



Multidisciplinary Management of Complete Rectal Prolapse: Surgical Approaches, Laboratory Assessment, Nursing Care, and Postoperative Outcomes

Khaled Hassan Alanazi⁽¹⁾, Tasneem Hejje Alkhaibari⁽²⁾, Nawal Mubarak Alkhudran⁽³⁾, Afrah Farhan Alanazi⁽⁴⁾, Muhammad Ahmad Sharahili⁽⁵⁾, Wejdan Salem Almutairi⁽⁶⁾, Abdulaziz Qaed Mukatil Alruwaili⁽⁷⁾, Darwish Mohammed Baal Gayth Almaghrabi⁽⁸⁾, Waheid Hadi M. Abuhadash⁽⁹⁾

(1)Iradah Mental Health Complex, Riyadh, Ministry of health, Saudi Arabia

(2)General Administration of Prison Health, General Administration of Medical Services, Ministry of Interior, Saudi Arabia

(3)Kood Asafyah Primary Health Care Center, Ministry of health, Saudi Arabia

(4)Madinah, Ministry of Health, Saudi Arabia

(5)Jazan Specialist Hospital, Ministry of health, Saudi Arabia

(6)Security Forces Hospital, Riyadh, Ministry of Interior, Saudi Arabia

(7)King Abdulaziz Specialist Hospital, Sakaka, Al Jouf Health Cluster, Ministry of health, Saudi Arabia

(8)Dammam Prison Health Center, General Administration of Prison Health, Ministry of Interior, Saudi Arabia

(9)Jazan Health Cluster, Ministry of health, Saudi Arabia

Abstract

Background: Complete rectal prolapse is a debilitating condition characterized by protrusion of the entire rectal wall through the anus. It can cause constipation, fecal incontinence, rectal bleeding, mucus discharge, and impaired quality of life. Although surgery is the primary treatment, recurrence and postoperative complications remain important clinical challenges.

Aim: This review aims to summarize the principal surgical approaches for complete rectal prolapse, highlighting their indications, operative principles, advantages, limitations, outcomes, and complications.

Methods: A narrative review of the available literature was undertaken, focusing on abdominal and perineal surgical techniques for complete rectal prolapse. The reviewed approaches included suture rectopexy, ventral mesh rectopexy, Wells rectopexy, Ripstein rectopexy, Mikulicz's procedure, Delorme's procedure, Altemeier's procedure, perineal stapled prolapse resection, and Thiersch's operation. Evidence concerning recurrence, postoperative complications, and the role of minimally invasive surgery was also considered.

Results: Abdominal procedures generally demonstrate lower recurrence rates in selected patients who can tolerate major surgery, while perineal procedures remain valuable for older, frail, and high-risk individuals. Mesh rectopexy may provide durable anatomical support but carries risks of mesh-related complications. Delorme's and Altemeier's procedures offer alternatives for selected patients, although recurrence and postoperative morbidity vary. Comparative studies have not consistently established the superiority of one procedure over another. Laparoscopic rectopexy has gained popularity because of its minimally invasive nature and favorable recovery outcomes, whereas robotic surgery remains limited by cost and availability.

Conclusion: Surgical management should be individualized according to prolapse severity, bowel function, comorbidities, patient preferences, and surgical expertise. Further comparative research is needed to establish optimal treatment strategies.

Keywords: Complete rectal prolapse; rectopexy; perineal surgery; abdominal surgery; recurrence; laparoscopic surgery.

