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REVIEW ARTICLE

Recurrent pelvic organ prolapse: International Urogynecological Association Research and Development Committee opinion

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Abstract
Introduction and hypothesis This committee opinion paper summarizes available evidence about recurrent pelvic organ prolapse (POP) to provide guidance on management.
Method A working subcommittee from the International Urogynecological Association (IUGA) Research and Development Committee was formed. The literature regarding recurrent POP was reviewed and summarized by individual members of the subcommittee. Recommendations were graded according to the 2009 Oxford Levels of Evidence. The summary was reviewed by the Committee.
Results There is no agreed definition for recurrent POP and evidence in relation to its evaluation and management is limited.
Conclusion The assessment of recurrent POP should entail looking for possible reason(s) for failure, including persistent and/or new risk factors, detection of all pelvic floor defects and checking for complications of previous surgery. The management requires individual evaluation of the risks and benefits of different options and appropriate patient counseling. There is an urgent need for an agreed definition and further research into all aspects of recurrent POP.

Keywords Recurrent · Pelvic organ prolapse · Definition · Incidence · Prevalence · Cost · Etiology · Diagnosis · Treatment

Introduction

The International Urogynecological Association (IUGA) and International Continence Society (ICS) define pelvic organ prolapse (POP) as "falling, slipping or downward displacement of the uterus and/or the different vaginal compartments and their neighboring organs such as bladder, rectum or bowel" [1]. Recurrent POP is increasingly seen in clinical practice without clear guidance as to how to deal with this

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clinical presentation. This IUGA Research and Development Committee Opinion summarizes evidence in relation to recurrent POP to guide patient management.

Materials and methods

This Committee Opinion was prepared by a Working Subcommittee and reviewed by the whole Committee. A review of the English-language literature was performed by searching the MedLine, PubMed, Cochrane, and Embase electronic databases up to 5 February 2016, using relevant key words. Searches were independently carried out by individual authors, the first author, the Clinical Librarian at Brighton and Sussex Library and Knowledge Service, and the Chair of the IUGA Research and Development Committee. Pertinent English-language publications, including abstracts presented at meetings and studies referred to in articles identified using this search, were also reviewed.

Available evidence was summarized in tables and both this evidence and the recommendations based on it were graded according to the Oxford Centre of Evidence-based Medicine Levels of Evidence, March 2009.[1] The grading of evidence is summarized in Table 1 and the grading of recommendations is summarized in Table 2.

Definition

There is no agreed definition for recurrent POP. The term "recurrent" implies the "failure" of previous surgery, which can be subjective and/or objective. It may affect a previously treated compartment (direct) or another compartment (indirect) [2]. These distinctions can give different failure rates in the same patient [3]. There is an association between symptoms and the leading edge of POP protruding at least 1 cm past the hymen [4], with significantly higher odds ratios of symptoms with stages 2B (leading edge of POP at the level of the hymen) and stage 2C (leading edge of POP beyond the hymen) [5]. Therefore, a proposed definition for recurrent POP is recurrent, direct or indirect POP reaching or going below the level of the hymen (POP-Q ≥ stage 2b) for objective recurrence and having symptoms attributed to recurrent POP for subjective recurrence. This may affect one compartment or more than one compartment and may be associated with other pelvic floor dysfunction, such as stress urinary incontinence.

Although anterior and posterior compartments have been used consistently to refer to anterior and posterior vaginal wall prolapse respectively [6], the middle, apical, and central compartments have been used to refer to uterine or post-hysterectomy vaginal vault prolapse [7–9]. Apical compartment prolapse is used to refer to uterine or post-hysterectomy vaginal vault prolapse, as it reflects a superior anatomical relation to the anterior and posterior compartments, which the other terms do not indicate.

[1] http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/accessed on 28.1.2016 at 09:00 GMT.

Table 1 Evidence grading according to the Oxford Centre for Evidence-based Medicine (March 2009)

Grade		Features
1	a	Systematic review with homogeneity of randomized controlled trials
	b	Individual randomized controlled trial with narrow confidence interval
2	a	Systematic review with homogeneity of cohort studies
	b	Individual cohort study
3	a	Systematic review with homogeneity of case–control studies
	b	Individual case–control studies
4		Case series
5		Expert opinion

Epidemiology of recurrent POP

The incidence of recurrent POP is difficult to estimate owing to the lack of an agreed definition and the paucity of adequately powered randomized, cohort or case–control studies, and an audit, that provide the compartment-specific incidence for both the primary and secondary management of POP. Variation in assessment tools, outcome measures, cut-off levels for diagnosis on physical examination [10] and follow-up duration [11] between studies preclude comparison and pooling of data for meta-analysis. The inherent bias in subjective preferences for, or aversion against, specific management options, in addition to the potential conflict of interest, cannot be ignored in this respect either.

Although the incidence of repeat surgery for recurrence may be easier to establish, it is a proxy indicator of recurrence. Not all patients with recurrence present for examination, let alone management. Repeat surgery needs to be specified as primary surgery on a different compartment or repeat

Table 2 Recommendation grading according to the Oxford Centre for Evidence-based Medicine (March 2009)

Grade	Features
A	Level 1 studies
B	Level 2 or 3 studies or extrapolations from level 1 studies
C	Level 4 studies or extrapolation from level 2 or 3 studies
D	Level 5 studies or troublingly inconsistent or inconclusive studies at any level

surgery for the same compartment [12]. The prevalence of POP, recurrent and nonrecurrent, varies from 3 to 6 %, when defined by symptoms, to 50 %, when defined by vaginal examination [13]. A similarly wide range is likely to be encountered for recurrent POP.

