Influence of Patient’s Age on the Outcome of Vaginal and Laparoscopic Procedures in Urogynaecology

Einfluss des Patientenalters auf das Outcome vaginaler und laparoskopischer Eingriffe in der Urogynäkologie

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Key words
prolapse surgery, incontinence surgery, urogynaecological surgery, pelvic organ prolapse, older patient

Schlüsselwörter
Deszensusoperationen, Inkontinenzoperationen, urogynäkologische Operationen, Descensus genitalis, ältere Patientin

ABSTRACT
Introduction In the treatment of prolapse and incontinence, the choice of surgical procedure often depends not only on the clinical findings but also on the age of the patient. Uncertainty exists at present regarding the effect of patient age on treatment outcomes for both vaginal and laparoscopic procedures. The aim of this study is therefore to compare both the anatomical outcome after prolapse surgery and the functional outcome after incontinence surgery in the context of the treatment of stress urinary incontinence in older and younger patients.

Patients/Methods This is a retrospective single-centre study conducted at a university site. Over the study period, a total of 407 women underwent surgery, 278 of whom were < 70 and 129 ≥ 70 years of age. They were assigned to one of three treatment groups (prolapse surgery, incontinence surgery or a combination of both types of surgery) and were then subjected to statistical analysis after assessment of the anatomical and functional outcome after 3–6 months.

Results The most common form of prolapse among the 407 evaluated patients was in the anterior and middle compartment, with a higher degree of severity being diagnosed in the older patients. Grade 4 prolapse according to the Baden–Walker system was thus present in the anterior compartment in 15.6 vs. 28.8% (p = 0.033) and in the middle compartment in 5.7 vs. 23.7% (p < 0.001) of cases. Younger women underwent vaginal mesh implantation less frequently and laparoscopic sacropexy more frequently for this overall. The proportion of cases of combined prolapse and incontinence surgery was the same in both groups. Overall, high success rates were observed in both younger and older patients following prolapse and incontinence surgery. These rates were 93.5 vs. 84.8% (p = 0.204) after prolapse surgery and 92.8 vs. 84.2% (p = 0.261) after incontinence surgery. A significant disadvantage for the older patients was the persistence of stress urinary incontinence after prolapse surgery alone (19.6 vs. 50%, p = 0.030) and the rate of occult (de novo) stress urinary incontinence (7.4 vs. 20%, p = 0.030).
Conclusion Our data show that both pelvic organ prolapse and stress urinary incontinence can be treated with surgery with good results in women aged ≥70 years. It was thus possible to show for the first time in a large patient population that older women should not be denied appropriate surgery but can be offered the same range of surgical options as younger patients.

ZUSAMMENFASSUNG


Ergebnisse Die häufigste Form des Deszensus bei den 407 ausgewerteten Patientinnen lag im Bereich des vorderen und mittleren Kompartment, wobei bei den älteren Patientinnen ein höherer Schweregrad diagnostiziert wurde. So lag ein Deszensus Grad 4 nach Baden Walker im vorderen Kompartment in 15,6 vs. 28,8% (p = 0,033) und im mittleren Kompartment in 5,7 vs. 23,7% (p < 0,001) vor. Jüngere Frauen er- hielten insgesamt seltener eine vaginale Netz einlage, dafür häufiger eine laparoskopische Sakropexie. Der Anteil kombi- nierter Eingriffe aus Deszensus- und Inkontinenz-OP waren in beiden Gruppen gleich. Insgesamt zeigten sich sowohl bei den jüngeren als auch bei den älteren Patientinnen hohe Erf- folgsraten nach Deszensus- sowie Inkontinenzoperationen. Diese lagen nach einer Deszensusoperation bei 93,5 vs. 84,8% (p = 0,204) und nach einer Inkontinenzoperation bei 92,8 vs. 84,2% (p = 0,261). Ein signifikanter Nachteil für die älteren Pa- tientinnen bestand in der Persistenz einer Belastungsinkonti- nenz nach alleiniger Deszensusoperation (19,6 vs. 50% p = 0,030) sowie bei der Rate der larvierten (De-novo-)Belas- tungsinkontinenz (7,4 vs. 20% p = 0,030).