Introduction

Complete rectal prolapse, also known as external rectal prolapse or procidentia, is a condition characterized by the protrusion of the entire thickness of the rectal wall through the anal canal and beyond the anal verge [1]. Although it occurs most frequently among older women, particularly those with pelvic floor dysfunction, it can affect individuals of all ages, including children [2,3]. The development of complete rectal prolapse is multifactorial and involves several anatomical, physiological, and predisposing factors, including pelvic floor weakness,

impaired rectal fixation, increased intra-abdominal pressure, chronic constipation, and disorders of defecation. Neurological dysfunction, connective tissue abnormalities, and previous pelvic floor injuries may also contribute to its occurrence. Complete rectal prolapse can substantially affect patients' physical health, psychological well-being, and quality of life. Common clinical manifestations include protruding rectal mass during defecation, fecal incontinence, mucus discharge, rectal bleeding, perianal discomfort, and incomplete evacuation. Some patients experience chronic constipation,

excessive straining, or difficulty emptying the rectum. In advanced cases, the prolapsed tissue may become edematous, ulcerated, incarcerated, or, rarely, strangulated, requiring urgent surgical assessment. Accurate diagnosis and comprehensive clinical evaluation are therefore essential for determining disease severity, identifying associated pelvic floor disorders, and selecting an appropriate treatment strategy.

Surgical intervention remains the principal definitive treatment for symptomatic complete rectal prolapse in adults. The main objectives of surgery are to eliminate the prolapse, restore or improve normal pelvic anatomy, address associated bowel dysfunction, and reduce the risk of recurrence while minimizing postoperative complications. Several surgical approaches have been developed, broadly classified into abdominal and perineal procedures. Abdominal operations include open, laparoscopic, and robotic rectopexy, with or without rectal resection. Perineal procedures include the Delorme procedure and Altemeier perineal rectosigmoidectomy. Each technique has specific indications, benefits, and limitations related to patient characteristics, operative risk, bowel function, and the surgeon's expertise [4]. Despite advances in minimally invasive surgery and perioperative care, selecting the optimal surgical approach remains challenging. Decisions depend on factors such as age, frailty, comorbidities, baseline constipation or fecal incontinence, anatomical abnormalities, and the risk of recurrence. Differences in study populations, surgical techniques, outcome definitions, and follow-up periods also complicate comparisons of treatment effectiveness. Consequently, no single procedure is appropriate for every patient, and treatment decisions require individualized assessment and consideration of both anatomical and functional outcomes [5]. In addition to surgical expertise, effective management requires multidisciplinary collaboration involving surgeons, nurses, medical laboratory professionals, anesthesiologists, pharmacists, and rehabilitation specialists. Preoperative assessment, laboratory investigations, infection prevention, perioperative monitoring, pain management, nutritional support, bowel-function assessment, and postoperative education all contribute to patient safety and recovery. Coordinated care may also facilitate the early identification of complications and support long-term follow-up. This review aims to examine the principal surgical approaches for complete rectal prolapse, compare their indications, advantages, limitations, recurrence rates, functional outcomes, and postoperative complications, and discuss the contribution of multidisciplinary care to treatment outcomes. By integrating surgical evidence with perioperative and postoperative management considerations, this review seeks to support evidence-based clinical decision-making and improve the

quality of care provided to patients with complete rectal prolapse.

Surgical Approaches For Complete Rectal Prolapse

Surgical intervention is the principal definitive treatment for symptomatic complete rectal prolapse in adults. The primary objectives are to restore normal rectal anatomy, prevent recurrent prolapse, improve bowel function, and minimize postoperative complications. Surgical procedures are broadly classified into abdominal and perineal or transanal approaches. The choice of procedure depends on the patient's age, general health, operative risk, pelvic floor anatomy, associated constipation or fecal incontinence, and the surgeon's experience. Abdominal procedures include rectopexy performed through open, laparoscopic, or robotic techniques, whereas perineal procedures include the Delorme procedure and Altemeier perineal rectosigmoidectomy. Among abdominal techniques, direct suture rectopexy and ventral mesh rectopexy represent two approaches to rectal fixation, each with distinct technical characteristics and clinical considerations.