A retrospective cohort study involving 1,811 patients who underwent primary surgery for POP over almost 20 years showed a re-operation incidence of 5.1 per 1,000 women-years, with a cumulative incidence of 5.6 % [14]. A prospective follow-up of 376 patients who had POP and anti-incontinence surgery reported a 13 % re-operation rate at 5-year follow-up, rising to 17 % in those who had had previous surgery [15], and a 17 % re-operation rate at the 10-year follow-up, rising to 26 % for those who had undergone previous surgery [16].

Cost of recurrent POP

There are no studies providing the cost of recurrent POP. In the USA, 225,964 patients underwent a surgical operation for POP in 1997 [17]. The estimated cost was $1,012 million and $1,543 million, in terms of Medicare and non-Medicare reimbursement charges respectively [18]. In a retrospective cohort study of 149,554 women in the USA, 29.2 % of patients undergoing surgery for POP and/or stress incontinence of urine, other than urethral bulking agent injection, underwent previous pelvic floor surgery [19].

Assuming 29.2 % to be the rate of surgery for recurrent POP across the USA, and the cost being the same for repeat as for primary procedures, then the estimated cost of surgery for recurrent POP in the USA in 1997 would be $295.5 million and $450.6 million at Medicare and non-Medicare reimbursement rates respectively. However, repeat surgery is likely to include more durable operations such as sacrocolpopexy, which is known to cost more than sacrospinous fixation [6], and use mesh, which has its own cost [20]. This estimation does not include nonsurgical management, such as vaginal pessaries, cost of visits, investigations, and other cost aspects, such as travel and time off work.

Etiology of recurrent POP

Patient factors

Levator avulsion injury, levator ani muscle weakness, enlarged genital hiatus, advanced stage POP (≥POP-Q stage 3) and family history of POP at the time of the primary surgery are independent risk factors for recurrent POP [21–32]. The more previous pelvic floor surgery a patient had increases her risk for recurrent POP and repeat surgery to treat it [15, 16, 33]. A systematic review of risk factors for POP and its recurrence showed pre-operative stage of POP to be significantly associated with recurrence in 4 out of 5 studies [34].

Although some studies reported high (≥30) body mass index (BMI) to be associated with a higher risk of recurrence after vaginal wall repair [35], others reported no such association after abdominal sacrocolpopexy and vaginal uterosacral ligament suspension [36, 37]. In spite of some studies showing that patients who undergo repair at a younger age (<60 years) or older age are considered to be at a high risk of recurrence [25, 36, 38, 39], one study reported no association between age and re-operation for POP [15]. POP at a young age may reflect tissue predisposition and/or greater nerve, muscle or fascia injury [40]. Other risk factors include co-morbidities, such as chronic obstructive pulmonary disease (COPD) and chronic constipation, and the premature resumption of physical exertion, such as heavy lifting, can increase the risk of recurrence.

Procedure factors

Failure to identify and correct all pelvic floor defects is associated with a higher incidence of recurrent POP than when all defects are corrected [11], bearing in mind the need to counsel patients in this respect. Recurrence may be indirect affecting the uncorrected defect [41], which is higher after mesh vaginal wall repair compared with fascial repair [42], or direct, affecting the repaired compartment.

Failure to identify and correct apical compartment prolapse at the time of dealing with anterior and/or posterior compartment prolapse is increasingly recognized as a cause of recurrence [43]. Apical compartment prolapse is associated with advanced anterior vaginal wall prolapse in patients with a uterus [44], and in those who had undergone a hysterectomy [45]. Likewise, level I support is important for both the posterior and the apical compartment [46] and this has been demonstrated in simulation studies in patients with advanced posterior compartment prolapse [47].

A retrospective study of de-identified administrative data of 2,756 patients over 10 years, as a random 5 % sample of the United States of America Medicare population showed significantly higher re-operation rates for recurrent POP following isolated anterior fascial repair than anterior fascial repair together with apical compartment suspension procedure (20.2 vs 11.6 %, $P < 0.01$) [48].

Although the same study showed no significant difference in overall re-operation rate following a posterior fascial repair alone and posterior fascial repair combined with apical suspension procedure (14.6 vs 12.9 %, $P = 0.60$), the rate of repeat posterior fascial repair was significantly higher following isolated posterior repair than posterior fascial repair combined with apical suspension procedure (4.5 vs 0.4 %, $P < 0.01$). However, those who had a posterior fascial repair alongside an apical suspension procedure had significantly

higher rate of subsequent surgery for anterior and apical compartment prolapse than those who only had posterior fascial repair (2.1 vs 0.0 %, $P = 0.03$) [48], which may reflect the increased risk for anterior compartment prolapse following sacrospinous fixation [27].

Anterior compartment

The anterior compartment is the most likely site of POP recurrence following surgical repair, with success rates for fascial anterior repair ranging from 34 to 97 % [49]. Sacrospinous fixation is a recognized risk factor for the subsequent development of anterior compartment prolapse [27]. Evidence in relation to procedures for anterior compartment prolapse is summarized in Table 3.

