Chapter 14

Summary
This thesis aims to evaluate the effects of genital prolapse surgery and hysterectomy on pelvic floor function. A normal pelvic floor function is required to allow normal micturition, defecation, sexuality and vaginal delivery. Both vaginal delivery and surgical trauma to the pelvic floor can negatively affect pelvic floor function. Genital prolapse surgery and hysterectomy can both be performed by vaginal or by abdominal approach. It is unknown if, and to what extent, both techniques equally damage the pelvic floor innervation and pelvic fibromuscular structures. If there is a difference in surgical trauma, the prevalence of micturition symptoms, defecation symptoms and sexual dysfunction may differ among patients following vaginal and abdominal surgery. Micturition symptoms, defecation symptoms and sexual dysfunction are all signs of impaired pelvic floor function. These symptoms may negatively affect the patient’s quality of life. Gynecologists may be expected to attempt to reduce the negative influence of gynecological surgery on quality of life as much as possible. This can only be established by studying the effects of different types of genital prolapse surgery and hysterectomy on pelvic floor function.

An additional aim of this thesis is to investigate diagnostic characteristics of defecography and ano-rectal function tests. Knowledge about these diagnostic characteristics may contribute in investigating whether defecography and ano-rectal function tests improve outcome of surgical correction in patients with descensus uteri. These investigations have not yet been incorporated in the standard diagnostic work-up of patients with genital prolapse. The diagnostic value of urodynamic investigation has already been assessed, and is therefore not subject to investigation in this thesis.

In Chapter 1, the introduction, the background of this thesis is illuminated. Furthermore, the aims and outline of this thesis are given. The aims of this thesis are threefold:

1. To compare the effects of vaginal and abdominal surgical correction on pelvic floor function in patients with descensus uteri grade II-IV (ICS).
2. To compare the effects of technique of hysterectomy on pelvic floor function.
3. To assess diagnostic characteristics of defecography and ano-rectal function tests.

In Chapter 2 the inconsistency is addressed between researchers about the scoring of defecographic findings. A new system to score rectocele, enterocele and rectal intussusception is proposed. In contrast to systems presented thusfar, this system involves both qualitative and quantitative measurements and focuses only on defecographic items that correlate well with clinical symptoms. The inter-observer
agreement of the new system was studied, and appeared to be almost perfect for all scored items. Intra-class Correlation Coefficients for quantitative measurements of rectocele, enterocele and rectal intussusception were respectively 0.87 (95 % lower confidence interval (CI) 0.82), 0.98 (95 % lower CI 0.96), and 0.84 (95 % lower CI 0.63). The weighted Kappa values for grade of enterocele and grade of rectal intussusception were respectively 0.97 (95 % CI 0.93 to 1.00) and 0.91 (95 % CI 0.79 to 1.00). The use of consistently and precisely identifiable radiographic landmarks in our system, may have importantly contributed to the observed good reproducibility. The diagnostic value of this scoring system needs to be studied, before this system can be used to ameliorate outcome of treatment.

In Chapter 3 we evaluated whether the presence of abnormal defecographic findings can be predicted with the quantified value of findings from patient history, pelvic examination and a validated questionnaire to assess the presence of defecation symptoms (Defecation Distress Inventory). We defined a defecography as abnormal in case an enterocele and/or rectal intussusception were detected. Using multivariate logistic regression analyses with Receiver Operating Characteristic (ROC) curves, a diagnostic model to predict the presence of an abnormal defecography was systematically constructed and validated. A prediction rule (3 + 3*history of pelvic surgery + quantification value (QV) of rectocele + 3*constipation) could be constructed that confidently predicts the presence of an abnormal DRE (Area Under Curve = 0.73 (95 % CI : 0.61 - 0.83)). This constructed diagnostic model provides the possibility to better consider the decision to demand for defecography in the individual patient.