Transabdominal Rectal Fixation

Transabdominal rectal fixation aims to restore the position of the rectum within the pelvis and prevent its descent through the anal canal. The procedure may involve direct suture fixation, mesh-assisted suspension, or rectopexy combined with sigmoid resection. Abdominal rectopexy is generally associated with favorable anatomical outcomes, although recurrence remains possible. Functional outcomes also vary, particularly regarding postoperative constipation, fecal incontinence, and obstructed defecation [8].

Transabdominal Direct Suture Fixation

Direct suture rectopexy involves mobilizing the rectum and securing it to the presacral fascia or other appropriate supporting structures using sutures. The procedure is intended to stabilize the rectum without introducing a prosthetic mesh. Depending on the technique, rectal mobilization may involve posterior dissection, with care taken to preserve the autonomic nerves responsible for pelvic and bowel function. In open surgery, abdominal access is obtained through an appropriate incision, allowing the surgeon to identify the rectum, sigmoid colon, sacral promontory, and surrounding anatomical structures. The rectum is mobilized to the extent required for reduction of the prolapse and restoration of its position. The surgeon then applies fixation sutures to secure the rectum or its supporting tissues to the presacral fascia. The sutures must provide adequate support without penetrating the rectal lumen or causing tissue injury. Hemostasis is achieved, and the operative field is inspected before abdominal closure. Laparoscopic and robotic techniques allow similar principles of rectal mobilization and fixation

through minimally invasive access. These approaches may reduce wound-related morbidity, postoperative pain, and hospital stay compared with open surgery in appropriately selected patients. However, outcomes depend on patient selection, operative technique, and surgical expertise. Direct suture rectopexy avoids mesh-related complications, including mesh erosion, infection, and chronic pelvic pain. Nevertheless, posterior rectal mobilization may increase the risk of autonomic nerve injury, potentially contributing to new or worsening constipation. The extent of mobilization, the method of fixation, and the presence of preoperative bowel dysfunction should therefore be considered when selecting this procedure [8].

Transabdominal Mesh Fixation and Ventral Mesh Rectopexy

Ventral mesh rectopexy (VMR) is an abdominal procedure in which a mesh is attached to the anterior rectal wall and secured proximally to the sacral promontory. The technique emphasizes anterior rectal mobilization while limiting posterior and lateral dissection. This approach is intended to preserve the pelvic autonomic nerves and reduce the risk of postoperative constipation associated with extensive posterior mobilization [4,9]. VMR is commonly performed laparoscopically, although robotic and open approaches may also be used. Following abdominal access and inspection of the pelvic cavity, adhesions are identified and divided when necessary. The surgeon exposes the sacral promontory, identifies relevant anatomical structures, and opens the peritoneum over the right side of the rectum. Dissection proceeds along the anterior rectal plane toward the pelvic floor. The right ureter, hypogastric nerves, and other adjacent structures must be identified or protected throughout the procedure. In female patients, dissection proceeds within the rectovaginal plane toward the pelvic floor. In male patients, the dissection follows the appropriate plane between the rectum and the prostate, taking account of Denonvilliers' fascia. The extent of anterior mobilization is determined by the anatomical requirements of the repair. Adequate exposure and careful dissection are necessary to avoid injury to the rectum, vagina, prostate, ureters, and pelvic nerves. After the anterior rectal wall has been adequately mobilized, a suitable mesh is positioned and secured to the rectum using sutures. The proximal end is then attached to the sacral promontory to suspend the rectum without excessive tension. Fixation must provide sufficient support while avoiding injury to presacral vessels and surrounding neural structures. The peritoneum is subsequently closed over the mesh, separating it from the abdominal viscera and reducing direct contact with the small intestine.

