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ORIGINAL CONTRIBUTION

Ventral Rectopexy: An International Expert Panel Consensus and Review of Contemporary Literature

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BACKGROUND: Ventral rectopexy has become increasingly used in the surgical management of rectal prolapse. There is a need for a contemporary evaluation of the role of the procedure and a description of its use in clinical practice.

OBJECTIVE: To create an international consensus on ventral rectopexy.

DESIGN: An expert panel undertook a scoping review of the literature to identify subject domains of interest. Literature reviews were completed for each domain with subsequent development of evidence-based and practice-based statements. These statements were compiled and reviewed by the group over a total of 9 meetings. Once statements were confirmed, supportive text was finalized, and an anonymous vote was completed using Research Electronic Data Capture to record consensus.

SETTING AND PARTICIPANTS: An international expert panel comprising colorectal surgeons who perform ventral rectopexy in a high-volume center.

MAIN OUTCOME MEASURES: Statements and associated expert consensus.

RESULTS: Eleven experts identified 10 domains for review: indications, contraindications, assessment and planning, consent, operative details, prostheses, complications, follow-up, recurrence and reoperative surgery, and specific considerations. After round table review, there were 17 resultant statements for consideration. Experts agreed unanimously with 13 of the statements and their accompanying text, with different

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experts disagreeing regarding the remaining 4 statements (91% consensus each).

LIMITATIONS: Paucity of high-quality data.

CONCLUSIONS: This international group developed 17 statements with high consensus. These statements provide an up-to-date summary of the literature, identify key areas for research development, and provide a reference point for colon and rectal surgeons who undertake ventral rectopexy as part of their practice. See **Video Abstract**.

RECTOPEXIA VENTRAL: CONSENSO DE UN PANEL INTERNACIONAL DE EXPERTOS Y REVISIÓN DE LA LITERATURA CONTEMPORÁNEA

ANTECEDENTES: La rectopexia ventral se ha utilizado cada vez más en el tratamiento quirúrgico del prolapso rectal. Es necesario realizar una evaluación contemporánea del papel del procedimiento y una descripción de su uso en la práctica clínica.

OBJETIVO: Crear un consenso internacional sobre la rectopexia ventral.

DISEÑO: Un panel de expertos realizó una revisión exhaustiva de la literatura para identificar los dominios temáticos de interés. Se completaron revisiones de la literatura para cada dominio con el desarrollo posterior de declaraciones basadas en la evidencia y la práctica. Estas fueron compiladas y revisadas por el grupo en un total de nueve reuniones. Una vez que se confirmaron las declaraciones, se finalizó el texto de apoyo y se completó una votación anónima utilizando REDCap para registrar el consenso.

ESCENARIO: Internacional.

PRINCIPALES MEDIDAS DE RESULTADOS: Declaraciones y consenso de expertos asociado.

RESULTADOS: Once expertos identificaron diez dominios para su revisión: indicaciones, contraindicaciones, evaluación y planificación, consentimiento, detalles operatorios, prótesis, complicaciones, seguimiento, recurrencia y cirugía reoperatoria y consideraciones específicas. Después de la revisión en mesa redonda, hubo 17 declaraciones resultantes para su consideración. Los expertos estuvieron de acuerdo unánimemente con trece de las declaraciones y su texto acompañante, y diferentes expertos estuvieron en desacuerdo con cuatro declaraciones (91% de consenso cada una).

LIMITACIONES: Escasez de datos de alta calidad.

CONCLUSIÓN: Este grupo internacional desarrolló 17 declaraciones con alto consenso. Estas declaraciones proporcionan un resumen actualizado de la literatura, identifican áreas clave para el desarrollo de la investigación y un punto de referencia para los cirujanos de colon y recto que realizan rectopexia ventral como parte de su práctica. *(Pre-proofed version)*

KEY WORDS: Consensus; Intussusception; Minimally invasive surgery; Pelvic floor; Prosthesis; Rectal prolapse.

The surgical management of rectal prolapse continues to evolve. With increasing investment in minimally invasive surgery and a philosophical shift away from resection, ventral rectopexy (VR) has become more widespread with a promise of lower recurrence rates and risk of de novo symptoms. However, there have been some geographic regions that have moved away from the procedure because of a concern for prosthesis-related complications.

Since the procedure's dissemination in 2004,[1] there has been a surge in research, with >80% of the published literature appearing in the past decade. As more surgeons have adopted the technique, there have been variations in indications and numerous procedural adjustments. Some of these adaptations have been productive; however, this global variation has made outcome assessment challenging. Therefore, there is a need for a contemporary evaluation of the role of VR and a description of its use in clinical practice.

The VR Working Group was established to develop a consensus on VR in the management of posterior compartment prolapse. The objectives were to provide an up-to-date summary of the literature, identify key areas for research development, and provide a reference point for colon and rectal surgeons who perform VR as part of their practice.

MATERIALS AND METHODS

The senior author (L.B.) convened an expert panel comprising colorectal surgeons who perform VR in a high-volume center. Participants were selected because of their academic reputation as experts in rectal prolapse and pelvic floor disorders. They all had formally trained or had trained others in VR and performed a minimum of 20 prolapse procedures per year, of which some were ventral but not to the exclusion of alternative procedures. Effort was made to represent all tripartite colorectal societies (The Association of Coloproctology of Great Britain and Ireland, The Section of Coloproctology Royal Society of Medicine, the Royal Australasian College of Surgeons Colon and Rectal Surgery Section, Colorectal Surgical Society of Australia and New Zealand, the European Society of Coloproctology, and the American Society of Colon and Rectal Surgeons) in a balanced distribution.