A randomized controlled trial showed porcine small intestine submucosa (SIS) biological graft anterior repair to be followed by a significantly better objective cure rate, no significant difference in quality of life and a significantly higher incidence of complications than fascial anterior repair [50]. On the other hand, another randomized controlled trial showed no significant difference in objective outcome [51].

A recent Cochrane review concluded that although there is evidence to suggest that absorbable polyglactin, absorbable porcine dermis or polypropylene mesh primary anterior vaginal wall repair significantly reduces the risk of objective recurrence in comparison to fascial anterior repair, a significant improvement in subjective outcome was only noted with polypropylene mesh. However, the use of polypropylene mesh was associated with a > 10 % mesh exposure rate, with > 5 % requiring surgical intervention, in addition to increased operating time, blood loss, and a rate of indirect recurrent POP and de novo stress urinary incontinence [6].

Posterior compartment

Evidence in relation to procedures for posterior compartment prolapse is summarized in Table 4. A recent Cochrane review showed transvaginal fascial posterior vaginal wall repair to be associated with significantly less subjective and objective recurrence than the transanal approach [6]. A randomized controlled trial reported no significant difference in subjective or objective outcome after site-specific and fascial posterior vaginal wall repair [52]. On the other hand, a retrospective study showed site-specific defect posterior vaginal wall repair to be followed by significantly more objective and subjective recurrence than fascial posterior vaginal wall repair [53]. A recent Cochrane review concluded that there was no evidence to recommend the use of any mesh for posterior compartment prolapse [6].

Apical compartment

A multiple regression analysis showed POP recurrence to be associated with vaginal cuff infection (OR 6.13, 95 % CI: 1.80–20.83) and urinary tract infection (OR 3.65, 95 % CI: 1.40–9.47) in 138 patients who underwent sacrospinous fixation or sacrospinous hysteropexy [54]. Post-operative infection was significantly associated with a lack of intravenous antibiotic prophylaxis, age <73 years, and vaginal ulceration.

Table 3 Evidence regarding procedure risk factors for recurrent anterior compartment POP

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Eilber et al. [48]	Retrospective, de-identified administrative data	Total of 2,756 - (anterior repair, anterior repair + apical support)	10 years	Re-operation rate 20.2 vs 11.6 %, ($P < 0.01$)	3b
Feldner et al. [50]	RCT	SIS biological graft repair (29 patients), anterior repair (26 patients)		Objective cure rate (86.2 vs 59.3 %, $P = 0.03$) Quality of life (no significant difference) Complications (67 vs 33.3 %, $P = 0.01$)	1b
Robert et al. [51]	RCT	SIS biological graft repair (28 patients), anterior repair (29 patients)	12 months	Objective outcome, no significant difference	1b
Maher et al. [6]	Cochrane systematic review	All types of anterior repair		Objective recurrence (significantly less with absorbable polyglactin, absorbable porcine dermis, and polypropylene mesh) Subjective outcome (significantly better with polypropylene mesh only) Complications with polypropylene mesh (11.4 % mesh exposure rate, 6.8 % mesh exposure requiring surgery rate) Increased operating time, blood loss, indirect recurrent pop and de novo stress urinary incontinence	1a

Table 4 Evidence regarding procedure risk factors for recurrent posterior compartment POP

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Eilber et al. [48]	Retrospective, de-identified administrative data	Total of 2,756 (posterior repair, posterior repair + apical support)	10 years	Overall re-operation rate (14.6 vs 12.9 %, $P = 0.06$ Repeat posterior repair (4.5 vs 0.4 %, $P < 0.01$) Subsequent anterior and apical prolapse surgery (2.1 vs 0.0 %, $P = 0.03$)	3b
Maher et al. [6]	Cochrane systematic review	Transvaginal repair Transanal repair		Subjective recurrence (RR 0.36, 95 % CI: 0.13–1.0) Objective recurrence (RR 0.24, 95 % CI: 0.09–0.64) Rectocele depth on defecography (MD −1.43 cm, 95 % CI: −2.86 to 0)	1a
Paraiso et al. [52]	RCT	Site-specific repair (37 patients) Posterior repair (37 patients)		Objective outcome (no significant difference) Subjective outcome (no significant difference)	1b
Abramov et al. [53]	Retrospective	Site-specific repair (124 patients) Posterior repair (138 patients)	1 year	Objective recurrence beyond midvaginal plane (33 vs 14 %, $P = 0.001$) Objective recurrence beyond the hymen (11 vs 4 %, $P = 0.02$) Subjective outcome (11 vs 4 %, $P = 0.02$)	3b
Maher et al. [6]	Cochrane systematic review	Mesh posterior repair	12 months	No evidence to support use	1a

Post-hysterectomy vaginal vault prolapse

Evidence in relation to procedures for post-hysterectomy vaginal vault prolapse is summarized in Table 5. A recent Cochrane review showed more subjective failure following sacrospinous fixation than abdominal sacrocolpopexy, though the difference was not statistically significant. Although there was no significant difference in objective failure per se, the rate of recurrent vault prolapse was significantly lower after abdominal sacrocolpopexy than after sacrospinous fixation. Patients who had undergone abdominal sacrocolpopexy took significantly longer to present with recurrent prolapse than those who had had sacrospinous fixation, but there was no significant difference in the re-operation rate [6].

