This version of the article has been accepted for publication, after peer review (when applicable) and is subject to Springer Nature's AM terms of use, but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at: https://dx.doi.org/10.1007/s00192-007-0321-0

Risk factors for the recurrence of pelvic organ prolapse after vaginal surgery: a review at 5 years after surgery

Diez-Itza I, Aizpitarte I, Becerro A

Department of Obstetrics and Gynaecology. Donostia Hospital. San Sebastian. Spain.

Name and Surnames: Irene Diez-Itza

Address: Paseo de Ondarreta Nº1, 5ºC. 20008 San Sebastian. Guipuzcoa. Spain.

Telephone: (00) 34 606415957.

Work address: Departamento de Obstetricia y Ginecologia. Secretaria Ginecología. Planta nº4, Edificio Materno-Infantil. Hospital Donostia . Paseo Beguiristain, 107-115. 20014 San Sebastian. Guipuzcoa. Spain. Telephone: (00) 34 943 00 70 00.

E-mail: idiezi@sego.es

ACKNOWLEDGMENTS

We thank Dra. Cristina Sarasqueta of the Statistics and Epidemiology Department of Donostia Hospital, for the help with statistics and also for her lessons in the use of the SPSS

program. Also we are very grateful to Dra. Montserrat Espuña of the Obstetrics and Gynaecology Department of the Clinic Hospital in Barcelona, for the review of the present manuscript.

ABSTRACT

Objective: The objective of this study has been to determine the factors associated with the anatomic and functional recurrence of prolapse.

Study design: An examination was performed of 134 of the 228 patients who underwent primary vaginal surgery for prolapse of the pelvic organs (POP) between 2000 and 2001. Anatomical recurrence of the prolapse was established by pelvic examination using the Pelvic Organ Prolapse Quantification (POPQ) staging system. Functional results were obtained by the interview of the patient. Descriptive statistical analyses and multivariate logistic regression were performed to determine the factors associated with recurrence.

Results: Five years after surgery, 42 women (31.3%) presented anatomical recurrence of the prolapse (grade ≥ II), and only 10 of the 134 (7.4%) had prolapse-related symptoms. High body weight (>65 kg.) and younger women (<60 years) were associated with an increase in the risk for both anatomical and functional recurrence. Advanced preoperative prolapse (grade III-IV) of any compartment was associated with anatomical failure but not with symptomatic recurrence.

Conclusion: There was a poor correlation between anatomical and symptomatic recurrence. Younger women and those with a higher body weight are more likely to experience recurrent prolapse after vaginal repair.

Key words: Pelvic organ prolapse; Surgery; Risk factors; Recurrent prolapse

BRIEF SUMMARY

Little is know about the risk factors involved in the anatomical and functional recurrence of POP. Its identification should be useful for indicating individualised treatment and prevention.

ABBREVIATIONS

POP: pelvic organ prolapse

OR: odds ratio

CI: confidence interval

POPQ: pelvic organ prolapse quantification

ICI: International Continence Society

BMI: body mass index

INTRODUCTION

Pelvic organ prolapse (POP) is defined as the descent of the pelvic organs below their normal situation, evidenced as a protrusion of the vagina and/or cervix. It is a common pathology, though it is difficult to establish its prevalence. It is estimated that 50% of non-nulliparous women develop disorders of the pelvic floor and that 10% require medical assistance (1, 2). *Swift et al* (3) presented a study including 1.004 women, finding that 37% presented a prolapse of grade II or higher.

The risk factors associated with prolapse are many and varied. *Bump and Norton* (4) described a model for the onset of pelvic floor dysfunction. This model was organised into predisposing factors like race, anatomy or collagen distribution, inciting factors like vaginal delivery or radical surgery, promoting factors like obesity and decompensating factors like aging which finally produce an alteration of pelvic floor function and support (Figure I). However, the authors concluded that the relative importance of each one of these factors remains to be established.

There are several epidemiological studies that analysed the risk factors associated with POP. The most important are those that include a large number of women. *Hendrix et al* (5), with a cohort of more than 27.000 women, and the *Progetto Menopausa Italia Study Group* (6), with a population of over 21.400, concluded that the risk of prolapse increased principally with parity and obesity.