A scoping review of the literature was undertaken to identify subject domains of interest, which were ultimately selected by consensus among experts. Domains

were selected to encompass perioperative and intraoperative management and any topic specific to VR. Experts were then assigned a domain on which to complete a literature review and produce both evidence-based and practice-based statements. These were subsequently compiled and reviewed by the group as part of a roundtable review with iterative modifications as required over a total of 9 in-person online or hybrid meetings for which quorum was set at 50%. Meetings were chaired by the first and senior authors (W.R.G.P. and L.B.). Those unable to attend the meetings had the opportunity to review the discussion and make alterations to the statements offline. Once statements were compiled, a final hybrid meeting was held to finalize each statement and agree to their accompanying text. All experts then voted anonymously as to whether they agreed or disagreed with each statement (binary). Responses were collected and managed using Research Electronic Data Capture electronic data capture tools hosted at Mayo Clinic (UL1TR002377).[2,3] The survey was exempt from institutional review board review.

RESULTS

Eleven experts were selected, and they collectively identified 10 domains for review: indications, contraindications, assessment and planning, consent, operative details, prostheses, complications, follow-up, recurrence and reoperative surgery, and specific considerations. After roundtable review, there were 17 resultant statements for consideration. Experts agreed unanimously with 13 of the statements and their accompanying text, but different experts disagreed with statements 4, 5, 9, and 15 (10/11; 91% consensus each). In general, the quality of evidence in this field was found to be poor, with a predominantly retrospective case series as the primary source of data. There was significant heterogeneity in outcome reporting and outcome definitions between studies. The final statements, presented per domain, were as follows.

Indications

Statement 1: VR is indicated for patients with full-thickness external rectal prolapse (ERP) and for selected patients with high-grade intussusception with symptoms of fecal incontinence and/or obstructed defecation who fail to respond to nonoperative therapy (100% consensus). The role of VR is well documented for full-thickness ERP[1,4–7] and is suitable for all who can tolerate general anesthesia and pneumoperitoneum.[8,9] Furthermore, there is a role for those with symptoms of fecal incontinence and high-grade intussusception (Oxford Grade III/IV[10]; Table 1)[11] who fail to respond to medical management.[7,12] Fecal incontinence associated with intussusception tends to be urge incontinence,[13] and it worsens with increasing grade.[14] Similarly, there is a role for those with symptoms of obstructed defecation and Oxford Grade IV intussusception or Oxford Grade III intussusception with high takeoff, enterocele, sigmoidocele, and/or solitary rectal ulcer syndrome who fail to respond to medical management.[9,15] Obstructed defecation is a subset of functional constipation or irritable bowel syndrome, with constipation associated with impaired evacuation during repeated attempts.[16]

Failure to respond to nonoperative therapy differs between institutions; however, it acknowledges a coordinated trial of bowel optimization, habit training, and pelvic floor physical therapy, ideally in coordination with biofeedback. Ultimately, treatment for high-grade intussusception is institution-specific, and the collection of further data will continue to guide patient-specific management recommendations. Moreover, a concerted effort should be made to identify those less likely to benefit from VR, including those with a primary disorder of gut-brain interaction, for whom a review with gastroenterology is recommended.

Statement 2: VR is suitable when there are findings of multicompartment prolapse (100% consensus). When patients are symptomatic with multicompartment prolapse, placement of a ventral prosthesis can provide additional support to the middle compartment. When there is significant middle or anterior compartment prolapse, involvement of urogynecology in choosing the best procedure for middle and anterior compartment support is warranted. Numerous studies have been published on the success of combined procedures, and it is suggested that a focus on single-compartment prolapse when

TABLE 1. Oxford rectal prolapse radiological grading system

Extent of prolapse	*Grade*	*Characteristics*
Internal		
Rectorectal intussusception/low-grade intussusception	I (high rectal)	Descends no lower than the proximal limit of the rectocele
	II (low rectal)	Descends to the level of the rectocele, but not onto sphincter/anal canal
Rectoanal intussusception/high-grade intussusception	III (high anal)	Descends onto sphincter/anal canal
	IV (low anal)	Descends into sphincter/anal canal
External		
External rectal prolapse	V (overt rectal prolapse)	Protrudes from anus

multicompartment prolapse exists will lead to suboptimal outcomes.[17–21]

Contraindications

Statement 3: VR may not be appropriate for patients with certain disease processes, including active pelvic malignancy, pregnancy, fistulizing rectovaginal disease, and pelvic sepsis, and case-by-case consideration is required (100% consensus). Contraindications include active pelvic malignancy, pregnancy, fistulizing rectovaginal disease, and pelvic sepsis. Relative contraindications include proctitis or IBD, significant pelvic endometriosis, and chronic pelvic pain. For each relative indication, there are specific circumstances in which VR may still be used, and it is imperative that such cases are discussed in a multidisciplinary meeting and with the patient. Additional consideration should be given to those with a prior Altemeier procedure (perineal proctosigmoidectomy), male patients, fistulizing perineal disease, obesity, slow transit constipation, and plans for a future pregnancy, all of which are best managed in a specialty center.

Assessment and Planning

Statement 4: Initial evaluation must include a history, physical examination, and use of a patient-reported outcome measure (91% consensus). It is imperative to obtain a full detailed history that includes duration and characteristics of presentation, bowel function, urinary function, vaginal symptoms, sexual function, and past surgical, medical, and obstetric history. As part of this, it is recommended that providers use a patient-reported outcomes measure that can be used as part of any scheduled follow-up to track a change in symptoms, symptom severity, and impact. Such tools include the Cleveland Clinic Fecal Incontinence Score,[22] the St. Marks Fecal Incontinence Score,[23] the Colorectal Anal Distress Inventory-8,[24] the Constipation Severity Instrument,[25] and the Patient Assessment of Constipation Symptoms,[26] which can be used by adopting the amalgamated IMPACT short form developed by the Pelvic Floor Consortium.[27] Additional useful patient-reported outcome measures include the Altomare Obstructed Defecation Score,[28] EQ-5D,[29] and MyMOP.[30]

Examination should involve perianal inspection for any deviation from the midline and presence or absence of perineal descent; digital rectal examination to assess sphincter integrity, sphincter tone, sphincter squeeze, and coordination; and inspection for the presence of a rectocele and to exclude other pathology. Anoscopy is recommended alongside evaluation of prolapse whether on the examination table or in the commode. A vaginal examination should be performed to ensure there is no concomitant posterior or anterior vaginal prolapse to the introitus, or patients should be examined by a urogynecologist.