A randomized controlled trial showed abdominal sacrocolpopexy using non-absorbable polypropylene mesh to be associated with significantly higher objective cure than absorbable cadaveric fascia lata [56]. A retrospective study showed abdominal sacrocolpopexy using Pelvicol and autologous fascia to be associated with significantly higher vaginal vault prolapse recurrence rates than synthetic (polyester or polypropylene) mesh, with all reoperations for recurrent vault prolapse being in the Pelvicol group [57].

A case report described recurrent prolapse following abdominal sacrocolpopexy in 3 patients, which is a very low number [58]. The mesh detached from the vagina in 2 and the vagina ruptured below the mesh attachment in the third. The authors recommended securing the mesh over a wide area of the vagina with permanent sutures and performing a meticulous culdoplasty above the mesh.

A randomized controlled trial, reported as an abstract, showed abdominal sacrocolpopexy to be followed by significantly less vault prolapse and anterior or posterior compartment prolapse recurrence and repeat surgery for POP than high vaginal uterosacral ligament suspension [59]. A retrospective study showed uterosacral suspension using permanent sutures to be associated with less objective failure than absorbable sutures [60].

A randomized controlled trial reported significantly higher objective success rate and a lower re-operation rate after laparoscopic sacrocolpopexy than Total Prolift mesh repair for post-hysterectomy vaginal vault prolapse [61]. A randomized controlled trial showed a significantly higher objective recurrence rate after pelvic floor repair and sacrospinous fixation than Total Prolift mesh repair for 2 post-hysterectomy vaginal vault prolapses. However, a mesh exposure rate >20 % was reported [62].

A randomized controlled trial showed pelvic floor repair and sacrospinous fixation to be followed by significantly higher objective recurrence, with no significant difference in subjective outcome, than Total Prolift mesh repair for post-hysterectomy vaginal vault prolapse in patients with levator avulsion injury [63].

A systematic review and meta-analysis of the surgical repair of post-hysterectomy vaginal vault prolapse reported that the re-operation rate for recurrent POP was lowest for vaginal mesh repair and highest for fascial vaginal repair, with abdominal

Table 5 Evidence regarding procedure risk factors for recurrent post-hysterectomy vaginal vault prolapse

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Maher et al. [6]	Cochrane systematic review	Sacrospinous fixation Sacrocolpopexy		Subjective failure (RR 0.53, 95 % CI 0.25–1.09) Objective recurrent vault prolapse (RR 0.23, 95 % CI 0.07–0.77) Time to presentation with recurrent vault prolapse (MD 10.90, 95 % CI 4.68–17.12) Re-operation rate (no significant difference)	1a
Culligan et al. [55]	RCT	Sacrocolpopexy mesh: non-absorbable polypropylene (64 patients); absorbable cadaveric fascia lata (46 patients)	1 year	Objective cure rate (91 vs 68 %, $P = 0.007$)	1b
Tate et al. [56]	RCT	Sacrocolpopexy mesh: non-absorbable polypropylene; absorbable cadaveric fascia lata	5 years	Objective cure rate (93 vs 62 %, $P = 0.02$)	1b
Quiroz et al. [57]	Retrospective	Sacrocolpopexy mesh/graft: Pelvicol (102 patients); autologous fascia (23 patients); synthetic (polyester/polypropylene) mesh (134 patients)	Mean follow-up of 1.1 years	Objective vault prolapse recurrence (11 % and 7 % vs 1 %, $P = 0.011$) Reoperation for recurrent vault prolapse (6.9 vs 0 % and 0 %, $P = 0.009$)	3b
Rondini et al. [59]	RCT	Sacrocolpopexy (54 patients) High vaginal uterosacral ligament suspension (56 patients)	1 year	Objective vault prolapse recurrence (0 vs 17.5 %, $P = 0.03$) Subsequent anterior or posterior compartment prolapse (5.3 vs 33.3 %, $P < 0.001$) Repeat surgery for POP (5.6 vs 17.9 %, $P < 0.04$)	1b
Chung et al. [60]	Retrospective	Sacrocolpopexy sutures: permanent; absorbable	Average of 160 days	Objective failure (6 vs 1 %, P 0.034)	3b
Maher et al. [61]	RCT	Laparoscopic sacrocolpopexy (53 patients) Total Prolift mesh repair (55 patients)	2 years	Objective success (77 vs 43 %, $P < 0.001$) Re-operation rate (5 vs 23 %, $P = 0.06$)	1b
Halaska et al. [62]	RCT	Pelvic floor repair and sacrospinous fixation (83 patients) Total Prolift mesh repair (85 patients)	1 year	Objective recurrence (39.4 vs 16.9 %, $P = 0.003$) Mesh exposure rate of 20.8 %	1b
Svabik et al. [63]	RCT	In patients with levator avulsion injury: pelvic floor repair and sacrospinous fixation (34 patients); Total Prolift mesh repair (36 patients)	1 year	Objective recurrence (65 vs 3 %, $P < 0.001$) Subjective outcome (no significant difference)	1b
Diwadkar et al. [43]	Systematic review and meta-analysis	Vaginal mesh repair Sacrocolpopexy Vaginal repair		Re-operation rate for recurrent POP (1.3 %, 2.3 %, 3.9 %) Total re-operation rate (highest (8.5 %) after vaginal mesh repair)	1a

sacrocolpopexy being intermediate. However, the total re-operation rate was highest for vaginal mesh repair [43].