Introduction

Functional pelvic floor disorders in the form of prolapse and uri- nary incontinence are common in the female population [1]. Ac- cording to current data, the average lifetime risk of a woman de- veloping urinary incontinence for which treatment is indicated is 13.6%, the peak age group being 71–72 years. The average risk of developing prolapse for which treatment is indicated is 12.6% with the age-specific risk increasing up to the age of 75 years [2].

In older people, besides considerably impairing quality of life, prolapse and urinary incontinence are often associated with a va- riety of medical, social and economic problems and constraints which can even have a detrimental effect on the mental state of those affected [3,4].

In Germany, urinary incontinence represents the second most important reason for receiving nursing care at home, after loss of mobility; up to 50% of admissions to elderly care homes are as a direct or indirect result of incontinence, and approx. 25% of the working day of the care staff in these homes is taken up by dealing with incontinence [5–7]. Going forward, there is reason to believe that the trend will continue as a result of the anticipated continu- ing increase in life expectancy, since statistical data illustrate the global demographic trend towards longevity [5,8]. The higher life expectancy of women leads to a shift in the gender balance in fav- our of women in old age and thus also to an increasing demand for treatment for urogynaecological conditions [9].

Although conservative treatment is often not sufficient for prolapse or incontinence, older patients are often denied access to surgical measures on age grounds alone and because of fears of the possible complications of surgery [10]. Besides this reluctance to select patients for surgery, uncertainty exists with regard to the anatomical and functional outcome of treatment to be ex- pected in older compared with younger patients. This also applies in particular to the outcome to be expected with regard to bladder function after prolapse surgery. Not only is the number of previous studies on this subject small, but the results are conflicting in some cases and there is insufficient comparability because of differences in methodology [11,12].

For this reason, the aim of this study is to compare both the anatomical outcome after prolapse surgery and the functional outcome after incontinence surgery in the treatment of stress uri- nary incontinence in older and younger patients.

Material and Methods

This retrospective study involved recording the data of all urogy- naecological patients who had undergone surgical treatment for symptomatic pelvic organ prolapse (POP-Q ≥II, B–W ≥2), pure stress urinary incontinence or both conditions simultaneously in
the Department of Gynaecology of Saarland University. As a general rule, the stress urinary incontinence was diagnosed and further evaluated by means of urodynamic studies and the Bonney test. In the case of borderline findings, a pad test was also used. The single inclusion criterion for the study was surgical treatment performed for the aforementioned indications. Patients with mixed urinary incontinence were excluded. The patient data were collected consecutively.

**Patient population**

All data for the period from July 2012 to the end of December 2014 were evaluated. The study period was therefore 2.5 years. With the end of acquisition period on 30.06.2015, the postoperative follow-up period, during which the surgical outcome was recorded and assessed, is between 3 and 6 months.

The age cutoff for distinguishing between younger and older patients was 70. Over the study period, a total of 407 women underwent surgery, 278 of whom were <70 and 129 ≥70 years of age.

**Procedures performed**

For patients suffering from a combination of symptomatic prolapse and concomitant stress urinary incontinence, we generally recommended a two-stage procedure. This involves first surgically repairing the prolapse and then reassessing the stress urinary incontinence and, if necessary, treating it by means of incontinence surgery. In selected cases, e.g. where the level of suffering was very high or if a patient requested it specifically, a one-stage procedure was also sometimes selected, i.e. the incontinence and prolapse surgery were combined.

Three treatment groups were defined in this study to assess the outcome: patients undergoing prolapse surgery, incontinence surgery or a combination of the two types of surgery. The data were compared between the two age groups, the younger (≤70 years) and the older (≥70 years) patients.