This should all be undertaken in the context of *trauma-informed care* in acknowledgment that many patients within this population do indeed have a history of trauma and that examinations are sensitive.[31] Adopting such a practice can improve engagement, treatment, and outcomes.

Statement 5: Consideration should be given to dynamic defecatory imaging, anorectal function testing, endoscopic evaluation, and a formal multidisciplinary review (91% consensus). Most patients should undergo dynamic defecatory imaging and endoscopic evaluation. In addition, anorectal function testing may be helpful to guide nonoperative management. Furthermore, it is recommended that a multidisciplinary review be undertaken before surgery.

Dynamic imaging in the form of perineal echodefecography, fluoroscopic defecography, or MRI defecography is recommended to help assess the biomechanics of the prolapse with the goal of informing operative technique. Fluoroscopic imaging and MRI are the most frequently used modalities. Fluoroscopic imaging is in a seated position, which may more accurately reflect defecatory biomechanics; however, anterior compartment assessment can be limited. Defecatory MRIs are likely under call findings as they are performed in supine positioning; however, they do provide higher definition imaging of all pelvic compartments. Furthermore, an MRI can readily ascertain a high versus low takeoff prolapse, depth of the pouch of Douglas, presence or absence of a -cele, and posterior dominance, among other anatomical findings.[32] MRI is also helpful when patients present with vaginal, urinary, or nondescript pelvic symptoms. Imaging is also imperative in reoperative surgery to understand anatomy and delineate potential causes for any recurrent prolapse. The role of imaging for patients with irreducible rectal prolapse or clinically visible multicompartment prolapse is of limited utility.

Anorectal function testing includes anorectal manometry, rectal sensory testing, and balloon expulsion testing. This can help delineate those who would benefit from pelvic floor physical therapy, biofeedback, and other nonoperative strategies. It also provides a comparative baseline for operative patients.

Endoscopic evaluation has the ability to assess for solitary rectal ulcer syndrome while also excluding colorectal malignancy, IBD, or other pathology.

Given the often complex nature of presentations and multicompartment involvement, multidisciplinary review is recommended. This may include specialists in colorectal surgery, urogynecology, radiology, gastroenterology, and pelvic floor physical therapy.

Consent

Statement 6: The consent process should include a discussion of the goals of VR with additional disclosure of risks, benefits,

and alternatives alongside expected outcomes (100% consensus). Consent should be obtained in a timely manner with opportunities to review shared decision-making. Where possible, the provision of written information is recommended. The process should include a discussion of the goals of VR. Broadly speaking, the goals are to correct anatomical prolapse with the intent to improve bowel function and quality of life while minimizing complications and de novo symptoms. Consent should specifically address the use of a permanent prosthesis versus a biologic prosthesis alongside associated risks: the risk for incomplete correction of bowel function, the risk of incomplete or lack of improvement to quality of life, and the risk of developing de novo symptoms, including change in bowel function and pain.

Given the paucity of convincing data as to what a criterion standard approach to rectal prolapse may be, the choice of VR should be made in a collaborative conversation with the patient, who should have a clear understanding that other alternatives also exist, each with their own risks and benefits. Numerous alternative approaches to the treatment of rectal prolapse have been described, and to date, randomized controlled trials and large observational studies have failed to show clear superiority of any surgical approach.[33–36]

Operative Details

Statement 7: VR should be performed as a minimally invasive procedure and can be done so as a day case with an enhanced recovery after surgery program (100% consensus). Whenever technically feasible, a minimally invasive approach, either laparoscopically or robotically, should be performed. In comparison to open surgery, minimally invasive rectopexy is safer and results in less pain and faster convalescence.[37] Robotic VR has the same safety profile,[38,39] and recovery of bowel function is claimed to be better after robotic VR.[38,40] VR can be performed as a day case procedure within an enhanced recovery after surgery program.[41,42]

The time it takes to learn the skill of laparoscopic VR (LVR), known as the learning curve, varies from 25 to 88 procedures per surgeon, with fewer cases to achieve skill acquisition in a proctored environment. Adequate performance was previously estimated to be 50 procedures for LVR.[5] The learning curve for robotic procedures is reported between 36 and 55 procedures in 2 surgeons with LVR experience but naive to robotics.[43] Ultimately, this consensus defines competence as the ability to not only perform the operation but also deal with any complications that may result from ventral mesh rectopexy (VMR).

Statement 8: Key operative steps include identification of the anterior longitudinal ligament over the sacral promontory, opening the peritoneum in the right pararectal space with autonomic nerve preservation, opening the rectovaginal septum down to the level of the anorectal ring, appropriately securing a prosthesis to the anterior rectum and sacral promontory, and peritonealization over the prosthesis. When multicompartment prolapse has been identified preoperatively, a multidisciplinary operative approach should be considered. (100% consensus). This description applies to the stereotypical female patient. The approach to the male pelvis is different—refer to the Special Considerations section.

Anterior Longitudinal Ligament. The first step of VR provides the identification of the anterior longitudinal ligament over the sacral promontory; this step is similar in both female and male patients. In this area, important structures (hypogastric plexus and right hypogastric nerve [HN], left common iliac vein, middle sacral artery, and right ureter) should be identified and carefully preserved to safely reach the anterior longitudinal ligament.

Peritoneal Flap. The peritoneum is opened along the right side of the rectum, and a peritoneal flap is created down the pouch of Douglas. Attention should be paid to avoiding both a too-lateral dissection and an excessively close dissection to the right rectal edge: the former can impede the fixation of the midrectum if necessary and the latter risks the neurovascular supply of the rectum and the right uterosacral ligament.[4,44]

Rectovaginal Septum and Pouch of Douglas. The original description of VR describes a peritoneal incision in the distal pouch of Douglas, completing an "inversed J" shape to the left side of the rectum. The rectovaginal septum is then dissected and opened down to the anorectal junction, the distal limit of which can be confirmed by a combined digital anovaginal examination. In male patients, dissection past the prostate's apex can be limited depending on the morphology of the prolapse. In a modified VR,[45] a retroperitoneal tunnel along the right side of the rectum has been proposed, allowing to connect 2 peritoneal mini-incisions at the pouch of Douglas and sacral promontory, aimed to avoid any injury on both lateral and uterosacral ligaments.