In Chapter 4 the associations are evaluated between defecation symptoms and findings at ano-rectal function tests in patients who are candidate for genital prolapse surgery. In 83 patients with descensus uteri grade II-IV (ICS classification) ano-rectal function tests were performed and the presence of constipation and fecal incontinence was assessed by a validated questionnaire. The prevalence of these defecation symptoms was compared between different levels of the ano-rectal function tests. Constipation was present in 7 (8.4 %) patients and fecal incontinence in 16 (19.3 %) patients. The prevalence of constipation was 17.9 % in the upper tertile, 0 % in the middle tertile and 7.7 % in the lower tertile of threshold for rectal sensibility ($\chi^2$ test p < 0.05). Defecation symptoms were not associated with any of the other ano-rectal function tests. It was concluded that, except for the significant association between decreased rectal sensibility and constipation,
findings at ano-rectal function tests appeared to be weakly associated with constipation or fecal incontinence in patients with genital prolapse.

In Chapter 5 the effects of genital prolapse surgery on bowel function are studied. In 73 patients participating in a randomized trial comparing vaginal and abdominal surgical correction of descensus uteri, defecography and ano-rectal function tests were performed before and at six months after surgery. Patients completed a validated questionnaire before and at six months after surgery, to assess the presence of persisting and developing defecation symptoms. Except for constipation, that disappeared in nearly all patients, all defecation symptoms reported before surgery disappeared in about half of the patients. Feelings of distension of the rectum were accelerated in patients in whom soiling and flatus incontinence persisted, in comparison to patients in whom these symptoms disappeared. The prevalence of all de novo defecation symptoms was lower than 15\%, except for incomplete evacuation and sensation of anal blockage which developed in 24.5\% respectively 22.7\% of the patients. In contrast to patients in whom these symptoms did develop, pudendal nerve terminal motor latency (PNTML) decreased after surgery in patients in whom these symptoms did not develop.

In Chapter 6 the results are described of a retrospective study performed to compare micturition, defecation and prolapse symptoms among 47 patients who underwent a unified vaginal or abdominal surgical correction of descensus uteri and coexisting stress incontinence. A second aim of this study is to compare duration of hospital stay and complication rate between both groups. Abdominal surgery was associated with a higher prevalence of difficulty emptying bladder (odds ratio (OR) 2.3 (95% CI 1.4-8.4)), fecal incontinence (OR 3.4, CI 1.1-10.7) and soiling (OR 2.8, CI 1.2-6.2), as well with a longer post-operative hospital stay (8.6 vs 7.3 days) and higher complication rate (25.0\% vs. 11.4\%) in comparison to vaginal surgery. These results suggest that a unified vaginal surgical correction of genital prolapse and coexisting stress incontinence appears to be preferable to a unified abdominal surgical correction.

In Chapter 7 we report on the results of a multi-center randomized trial comparing the effects of vaginal and abdominal surgical correction of descensus uteri on micturition and defecation. Additionally, the number of doctor visits within the first year after surgery and recurrence rates are compared between both groups. Vaginal surgery involved vaginal
hysterectomy combined with anterior and/ or posterior colporraphy. Abdominal surgery involved sacrocolpopexy. Both procedures were combined with a bladder neck suspension in patients in whom evident or masked stress incontinence was observed at urodynamic investigation. To measure the presence and discomfort of micturition and defecation symptoms, 82 participating patients were asked to complete the urogenital distress inventory (UDI), defecation distress inventory (DDI) and incontinence impact questionnaire (IIQ), both before and after surgery. Scores on the UDI discomfort/ pain domain (p = 0.01), overactive bladder domain (p = 0.02), genital prolapse domain (p=0.02) and obstructive micturition domain (p=0.04) of the UDI were during the first year after surgery higher in the abdominal group than in the vaginal group. DDI domain scores, IIQ domain scores and findings at pelvic examination were similar in both groups. Patients who had undergone abdominal surgery visited more often a doctor within the first year after surgery because of prolapse, micturition or defecation symptoms than patients who had undergone vaginal surgery. Repeated prolapse surgery was performed or planned in 9 (22.9 %) patients who had undergone abdominal surgery and in 1 (2.4 %) patient who had undergone vaginal surgery (Fishers Exact Test p = 0.01). It was concluded that vaginal hysterectomy with anterior and/ or posterior colporraphy appears preferable above abdominal sacrocolpopexy with preservation of the uterus, as surgical correction of patients with descensus uteri.