The natural history of the development of the POP is still unknown. There is a current theory that indicates that the first step in the alteration of the pelvic floor involves the injury to the levator ani muscles. This weakening contributes on the enlarging of the genital hiatus and places the connective tissue support on tension. These modifications in the pelvic floor

should play a key role in prolapse development (7). In fact, *Dietz et al* (8) in a study that included 384 women had demonstrated that mayor morphological abnormalities of the pubovisceral muscles were associated with prolapse.

The annual incidence of surgery for prolapse varies between 1.5 and 4.9 per 1.000 women (9). The major problem with this type of surgery is that it is not always definitive and sometimes we don't now how to manage to do it. It should be essential to identify which patients have a higher probability of recurrence after surgery in order to indicate individualised treatment and prevention. But the real thing is that it had been reported reoperation rates from 13% to 30% (2, 10), being the greatest number of recurrences in the anterior compartment (11).

Very little is known about the factors associated with surgical failure. We may assume that the factors that play a role in the origin of the prolapse are also present in the recurrence. There are other factors which also have to be included such as the preoperative grade of prolapse, the type of surgery, the experience of the surgeon and the postoperative complications.

There are few studies in the literature analysing which factors influence in the prolapse recurrence but they didn't clearly distinguish between anatomical and functional recurrence. *Whiteside et al* (12) found that younger women (<60 years) and those with a higher grade of prolapse (III or IV) presented a higher risk of anatomical recurrence. He didn't mention their relationship with functional recurrence. *Tegerstedt et al* (13) found that complicated delivery and urinary incontinence prior to operation were risk factors associated with anatomic recurrence and complicated delivery was the only variable associated with new or persistent symptoms after surgery. *Vakili et al.* (14) found that diminished levator ani contraction

strength and a widened genital hiatus correlate with an increased in anatomical recurrence prolapse in the early postoperative period.

The objective of the present study has been to identify which risk factors and perioperative clinical characteristics predispose both anatomical and functional recurrence of the prolapse within 5 years after surgery.

MATERIALS AND METHODS

Patients:

The study group consisted of 134 of the 228 patients who underwent primary vaginal surgery for prolapse of the pelvic organs between 2000 and 2001. The surgery performed included vaginal hysterectomy, anterior colporrhaphy or posterior colporrhaphy.

The characteristics of all patients (n=228) and the perioperative data were obtained retrospectively from the patients clinical histories (Table I). The perioperative grade of the prolapse was classified between I and IV (Baden classification) (15). We observed that the characteristics of the women who were not included in the study were similar to those included, except for age. The mean age of the women who did not attend the follow-up visit was higher. None of the patients included in the study had a prior surgery for POP and only two had a previous total abdominal hysterectomy for another reasons.

Surgical procedure:

In the group of 134 patients that formed the study population, a total of 120 vaginal hysterectomies had been performed using the classical surgery described for prolapse associated with vaginal vault suspension to the uterosacral ligaments, 127 anterior colporrhaphies and 124 posterior colporrhaphies. Table I shows the different types of intervention affecting one, two or the three compartments. The most frequent intervention was vaginal hysterectomy associated with anterior and posterior colporrhaphy (81.3%). In 23 (17.2%) patients, the POP surgery was associated with tension free vaginal tape for the treatment of urinary stress incontinence. The 88.8% of the operations were performed by senior surgeons, that is, surgeons who had previously performed more than 20 similar operations. Spinal anaesthesia was used in 72.4% and general anaesthesia in 27.6%. All patients received antibiotic and antithrombotic prophylaxis before surgery.

The postoperative complications recorded were the following: 11 urinary tract infections, 3 voiding difficult, 1 vaginal vault abscess, 2 vaginal vault haematomas and 2 major postoperative haemorrhages.

Follow-up:

The follow-up visits were performed during the months of November and December in 2005. The patients were localized by the telephone number that was registered in the hospital. We invited them to be evaluated by an experienced gynaecologist at the hospital. We asked them for a voluntary participation with the objective of analysing the results of the surgery five years after it. From the total, 134 agreed with the participation (58.8%), 51 accepted a telephone interview (22.4%), 21 were unable to be localized (9.52%), 10 were too old or had an invalidating disease (4.4%), 6 declined the invitation (2.6%) and 6 had died at the time of the study (2.6%). All the women that accepted to participate singed out a consentient before enrolment.