This group now recommends formal excision of the pouch of Douglas to remove excess anterior rectal tissue, aid exposure of the rectum, provide a suitable landing zone for the prosthesis, and elevate the cul-de-sac to address symptoms resulting from an enterocele/sigmoidocele. This step involves a peritoneal incision over the posterior upper vaginal vault, dissecting the peritoneum free, and reflecting it back off the rectum before excising. Dissection should be kept relatively narrow, in line with the anterior rectal wall. The rectovaginal space can be opened thereafter as described earlier.

Securement of Prosthesis. The synthetic or biological prosthesis is measured and tailored according to the

anatomy. This should be placed on the ventral rectum and fixated with absorbable sutures. The use of a permanent suture is not recommended because it has been associated with prosthesis complications.[46–49] Approximately 6 partial-thickness sutures can be placed for synthetic prostheses; however, more sutures (9 to 12) may be required for biological prostheses. The fixation of the prosthesis at and above the site of intussusception is important, particularly in high takeoff prolapse as opposed to low takeoff prolapse.[50] This concept is put forward as a possible explanation for technical failure and early recurrence of symptoms. Some surgeons use a biological glue to reduce the potential risk of suture fixation and assist in the prosthesis remaining flat into the rectovaginal septum,[51] but such alternatives are not routinely used or currently supported in the literature.

Some case series document securing the prosthesis to the muscles of the pelvic floor.[38,52] This should be avoided: first, it is unnecessary to achieve prolapse reduction; second, it potentially immobilizes what should be a dynamic structure that assists in defecation and continence; and third, there is a purported risk of pain.

The prosthesis can be sutured to the posterior vagina with an absorbable suture to close the rectovaginal space and provide additional support. However, if middle compartment prolapse is identified, the operative approach should be coordinated with a urogynecologist.

In the rare instance of bowel or vaginal perforation, or indeed loss of integrity of either organ, avoidance of a synthetic prosthesis is recommended, or alternative prolapse repair strategies should be considered.

Tensioning. After a full reduction of the prolapse, holding the rectum in a normative position, the prosthesis is secured to the anterior longitudinal ligament over the sacral promontory, avoiding the intervertebral disc, using absorbable or permanent sutures. Discitis has been described as a postoperative complication of all forms of -pexy procedures to the sacral promontory, likely the result of the fixation technique being placed too deep.[53–55] The disc and right HN should be avoided.[55] Tension on the prosthesis is difficult to judge but should be adequate, counterbalancing the pressure of the pneumoperitoneum and fixing the rectum in its natural/anatomic situation in the pelvis, preventing further internal rectal prolapse (IRP) or ERP and rectocele herniation. Conversely, prosthesis fixation should avoid excessive tension and undue traction to the rectum.

Reperitonealization. Once the prosthesis is in place, meticulous reperitonealization is to be undertaken to avoid adhesion/obstruction and reduce the risk of recurrence and/or symptomatic enterocele. This is regardless of the prosthesis type used; it is important to cover biological prostheses to enhance tissue in-growth, whereas synthetic prostheses are used to avoid adhesion/obstruction.

Prosthesis

Statement 9: A biologic graft or a synthetic mesh can be used as the prosthesis for VR using an absorbable suture to attach it to the rectum (91% consensus). The quality of evidence regarding the choice of prosthesis is generally poor, with retrospective case series or syntheses being the predominant source of data. There is also significant heterogeneity in outcome reporting and outcome definitions between studies. Additionally, periods of follow-up in many studies are too short to detect all prosthesis-related complications and to truly reflect the effectiveness of each prosthesis.

This statement is not intended to exclude the use of fascia lata in urogynecology, but there is currently limited expert experience or evidence to guide its use in VR.

Efficacy

When using synthetic mesh, the utilization of lightweight, macroporous polypropylene mesh appears to be the most favorable option. Polyester mesh does not appear to be as favorable in terms of efficacy and safety and is not recommended.[56] Overall, there does not appear to be a difference in terms of recurrent rectal prolapse or symptoms between patients undergoing VR using a biologic graft or synthetic mesh.[57] However, there does appear to be considerable differences in performance between the various biologic grafts: for example, the reported recurrence using small intestinal submucosa-derived collagen is 1.54%,[58] whereas the recurrence rate using a dermal-based collagen graft may be as high as 14%.[59]

Safety

Historically, a wide variety of prostheses have been used in VR. These include synthetic meshes, including polypropylene,[1] titanium-coated polypropylene,[56] composite polypropylene,[60] polyester,[61] polyvinylidene fluoride,[62] expanded polytetrafluoroethylene,[63] and biological grafts, such as porcine dermal collagen[59] (Permacol, Pelvicol, and Cellis) and porcine small intestinal submucosa (Biodesign).[58,64,65]

There is a low incidence of complications related to the use of synthetic and biologic prostheses in VR, which are distinctly different from those associated with transvaginal placement of prostheses.[66] Although no prosthesis-related complication has been described with the use of polyvinylidene fluoride or porcine small intestinal submucosa-derived collagen, the event rate of complications, such as erosion, pain, and fistulation, is very low, making it difficult to accurately state.[46,57]

A multicenter collaborative study to evaluate the safety of VR examined prosthesis type and complication rates for various synthetic (n = 1764) and biologic (n = 439)

prostheses implanted in 2203 patients.[46] The synthetic meshes compared were polypropylene, polyester, and titanium-coated polypropylene. The synthetic erosion rate was 2.4% (mean follow-up, 38 months). The biologic grafts were porcine dermis or porcine intestinal submucosa, and the erosion rate was 0.7% (mean follow-up 26 months). Kaplan-Meier estimates of erosion probability at 1, 2, and 5 years for synthetic mesh were 0.4%, 1.1%, and 2.3%. For biologic grafts, they were 0.5%, 0.7%, and 0.7%. There was no statistical difference between synthetics and biologics. The polyester mesh was associated with a statistically significant increased risk of erosion compared to the other mesh types.