**Data entry and evaluation**

In all cases, prolapse quantification was carried out in accordance with the Baden–Walker half-way system (B–W). Quantification in accordance with the Pelvic Organ Prolapse Quantification System (POP-Q) was also carried out by the Head of the Urogynaecology Section. It was the aim of this study to define treatment success after prolapse surgery as POP-Q ≤1 based on the criteria of the International Continence Society (ICS).

The data were taken from both the digitised outpatient and the inpatient documentation. Details of the applied procedures, the intraoperative course and potential complications were obtained from the operative report in the patient’s chart. The patients’ ASA score was documented in the anaesthetic record. We defined the length of stay in hospital as the time from postoperative day 1 up to and including the day of discharge.

The surgical outcome was derived from the findings of the postoperative examination performed during the inpatient stay before discharge. As part of this final examination, an ultrasound measurement of residual urine was also performed and specific questions were asked about continence. All patients were asked to attend the Urogynaecology Clinic for follow-up 3 months after surgery, to enable any early recurrences or postoperative complications to be documented.

Any occurrence of occult stress urinary incontinence after prolapse surgery was also assessed and the outcome of pre-existing stress urinary incontinence determined within the context of postoperative follow-up.

The statistical analysis was performed using IBM SPSS Version 22. The t-test was used for continuous variables, provided that they were approximately normally distributed, and the Mann-Whitney U test when the data did not have an approximately normal distribution. Descriptive statistics were described in terms of mean and standard deviation for normally distributed data and median and interquartile range (IQR) for non-normally distributed data. Group differences in the case of categorical variables were evaluated using the \( \chi^2 \) test. If the expected frequency here was <5 for at least one field, Fisher’s exact test was used. The distribution of the categorical variables was described in terms of the absolute number and the percentage.

**Results**

**Characteristics of the patient population**

During the study period, 407 uro-gynaecological operations were evaluated in total, with 278 of the patients (68.3%) falling into the younger and 129 (31.7%) into the older (≥70 years) group. The mean age in both groups was 55.60 ± 8.94 and 75.41 ± 4.05 years respectively.

The ASA score was used as a proxy measure for pre-operative comorbidity. Overall, significantly more younger patients were classified as ASA I (11.2 vs. 0.8%; \( p = 0.001 \)) or ASA II (77.3 vs. 60.9%; \( p = 0.003 \)), and these patients were classified more rarely as ASA III (11.5 vs. 37.5%; \( p < 0.001 \)). In addition, the data relating to the detailed obstetric and hormonal history were also collected (Table 1).

**Patients’ previous surgical history**

Overall, 14.7% of the younger and 26.4% of the older patients had had at least one operation for prolapse in the anterior compartment (\( p = 0.026 \)). The most frequent previous procedure in both age groups was anterior colporrhaphy. The use of mesh in the anterior vaginal compartment was found more frequently in the history of the older patients (2.2 vs. 4.7%).

7.2% of the younger and 12.4% of the older patients (\( p = 0.142 \)) reported at least one previous operation for prolapse in the middle compartment. With regard to differences in history of surgery in the posterior compartment, no statistical significance could be established despite a higher incidence in older compared with younger patients (15.5 vs. 8.3%).

On the other hand, only 7.2% of the younger and 6.2% of the older patients had undergone surgical treatment for stress urinary incontinence prior to the study (\( p = 0.887 \)). At 48.8%, the percentage of patients with a history of hysterectomy was significantly higher in the older patient group than in the younger group (34.2% [\( p = 0.002 \)]). The most frequent surgical approach in both groups was the vaginal approach (Table 2).
Pre-operative prolapse findings
The most frequently diagnosed form of prolapse was in the ante-
rior and middle compartment, the distribution of prolapse be-
tween the different compartments remaining the same regard-
less of age group.

The severity of anterior and middle compartment prolapse did
differ significantly between the younger and older groups, howev-
er. The descent in the anterior compartment corresponded to Ba-
den–Walker grade 4 in 15.6% of the younger and 28.8% of the
older women (p = 0.033). Grade 4 prolapse in the middle com-
partment was found in 5.7% of the younger and 23.7% of the
older women (p < 0.001) (▶Table 3).