The history taken was focused on the known risk factors for pelvic organ prolapse. The factors included age, weight, height, family history of prolapse, presence of abdominal hernias or antecedent of abdominal hernias surgery, collagen diseases, constipation, chronic bronchopulmonary disease associated with chronic cough and intense physical exertion defined as repeated putting on heavy weight. We also asked about the number and route of deliveries, the age at the last delivery and a prior gynaecological surgery. The history also included the recurrence of prolapse-related symptoms, as feeling of a lump in the genital area or any other symptom that had had prior to surgery. Finally, the patients were invited to make a subjective evaluation of the results of the surgery. We asked them if they considered themselves to be cured by the surgery, or had a notable improvement, or had a discrete improvement, or were similar or were worst.

All patients fulfilled a symptom and quality of life questionnaire for urogenital prolapse described by Digesu (16). This questionnaire was not validated in Spanish language, thus we translated it from English.

Pelvic examination was performed in all cases with the woman in the lithotomy position under maximal straining (17) and by the same experienced gynaecologist, using the Pelvic Organ Prolapse Quantification (POPQ) staging system validated by the International Continence Society (ICS) (18).

For the functional evaluation of pelvic floor muscles we instructed the women the way of doing a levator ani contraction. The contraction strength was recorded using the Oxford 0-5 Classification Scale of Muscle Strength used by physiotherapists and modifies for the pelvic floor (19). The contraction strength was assigned a value from 0-5 as follows: 0, no contraction; 1, flicker; 2, weak contraction; 3, moderate contraction; 4, good contraction; and 5, strong contraction.

Anatomical recurrence was defined as any prolapse equal to or greater than grade II of the POPQ classification (12). Symptomatic recurrence was defined as the presence of prolapse-related symptoms or any symptom that was similar to those prior to surgery.

Statistical analysis of the data:

The statistical analysis was performed using the SPSS statistical software (version 13.0 for windows).

Association of the clinical and demographic characteristics with the recurrence of the prolapse was performed by a univariate descriptive analysis. The variables studied were the following: age, family history of prolapse, abdominal hernias, constipation, chronic bronchopulmonary disease, intense physical exertion, body mass index, weight, parity, advanced prolapse grade prior to surgery (grade III-IV) in any compartment, experience of the

surgeon and levator muscle contraction. The continuous variables age, weight, parity and levator contraction were categorised forming 2 subgroups. For age: < 60 years and ≥ 60 years; for weight: <65 kg and ≥65 kg; for parity: nulliparous and parous; for muscle contraction: < 3 and ≥ 3 in the Oxford scale. All the statistical tests were evaluated with a significance level of 0.05. A multiple logistic regression model was performed with the variables of borderline statistical significance in order to identify the factors independently associated with recurrence of the prolapse.

We also studied the association between the presurgical grade of prolapse and anatomical recurrence in the same compartment. We did a univariate analysis for each compartment including preoperative grade of prolapse in that compartment and the rest of the risk factors mentioned above. Grade of prolapse was categorised in two groups: lower (I-II) and advanced (III-IV). A multiple regression model was performed with the variables of borderline statistical significance in all cases.

This study was approved by the Local Ethics and Management Committee of Donostia Hospital.

RESULTS

Five years after surgery, 42 of 134 (31.3%) women presented anatomical criteria of failure in one or more compartments. None of the patients without anatomical recurrence were symptomatic. Only 10 of the 134 (7.4%) had functional surgical failure. In total, two of the 134 women had a second operation for POP. All the symptomatic patients were offered surgical correction and only one woman with a grade II prolapse of the vault associated with an enterocele, have accepted to be programmed for surgery.

Specific sites of recurrence both anatomical and symptomatic are shown in Table II. We can see that anatomical recurrence was more frequent when surgery was performed in the anterior compartment (19.7%), followed by the posterior (15.3%) and apical (6.7%) compartments. In all cases, the predominant degree of prolapse was of grade II. The anatomical recurrence affected one compartment in 34 patients (80.9%), two compartments in 6 (14.3%) and the three in 2 (4.8%). The symptomatic recurrence affected 7 women with anatomical recurrence in only one compartment, one with anatomical recurrence in two compartments and the two with anatomical recurrence in the three compartments. These two women were the ones that had a second operation for POP.

Additionally, 6 of 134 (4.5%) patients presented POPQ grade ≥ II in one compartment that had not been previously operated. In all cases the preoperative grade of prolapse in that compartment was ≤ I. In these six patients the prolapse affected only one compartment and was distributed as follows: one anterior, one apical and four posterior. Three of the patients with posterior prolapse compartment were symptomatic.