Suture

Two of the 3 reported incidents of biologic prosthesis (using Permacol) erosion have been associated with the use of braided polyester (Ethibond) sutures to secure the graft to the anterior rectum, and this should be avoided.[46] A retrospective series examining the use of different suture materials to secure synthetic mesh in sacrocolpopexy demonstrated an erosion rate of 3.7% (6/161) when a braided polyester suture was used versus 0% (0/254) with the use of polydioxanone sulfate sutures.[47] Similarly, a retrospective series of 495 ventral rectopexies found an erosion rate of 2% in those who had nonabsorbable sutures used to secure the mesh to the rectum and 0% in those who had absorbable suture used.[49] The same center saw no erosions after a switch to absorbable sutures.[48]

Complications

Statement 10: Postoperative complications after VR include prosthesis erosion, prosthesis infection, and de novo symptoms (100% consensus). Concerns regarding the sequelae of placing foreign material in the pelvis have been under debate for several decades. Prosthesis-related complications include erosion into the rectum, vagina, and/or perineum, causing infection, bleeding, pain, sepsis, and/or rectal vaginal fistula. In actuality, reported prosthesis complication rates by experienced surgeons are low, ranging from 0.7% to 2.4% using biologic prosthesis or synthetic prosthesis, respectively.[46] Infection at the proximal fixation point where the prosthesis is fixed to the anterior longitudinal ligament can result in discitis and is reported in 2% of VR procedures.[53] De novo symptoms of pain are reported in 12% to 31% of individuals undergoing VMR when obstructed defecation was the indication, age younger than 50 years, and revisional surgery.[67]

Statement 11: Prosthesis-related complications should be managed by experienced surgeons at specialty centers (100% consensus). Acute complications specific to VR that usually occur within the 30-day period are rare and may be intra-abdominal fluid collections or abscesses or mesh-related complications. Chronic complications that persist beyond 30 days may be related to prosthesis complications, de novo bowel symptoms, or pain.

Experienced surgeons are considered those who are beyond their learning curve for pelvic floor procedures. Fellowship training and proctoring can augment the learning process and facilitate skill acquisition.

Ultimately, specialty pelvic health centers should have the resources needed to evaluate, test, and provide lifestyle recommendations and nonoperative and surgical management for multicompartment prolapse and bowel and bladder dysfunction. Furthermore, a multidisciplinary team (MDT) is helpful in reviewing clinical and radiologic findings, optimizing nonoperative therapies, and creating a surgical plan. In some centers, all patients undergoing placement of prosthetic material are discussed as part of an MDT approach. The role of an MDT is particularly important in reviewing complications or when considering reoperative surgery.

Reoperative surgery for mesh-related complications is challenging and uncommon.[68] It is strongly recommended that revisional surgery for complications is undertaken at a specialist unit with appropriate multispecialty team review and experience with reoperative pelvic surgery. These units should be identified as the preferred referral center in their region.

Follow-Up

Statement 12: Optimal long-term follow-up after VR has not been determined but should be patient-specific (100% consensus). At least a 30-day postsurgical visit and up to 1-year short-term follow-up is suggested after VR. If de novo symptoms or functional difficulties persist, more frequent follow-up may be prudent. Five-year follow-up is recommended by expert consensus for outcomes reporting, but it is challenging to have patients respond to surveys or in-person follow-up when they have minimal symptoms. Prosthesis erosions have been reported even after 5 years with permanent prosthesis, and primary care education should be provided for patients who have their follow-up with their medical provider.[69] Red flag symptoms include pain, fever, increasing vaginal discharge, and/or rectal/vaginal bleeding. Initiatives that support patient education and engagement to facilitate outcomes collection can improve rectal prolapse knowledge.

Recurrence and Reoperative Surgery

Statement 13: Recurrences after VR may occur and should be categorized by causation and extent. Revisional surgery is possible and can include redo VR (100% consensus). A recent systematic review reported a prolapse recurrence of 0% to 18.8% after VR[70]; however, the true incidence remains uncertain. Predictors for recurrence are patient factors, such as male sex, obesity, old age, known connective tissue

disease, and surgically remediable prosthesis failure, such as mesh detachment for the sacral promontory or detachment from the rectum.[71–74]

Recurrence can be mucosal or full thickness.[69] It is important to distinguish between a full-thickness recurrence and what can be rectal mucosal prolapse because this will affect the treatment strategy. Furthermore, the majority of recurrence of functional bowel symptoms may not be associated with anatomic abnormalities or failure of suspension and need to be reassessed and reevaluated in a systematic manner.

Suspicion of anatomical reprolapse should be verified through clinical examination and imaging. The latter can provide deeper insights into the most likely cause of the recurrence. This could be imaging with defecography or dynamic MRI of the pelvis. In addition, examination under general anesthesia can also help distinguish between a full-thickness prolapse recurrence or a rectal mucosal prolapse only. Diagnostic laparoscopy can be helpful in aiding diagnosis and operative planning.

Ultimately, perioperative and intraoperative assessment of the most likely cause of recurrence should inform the reconstructive approach. Types of recurrence can be subtyped. One way of classifying the types of recurrence is provided in Table 2.[75] In one series, the most frequent cause of recurrence has been suggested to be detachment from the sacral promontory (30.2%), followed by detachment from the rectum (23.3%), and then too proximal fixation of the mesh (20.9%).[76] In another, the most frequent cause of recurrence was suboptimal distal mesh positioning in 54 cases (71%).[68]

In a multivariate analysis of 132 prospective VR cases, strong predictors for recurrence were male sex (HR, 11.3; 95% CI, 3.0–43.0) and age older than 80 years (HR, 10.7; 95% CI, 1.3–86.3).[72]

In a recent multicenter study of 461 patients, 89 (19.3%) underwent redo rectal prolapse repair. Recurrence rates for redo repairs were similar to those undergoing de novo repair. Patients undergoing redo procedures rarely had the same operation as their index procedure.[77] The 6 patients with VR as an index procedure were all treated with redo VR. In general, a redo-rectopexy is a safe approach for revision surgery after any prior repair; however, additional adjuncts, including pouch of Douglas excision, posterior dissection and suture rectopexy, and concomitant urogynecology surgery, should be considered.