VMR has gained acceptance in pelvic floor surgery because it combines anatomical correction

with limited posterior dissection. Clinical studies suggest that it can improve prolapse-related symptoms and bowel function in selected patients. Some patients experience improvement in constipation and obstructed defecation, although these benefits are not universal and depend on the underlying functional disorder [10,11]. Recurrence may still occur, and long-term outcomes require appropriate follow-up. Mesh-related complications remain an important consideration. These include infection, erosion into adjacent organs, chronic pain, and, rarely, bowel obstruction or perforation. The choice between synthetic and biological mesh should be guided by the available evidence, the patient's characteristics, local practice, and the surgeon's experience. Biological mesh may undergo tissue remodeling, but it should not automatically be considered free of erosion or other complications. Overall, direct suture rectopexy and VMR offer different methods of restoring rectal support. Direct fixation avoids prosthetic material but may involve more extensive posterior mobilization, whereas VMR limits posterior dissection but introduces mesh-related risks. The choice should be individualized according to the patient's anatomical abnormalities, baseline bowel function, operative risk, and preferences. Assessment of recurrence, constipation, fecal continence, postoperative complications, and quality of life is essential when comparing the effectiveness of these surgical approaches [10,11].

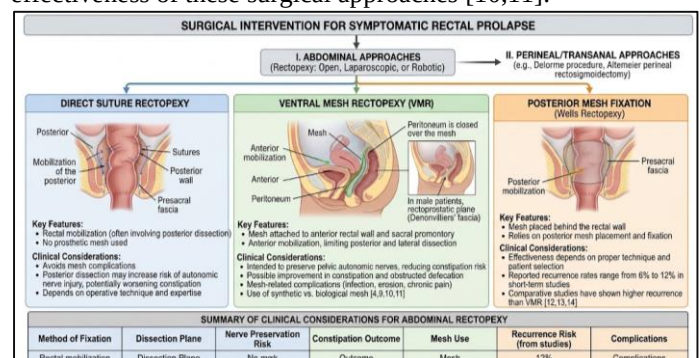


Figure-1: Abdominal Surgical approaches for rectal prolapse.

Transabdominal Posterior Mesh Fixation of the Rectum (Wells Rectopexy)

Wells rectopexy is an abdominal surgical procedure developed to correct complete rectal prolapse by restoring rectal support and preventing abnormal descent through the anal canal. The procedure involves posterior mobilization of the rectum and placement of a prosthetic mesh behind the rectal wall, with the objective of maintaining the rectum in its corrected anatomical position. Unlike ventral mesh rectopexy (VMR), which primarily supports the anterior rectal wall while limiting posterior dissection, Wells rectopexy relies on posterior mesh placement and fixation. It can be performed through open or laparoscopic surgery, depending on the patient's condition, available

resources, and the surgeon's experience. The effectiveness of Wells rectopexy depends on appropriate patient selection, adequate rectal mobilization, preservation of pelvic autonomic nerves, and secure mesh positioning. Short-term studies have reported recurrence rates ranging from 6% to 12%, although recurrence may increase with longer follow-up [12,13]. Comparative studies have also reported differences in recurrence between Wells rectopexy and VMR, with some evidence favoring VMR [12,14]. However, outcomes vary according to surgical technique, patient characteristics, follow-up duration, and the definitions used to assess recurrence. Postoperative constipation, fecal incontinence, pelvic pain, and mesh-related complications should also be considered when evaluating the overall effectiveness of the procedure.

Laparoscopic Wells Rectopexy

Laparoscopic Wells rectopexy is performed under general anesthesia using minimally invasive abdominal access. The patient is positioned to provide adequate exposure of the pelvis and facilitate visualization of the rectum, sigmoid colon, sacral promontory, and adjacent structures. Pneumoperitoneum is established, and laparoscopic ports are inserted according to the planned operative approach. Port placement should allow the surgeon and assistant to perform traction, dissection, and mesh fixation without compromising instrument movement or visualization. After abdominal access, the surgeon inspects the pelvic cavity and identifies adhesions that could interfere with the procedure. Adhesions are divided when necessary, with care taken to avoid injury to the bowel and adjacent organs. The sigmoid colon and its mesentery are then assessed to determine the extent of mobilization required for tension-free rectal repositioning [12,14].