For the study of the risk factors associated with anatomical recurrence we established two groups. One with the 92 patients, with no criteria of anatomical failure and the other with the 42 patients who satisfied the criteria of failure. The women with anatomical recurrence

were younger (mean age 60.5 years vs. 64.88 years; *P*=.024), had a higher body weight (mean weight 70.40 kg vs. 64.47 kg; *P*=.001), higher BMI (mean BMI, 27.60 vs. 26.34; *P*=0.071) and more advanced prolapse in at least one compartment prior to surgery (*P*=0.002). Age, weight, parity and levator contraction were categorised as mention before. We chose the cut-off points of 60 years for age and 65 kg for weight, because the univariate analysis between the categorized groups and recurrence showed the maximal differences with those values. The levator contraction strength was categorized in two groups taking into account the capability of doing a normal contraction (≥ 3 of the Oxford modified scale). Table IV shows the results of the univariate analysis performed to associate anatomical recurrence with different characteristics of the subjects. We didn't include the personal antecedent of previous hysterectomy because we only had two cases and none of them presented recurrence.

A multiple logistic regression model was performed with the variables of borderline significance to determine which patients' characteristics were associated independently with recurrent prolapse. The following variables were included: age, parity, weight, intense physical exertion, advanced prolapse grade prior to surgery in any compartment and surgeon experience. We observed that age < 60 years (OR 4.06; 95% CI, 1.58-10.42; *P*=.004), body weight >65 kg (OR 3.96; 95% CI, 1.63-9.63; *P*=0.002) and presurgical advanced prolapse in any compartment (OR 3.93; 95% CI, 1.19-12.97; *P*=0.025) appear to have a greater likelihood of anatomical recurrent prolapse within five years.

We also studied the relationship between the grade of prolapse prior to surgery and the specific anatomical recurrence in the same compartment. We established two different groups for each compartment and we performed a univariate analysis including the risk factors mentioned above (data not shown) and the preoperative grade of prolapse categorised in two groups (I-II and III-IV). The results are shown in table V. In the apical and posterior compartment, more advanced prolapse was associated to recurrence (*P*=0.002 and *P*=0.16

respectively). A multiple logistic regression model was performed with the variables with significative differences. For the apical compartment we included age, chronic pulmonary disease and grade of prolapse. In the case of the posterior compartment we included chronic pulmonary disease, abdominal hernias and grade of prolapse. We did not find significative association between advanced grade of prolapse and anatomical recurrence in any compartment.

We also studied the relationship between risk factors and functional failure. The results of the univariable analysis performed are shown in table VI. We didn't found statistical significative association between advanced presurgical grade of prolapse in any compartment and symptomatic recurrence (P=0.76). The multiple logistic regression model with the variables of borderline significance which were age, weight and the present of bronchopulmonary diseases showed that younger women (<60 vs. ≥60; P=0.002) and higher weight (>65 vs. ≤ 65; P=0.045) were independently associated with functional failure.

We didn't analyse the relationship between recurrence and postoperative complications because we had a very low number of cases. The two women, who have had vaginal vault haematomas, had anatomical and symptomatic recurrence in the follow up visit. The women with the abscess presented anatomical recurrence only. In the urinary tract infection group (11), two had anatomical failure and one was symptomatic. In the voiding difficulty group (3) only one had anatomical recurrence. None of the patients that presented major postoperative haemorrhages (2) had recurrence of POP.

Interrogation of the subjective evaluation of the results of the surgery revealed that 118 (88.8%) considered themselves to be cured by the surgery, 7 (5.2%) had notable

improvement, 2 (1.5%) had discrete improvement, 3 (2.2%) were similar and 3 (2.2%) were worst.

DISCUSSION

Recurrent prolapse after surgery is a difficult and complicated problem. First of all it is not well defined what is success or failure with prolapse surgery. In many cases it had been defined prolapse failure in purely anatomic recurrence. However, we had demonstrated that there is a poor correlation between anatomic prolapse recurrence and prolapse-related symptoms. Moreover all asymptomatic patients considered then cured by surgery, including those who had an anatomical recurrence. Thus, should we have to do a second and more aggressive surgery in anatomical recurrent patients, or should we leave them with hers asymptomatic prolapse recurrence? Is it necessary to introduce other surgical procedures as reinforcement with graft materials, to prevent an anatomical failure that in most cases is asymptomatic? If we were able to find a surgery technique with better functional results and out of adverse effects, it should be introduce. But at the moment, and taking into account the complications that had been published within the insertion of meshes in the vaginal surgery for POP (20, 21), we should be careful with its use. Surely, we should leave them for symptomatic recurrence in which surgery is mandatory.