TABLE 2. Classification of ventral rectopexy surgical failure

Type	*Description*
Type 1	Detachment of the prosthesis from the sacral promontory
Type 2	Detachment of the prosthesis from the rectum
Type 3	Inadequate midrectal support from the prosthesis
Type 4	Too proximal fixation of the prosthesis onto the rectum
Type 5	Prosthesis too loose
Type 6	Posterior rectal prolapse
Type 7	No evidence of the prosthesis

Specific Considerations: Pregnancy

Statement 14: Patients considering pregnancy require special consideration with a selective surgical approach (100% consensus). Pregnancy and vaginal delivery are leading risk factors for the development of pelvic organ prolapse (POP). High-quality data relating pregnancy and delivery exclusively to rectal prolapse risk are lacking and are largely extrapolated from broader POP data.

Mode of delivery has the greatest influence on POP, with vaginal and forceps delivery being associated with the highest risk.[78] Cesarean section is considered protective for the future development of POP when compared with vaginal delivery.[78] However, a surprising omission in the current literature is the lack of distinction between the effect of emergency versus planned cesarean section.[79]

The conditions that promote POP are mostly established with the first pregnancy and vaginal delivery—stretch of soft tissues and supportive ligaments, levator muscle tears and avulsions, denervation (such as pudendal and levator ani neuropathy), and consequent widening of the genital hiatus.[78] These features can worsen (albeit to a lesser extent) after the second and subsequent deliveries.[80] Encouraging a patient with internal intussusception to complete their family first allows the pelvic tissues to establish their postpartum steady state before a decision is made on the severity of rectal prolapse and mode of repair.

A relative exception to this is ERP, which, by its very nature, causes more significant symptoms than its internal counterpart. Symptoms may include fecal incontinence, constipation, rectal bleeding, mucus leakage, pain, and palpable rectal protrusion. These can have a significant effect on quality of life on a daily basis, interfering with personal life, work, and physical and mental health.[81] Given the immediacy of these symptoms and the likelihood that they will worsen in pregnancy, repair can be considered before a patient's attempts to conceive and/or before they have completed their family.

There are no published data that explore the fertility implications of a pelvic mesh procedure, either VR or a similar sacrohysteropexy (SHP). Conclusions are sometimes extrapolated from other colorectal pelvic surgeries that women of child-bearing age may undergo, such as restorative proctocolectomy for ulcerative colitis. This surgery may increase the relative risk of an individual's infertility 4-fold from baseline.[82] However, this comparison is probably not valid because the limited and localized pelvic dissection and deliberate reperitonealization in a VR is a significantly lower pelvic insult than a restorative proctocolectomy.

Statement 15: Full-term pregnancy is likely safe after VR with synthetic mesh, with both vaginal and cesarean delivery reported without mesh complications; however, alternative strategies, including biologic and nonprosthesis-based abdominal repairs, should be considered in those who are in child-bearing years (91% consensus). Pregnancy in a woman who has had a previous VR may prompt a discussion around the mode of delivery with their clinician, given the concern for increased risk of recurrence with vaginal delivery.

One published cohort study directly analyzed this topic.[83] The study was a 10-year single-center retrospective review of 954 ventral rectopexies with a synthetic mesh. Of these patients, 225 were women younger than 45 years. Eight of these patients (4%) became pregnant after rectopexy. Between a gestational range of 36 to 39 weeks, 6 patients delivered by elective cesarean section and 2 by spontaneous vaginal delivery (both in advance of planned cesarean section). The median postpartum follow-up was 31 months (range, 1–42). The babies were discharged with their mother; no admission to a special care unit was needed. For both mothers who underwent spontaneous vaginal delivery it was their second baby, and neither had obstetric trauma. There were no reports of adverse outcomes related to the mesh.

Similarly, a paucity of data exists in the gynecological literature around pregnancy and delivery after SHP, a procedure with surgical similarities to VR. A recent systematic review examined POP recurrence after pregnancy following various techniques of uterine-sparing prolapse repair.[84] Of the 218 pregnancies reported, 22 occurred in women who had had a previous SHP. Of these 22 women, only 1 (elective termination at 8 weeks) did not deliver by planned cesarean section. No perinatal complications were reported. No significant trend to postpartum worsening/recurrence of POP symptoms was seen in these patients.

The data from these studies suggest that full-term pregnancy is safe in the presence of a previous VR. Data on the safety of vaginal delivery are lacking, but as reported in the Oxford study,[83] there is always the possibility of spontaneous labor and vaginal delivery regardless of the proposed birth plan.

Synthetic surgical mesh in the rectovaginal septum after VR will inherently reduce rectal and vaginal compliance, an essential component of safe vaginal delivery. A biologic graft may confer a greater degree of compliance in this regard due to the reported inherent remodeling. There are no gynecological data to guide us in this regard either. A recent guidance document from the American Urogynecologic Society identified only 1 published case of pregnancy after transvaginal mesh repair for POP (a reasonable surrogate for the rectovaginal component of a VR), and this patient delivered by cesarean section, with no reported adverse sequelae.[84]

Therefore, in the situation that a rectal prolapse repair is deemed clinically necessary in a female patient who is in child-bearing years, a biologic VR or nonprosthesis-based abdominal repair (eg, sutured posterior rectopexy) is recommended.