Depending on the examiner, an additional quantification of the
prolapse was also carried out in accordance with POP
-Q. This was
available for analysis for 45.3% of the younger and 45.8% of the
older patients.

Table 3 also provides a comparison of the differ-
ent stages between the age groups.

Surgical procedures used
Younger patients presented more frequently with stress urinary
incontinence for which treatment was indicated, whereas the old-
er patients presented more frequently with prolapse for which
treatment was indicated. As a result, 30.9% of the younger and
just 8.5% of the older patients underwent incontinence surgery
(p < 0.001). On the other hand, 60.1% of the < 70-year-olds and
as many as 85.3% of the ≥ 70-year-olds underwent prolapse sur-
surgery (p < 0.001).

With regard to the choice of procedure, the method used most
frequently to treat stress urinary incontinence was suburethral
sling implantation in both groups (76.7 and 90.9%).

Significant differences were identifiable between the two age
groups in terms of the choice of prolapse surgery, however. Vagi-
nal mesh implantation was less frequent among the younger than
among the older patients (19.8 vs. 42.7%; p < 0.001), with anteri-
or mesh being the most common form in both groups.

Laparoscopic sacropexy was performed significantly more fre-
quently in the younger patients, on the other hand (40.1 vs.
24.5%; p = 0.016). The most common type of sacropexy per-
formed was cervicosacropexy.

With regard to procedures performed with autologous tissue
and also in respect of concurrent procedures carried out, no sta-
tistically significant difference could be identified between the
two groups (▶Table 4).

Peri-operative data
The average operative time was 91.06 ± 65.57 minutes for the
younger patients and 96.64 ± 64.35 minutes for their older coun-
terparts (p = 0.643). In the comparison of both groups, we found

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt; 70 years</th>
<th>≥ 70 years</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>[n]</td>
<td>[n]</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>55.60 ± 8.94 [278]</td>
<td>75.41 ± 4.05 [129]</td>
<td>0.658a</td>
</tr>
<tr>
<td>BMI</td>
<td>27.20 ± 4.72 [278]</td>
<td>26.97 ± 4.05 [129]</td>
<td>0.306c</td>
</tr>
<tr>
<td>ASA score</td>
<td>[278]</td>
<td>[128]</td>
<td></td>
</tr>
<tr>
<td>▪ I</td>
<td>31 (11.2)</td>
<td>1 (0.8)</td>
<td>0.001c</td>
</tr>
<tr>
<td>▪ II</td>
<td>215 (77.3)</td>
<td>78 (60.9)</td>
<td>0.003c</td>
</tr>
<tr>
<td>▪ III</td>
<td>32 (11.5)</td>
<td>48 (37.5)</td>
<td>&lt;0.001c</td>
</tr>
<tr>
<td>▪ IV</td>
<td>0 (0.0)</td>
<td>1 (0.8)</td>
<td>0.401f</td>
</tr>
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<td>Number of births</td>
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<td>2 [2–3]</td>
<td>0.032m</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Spontaneous</td>
<td>2 [1–2]</td>
<td>2 [2–3]</td>
<td>0.005m</td>
</tr>
<tr>
<td>▪ Caesarean</td>
<td>0 [0–0]</td>
<td>0 [0–0]</td>
<td>0.006m</td>
</tr>
<tr>
<td>▪ VE/forceps</td>
<td>0 [0–0]</td>
<td>0 [0–0]</td>
<td>0.098m</td>
</tr>
<tr>
<td>BW ≥ 4000 g</td>
<td>0 [0–0]</td>
<td>0 [0–0]</td>
<td>0.628m</td>
</tr>
<tr>
<td>BW ≥ 4500 g</td>
<td>0 [0–0]</td>
<td>0 [0–0]</td>
<td>0.717m</td>
</tr>
<tr>
<td>Multipara (≥ 3)</td>
<td>68 (24.5)</td>
<td>46 (36.8)</td>
<td>0.029f</td>
</tr>
<tr>
<td>Years PMP</td>
<td>6.74 ± 6.88 [196]</td>
<td>24.36 ± 6.57 [74]</td>
<td>&lt;0.001f</td>
</tr>
<tr>
<td>Current HRT</td>
<td>33 (16.1)</td>
<td>10 (8)</td>
<td>0.066a</td>
</tr>
</tbody>
</table>

VE = vacuum extraction; BW = birth weight; PMP = post menopause; HRT = hormone replacement therapy
[n] = reference data count; expressed as: mean ± standard deviation, median [IQR] or number (%).