Another important problem with POP surgery is that little is known about the risk factors that prevent or promote surgical failure. These factors had been analyzed only in a few studies in the literature and without distinguishing between anatomical recurrence and symptomatic recurrence. It is important to determinate these factors if we want to understand why prolapse surgery fails and how to prevent it. We have analysed the factors that could be associated with anatomical recurrence, including the known risk factors for POP and some perioperative characteristics of the patients and surgery.

The known risk factors for POP were included in the *Bump and Norton* (4) model for the onset of pelvic floor dysfunction. Among the inciting factors, parity had been associated with POP in different studies (5, 6, 22, 23). The manner in which parity influences the

changes in the pelvic floor is still to be explained. Some authors suggest that the damage to the levator muscle of the anus during second stage of delivery is crucial (24). However, changes occurring during gestation cannot be excluded. *MacLennan et al* (25) suggested that it is the pregnancy rather than the delivery that predisposes to pelvic floor dysfunction. In their study they found that caesarean section was not associated with a significant reduction in pelvic floor pathology compared to spontaneous vaginal delivery.

In any case, the changes on the pelvic floor that onset secondary to pregnancy or vaginal deliveries should persist after POP surgery, thus parity should be expected to be a risk factor in the recurrence. In our study we only had six nulliparous women and none of them had recurrence. However, it was difficult to determinate the association between failure and parity because of the reduced number of cases. We also try to investigate the damage on the levator anus muscle testing its contractility. We found that there was only a little association between none or weak contractility and recurrence.

With the delivery damage onset, there are promoting factors that facility the prolapse. It is well established that obesity is a risk factor for POP (5, 6). We have demonstrate an independently association between weight > 65 kg and recurrence both anatomic and symptomatic. There were also association closed to statistical significance between higher BMI and surgery failure in the univariate analysis.

We preferred to use the weight rather than the BMI in our multivariate analysis, because the difference of the means weight between the groups was higher than the difference of the means BMI in the univariate study. But also, because we thought that what it's really important in the damage of pelvic floor is the constant force exerted on it. Other authors had also evaluated this idea. They used the abdominal circumference which is directly associated with body weight. *Hendrich et al* (5) concluded that abdominal circumference greater than 88 cm. increased the risk of cystocoele and rectocoele by 17% and *Handa et al* (26)

demonstrated that a high abdominal circumference was associated with progression of the cystocoele.

We didn't find any significative association in the multivariate analysis between recurrence and the rest of promoting factors such as bronchopulmonary disease or intense physical exertion. We expected those findings because their relationship with POP had also been poorly demonstrated in the literature (9).

Finally in the *Bump and Norton* model, there were described some descompensating factors that influence over the rest and facility the onset of pelvic floor dysfunction. Overall aging is the most important. Prevalence and incidence studies demonstrate an increase of POP with increasing age (5, 6, 23). It is possible that, apart from the characteristics specific to aging, other risk factors have a greater period of action in older women. In our population the mean age for prolapse surgery was 63. 51 (range: 37-84). We also found that more advanced prolapse of the anterior and apical compartment were present in older women with significative statistical differences (data not shown). When we analysed the association between age and recurrence we found out that younger women (<60 years) were associated with an increase risk of anatomical and functional recurrence. *Whiteside et al* also indicated an increased risk of anatomical recurrence associated with younger women (12). They explain that the early onset of the prolapse could be associated with an inferior tissue quality and greater nerve, muscle or fascial injury and that may justify the higher risk of recurrence in this population.

We have also studied the relationship between preoperative grade of prolapse and recurrence. First we analysed the association between advanced grade of prolapse in any compartment and surgical failure as other authors have done before (12). We found association with the anatomical recurrence but not with symptomatic. Second we compared presurgical grade of prolapse and compartment specific recurrence, because we thought it

would give us more information in terms of individualized treatment or prevention. We found univariable associations between higher grade of prolapse and recurrence for the apical and posterior compartment, but in the multivariate logistic regression analysis we loosed that association. These discrepancies with the results when we analysed site specific recurrence should be produced by the fact that the preoperative grade of prolapse depends on different factors. Not only the degree of damage of vaginal tissues, but also the age at onset of the prolapse and how fast did it reach to advanced grades. We also have to mention that there is broadmindedness in the indication for POP surgery and it depends more on symptoms and the grade of bother than on the anatomical prolapse grade.