Uterine prolapse

Evidence in relation to procedures for uterine prolapse is summarized in Table 6. A randomized controlled trial showed a significantly higher subjective recurrence and re-operation rate after abdominal sacrohysteropexy than vaginal hysterectomy and pelvic floor repair for utero-vaginal prolapse [64]. A randomized controlled trial reported a significantly higher incidence of repeat pelvic floor repair after laparoscopic sacrohysteropexy than after vaginal hysterectomy for uterine prolapse [65]. Significantly more patients underwent pelvic floor repair together with vaginal hysterectomy than laparoscopic hysteropexy.

A randomized controlled trial showed a significantly lower rate of recurrent uterine or post-hysterectomy vaginal vault prolapse after vaginal hysterectomy than sacrospinous hysteropexy together with anterior and/or posterior vaginal wall repair as required, for utero-vaginal prolapse. However, there was no significant difference in repeat surgery, quality of life or symptoms [66].

Table 6 Evidence regarding procedure risk factors for recurrent uterine prolapse

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Roovers et al. [64]	RCT	Abdominal sacrohysteropexy (41 patients) Vaginal hysterectomy and pelvic floor repair (41 patients)	1 year	Subjective recurrence (RR 3.2, 95 % CI 1.29–7.92) Re-operation rate (OR 11.2, 95 % CI 1.4–90.0)	1b
Rahmanou et al. [65]	RCT	Laparoscopic sacrohysteropexy (50 patients) Vaginal hysterectomy (50 patients) Significantly more patients had pelvic floor repair alongside vaginal hysterectomy than laparoscopic sacrohysteropexy	1 year	Repeat pelvic floor repair (significantly more after laparoscopic sacrohysteropexy)	1b
Dietz et al. [66]	RCT	Vaginal hysterectomy (31 patients) Sacrospinous sacrohysteropexy	1 year	Recurrent uterine or post-hysterectomy vaginal vault prolapse (3 vs 21 % on the basis of the last carried out observation carried forward, $P = 0.03$; 3 vs 26 % on the basis of worst possibility, $P = 0.01$) Repeat surgery (no significant difference) Quality of life (no significant difference) Subjective outcome (no significant difference)	1b

Practitioner factors

There are no studies looking at the association between POP recurrence and surgeons' training and work load. However, there is evidence to suggest that subspecialization and high work load might be associated with a better outcome in terms of success and failure in relation to continence surgery [67] and other conditions, such as hernia [68]. A multivariate logistic regression analysis of the outcome of vaginal wall mesh repair showed that surgeon's experience, defined as performing 50 mesh repairs, is significantly associated with a reduced risk of POP recurrence [69].

Assessment of patients with recurrent POP: history

Few studies specifically addressed the symptoms of patients with recurrent POP. One study showed vaginal bulge to be the most frequent complaint of patients with recurrent POP (39 %) amongst 142 patients 10 years following primary surgery, with 58 % of patients having POP-Q stage 1 recurrent POP reporting no symptoms [38]. Enquiry should be made about previous surgery, especially outcome, complications, and patient expectations beforehand. Risk factors for recurrence and suitability for repeat surgery, including the development of medical problems, should be established. It is important to ascertain whether symptoms are the same as before surgery or are new ones, whether or not there was a symptom-free interval after surgery, the duration between previous surgery and onset and/or reappearance of these symptoms, any precipitating factors, and impact on quality of life.

The symptom check should cover all aspects of pelvic floor dysfunction, including sexual function, and establish the degree of bother, using validated questionnaires. Pain, painful intercourse, vaginal bleeding, spotting or discharge, mesh exposure or extrusion in addition to urinary and/or anal incontinence may indicate complications from previous, especially mesh, surgery for POP. Sexual function may be affected by POP recurrence or as a consequence of previous surgery.

Examination of patients with recurrent POP

There are no studies looking specifically at the signs of recurrent POP. The aim of examination should be to identify risk factors for recurrence, looking for complication(s) of previous surgery, establishing the extent of recurrence and judging the suitability of management options. Establishing BMI and fitness for further surgery is pertinent not only for judging the risk/benefit of alternative management options, but also identifying the possible cause(s) of recurrence.

Special attention should be given to identifying all pelvic floor defects that may have developed since previous surgery or that were present and not detected and/or corrected at the time, especially apical compartment prolapse, as it may coexist with advanced degrees of anterior and/or posterior compartment prolapse. An enterocele can present as a rectocele [70]. It is helpful to look for a paravaginal defect and check for an anterior enterocele (where the peritoneal sac containing the small intestine herniates underneath the anterior vaginal wall, usually in patients who have previously undergone a hysterectomy), which may mimic an anterior compartment prolapse [71], bearing in mind the limitations of clinical examination in this respect [72]. The use of a standardized examination system, such as the POP-Q, before and after surgery helps to establish and compare outcomes. Hernias and joint hypermobility may indicate a predisposition to POP.

Tissue healing and tenderness, especially over mesh used in previous surgery, may not only influence management options, but also discern complications, such as mesh exposure

and/or infection. Digital assessment for levator avulsion injury at the time of assessing pelvic floor muscle tone may explain the recurrence, although it has moderate inter-observer agreement [73], and may under-diagnose the injury, in comparison with imaging [74].