Mobilization of the Sigmoid Colon and Mesentery

Mobilization of the sigmoid colon provides access to the posterior pelvic compartment and facilitates subsequent rectal fixation. The surgeon opens the peritoneum along the appropriate anatomical plane near the sacral promontory and sigmoid mesocolon. Dissection proceeds through the loose connective tissue between the mesocolon and the underlying retroperitoneal fascia. This plane corresponds to the fusion fascial plane commonly referred to as Toldt's space. The sigmoid colon is gently retracted to expose the mesentery and maintain tension across the dissection plane. Mobilization proceeds as required to achieve adequate reach and reduce tension on the rectum after fixation. The integrity of the mesocolon and underlying retroperitoneal fascia should be preserved whenever possible. The left ureter, gonadal vessels, and major retroperitoneal vascular structures must be identified or protected throughout the procedure. Particular attention is required near the inferior mesenteric vessels and associated autonomic nerve plexuses.

Lateral mobilization may be performed by dividing the peritoneal attachments along the white line of Toldt. This permits the sigmoid colon to move medially and provides access to the retroperitoneal plane. The extent of colonic mobilization depends on the patient's anatomy and the requirements of the planned repair. Excessive dissection should be avoided when it does not contribute to safe rectal repositioning [12,14].

Posterior and Lateral Rectal Mobilization

Rectal mobilization is a central component of Wells rectopexy. Dissection generally begins near the sacral promontory and continues caudally within the presacral plane. The surgeon develops the space between the rectal mesentery and presacral fascia, proceeding carefully toward the pelvic floor. The rectosacral fascia may require division to permit adequate mobilization. Dissection is extended laterally as necessary to provide sufficient space for posterior mesh placement. The anatomical relationships of the pelvic autonomic nerves are particularly important during this stage. The superior hypogastric plexus, hypogastric nerves, and inferior hypogastric plexuses contribute to bowel, bladder, and sexual function. Excessive lateral dissection, unnecessary division of the rectal lateral ligaments, or injury to these structures may contribute to postoperative dysfunction. The rectal blood supply should also be preserved, and dissection should be limited to the extent required for effective fixation. The degree of mobilization must balance adequate correction of the prolapse against the risk of postoperative constipation and pelvic nerve injury. Once the rectum can be repositioned without excessive tension, the surgeon prepares the posterior space for mesh placement [12,14].

Posterior Mesh Placement and Rectal Fixation

After mobilization, the rectum is returned to its intended anatomical position. A mesh is selected and shaped to fit the posterior rectal space. The material is placed behind the rectum and positioned to provide support without excessive compression or distortion of adjacent tissues. The mesh must lie flat, without folds or unnecessary tension, to reduce the risk of local tissue irritation and displacement. The rectum is elevated to correct the prolapse, and the mesh is secured according to the chosen Wells technique. Historical variations of Wells rectopexy have used different methods of posterior mesh placement and fixation. The precise method depends on the operative technique and the material selected. Fixation should provide adequate support while avoiding penetration of the rectal lumen, injury to adjacent structures, or excessive restriction of rectal mobility. Careful hemostasis is essential before completing the procedure. The surgeon assesses the position of the rectum, the stability of the fixation, and the integrity of surrounding tissues. Where the technique involves peritoneal closure, the peritoneum

is restored over the mesh to separate it from the abdominal viscera and reduce direct contact with the small intestine. The final operative assessment includes confirmation of hemostasis and the absence of apparent injury to the bowel, ureters, or surrounding structures [12,14].

