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Laparoscopic surgery in gynecology : studies about implementaion and training

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Discussion

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Discussion

Gynecological laparoscopic surgery has developed into an important component of the surgical palet, however its implementation into daily practice is shown to be difficult. [SAGES 1998, Navez 1999, Loh 2002, Nussbaum 2002] The research presented in this thesis deals with the current diffusion and acceptance of gynecological laparoscopy in The Netherlands and objectifies the limitations in daily practice and residency curriculum. Medical Technology Assessment studies have shown us that multiple factors influence the implementation, however this thesis focused on skills training for gynecologists as well as residents, and the implementation of skills training necessary for proficiency in laparoscopic surgery.

The discrepancy between the promising technological development on one hand and the actual implementation into practice on the other, has also been observed by policy makers. In the matter of the implementation of new medical technologies, the Ministry of Health, Welfare and Sports has reported that the Dutch government should modify policy rules such that financial regulations no longer impede the adoption of new technologies, such as laparoscopic surgery. Also revealing the performance of individual care providers should enhance rivalry and patient empowerment should be encouraged in order to stimulate the incorporation of new technologies. [Raad voor de Volksgezondheid en Zorg 2005]

The implementation of a medical innovation can be established by assessing its diffusion and acceptance in clinical practice. The study in **Chapter 2** showed the diffusion of operative procedures in The Netherlands has increased over the last decade, however acceptance in general is still limited, especially for laparoscopic hysterectomy and other more advanced laparoscopic procedures.

In order to elucidate the causes of the difficulties of implementation into practice the study in **Chapter 3** was performed. It showed that gynecologists feel they have not reached their preferred level of competence due to lack of training, which results in the long duration of laparoscopic procedures and results in difficulties implementing laparoscopic procedures into their daily practice. Establishing a mentor traineeship by hiring a laparoscopic expert is expected to be the solution to reach the preferred level of competence.

In General Surgery and Urology a mentor traineeship has shown to increase laparoscopic caseload and to have a positive effect on laparoscopic education and research. [Fowler 2000, Fabrizio 2003] In a mentor traineeship the mentor is a laparoscopic expert, who teaches the trainee laparoscopic skills and procedures in the trainee's operating room. The trainee's operating team is familiarized with the procedures and equipment and more awareness is created of indications, contraindications and possible complications. The study in **Chapter 4** showed that a mentor-traineeship in gynecological laparoscopy enhanced caseload. It is well established

that complication rates increase when more advanced endoscopic procedures are performed. [Chapron 1998, Mirhashemi 1998, Harkki-Siren 1999, Leonard 2000, Sokol 2003, Jansen 2004]. However, despite the significant increase of complex endoscopic procedures in our study, the complication and conversion rates of the trainee showed no significant change. Predominantly, mentor-traineeship facilitated implementation of endoscopic procedures into gynecological practice.

Within the scope of the difficult implementation of gynecological endoscopy it is of utmost importance to 'teach the teachers'. In the current situation where gynecologists in practice are not skilled to perform advanced endoscopic procedures adequately or on a regular basis, their residents will not have the opportunity to be sufficiently trained. A formal laparoscopic training program during residency is of importance since laparoscopic procedures are more likely to be performed by surgeons who received training during residency. [Rosser 2000] Therefore, a mentor-traineeship should not be considered as a substitute for formal endoscopic training during residency.

In order to demonstrate the optimal duration of mentor-traineeship, learning curves for each procedure need to be determined, as is established for laparoscopic-assisted vaginal hysterectomy where a learning experience of 30 procedures was necessary to reach a significant lower level of complications. [Altgassen 2004] Also, long term benefits of the mentorship period should be elucidated. [Cook 2005]

Correctly the question raises whether or not all gynecologists should be able to perform advanced (level 3) endoscopic procedures. [RCOG 2001] All gynecologists should be capable of performing level 1 and level 2 procedures, with the laparoscopic hysterectomy as an exception. Hysterectomy is the most frequent, major surgical procedure performed by gynecologists [Brölmann 2001] and patients' demand for the minimal invasive approach for hysterectomy is increasing. Therefore every hospital (teaching and non-teaching) should be able to offer this specific procedure. To implement this, every department of Gynecology should dispose of one or two laparoscopic skilled gynecologists in order to be able to establish an internal referral system. In this internal referral system 'open' gynecologists can refer patients with an indication eligible for the laparoscopic approach to their skilled colleagues for a laparoscopic hysterectomy. An internal referral system will build a bridge between abdominal and vaginal hysterectomy on one hand, and laparoscopic hysterectomy on the other.