Specific Considerations: Connective Tissue Disorder

Statement 16: In those who have a connective tissue disorder (CTD), comprehensive nonoperative strategies should be maximized and optimized before any operative intervention, and more rigorous evaluation for multicompartment prolapse must be undertaken (100% consensus). POP is disproportionately common in patients with joint hypermobility (JH) disorders[85,86] and disorders of collagen metabolism and may explain some of the prolapse occurrences in male and nulliparous patients.[87] The hypermobility spectrum disorders (HSDs) were formerly known as benign JH syndrome; they are a group of disorders where JH is a cardinal sign but are without a molecular diagnosis of a CTD. Within the recognized collagen CTDs, there are the distinct Ehlers-Danlos syndrome (EDS) subtypes and the hypermobile subtype of EDS, where a genetic marker has not yet been identified.[88] Marfan syndrome, which affects fibrillin production, a different connective tissue component to the above, can also be included under the CTDs for this discussion.

An important observation with HSDs, EDS, and hypermobile subtype of EDS is that extra-articular manifestations are common. Although patients with HSDs have the expected subluxations, scoliosis, and valgus deformities, there are also associations with chronic pain, possibly as a result of pain sensitization, and reduced proprioception, with limitation of activities. Within the EDS subtypes, this goes further to include mood disturbances, chronic fatigue, functional GI disorders, and dysautonomia. These can presage the development of chronic (pain) central sensitivity syndromes (CSS). Patients with CSS are thought to have less favorable subjective outcomes from POP surgery in terms of persistence of symptoms, pain, and overall satisfaction.[89] Preempting the presence of CSS and related conditions such as fibromyalgia is vital because it may dictate the threshold for surgery and the choice of the operation, and it may allow for a prospective discussion of realistic postoperative outcomes.[89]

Studies regarding the influence of HSDs and CTDs in rectal prolapse are limited. One study from Oxford directly addressed this topic in consecutive patients with rectal prolapse grade 4 and 5 who underwent a laparoscopic VMR with a polypropylene mesh.[90] Patients had a preoperative Beighton score to stratify them as either HSD or "normal." Patients with HSD (or benign JH syndrome in this article) were younger and had a significantly higher reintervention rate during 1 year of postoperative follow-up than the normal group (31% vs 8%). The

reinterventions usually dealt with persisting posterior rectal prolapse and led to a modification of the operative technique to include posterior rectal mobilization at the index operation. No difference in perioperative complication rates was seen between the groups.

The expectation of the need for reinterventions over time for recurrent prolapse is central to initial management. Strategies that are generally important in these patients are weight optimization and participation in regular exercise.[88] Pelvic floor physiotherapy, preferably with a physiotherapist familiar with HSDs, should be routine. Multidisciplinary assessment is encouraged to quantify any concurrent middle or anterior compartment prolapse. Patients should be counseled that several prolapse repairs may be required sequentially over their lifetime. Whether this means an initial ventral abdominal approach to their rectal prolapse or another abdominal or perineal repair will be influenced by the patient's wishes and stage of life, as the aforementioned fertility and pregnancy considerations may need to be factored in.

Specific Considerations: Male Patients

Statement 17: VR can be considered as an option for surgical repair of rectal prolapse in male patients if the anatomical conditions support this approach (100% consensus). ERP in male patients represents a small proportion of rectal prolapse presentations. Abdominal repair in male patients has historically been discouraged because of considerations around the narrow android pelvic dimensions and proximity to the pelvic nerve structures, particularly those relating to sexual function. However, the functional outcomes of VR for both ERP and high-grade IRP have led to the uptake of this approach in both male and female patients.

Pelvic neural structures are at risk during an abdominal approach to rectal dissection in male patients. The HNs (sympathetic) may be injured along the sacral promontory/presacral region. Its fibers meet with parasympathetic splanchnic nerves in the inferior hypogastric plexus (IHP or "pelvic plexus"), close to the lateral rectal wall, midway down the rectum. From here, organ-specific, mixed sympathetic, and parasympathetic nerves supply rectal, prostatic, and cavernous branches.[91] The prostatic branches coalesce as the periprostatic bundles found at the 10 and 2 o'clock positions from the perspective of the abdominal operator,[92] beginning at the level of the seminal vesicles. The periprostatic nerve bundles are most densely arranged at the upper part of the prostate (base) and diminish toward the lower part (apex).[93] In general, sympathetic denervation can result in retrograde ejaculation, whereas injuries to the parasympathetic nerves can result in erectile dysfunction.

Careful dissection and knowledge of anatomy usually make the HN easily located and avoided at the sacral promontory. Similarly, the IHP can usually be displayed and avoided by rectal mobilization on the fascia propria. Rectal branches of the IHP should be avoided in a VR, as the dissection at this level is superficial (just through the peritoneum) and unilateral only.

The deep pouch of Douglas or peritoneocele sac has been recognized as a feature of pelvic prolapse anatomy for >100 years.[94,95] There are no published data describing the rectovesical pouch (RVP) depth in male rectal prolapse, but a deep RVP is a consistent feature recognized by this expert group. Specifically, one of the cardinal features of rectal prolapse in male patients is the rectovesical peritoneal reflection lying at or below the level of the base of the prostate. This means that careful anterior rectal dissection on the surface of the mesorectal fascia will usually commence below the level of periprostatic nerve bundles, thereby avoiding these structures. Therefore, the absence of the deep RVP should give the abdominal operator pause to consider not only the veracity of the diagnosis but also the optimal approach to repair.

A 2023 systematic literature review specifically examined outcomes for men undergoing all forms of surgery for ERP.[96] Most studies are case series, and numbers are too small to make a direct comparison between techniques. Two papers contained male-only data. Four of the 28 included papers reported on VR, with 1 article reporting exclusively on male VR in 52 patients.[97] There was a 17% recurrence rate and persistence of anal mucosal prolapse symptoms in 21% of patients. No preoperative questionnaires were completed, but postoperative functional questionnaires were sent out and achieved a response rate of 64% at a mean follow-up time of 4.7 years (range, 1.9–10.7). On direct questioning, no significant sexual or urinary dysfunction was reported in the group younger than 40 years. Patients older than 40 years were more likely to report sexual and urinary changes, but possibly in line with a population mean for this cohort. Most patients were satisfied with the treatment. There were no mesh-related complications.