Postoperative Outcomes and Complications

Postoperative assessment should address anatomical correction, bowel function, pain, complications, and recurrence. Patients should be monitored for bleeding, infection, ileus, urinary dysfunction, and difficulties with defecation. Long-term follow-up is important because recurrent prolapse may develop after an initially successful repair. Functional assessment should include constipation, fecal incontinence, obstructed defecation, and changes in quality of life. Wells rectopexy provides a method of restoring rectal support without requiring bowel resection in every patient. Nevertheless, posterior mobilization and mesh placement introduce potential risks, including autonomic nerve injury, postoperative constipation, mesh infection, chronic pain, and recurrence. The balance between anatomical durability and preservation of normal bowel function remains an important consideration when selecting this procedure. In summary, Wells rectopexy is an established abdominal approach for complete rectal prolapse that relies on posterior rectal mobilization and mesh-supported fixation. Successful outcomes require detailed knowledge of pelvic anatomy, careful dissection, protection of autonomic nerves and retroperitoneal structures, appropriate mesh placement, and structured postoperative follow-up. Comparisons with ventral mesh rectopexy and other procedures should consider both anatomical recurrence and functional outcomes rather than relying on recurrence rates alone [12,14].

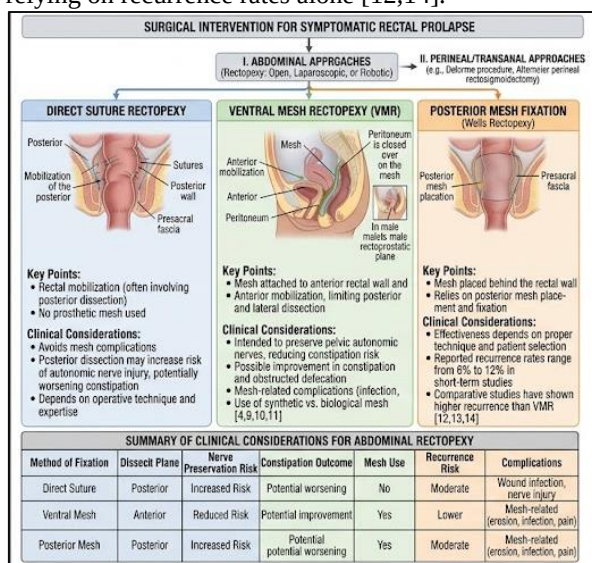


Figure-2: Comparison of abdominal surgical management of rectal prolapse.

Transabdominal Anterior Mesh Fixation (Ripstein Rectopexy)

Ripstein rectopexy is an abdominal surgical procedure used to treat complete rectal prolapse by suspending the rectum with a prosthetic mesh attached to the presacral region. The original technique involves placing a mesh strap around the anterior aspect of the rectum and securing it to the presacral fascia or periosteal tissues near the sacral promontory. The principal objective is to restore the anatomical position of the rectum, provide durable support, and prevent recurrent prolapse. The procedure can be performed through an open abdominal approach or laparoscopically, depending on the patient's condition, surgical expertise, and available resources. Although Ripstein rectopexy can provide effective anatomical correction, the placement of mesh around the rectum may cause complications, particularly when the material exerts excessive pressure on the rectal wall. These complications have limited the use of the original technique in some clinical settings. Reported adverse outcomes include colorectal obstruction, fecal impaction, mesh erosion into the intestine, small bowel obstruction, ureteral injury or fibrosis, and rectovaginal fistula [17]. Consequently, careful patient selection, appropriate mesh positioning, and preservation of surrounding anatomical structures are essential considerations when evaluating this procedure.