In Chapter 8 the effects of prolapse surgery on sexual function are evaluated. All patients participating in the previously described randomized trial (Chapter 7), were asked to complete the Questionnaire for screening Sexual Dysfunctions (QSD) before surgery and six months and one year after surgery. In 62 patients who participated in this study, general satisfaction was statistically significantly improved at six months after surgery but not at one year after surgery. Of 41 patients who were sexually active before surgery and at one year after surgery, 28 (68.3 %) patients reported sexual problems before surgery. In 13 (46.4 %) patients, all sexual problems disappeared. De novo sexual problems were reported by 2 patients of the 13 patients without sexual problems before surgery. Disappearance of sexual problems was associated with grade of cystocele. The relative risk of patients with cystocele grade II or III in comparison to patients without cystocele grade II or III on disappearance of sexual problems was 1.5 (95 % confidence interval 1.1-2.1). Differences in other characteristics between patients in whom sexual problems persisted and disappeared were not observed.
In Chapter 9 a study is described comparing pain, quality of life and physical performance during the first six weeks after surgery, between patients undergoing vaginal and abdominal surgical correction of descensus uteri. Data were obtained from the randomized trial described in Chapter 7. All patients were asked to fill out the RAND-36 before surgery and 6 weeks after surgery. Additionally, during the first 6 weeks after surgery, they answered questions to assess pain perception, amount of administered pain medication per day, presence and experienced bother of limitations during hospital stay and performance of daily activities. Patients who had undergone abdominal surgery had a statistically lower score on the health change domain (56 vs 68), bodily pain domain (63 vs 80) and mental health domain (74 vs 81) of the RAND-36, in comparison to patients who had undergone vaginal prolapse surgery. During hospital stay, the abdominal group experienced on average more days of pain (4.5 vs 3.0) and impaired mobility (3.7 vs 2.9) in comparison to the vaginal group. Pain medication during the first week of surgery was given longer (5.5 days vs 4.1 days) and in higher dosages (1943 mg of paracetamol daily vs 1334 mg) to patients who underwent abdominal surgery than to patients who underwent vaginal surgery. It was concluded that the vaginal operation to correct a descensus uteri grade II or more, is less morbid than the abdominal one.

In Chapter 10 the results are described of a retrospective study comparing the effects of different techniques of hysterectomy on micturition and defecation. Two-hundred-and-twenty-seven patients without micturition and defecation symptoms before surgery in whom uterine length was 10 cm or less, completed the UDI and DDI. All potential confounders were documented as completely as possible. Using multivariate logistic regression analysis, adjusted odds ratios (ORs) were calculated for all symptoms of which the prevalence between techniques of hysterectomy differed more than 10 %. An increased prevalence of urge incontinence (adjusted OR 1.5 (95 % CI 0.8-3.1)) and feeling of incomplete evacuation of the rectum (adjusted OR 1.9 (95 % CI 1.0-4.0)) was observed among patients who had undergone vaginal hysterectomy in comparison to patients who had undergone total abdominal hysterectomy. The prevalence of urge incontinence (adjusted OR 1.8 (95 % CI 0.8-4.2)) and difficulty emptying rectum (adjusted OR 1.8 (95 % CI 0.7-4.4)) was higher among patients who had undergone vaginal hysterectomy than among patients who had undergone subtotal abdominal hysterectomy. It was concluded that technique of hysterectomy may influence the prevalence of micturition and defecation symptoms following hysterectomy.
In Chapter 11 the results are described of a multi-center prospective observational study comparing morbidity, success and prevalence of micturition and defecation symptoms after vaginal and after abdominal hysterectomy. Hundred-and-ninety-four patients in whom both techniques were technically feasible completed the UDI and DDI before surgery and at 6 weeks and 6 months after surgery. Using multivariate logistic regression analysis, adjusted odds ratio’s (OR) were calculated to study whether surgical route is independently associated with micturition and defecation symptoms. Abdominal approach (n=112) increased the risk to report dysuria at 6 weeks after hysterectomy in comparison to vaginal approach (n=82) (adjusted OR 3.0 (95 % CI 1.0-8.8)), but not after 6 months. Vaginal approach increased the risk to report stress incontinence at 6 months after hysterectomy in comparison to abdominal approach (adjusted OR 1.8 (95 % CI 0.8-3.7)). This increased risk was present in both patients with and without stress incontinence before hysterectomy. The prevalence of post-operatively reported defecation symptoms, morbidity and reported success of hysterectomy were similar in both groups. It was concluded that vaginal hysterectomy may increase the risk on persistence or development of stress incontinence in comparison to abdominal hysterectomy.