* t-test; ** Mann-Whitney U; † χ²; ‡ Fisher’s exact test; p-values adjusted to ”fdr”.

Table 1 General patient data.
the operative time respectively, 109.32 ± 59.75 and 101.24 ± 60.93 minutes (p = 0.643) for prolapse and 39.84 ± 35.09 and 33.09 ± 21.05 minutes for incontinence.

The postoperative reduction in the Hb level was 1.13 ± 0.77 g/dl in the younger and 1.24 ± 0.89 g/dl in the older group (p = 0.343). There was therefore no significant difference either in the length of surgery or the reduction in the Hb level.

The length of stay in hospital did differ between the two age groups, however. The median was 5 [3.50–7.00] days for the younger and 6 [2.25–8.75] days for the older patients (p < 0.001) (Table 5).

### Success after prolapse surgery

In this study, success after prolapse surgery was defined as POP-Q ≤ I. Only those cases in which pre- and postoperative POP-Q findings were recorded were used for the analysis. This applied to 77 patients in the younger and 46 in the older age group, the success rate being 93.5% in the < 70-year-old and 84.8% in the ≥ 70-year-old patients (p = 0.204). Separate assessment of prolapse surgery alone and in combination with incontinence surgery also failed to reveal any significant difference between the two age groups. The success rate in younger vs. older patients was 93.8 and 84.1% respectively after prolapse surgery alone.
The success rate after incontinence surgery, defined as complete cure of incontinence and restoration of voiding without residual urine (residual urine < 50 ml), was 92.8% among < 70-year-old and 84.2% among ≥ 70-year-old patients (p = 0.261). The assessment was carried out as part of the discharge examination on the basis of a cough stress test with natural bladder filling and ultrason sound measurement of postvoid residual urine. The same investigations were repeated as part of the follow-up examination. Separate assessment of incontinence surgery alone and in combination with prolapse surgery failed to reveal any significant difference between the two age groups. The success rates for younger vs. older patients were thus 94.2 and 100% respectively after incontinence surgery alone (p = 1) and 88 and 62.5% respectively after combined surgery (p = 0.204). The persistence of stress urinary incontinence was 19.6% in the younger and 50% in the older patient group (Table 6).

The occurrence of occult (de novo) stress urinary incontinence was identified considerably more frequently in older than in younger patients (7.4 vs. 20%, p = 0.03) (Table 6).

### Discussion

This study examined the effect of patient age on the outcome of vaginal and laparoscopic procedures in urogynaecology, taking a closer look at the fact that, as a rule, older women have been and continue to be denied the opportunity of urogynaecological surgery. In addition, the influence of prolapse surgery on bladder function was studied and compared between younger and older patients.

These investigations show that the caution exercised in the past in selecting older patients for such operations needs to be reconsidered because these patients are clearly just as likely as their younger counterparts to benefit greatly. Furthermore, the results obtained in a large patient population within the scope of this study also indicate that the separation of prolapse and incontinence surgery into a two-stage procedure remains a sensible approach as a rule – a single-stage procedure appears at best to be an alternative treatment option for the elderly patient.

The choice of 70 years as the age cutoff for distinguishing between younger and older patients is based on the definition of geriatric patients applied in Germany, which uses an age cutoff of 70 years.
of 70 years in addition to the presence of other criteria to make the distinction [13].