The performance of the other level 3 procedures, such as pelvic reconstructive procedures, myomectomy, oncological procedures, and tubal surgery for infertility, remain controversial topics. Besides knowledge of the disease, therapeutic alternatives, indications for surgery and the options of the surgical approach, these advanced procedures require a much higher level of competence in order to be completed successfully and have a high conversion rate in inexperienced hands.

[Rosser 2000] The competence required is much more than the technical surgical abilities necessary for a laparoscopic procedure. In addition, the incidence of these procedures is low and evidence to perform these procedures laparoscopically is still limited or in progress. Therefore, it is appropriate that only experienced, skilled and qualified (accredited and credentialed) gynecologists in that special field should perform these laparoscopic procedures in order to minimize complication rates and to deliver high-quality patient care. Studies have shown that referring is associated with a reduction in rates of excessive blood loss and operating times and a decreasing trend in visceral injuries. [Milad 2000] A referral system can be accomplished by establishing a privileging program with a credentialing system and preceptorship. In this organization patients can be transferred to referral clinics for that particular field in which expert minimal invasive surgery is incorporated. Such a privileging program would include monitoring of laparoscopic performance, continuing medical education and renewal of privileges. [Chapron 1997, SAGES 1998, Hasson 2001]

The study in **Chapter 5** showed that incorporation of basic laparoscopic procedures into residency training has been successful, however, advanced procedures are not. Training programs in general surgery also encounter this problem. [SAGES 1998, Rattner 2001, Navez 1999, Loh 2002, Nussbaum 2002, Chiasson 2003, Chiasson 2004, Schijven 2004] We found that residents lack experience in advanced procedures acquired during residency to feel comfortable with these procedures when they enter daily practice as a gynecologist. Ultimately this is in itself a limiting factor of the implementation of laparoscopic surgery. [Shay 2002]

Over the last couple of years studies have shown the evidence in favor of the laparoscopic approach of hysterectomy in case of benign pathology. [Claerhout 2005, Johnson 2005, Johnson 2006, Vaisbuch 2006] It is considered an advanced procedure according to the RCOG [RCOG 2001] and is not included in the curriculum guidelines in the Dutch residency curriculum. However, a debate needs to be initiated whether laparoscopic hysterectomy should be added to these curriculum guidelines. The first problem that is encountered to realize this is that only in a minority of the clinics in The Netherlands perform laparoscopic hysterectomy and not all teaching hospitals dispose of a skilled laparoscopic gynecologist. Given that the presence of a skilled laparoscopic surgeon has shown to increase the caseload, to improve residents' exposure and to have a positive effect on laparoscopic education and research, [Fowler 2000] appointing such a laparoscopic expert in every teaching hospital may be the best step in the direction of more adequately implementing gynecological endoscopy into residency training.

At this moment the low incidence of laparoscopic hysterectomy in The Netherlands, the suboptimal implementation of advanced gynecological endoscopy into

daily practice, the lack of skilled laparoscopic gynecologists in every (teaching) hospital, it is impossible for all residents to master the entire procedure during their training. However, it is of importance to expose residents to these procedures so they experience the indications, possibilities and restrictions of the laparoscopic hysterectomy. Moreover, they will be able to build bridges between the two worlds of 'open' and minimal invasive surgery, for instance by creating an earlier described internal referral system.

It is well known that laparoscopy is a difficult technique to master, and the incorporation of laparoscopic training into residency is shown to be troublesome. [Navez 1999, Loh 2002, Nussbaum 2002] Current Dutch gynecological residency curriculum has established guidelines concerning laparoscopic training and skills assessment and contains requirements that are essential for graduation: a minimum number of laparoscopic procedures that need to be performed by residents as a primary surgeon. [Schutte 2004] At present, the number of cases performed by a resident is the most important and widely accepted measure of competence. [Park 2002] Case volumes are easily quantifiable; unfortunately they do not represent the competence of a resident. Additionally, the number of cases required for competency is not known yet and presumably differs between individuals. [Feldman 2004] Besides the number of procedures performed, evaluation of residents' laparoscopic skills in the operating room is usually based on subjective assessment by surgical educators, influenced by personal traits and relationships. Emphasis should be placed on objectively assessing individual skills, for instance by means of a simulator. [Martin 1997, Reznick 1997, Goff 2000] Also, other methods of evaluation are developed for operative skills assessment, such as Global Operative Assessment of Laparoscopic Skills (GOALS) and Objective Structured Assessment of Technical Skills (OSATS). [Martin 1997, Vassiliou 2005] These are based on task-specific checklists and global rating scales and have shown their reliability and validity, and are of value in addition to simulator assessment.