Finally we have to mention that we didn't find any association between the diminished levator ani contraction strength and the anatomical or functional recurrence. *Vakily el al.* (14) found an association between anatomical recurrence and diminished levator ani contraction strength in the early postoperative period. The fact that our patients were explored far away from surgery should affect our results. Other factors might influence in the contraction strength such as exercise the pelvic floor muscles for the treatment of urinary incontinence or the muscle changes secondary to aging.

The results of our study are limited by the fact that this is an observational study. Furthermore, the grade of preoperative prolapse was evaluated by other gynaecologists and the variability between explorations could affect the results obtained. Also, not all the women who underwent surgery attended the follow-up visit. The inclusion of all the women may have modified the results.

Recurrence of the prolapse after surgery is a difficult and complicated problem, both with regard to prevention and to treatment. Moreover, it is not well defined what is success or

failure with prolapse surgery. Despite the limitations of our study, we have demonstrated that a higher weight and lower age is associated with a greater probability of anatomical and functional recurrence. We have also seen that anatomical recurrence does not correlate with symptomatic failure. We believe that recurrence should be appropriately defined taking into account both anatomical and clinical factors, thus we could be able to establish an appropriate instrument for the evaluation of the results of surgery.

REFERENCES

1. Beck RP (1983) Pelvic relaxational prolapse. In: Kase NG, Weingold AB (Eds) Principles and practice of clinical gynaecology. New York, John Wiley & Sons, pp 677-85

2. Olsen AL, Smith VJ, Bergstrom Jo, Colling JC, Clark AL (1997) Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. Obstet Gynecol 89: 501-06

3. Swift S, Woodman P, O'Boyle A, Kahn M, Valley M, Bland D, Wei Wang, Schaffer J (2005) Pelvic Organ Support Study (POSST): The distribution, clinical definition and epidemiologic condition of pelvic organ support defects. Am J Obstet Gynecol 192: 795-806

4. Bump R, Norton PA (1998) Epidemiology and natural history of pelvic floor dysfunction. Obstet Gynecol Clin North Am 25: 723-46

5. Hendrix S, Clark A, Nygaard I, Aragaki A, Barnabei V, McTiernan A (2002) Pelvic organ prolapse in the Women`s Health Initiative: Gravity and gravidity. Am J Obstet Gynecol 186: 1160-66

6. Progetto Menopausa Italia Study Group (2000) Risk factors for genital prolapse in non-hysterectomized women around menopause. Results from a large cross-sectional study in menopausal clinics in Italy. Eur J Obstet Gynecol Reprod Biol 93:135-40

7. Gill EJ, Hurt WG (1998) Urogynecology and pelvic floor dysfunction. Obstet Gynecol Clin North Am 25:757-69

8. Dietz HP, Steensma AB (2006) The prevalence of major abnormalities of the levator ani in urogynaecological patients. BJOG 113:225-30

9. Burgio K, Clark A, Lapitan MC, Nelson R, Sillén U, Thom D (2004) Epidemiology of urinary (IU) and faecal (FI) incontinence and pelvic organ prolapse (POP). In: 3rd International Consultation on Incontinence (ICI). Paris, France, pp 257-312

10. Clark A, Gregory T, Smith V, Edwards R (2003) Epidemiologic evaluation of reoperation for surgically treated pelvic organ prolapse and urinary incontinence. Am J Obstet Gynecol 189: 1261-67

11. Schull BL, Bachofen C, Coates KW, Kuehl TJ (2000) A transvaginal approach to repair of apical and other associated sites of pelvic organ prolapse with uterosacral ligaments. Am J Obstet Gynecol 183: 1365-1374

12. Whiteside J, Weber A, Meyn LA, Walters MD (2004) Risk factors for prolapse recurrence after vaginal repair. Am J Obstet Gynecol 191:1533-38

13. Tegerstedt G, Hammarström M (2004) Operation for pelvic organ prolapse: a follow-up study. Acta Obstet Gynecol Scand 83: 758-63

14. Vakili B, Zheng YT, Loesch H, Echols KT, Franco N, Chesson RR (2005) Levator contraction strength and genital hiatus as risk factors for recurrent pelvic organ prolapse. Am J Obstet Gynecol 192: 1592-98