Investigations in patients with recurrent POP

Investigations may help in assessing the patient's suitability for alternative management options, in diagnosing complications of previous surgery, and in guiding management. For example, cystoscopy is required when dealing with hematuria and suspected mesh exposure, whereas endoscopy and/or imaging are required when a fistula is suspected.

Pelvic floor ultrasound can establish the nature and stage of POP recurrence, detecting and differentiating among enterocele, cystocele, and rectocele. It may also elucidate possible cause(s) of the recurrence, such as levator avulsion injury and hiatal ballooning. In addition, it can show the relation of the prolapse to previously inserted mesh and mesh anchorage, contraction, and mobility [75]. Magnetic resonance imaging (MRI), especially dynamic, can detect levator avulsion injury and establish the nature and extent of POP [76], but it cannot visualize polypropylene mesh [77]. Whereas ultrasound is readily available and can be used in the clinical area, MRI involves attendance at the radiology department and entails a high capital cost.

Management of recurrent POP

Patient preference, future fertility plans, domestic circumstances, and fitness for surgery are taken into consideration when deciding on management. Evidence in relation to dealing with some risk factors is limited. For example, it is not clear whether deferring surgery until patients lose weight or offering surgery at a younger age would lead to less recurrence or not [78].

Conservative measures for recurrent POP

The goal of conservative management is to minimize symptoms and possible progression of POP. There is no evidence in relation to the value of conservative measures such as local estrogen, vaginal pessaries, pelvic floor muscle training, smoking cessation, avoidance of heavy lifting, and weight loss in treating recurrent POP or the proportion of patients with recurrent POP who would prefer conservative measures to repeat surgery, leaving their use to follow the same lines applied in relation to POP in general.

Surgery for recurrent POP

There is no evidence regarding the time interval that should be allowed before further surgery. This depends on the degree of symptom bother, the impact on quality of life, the presence of complications and whether the recurrence is direct or indirect. However, it is generally advisable to allow some time for maximum tissue healing and patient recovery.

Identifying and addressing each pelvic floor defect, critically important in optimizing the results of primary surgery for POP, are even more pertinent in repeat procedures. This applies particularly to apical compartment prolapse, which is known to be associated with advanced anterior and posterior compartment prolapse. Newer mesh kits for anterior compartment repair, such as Elevate Anterior [79], and mesh kits for posterior compartment repair, such as Posterior Prolift and Elevate Posterior, entail mesh attachment to the sacrospinous ligament, which represents a form of apical support. However, evidence for their value is awaited, bearing in mind that some of these mesh kits have now been withdrawn from the market.

Vaginal obliterative procedures, such as total and partial colpocleisis, have been used for older patients with medical problems that pose an anesthetic risk when sexual function is not an issue, with good objective and subjective outcome. However, secondary procedures have not been reported separately and subsequent recurrences were included as individual cases within case series that were managed with repeat colpocleisis or perineorrhaphy [80], which makes it difficult to judge their value in recurrent POP [81]. Evidence in relation to procedures for recurrent anterior and posterior compartment prolapse is summarized in Table 7.

A randomized controlled trial compared fascial repair and trocar-guided polypropylene mesh kit repair to treat recurrent POP [82]. However, the anterior and posterior compartments were not reported separately. Although significantly more direct objective recurrence was noted in the anterior compartment following fascial repair than trocar-guided polypropylene mesh kit repair, there was no significant difference in subjective outcome and a mesh exposure rate of >15 % was noted.

A randomized controlled trial compared fascial anterior and/or posterior fascial vaginal wall repair with Pelvicol anterior and/or posterior vaginal wall repair for patients with recurrent anterior and/or posterior compartment prolapse [78]. Objective recurrence rates were significantly higher 3 months following Pelvicol anterior and/or posterior vaginal wall repair, but became comparable at the 3-year follow-up. However, the feeling of a vaginal lump at the 3-year follow-up was significantly more common after Pelvicol anterior and/or posterior vaginal wall repair than fascial anterior and/or posterior vaginal wall repair.

Table 7 Evidence regarding the management of recurrent anterior and/or posterior compartment prolapse

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Dahlgren et al. [78]	RCT	Pelvicol repair Pelvic floor repair	3 months and 3 years	Objective recurrence at 3 months (significantly higher with Pelvicol) Objective recurrence at 3 years (comparable) Subjective outcome at 3 years (OR 7.75, 95 % CI 1.27–47.62)	1b
Withagen et al. [82]	RCT	Pelvic floor repair (97 patients) Trocar-guided polypropylene mesh kit repair (93 patients)	6 and 12 months	Objective anterior compartment recurrence at 6 months (44.4 vs 7.4 %, $P < 0.001$) Objective anterior compartment recurrence at 12 months (55.1 vs 7.8 %, $P < 0.001$) Subjective outcome (no significant difference) Mesh exposure (16.9 %)	1b
Morse et al. [83]	Retrospective	Anterior repair Anterior repair + vaginal paravaginal repair		Duration to re-operation (median of 41 months vs 12 months, $P = 0.022$	3b
Natale et al. [84]	RCT	Polypropylene anterior repair (96 patients) Pelvicol anterior repair (94 patients)		Objective recurrence (no significant difference) Mesh exposure (6.3 vs 0 %, $P = 0.02$) Quality of life improvement (significantly better following Pelvicol pelvic floor repair in social limitations ($P = 0.04$), emotions ($P = 0.02$), and sexuality (P 0.03))	1b
Nüssler et al. [85]	National register-based study	Anterior repair (157 patients) Polypropylene anterior repair (129 patients) Worse degree of POP in patients who had polypropylene pelvic floor repair ($P = 0.001$)	12 months	Subjective cure (OR 2.90, 95 % CI 1.34–6.31) Patient satisfaction (OR 3, 95 % CI 1.52–5.92) Complication rate (no significant difference) Re-operation rate (no significant difference)	3b
Gauruder-Burmester et al. [86]	Retrospective	Polypropylene mesh kit anterior repair (72 patients), propylene mesh kit posterior repair (48 patients)	1 year	Objective anterior compartment prolapse recurrence (7 %)	4