In Chapter 12 we report on a multi-center prospective observational study evaluating the effects of different techniques of hysterectomy on sexuality. All participating patients were asked to complete the Questionnaire for screening Sexual Dysfunctions (QSD) before and six months after hysterectomy. Sexual satisfaction statistically significantly improved in all patients, independently of the performed technique of hysterectomy. Of patients who were sexually active before as well as six months after surgery, 89 patients underwent vaginal hysterectomy, 76 patients underwent subtotal abdominal hysterectomy and 145 patients underwent total abdominal hysterectomy. An increased prevalence of persisting problems with lubrication (adjusted OR 2.6 (95 % CI 0.6-10.2)) and problems with arousal (adjusted OR 2.1 (95 % CI 0.6-7.8)) was observed among patients who had undergone abdominal hysterectomy in comparison to patients who had undergone vaginal hysterectomy. The prevalence of persisting problems with pain/sensation of the genitals (adjusted OR 1.8 (95 % CI 0.8-4.2)) was higher among patients who had undergone total abdominal hysterectomy than among patients who had undergone vaginal hysterectomy. It was concluded that removal of the cervix during abdominal hysterectomy did not appear to affect sexuality. Vaginal approach may have beneficial effects in patients with sexual problems before hysterectomy.
In Chapter 13, the general discussion, the most important findings of this thesis are discussed, questions for future research are pointed out and recommendations for clinical practice are given. The most important implications are the following: At moment, there is no evidence that defecography and ano-rectal function tests should be incorporated in the standard diagnostic work-up of patients undergoing surgical correction of descensus uteri. In patients with descensus uteri, gynecologists can use a diagnostic model, based on findings obtained from a non-invasive work-up, to accurately predict the presence of an enterocele and/ or rectal intussusception.

Vaginal hysterectomy with anterior and/ or posterior colporraphy appears to be preferable above abdominal sacrocolpopexy with preservation of the uterus, as surgical correction of patients with descensus uteri. Sexuality improves or does not change in most women after surgery for descensus uteri. The presence of a large cyssteocele before surgery may enhance the chance on disappearance of sexual problems after prolapse surgery. The observed differences between vaginal and abdominal surgery may be explained by a difference in surgical approach but also by a difference in whether the uterus is removed or not. A randomized trial comparing vaginal surgery with removal of the uterus and vaginal surgery with preservation of the uterus is planned.

Performing vaginal hysterectomy should not always be a goal when performing hysterectomy. Both data from a retrospective and of a prospective study suggest that abdominal hysterectomy may be beneficial with respect to the effects on bladder and bowel function in comparison to vaginal hysterectomy. A randomized trial comparing the effects of vaginal and abdominal hysterectomy on micturition and defecation is warranted. Removal of the cervix during abdominal hysterectomy does not appear to affect sexuality. Vaginal approach may have beneficial effects in patients who have sexual problems before hysterectomy.