What is unusual about the data presented here is the extraordinarily high proportion of older patients in the study population. Unlike most other studies [14, 15] on this subject, the percentage of ≥70-year-olds in this study is 31.7%. Because these older patients, despite often having poorer general health, were offered the same range of treatments as their younger counterparts, the statements that can be made about the older patient group on the basis of these data are particularly valid.

The range of comorbidities existing prior to treatment was similar to that in other studies, both in terms of the ASA classification and with regard to the pre-operative local findings. In other words, within the study population, older patients were classified more frequently as ASA III and had significantly more severe prolapse in the anterior and middle compartment than their younger counterparts [15–19].

Regarding the surgical procedure used, older patients with prolapse also underwent reconstructive procedures (maintaining coital function), both for primary and recurrent prolapse. This means that, unlike in other studies [15, 19], obliterator procedures such as colpocleisis were avoided as a rule in favour of functional reconstruction. In terms of the choice of mesh-based reconstructive procedure, however, vaginal mesh implantation was performed more frequently in the older patients and laparoscopic sacroscopy in their younger counterparts. The reason for this was that the use of vaginal mesh implants tends to be indicated in more severe forms of prolapse and recurrences, which occur more frequently in the ≥70-year-old age group. In addition, vaginal mesh implantation can be carried out under spinal anaesthesia, thereby avoiding general anaesthesia in very old patients (Table 3).

The procedure most used for treating stress urinary incontinence was the suburethral sling for all patients, with a retropubic, transobturator or adjustable sling being indicated on the basis of clinical criteria alone, not age. Because of the much longer duration of the operation and the need for general anaesthesia, laparoscopic colposuspension was offered only to younger patients, however (Table 4).

<table>
<thead>
<tr>
<th>Table 4</th>
<th>The surgical procedures used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical procedures</td>
<td>&lt; 70</td>
</tr>
<tr>
<td>All procedures</td>
<td>n = 278</td>
</tr>
<tr>
<td>Incontinence surgery</td>
<td>86 (30.9)*</td>
</tr>
<tr>
<td>• Suburethral slings</td>
<td>79 (91.9)</td>
</tr>
<tr>
<td>• LSC colposuspension</td>
<td>7 (8.1)</td>
</tr>
<tr>
<td>Prolapse surgery</td>
<td>167 (60.1)*</td>
</tr>
<tr>
<td>Vaginal meshes</td>
<td>33 (19.8)</td>
</tr>
<tr>
<td>• Anterior mesh</td>
<td>17 (51.5)</td>
</tr>
<tr>
<td>• Posterior mesh</td>
<td>6 (18.2)</td>
</tr>
<tr>
<td>• Total mesh</td>
<td>10 (30.3)</td>
</tr>
<tr>
<td>LSC sacroscopy</td>
<td>67 (40.1)</td>
</tr>
<tr>
<td>• LSC colposacropexy</td>
<td>16 (23.9)</td>
</tr>
<tr>
<td>• LSC cervicosacropexy</td>
<td>43 (64.2)</td>
</tr>
<tr>
<td>• LSC hysterosacropexy</td>
<td>8 (11.9)</td>
</tr>
<tr>
<td>Repair with autologous tissue</td>
<td>67 (40.1)</td>
</tr>
<tr>
<td>• Colporrhaphy</td>
<td>31 (46.3)</td>
</tr>
<tr>
<td>• Amreich-R. ± colporrhaphy</td>
<td>14 (20.9)</td>
</tr>
<tr>
<td>• McCall ± colporrhaphy</td>
<td>22 (32.8)</td>
</tr>
<tr>
<td>Combined prolapse and incontinence surgery</td>
<td>25 (9.0)*</td>
</tr>
<tr>
<td>• LSC sacroprosuspension</td>
<td>4 (16.0)</td>
</tr>
<tr>
<td>• Colporrhaphy + suburethral sling</td>
<td>9 (36.0)</td>
</tr>
<tr>
<td>• McCall + colposuspension</td>
<td>3 (12.0)</td>
</tr>
<tr>
<td>• LSC lateral repair + colposuspension</td>
<td>7 (28.0)</td>
</tr>
<tr>
<td>• Other</td>
<td>2 (8.0)</td>
</tr>
<tr>
<td>Concurrent procedures</td>
<td>140 (50.4)</td>
</tr>
</tbody>
</table>

n = number; expressed as n = number and (%); percentages relate to the next higher category in each case

* percentage relates to the entire age group; ** percentage relates to prolapse surgery

TVT = tension free vaginal tape; TVT-O = transobturator TVT; LSC = laparoscopic; p-value adjusted for “fdr”.