Anterior compartment

A retrospective comparison showed fascial anterior repair to be associated with a significantly longer time to re-operation in patients who had undergone previous POP surgery than fascial anterior repair together with vaginal paravaginal repair [83].

A randomized controlled trial reported no significant difference in objective recurrence at the 2-year follow-up after secondary anterior repair using Gynemesh synthetic polypropylene mesh and Pelvicol biological mesh [84]. However, mesh exposure was noted only with Gynemesh and significantly better quality of life improvement was noted following Pelvicol anterior vaginal wall repair.

A national register-based study reported significantly higher subjective cure and patient satisfaction after polypropylene mesh for recurrent anterior compartment prolapse in comparison with fascial repair without a significant difference in complications or re-operation rate [85]. However, patients undergoing mesh repair had significantly worse degrees of anterior compartment prolapse and no information was provided about objective outcome.

A retrospective study reported the outcome of Perigee polypropylene mesh kit repair for recurrent anterior vaginal wall prolapse. The study also included patients who had undergone Apogee polypropylene mesh kit posterior vaginal wall repair. Less than 10 % of patients had recurrent anterior vaginal wall prolapse, but no information was provided as to whether these patients had anterior and/or posterior mesh vaginal wall repair. No information was provided on subjective failure [86].

Although the use of mesh for recurrent anterior compartment prolapse would make sense, in view of the better objective outcome after primary mesh anterior vaginal wall repair noted in a recent Cochrane review [6], in addition to the studies outlined above reporting its use for recurrent anterior compartment prolapse, evidence in this respect is limited, as noted in a recent Cochrane review on the use of transvaginal mesh for the treatment of POP [87]. Randomized controlled trials comparing mesh with fascial anterior vaginal wall repair looking at subjective and objective outcomes and quality of life for recurrent anterior compartment prolapse should provide additional information in this respect [88].

Posterior compartment

A retrospective study reported no recurrent posterior vaginal wall prolapse in patients who undergone Apogee polypropylene mesh kit posterior vaginal wall repair at 1-year follow-up [86]. However, the study also included patients who had undergone Perigee polypropylene mesh anterior vaginal wall repair and the results were not reported separately. Less than 10 % had recurrent anterior vaginal wall prolapse and no information was provided as to whether these were patients who had undergone anterior or posterior mesh kit vaginal wall repair.

Apical compartment

Factors to be taken into consideration include patient preference, age, reproductive plans, fitness for surgery, previous surgery, in addition to physical and sexual activity. Abdominal surgery may be a more durable option for patients who had undergone previous vaginal surgery, whereas previous abdominal surgery and poor anesthetic risk may make a vaginal approach safer.

Post-hysterectomy vaginal vault prolapse

Evidence in relation to procedures for recurrent post-hysterectomy vaginal vault prolapse, which is limited to small cohort studies, is summarized in Table 8. A prospective study reported <15 % grade I cystocele that did not require surgery after suturing folded prolene (polypropylene) mesh to the sacrospinous ligament and vaginal apex, and used this mesh for anterior and/or posterior vaginal wall repair, as required in patients who had undergone previous sacrospinous fixation [89].

A retrospective study described bilateral uterosacral suspension or left-sided uterosacral suspension with right-side re-attachment of the vaginal vault to the detached sacrocolpopexy mesh for patients with recurrent post-hysterectomy vaginal vault (apical) prolapse after abdominal sacrocolpopexy [90]. More than 15 % of those who underwent bilateral uterosacral suspension had asymptomatic anterior vaginal wall prolapse that did not require surgical treatment and 10 % of those who had mesh re-attachment had a recurrence, which was managed with bilateral uterosacral suspension.

A retrospective study of abdominal sacrocolpopexy with Marlex polypropylene mesh extended in front and behind the vagina in patients with recurrent triple compartment post-hysterectomy vaginal vault prolapse showed that only > 5 % of patients had recurrent anterior compartment prolapse [91]. A prospective series of patients who had laparoscopic sacrocolpopexy for recurrent POP after vaginal mesh kit repair, including patients with post-hysterectomy vaginal vault (apical) prolapse, reported a 100 % success rate with no serious complications [92].

Uterine prolapse

There are no studies looking at repeat surgery to treat recurrent uterine prolapse.