15. Baden WF, Walter TA, Lindsay HJ (1968) The vaginal profile. Tex Med J 64:56-58

16. Digesu GA, Khullar V, Cardozo L, Robinson D Salvatore S. (2005) P-QOL: a validated questionnaire to assess the symtoms and quality of life of women with urogenital prolapse. Int Urogynecol J Pelvic Floor Dysfunct 16:176-81

17. Swift SE, Herring MD (1998) Comparison of pelvic organ prolapse in the dorsal lithotomy versus the standing position. Obstet Gynecol 91: 961-64

18. Bump RC, Mattiason A, Bo K, Brubaker LP, DeLancey JO, Klarskov P, Shull BL, Smith AR (1996) The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. Am J Obstet Gynecol 175: 10-17

19. Laycock J (1991) Incontinence. Pelvic floor re-education. Nursing (Lond) 25;4 (39):15-7

20. Norton P (2006) New technology in gynecology surgery. Is new necessary better? (2006) Obstetrics & Gynecology 108 (N.3 part 2): 707-08

21. Baessler K Maher CF (2006) Mesh augmentation during pelvic-floor reconstructive surgery: risks and benefits. Curr Opin Obstet Gynecol 18: 560-66

22. Chiaffarino F, Chatenoud L, Dindelli M, Meschia M, Buonaguidi A, Amicarelli F, Surace M, Bertola E, Di Cintio E, Parazzini F (1999) Reproductive factors, family history, occupation and risk of urogenital prolapse. European Journal of Obstetrics and Gynecology 82: 63-67

23. Mant J, Painter R, Vessey M (1997) Epidemiology of genital prolapse: observations from the Oxford Family Planning Association study. British J Obstetric and Gynecol 104: 579-85

24. DeLancey, JO. (2005) The hidden epidemic of pelvic floor dysfunction: Achievable goals for improved prevention and treatment. Am J Obstet Gynecol 192: 1488-95

25. MacLennan AH, Taylor AW, Wilson DH (2000) The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. British J Obstetric and Gynecol 107; 1460-70

26. Handa V, Garrett E, Hendrix S, Gold E, Robbins J (2004) Progression and remission of pelvic organ prolapse: A longitudinal study of menopausal women. Am J Obstet Gynecol 190: 27-32

FIGURE I. Risk factors associated with prolapse (*).

Predisposing factors

- Race
- Anatomy
- Collagen
- Levator muscle strength

Inciting factors

- Vaginal delivery
- Radical surgery
- Radiotherapy

Promoting factors

- Obesity
- Bronchopulmonary disease
- Constipation
- Physical exertion

Descompensating factors

- Aging
- Demencia
- Medication
- Concomitant diseases

* Modified from Bump R, Norton PA (1998) Epidemiology and natural history of pelvic floor dysfunction. Obstet Gynecol Clin North Am 25: 723-46.

TABLE I. Characteristics of the 228 patients who underwent primary vaginal surgery for POP.

		Attended follow-up visit n = 134	Did not attended follow-up visit n =98
Mean age (years, range)		63.5 (37-84)	69.8 (38-88)
Mean parity (n, range)		3.09 (0-9)	3.18 (1-10)
POP surgery performed (n, %)			
• Vaginal hysterectomy (only)		1 (0.7)	3 (3.2)
• Vaginal hysterectomy with anterior colporrhaphy		5 (3.7)	6 (6.4)
• Vaginal hysterectomy with posterior colporrhaphy		5 (3.7)	4 (4.3)
• Vaginal hysterectomy with anterior and posterior colporrhaphy		109 (81.3)	70 (74.5)
• Anterior colporrhaphy (only)		4 (3)	4 (4.3)
• Posterior colporrhaphy (only)		1 (0.7)	2 (2.1)
• Anterior and posterior colporrhaphy (only)		9 (6.7)	4 (4.3)
Preoperative examination (n, %)			
• Cystocele	I-II	58 (43.3)	38 (40.4)
	III-IV	76 (56.7)	56 (59.6)
• Uterine prolapse	I-II	78 (58,2)	54 (57.4)
	III-IV	56 (41,8)	40 (42.6)
• Rectocele	I-II	124 (92.5)	89 (94.7)
	III-IV	10 (7.5)	5 (5.3)

TABLE II. Distribution of the anatomical recurrence and symptomatic recurrence 5 years after surgery in each compartment.