Statistical test methods: \( \chi^2 \); p-values adjusted for “fdr”.

Regardless of the age group, analysis of the pre-operative data shows that, as expected, there is no difference between the two groups in terms of the length of surgery and the postoperative reduction in Hb levels. This is also confirmed by other authors in this way [16, 18–20].

The length of stay in hospital was admittedly longer for the older than for the younger patients. This was not for medical or surgery-related reasons in most cases, however, but was due to the logistical situation at home. Because of the different comorbidities and definitions of age in the published data, the literature on this subject is somewhat heterogeneous. For example, some authors have also reported longer stays in hospital for older patients [14, 19, 21], and others not [18].

The main focus of this study is postoperative outcomes, however. It was thus possible to show that, in specialist Urogynaecology Departments with a high level of expertise, ≥70-year-old patients can be offered the same surgical procedures as their younger counterparts and a similar success rate can be expected, in the short and medium term at least. Despite the greater severity of pre-operative prolapse generally found in ≥70-year-old patients, the postoperative outcome achieved was as good as in younger patients. Other authors have reached a similar conclusion in some cases, although in much smaller patient populations. For example, the success rate following prolapse surgery in one study, at 84.4%, was similar to that in this study with the same definition of success as POP-Q stage ≤ stage I, or slightly higher (93%) with a less strict definition of success as POP-Q stage ≤ stage II [20, 22, 23].

Other recent studies on outcome and patient safety following prolapse and incontinence surgery have, like our study, been able to show that a similarly good outcome can be achieved in very old patients to that in younger patients. Of particular significance in

### Table 5 Peri-operative patient data.

<table>
<thead>
<tr>
<th>Age group</th>
<th>&lt;70 years</th>
<th>≥70 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
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<td>[n]</td>
</tr>
<tr>
<td>Length of surgery (min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All operations</td>
<td>91.06 ± 65.57</td>
<td>[278]</td>
</tr>
<tr>
<td>Prolapse surgery</td>
<td>109.32 ± 59.75</td>
<td>[167]</td>
</tr>
<tr>
<td>IC surgery</td>
<td>39.84 ± 35.09</td>
<td>[86]</td>
</tr>
<tr>
<td>Prolapse and IC surgery</td>
<td>140 [67.5–219.5]</td>
<td>[25]</td>
</tr>
<tr>
<td>Hb reduction (g/dl)</td>
<td>1.13 ± 0.77</td>
<td>[247]</td>
</tr>
<tr>
<td>Length of stay (d)</td>
<td>5 [3.5–7.0]</td>
<td>[278]</td>
</tr>
</tbody>
</table>

[n] = reference data count; min = minutes; IC = incontinence
Expressed as mean ± standard deviation, median and [IQR]
t = t-test; m = Mann-Whitney U; p-values adjusted for “fdr”.