Summary

Available evidence about recurrent POP is scant and there is a pressing need for research in all its aspects, including definition, risk factors, prevention, and the roles of conservative and

Table 8 Evidence regarding the management of recurrent post-hysterectomy vaginal vault prolapse

Study	Type	Interventions	Follow-up duration	Outcome	Grade
Maher [88]	Prospective	Polypropylene mesh vaginal wall repair with attachment to the sacrospinous ligament (15 patients)	Mean duration of 2.9 years	Grade I anterior compartment prolapse that did not require surgery (13.3 %)	2b
Lo et al. [89]	Retrospective	For recurrence after sacrocolpopexy: Bilateral uterosacral suspension (12 patients) Left-sided uterosacral suspension with re-attachment of the right side to the detached sacrocolpopexy mesh (10 patients)		Objective failure (16.7 % asymptomatic anterior compartment prolapse that did not require surgery vs 10 % failure that was managed with bilateral uterosacral suspension)	4
Gilleran and Zimmern [91]	Retrospective	For recurrent triple compartment prolapse Polypropylene sacrocolpopexy with mesh extension in front and behind the vagina (29 patients)	23 ± 16 months	Objective recurrence (6.9 % recurrent anterior compartment prolapse)	4
Schmid et al. [92]	Prospective	For recurrent POP after vaginal mesh kit repair: Laparoscopic sacrocolpopexy (16 patients, including 12 patients with post-hysterectomy vaginal vault prolapse)	12 months	Success (100 %) Serious complications (0 %)	2b

surgical management. Registries and adequately powered randomized trials assessing various surgical and nonsurgical management options are required to help to identify risk factors for surgical failure and more effective management options.

The best available evidence relates to the management of recurrent prolapse of the anterior compartment, which is the most frequent site of recurrent POP. However, this evidence is still limited in view of the frequency of this recurrence and the number of procedures performed worldwide. Although vaginal mesh is associated with less failure, there is inadequate evidence to support its routine use and the complications need to be taken into consideration. Available evidence for the management of posterior compartment prolapse and recurrent post-hysterectomy vaginal vault prolapse is limited and there is no available evidence for the management of recurrent uterine prolapse. The factors affecting a patient's decision to present to health care professionals and the effect on the results of repeat surgery of surgical experience, training, and the volumes of operations performed are yet to be studied.

Prevention and management of recurrent POP rely on proper patient assessment, detecting all the risk factors, and identifying all pelvic floor defects, in addition to individualized patient counseling about the value of different management options. The choice between conservative measures and repeat surgical management and the timing of any repeat surgery vary from patient to patient. Any surgical procedure should be carried out by trained and experienced surgeons with an adequate work load and good results.

Recommendations

- Sacrospinous fixation is followed by more frequent anterior compartment prolapse than sacrocolpopexy. The use of polypropylene mesh in primary anterior vaginal wall repair is associated with less objective failure, albeit without improvement in subjective outcome, but with the risk of mesh complications (level A).
- For posterior compartment prolapse, fascial plication and transvaginal repair are associated with less objective and subjective recurrence than site-specific defect and transanal repair respectively (level A).
- For post-hysterectomy vaginal vault prolapse, sacrocolpopexy is associated with less recurrence than sacrospinous fixation and vaginal uterosacral ligament suspension. Laparoscopic sacrocolpopexy is associated with greater objective success than total vaginal mesh repair, which has higher objective success than pelvic floor repair and sacrospinous fixation (level A).
- For uterine prolapse, sacrohysteropexy is associated with more re-operations for recurrence than vaginal hysterectomy and pelvic floor repair and sacrospinous hysteropexy is associated with more recurrent apical prolapse than vaginal hysterectomy and pelvic floor repair (level A).
- Known patient factors for recurrence include levator avulsion injury, pelvic floor muscle weakness, wide genital hiatus, and advanced prolapse stage. Failure to identify and address all pelvic floor defects at the time of index surgery, especially apical compartment prolapse, can lead to recurrence (level C).
- Repeat surgery should address all pelvic floor defects and include apical compartment support for advanced anterior and posterior compartment prolapse. Although vaginal mesh is associated with less failure, there is inadequate evidence to support its use and its complications need to be taken into consideration (level C).
- Recurrence can be objective, when ≥ POP-Q stage 2b POP is detected on examination, or subjective, when patients experience symptoms attributed to recurrent POP. It can be direct, when it affects a previously operated upon compartment, or indirect, when it affects another compartment (level D).
- The choice of management should be based on thorough patient assessment and made after discussion with the patient in the light of the likely benefit and risk of different options, taking note of her individual characteristics (level D).

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Compliance with ethical standards

Disclaimer This Committee Opinion was developed by the International Urogynecological Association Research and Development Committee. The information is designed to aid practitioners in making decisions about appropriate urogynecological care and should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

Conflicts of interest J. Duckett is the Chairman of the British Society of Urogynaecology Research Committee, has received travel expenses, speaker honoraria and research grants from Astellas, Ethicon, American Medical Systems, Pfizer, and Lilly, and acts as a consultant to Astellas and Ethicon. H. Al-Mandeel has received travel expenses and speaker honoraria from Ethicon and Saja. K. Svabik received travel expenses and speaker honoraria from and acts as a consultant to Astellas. C. Philips has received travel expenses and speaker honoraria from Ethicon. M. Parekh has received travel expenses and speaker honoraria from and acts as a consultant to Boston Scientific and Astellas. S. Ismail, D. Rizk, O. Sorinola, D. Kammerer-Doak, and O. Contreras-Ortiz have no conflicts of interest.

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