McMahan's Modification of Ripstein Rectopexy

McMahan modified the original Ripstein procedure to reduce complications associated with circumferential compression of the rectum. Rather than securing the mesh directly around the anterior rectal wall in the original configuration, the modified technique fixes the mesh ends to the lateral aspects of the rectum. This modification aims to maintain rectal support while reducing the risk of excessive compression and obstruction. Published reports have described recurrence rates of approximately 2%–5% for McMahan's modified procedure, with a reported complication rate of about 20% [15]. Other reports examining Ripstein rectopexy and related modifications have documented recurrence rates ranging from 4% to 10% [16]. These figures should be interpreted in the context of differences in patient populations, surgical techniques, follow-up periods, and definitions of recurrence. They should not be regarded as directly comparable estimates across all clinical settings. The principal advantage of mesh-based rectopexy is its ability to provide mechanical support to the rectum. However, the use of prosthetic material introduces specific risks that must be weighed against the potential benefits. Mesh-related fibrosis may contribute to narrowing or restriction of the rectum, while erosion into adjacent organs can produce serious complications. The choice of mesh material, the extent of rectal mobilization, and the

tension applied during fixation may influence postoperative outcomes.

Laparoscopic Ripstein Rectopexy

Laparoscopic Ripstein rectopexy applies the principles of the open procedure through minimally invasive abdominal access. The operation is generally performed under general anesthesia. The patient is positioned to provide adequate exposure of the pelvis, and pneumoperitoneum is established to facilitate visualization and instrument movement. Several laparoscopic ports are inserted according to the surgeon's preferred configuration and the patient's anatomy. After abdominal access, the surgeon examines the pelvic cavity and identifies adhesions that could interfere with the procedure. Adhesions are divided when necessary, with care taken to avoid injury to the bowel and adjacent structures. The sacral promontory, rectum, sigmoid colon, and surrounding pelvic anatomy are then identified. Appropriate positioning and exposure are important because the operation requires dissection in proximity to major vessels, ureters, and autonomic nerves [16].

Posterior and Lateral Mobilization of the Rectum

Rectal mobilization begins near the sacral promontory, where the surgeon develops the posterior dissection plane within the loose connective tissue between the rectal mesentery and presacral fascia. Dissection proceeds caudally toward the pelvic floor, with division of the rectosacral fascia when necessary to achieve adequate mobilization. The posterior rectal space is extended toward the region above the levator ani muscles. Lateral mobilization is performed as required to allow the rectum to be elevated and repositioned without excessive tension. The extent of dissection should be determined by the anatomical requirements of the repair rather than by routine extensive mobilization. Particular attention is required to preserve the pelvic autonomic nerves, which contribute to normal bowel, bladder, and sexual function. The inferior mesenteric and superior rectal vessels should be protected, and unnecessary division of the lateral rectal ligaments should be avoided when consistent with the planned technique. The surgeon must also consider the risks associated with dissection near the presacral venous plexus and major pelvic vessels. Injury in this region may result in significant bleeding and complicate the operation. Maintaining a clear anatomical plane, controlling traction, and achieving adequate visualization are therefore important aspects of operative safety [16].

Mesh Placement and Rectal Fixation

After adequate mobilization, the rectum is elevated into its corrected anatomical position. In the original Ripstein technique, a mesh strap, traditionally approximately 5 cm wide, is placed around the anterior aspect of the upper rectum. The mesh is secured to the presacral fascia or periosteal tissues near the sacral promontory using non-

absorbable sutures. The fixation provides suspension and helps prevent the rectum from descending through the anal canal. The mesh must be positioned carefully to avoid excessive compression of the rectal wall. The surgeon assesses the relationship between the mesh and the rectum, ensuring that fixation provides support without creating a constricting band. In modified procedures, the mesh ends may be secured to the lateral rectal walls to reduce the risk of circumferential compression. The precise configuration depends on the operative technique being performed. Once fixation is complete, the surgeon inspects the operative field for bleeding, verifies the position of the rectum, and assesses the stability of the repair. Peritoneal closure may be performed according to the selected technique to separate the mesh from adjacent abdominal viscera. The laparoscopic instruments are removed, the pneumoperitoneum is released, and the port sites are closed [16].