COMPARTMENT	Operations performed (n)	ANATOMICAL RECURRENCE*	SYMPTOMATIC RECURRENCE	
			Without anatomical recurrence	With anatomical recurrence**
ANTERIOR (n, %)	127	25 (19.7)	0 (0)	7 (5.5)
APICAL (n, %)	120	8 (6.7)	0 (0)	5 (4.2)
POSTERIOR (n, %)	124	19 (15.3)	0 (0)	3 (2.4)

(*) There were six patients with anatomical recurrence in two compartments and two in the three.

(**) There were one patient with symptomatic recurrence with anatomical recurrence in two compartment and two patients in the three.

TABLE III. Relationship between anatomical recurrence and symptomatic recurrence.

		ANATOMICAL RECURRENCE		
		NO (n, %)	YES (n, %)	TOTAL (n, %)
SYNTOMATIC RECURRENCE	NO (n)	89 (98.9)	32 (76.2)	121 (92.4)
	YES (n)	0 (0)	10 (23.8)	10 (7.6)
	TOTAL (n)	89 (67.9)	42 (32.1)	131*

(*) We excluded 3 patients that had prolapse symptoms but the prolapse affected only a compartment that was not previously operated.

TABLE IV. Univariate comparison of the characteristics of the 98 without and 42 with anatomical recurrence 5 years after vaginal surgery.

		No anatomical recurrence n= 92	Anatomical recurrence n=42	*P* value
Mean parity (n)		2.98	3.33	0.227
Mean age at last delivery (years)		33.39	33.81	0.688
Age (years)	< 60 (n, %)	27 (29.3)	20 (47.6)	0.04
Weight (kg)	> 65 (n, %)	35(38)	29 (69)	0.001
Familiar history of POP	Yes (n, %)	25 (27.2)	12 (28.6)	0.867
Abdominal hernias	Yes (n, %)	13 (14.1)	3 (7.1)	0.247
Constipation	Yes (n, %)	19 (20.7)	7 (16.7)	0.588
Bronchopulmonary diseases	Yes (n, %)	5 (5.4)	5 (11.9)	0.286
Intense physical exercise	Yes (n, %)	37 (40.2)	22 (52.4)	0.188
Parity	Yes (n, %)	86 (93.5)	42 (100)	0.176
Levator muscle contraction	< 3 (n, %)	66 (71.7)	33 (78.6)	0.404
Surgeon’s experience	Junior	8 (8.7)	7 (16.7)	0.176
Presurgical grade of any prolapse	III-IV	65(70.7)	37(88.1)	0.002

TABLE V. Univariate comparison of the preoperative grade of prolapse and risk of anatomical recurrence in the same compartment.

			ANATOMICAL RECURRENCE		
COMPARTMENT	Operations performed (n)	Preoperative prolapse grade	NO (n, %)	YES (n, %)	*P* value
ANTERIOR	127	I-II	41 (40.2)	10 (40)	0.986
		III-IV	62 (59.8)	14 (60)	
APICAL	120	I-II	64 (57.1)	0 (0)	0.002
		III-IV	48 (42.9)	8 (100)	
POSTERIOR	124	I-II	98 (93.3)	16 (84.2)	0.179
		III-IV	7(6.7)	3 (15.8)	

TABLE VI. Univariate comparison of the characteristics of the 124 without and 10 with symptomatic recurrence 5 years after vaginal surgery.

		No symptomatic recurrence n= 124	Symptomatic recurrence n=10	*P* value
Age (years)	< 60 (n, %)	38 (30.6)	9 (90)	0.000
Weight (kg)	> 65 (n, %)	57 (46)	7 (70)	0.193
Familiar history of POP	Yes (n, %)	34 (27.4)	3 (30)	1
Abdominal hernias	Yes (n, %)	15 (12.1)	1 (10)	1
Constipation	Yes (n, %)	26 (21)	0 (0)	0.209
Bronchopulmonary diseases	Yes (n, %)	8 (6.5)	2 (20)	0.163
Intense physical exercise	Yes (n, %)	53(42.7)	6 (60)	0.335
Parity	Yes (n, %)	118 (95)	10 (100)	0.475
Levator muscle contraction	< 3 (n, %)	75 (60.5)	6 (60)	1
Surgeon’s experience	Junior	15 (12.1)	0 (0)	0.602
Presurgical grade of any prolapse	III-IV	94 (75)	8 (80)	0.76