the time of the survey, the opinion of the nurses might be influenced by it. On the other hand, it can also be considered as a strength that the nurses had the opportunity to work with both catheter policies. Other strengths of the study were the fact that we had a 100% response rate for our telephone consultation and that 81% of the nurses responded to our survey.

Conclusions

To conclude, most Dutch hospitals removed the urinary catheter one day after the LH (78%). Of the survey nurses, 78% of nurses recommend a direct removal. Although randomised trials are necessary to determine an optimal catheterisation management, our findings are helpful if a new urinary catheter policy has to be implemented.

Disclosure statement

F.S. Leinweber, P.J. Herbschleb, D.M.A. Berends-van der Meer and F.W. Jansen report that they have no conflicts of interest to state.

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