A previous VR consensus statement identified IRP in male patients as a relative contraindication to VR based on perceived greater operative difficulty and surgical risks.[5] One published series subsequently examined a combination of exclusively male IRP (73%) and ERP (27%) patients treated with VR.[98] The IRP patients variously presented with fecal incontinence, obstructed defecation, and pelvic pain. The median follow-up was 42 months. Eighty-two percent of patients reported being asymptomatic at the last follow-up. There was no new-onset impotence and 1 transitory case of retrograde ejaculation. The response rate to the patient-reported outcomes questionnaires was 77%.

This discussion underscores that there is a lack of high-quality data in the setting of male patients undergoing VR. On balance, there does not appear to be significant

morbidity associated with the procedure, and new-onset functional symptoms relating to bowel and sexual/urinary function appear uncommon. There may be a high reintervention rate for reasons that may be specific to male patients. However, there are recognized functional advantages to performing a VR as opposed to other rectal prolapse procedures for both male and female patients. In the hands of an experienced operator, it is reasonable to consider VR for male patients with either ERP or high-grade IRP, but it is acknowledged that high-quality long-term data are still required in this area.

DISCUSSION

This international expert consensus group developed 17 statements covering indications, contraindications, assessment and planning, consent, operative details, prostheses, complications, follow-up, recurrence and reoperative surgery, and specific considerations for VR. The statements provide a contemporary summary of the literature and a reference point for colon and rectal surgeons who undertake VR as part of their practice.

Consensus was high throughout the group, with 13 of 17 statements receiving unanimous support. Statements 4, 5, 9, and 15 had 91% consensus each. The nature of the survey was such that responses were anonymous, so the reasons for dissent were unknown; individual experts were asked not to speak to the rationale for dissent to maintain anonymity.

Statement 4 recommended a history, examination, and use of a patient-reported outcome measure during initial assessment. It was acknowledged that patient-reported outcome measures could arguably be less relevant for someone with grade 5 prolapse: the outcome metric of primary concern is of correction of the prolapse, and postoperative functional symptoms may be hard to ascribe to the baseline, prolapse, or intervention. Furthermore, not all institutions have the ability to follow patients and track outcomes, although the majority believed this should be the criterion standard.

Statement 5 stated that consideration should be given to dynamic defecatory imaging, anorectal function testing, endoscopic evaluation, and a formal multidisciplinary review. The expert discussion focused on the utility of investigations preoperatively and multidisciplinary review. It is acknowledged that not all institutions can offer the array of investigations or multidisciplinary reviews and that this procedure need not necessarily be restricted to those who can, but again, this statement was included as the majority believed these preoperative evaluations should at least be considered with reasons for each outlined in the results section.

Statement 9 referred to the use of synthetic and biologic prostheses. The debate during the roundtable discussion centered around the long-term efficacy of biologic prostheses, so it is likely that this was the contentious component of the statement for 1 expert.

Statement 15 referred to the VR and pregnancy. This was a controversial topic for review, given the paucity of data to guide recommendations. The group were conscious that both pregnancy and mode of delivery are outside their area of expertise and training. Furthermore, this is an area that is very individualized and requires conscious shared decision-making with the patient and obstetric providers. Ultimately, it was hoped that any statement would highlight the challenges of this aspect of practice.

The quality of evidence in this field was found to be poor, with predominantly retrospective case series being the primary source of data. Furthermore, there was significant heterogeneity in outcome reporting and outcome definitions between studies. To address the paucity of data, there is a need for increased standardization of technique and reporting. These statements help set a baseline standard for VR and will support future research efforts. Furthermore, one must acknowledge that no 2 posterior compartment prolapses are the same. Accordingly, institutions must work toward better understanding of the spectrum of causation and biomechanics of posterior compartment prolapse to then establish comparable groups to better study intervention and outcomes. It is only then that a more targeted approach to care can be implemented.

This review specifically highlighted the need for a better understanding of indications, particularly for grades 3 and 4 prolapse when there is an overlay of functional disorder. There is also an opportunity to research and better understand CTDs among the other identified specialty considerations. Furthermore, there is an impetus to understand the contemporary risk of prostheses, both synthetic and biologic as they relate to complications and recurrence. The former is particularly pertinent given the informal moratorium of VR in the United Kingdom for concern around mesh. Much of this controversy stemmed from transvaginal mesh placement[66] and the use of VR mesh outside the guidance of modern indications. It should be highlighted that there is a suggestion that the synthetic mesh itself has not been the problem, but rather the use of permanent braided suture on the rectum causing erosion and the like. Accordingly, statement 9 highlights the need to use an absorbable suture.

The first international consensus in 2013[46] was criticized for its methodology and for selecting proponents of VR as authors. The former concern was addressed in this iteration with a more robust process, requiring an extensive literature review on each subject domain and anonymous voting to record true consensus. It is difficult to avoid the perception that such statements are driven by the procedure's proponents. However, all experts on the panel offer VR as part of their practice, but not exclusively so. This consensus article does not portend to claim the superiority of this technique over

another: the literature is sparse on this matter. In fact, each statement was written specifically to acknowledge that alternative approaches may be comparable or even better choices in some situations. An alternative methodology, such as an international Delphi, would likely capture widespread variation from a heterogenous group of surgeons and would likely become dilute in its recommendations, limiting the utility of such work. The group acknowledges that internationally, there are high-volume surgeons who did not partake in this body of work. The next step is for these statements to be reviewed by a wider group of stakeholders and involve the appropriate specialty societies.

Ultimately, this document provides a common standard from which to work. Evolution is inevitable with advancing research. It will undoubtedly continue to advance our field. Given the complexity of this patient cohort, alongside challenges with decision-making and operative technique, evolution of this operation should be undertaken with an enhanced consent process and in the context of research with well-defined inclusion and exclusion criteria and robust follow-up.

CONCLUSIONS

VR is a safe procedure and a useful technique in the surgical management of rectal prolapse. A variation in functional outcomes is acknowledged, and further investment must be made in better identifying those who would benefit from this approach versus an alternative.

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