### Table 6 Postoperative outcome.

<table>
<thead>
<tr>
<th>Age group</th>
<th>&lt;70 years</th>
<th>≥70 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>[n]</td>
<td>[n]</td>
</tr>
<tr>
<td>Success after IC surgery</td>
<td>103 (92.8)</td>
<td>[111]</td>
</tr>
<tr>
<td>IC surgery</td>
<td>81 (94.2)</td>
<td>[86]</td>
</tr>
<tr>
<td>Concurrent POP/IC surgery</td>
<td>22 (88.0)</td>
<td>[25]</td>
</tr>
<tr>
<td>Success after POP surgery</td>
<td>72 (93.5)</td>
<td>[77]</td>
</tr>
<tr>
<td>POP surgery</td>
<td>60 (93.8)</td>
<td>[64]</td>
</tr>
<tr>
<td>Concurrent POP/IC surgery</td>
<td>12 (92.3)</td>
<td>[13]</td>
</tr>
<tr>
<td>Development of SIC after POP surgery</td>
<td>37 (80.4)</td>
<td>[46]</td>
</tr>
<tr>
<td>Pre-existing SIC cured</td>
<td>9 (19.6)</td>
<td>[46]</td>
</tr>
<tr>
<td>Persistence of pre-existing SIC</td>
<td>9 (7.4)</td>
<td>[121]</td>
</tr>
</tbody>
</table>

[n] = reference data count; POP = pelvic organ prolapse; IC = incontinence; SIC = stress urinary incontinence
Expressed as number (%)
χ² = χ²; f = Fisher’s exact test; p-values adjusted for “fdr”.
Success is defined: after POP surgery in accordance with POP-Q ≤ I/Baden–Walker ≤ grade 1; success after SIC surgery restoration of continence.
this respect are the studies which have selected a very high age cutoff of 80 years for the comparison [24, 25].

Similar results were observed for incontinence surgery. Despite a strict definition of success as complete restoration of urinary continence and voiding without residual urine, a good success rate was observed in both groups with no statistically significant difference based on age. Taking into account other studies, this quite clearly indicates that the clinical practice applied in many cases should be reconsidered and that older patients should not be denied access to appropriate surgery [11, 26].

It is generally unclear in the literature whether, in patients with existing prolapse with concomitant incontinence, normal bladder function is more likely to be restored by a single- or two-stage surgical approach. It therefore seems that neither approach will always be the right one and for all patients. What does seem clear on the basis of these data, however, is that patient age has a direct influence on bladder function after prolapse surgery. Of course, the poorer incontinence rate after prolapse surgery frequently cited in discussions on the subject might in principle also be caused by the higher rate of revision surgery in the older patient group.

In the case of a differentiated approach, the results for pre-existing and de novo stress urinary incontinence must be considered separately.

With regard to pre-existing stress urinary incontinence, the available data show that incontinence resolved as a result of prolapse treatment in the majority of cases involving young and as many as half of the cases involving older patients. Consideration should therefore be given to a combined procedure.

According to Dwyer (2012), 10 women would have to receive TVT concurrently with prolapse surgery in order to prevent just one patient from needing follow-up surgery for this 2–4 years after the prolapse surgery [27].

The incidence of de novo stress urinary incontinence was also considerably higher among the older patients. The data of Lo et al. (2015) point to a similar result: The risk of de novo stress urinary incontinence after prolapse surgery was 2.86 times higher in women > 66 years of age than in their younger counterparts [28].

A certain bias is possible in the interpretation of the data because the procedures performed are, of course, generally of an elective nature. It must therefore be assumed that a selection bias existed in the elderly patient group based on their general state of health, because seriously ill patients do not generally attend Urogynaecology Clinics. Nevertheless, our results show clearly that postoperative success can also be achieved in older patients. Provided that they were healthy enough, surgery should not be ruled out due to high age alone. In the case of prolapse, these patients should also not be offered obliterative surgery automatically either.

In summary, it can be said that the data presented here make an important contribution to answering the question of urogynaecological surgery outcome in elderly patients. Going forward, the evaluation needs to be confirmed on a prospective basis. Until these results are available, however, there are good reasons on the basis of our data to suggest that both prolapse and stress urinary incontinence can be treated surgically in ≥ 70-year-old women with good results and that these patients should be offered the same range of surgical options as their younger counterparts. In principle, a combined surgical procedure cannot be recommended generally, although it should be considered for older patients on a case-by-case basis.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

[27] Dwyer PL. Women with occult stress urinary incontinence should not routinely have a midurethral sling with prolapse surgery. Int Urogynecol J 2012; 23: 827–829