The current guidelines of the gynecological residency curriculum include a mandatory 2-day course in basic skills in surgery, laparoscopy and hysteroscopy. However, these guidelines do not yet include the laparoscopic skills simulator. Unfortunately, the majority of residents do not yet have the opportunity to train on a simulator. On the other hand, residents that did have the opportunity scarcely trained. Surprisingly, this finding is contradictory to the residents' opinion that simulator training is an important addition to their residency program. A recent survey from the United States concluded that those who had received formal laparoscopic training during residency training were much more likely to incorporate laparoscopic techniques into their daily practices as a gynecologist. [Shay 2002] In accordance with these findings it is our opinion that the implementation of laparos-

copy will improve, provided residency training is optimized. It is not the quantity of training, but the quality of training and assessment that leads to sufficient surgical skills. For this, skilled laparoscopic gynecologists with teaching abilities and a formal mandatory laparoscopic training course are urgently needed in every teaching hospital.

To initiate such a formal and structured training program a simulator was developed. **Chapter 6** showed our inanimate simulation model disposes of construct validity and is a successful device for training and measuring basic laparoscopic skills objectively. The current existing laparoscopic simulators can be classified into two categories: box (video) trainers and virtual reality devices (VR). Both types are shown to have high potential for both training and assessment purposes. [Munz 2004] Limited comparison studies were performed to compare the two types; however they did not demonstrate any significant advantages of one modality over the other. [Munz 2004, Youngblood 2005]

At the Department of Bio-Mechanical Engineering of the Technical University in Delft, The Netherlands a tracking system (TrEndo) was developed to measure movements of the laparoscopic instrument on our inanimate simulator [Chmarra 2006]. TrEndo is already shown to have construct validity; its accuracy is higher than 95% and has the advantages of the inanimate simulation model in combination with objective feedback of movement analysis as in VR-systems. [Hasson 2001, Chmarra 2006] Considering the costs and the lack of proper tactile feedback of VR systems, at this moment these inanimate simulators, with the TrEndo are the system of choice.

Surgical curricula should result in achieving an appropriate laparoscopic skills level based on performance standards. Experts' basic skills level on the simulator as performance standard is feasible, given that novices can be trained to reach experts' laparoscopic basic skills level after a short training program on our simulator. Major advantage of using goal-oriented training, such as performance standards is consistency of the final result, since all residents are expected to reach the performance standard. For residents with exceptional ability, minimal practice is required. For those who require more practice, appropriate training should be scheduled until the predetermined level of performance is accomplished. In addition, residents are competitive and thrive from having a target to achieve. [Korndorffer 2005] The frequency of training necessary to maintain skills and the retention of skills after training are not well established yet. [Brunner 2004, Stefanidis 2006] Presumably, continuous training, either in the operating room or on a simulator, is essential to preserve proficiency.

Chapter 7 showed that in current Dutch gynecological residency curriculum, residents do not reach all performance standards for basic laparoscopic skills. We

conclude that a voluntary simulator training program has a substantial risk to fail and the implementation of the laparoscopic skills simulator in current residency curriculum is underdeveloped. Therefore, the curriculum concerning laparoscopic training needs serious modifications by implementing laparoscopic simulators. Simulator training and skills assessment should be structured, mandatory and performance standards should be established. Given that novices benefit the most from simulator training, [Scott 2001, Feldman 2004] we stress that residents need to reach the performance standard for basic laparoscopic skills as early as possible in residency before participating in live laparoscopic surgery. In this way, residents will enter the operating room with a set of basic skills, which undoubtedly will enhance educational opportunities throughout residency. If proficiency in basic skills is present, time in the operating room can be spent on learning anatomy, pathology, and operative techniques instead of basic skill acquisition. [Korndorffer 2005]

Multiple factors influence the implementation of an innovative technique, such as laparoscopic surgery. It is well established that laparoscopic surgery is a difficult technique to master and therefore skills training is of utmost importance. With the growing evidence of the valuable aspects of training outside the operating room, there is no excuse for depriving residents of simulator training. It is no longer an added luxury, but an essential and mandatory component in residency curriculum. It is of value to appropriately implement laparoscopic simulators into residency in a mandatory fashion to optimize acquisition and evaluation of laparoscopic skills during residency training.

Subsequently, the simulator may play a role in evaluating experts' basic laparoscopic skills as part of a credentialing or accreditation system in the future or for the selection of eligible applicants for residency training. [Schijven 2004] However, simulators represent basic laparoscopic skills and these are not the only factor on which accreditation or selection for residency should be based.