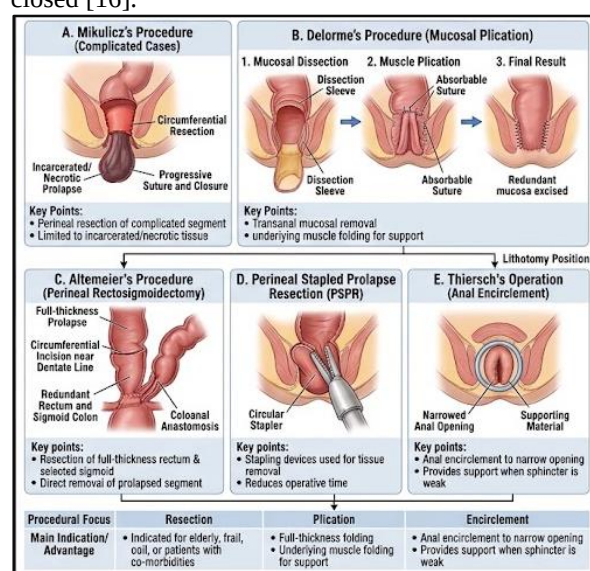


Figure-3: Other surgical procedures.

Postoperative Outcomes and Complications

Postoperative evaluation should assess anatomical correction, bowel function, pain, urinary function, and complications. Particular attention should be given to constipation, obstructed defecation, fecal impaction, and symptoms suggesting rectal narrowing. Patients should also be monitored for infection, bleeding, ileus, and urinary dysfunction. Mesh-related complications remain a major concern with Ripstein rectopexy. Colorectal obstruction may result from excessive compression or fibrosis, while mesh erosion can damage the rectum or adjacent organs. Other reported complications include small bowel obstruction, ureteral fibrosis or injury, and rectovaginal fistula [17]. Some complications may present months or years after surgery, making long-term clinical follow-up important. In summary, Ripstein rectopexy is a mesh-based abdominal procedure designed to restore rectal support and prevent recurrent complete rectal

prolapse. McMahan's modification attempts to reduce complications by altering the points of mesh fixation. Although both approaches can provide anatomical correction, their potential benefits must be considered alongside mesh-related risks and postoperative functional outcomes. Individualized procedure selection, careful operative technique, preservation of pelvic structures, and long-term follow-up remain essential for optimizing patient outcomes.

Transperineal and Transanal Surgical Approaches for Complete Rectal Prolapse

Transperineal and transanal procedures represent important surgical options for the management of complete rectal prolapse. Unlike abdominal rectopexy, which restores rectal support through abdominal access, these procedures correct the prolapse through the perineum or anal canal. They are particularly relevant for older adults, frail patients, and individuals with comorbidities that increase the risks associated with major abdominal surgery. The choice of procedure depends on the length and condition of the prolapsed rectum, the patient's physiological status, the presence of incarceration or tissue necrosis, and the surgeon's experience.

Mikulicz's Procedure

Mikulicz's procedure is a perineal resection technique used primarily for complicated rectal prolapse. It involves removing the protruding rectal segment and reconnecting the remaining bowel tissue. Unlike rectopexy, which aims to restore rectal support, this procedure primarily addresses the prolapsed segment and does not correct all underlying anatomical abnormalities. Consequently, its use is generally limited to selected patients with severe edema, adhesions, irreducibility, or necrosis of the prolapsed tissue [18]. The procedure is performed with the patient in the lithotomy position under appropriate anesthesia. Traction sutures are placed to expose the prolapsed bowel, and a circumferential incision is made in the outer bowel wall at a suitable distance from the anal margin. The surgeon separates the inner and outer layers of the prolapsed segment, controls bleeding, and progressively resects the affected tissue while suturing the remaining bowel layers. Particular care is required to avoid entering the abdominal cavity unnecessarily or contaminating it with bowel contents. The resection and suturing are completed in a controlled sequence until the prolapsed segment is removed and the remaining bowel is returned through the anus. Postoperative monitoring focuses on bleeding, infection, anastomotic integrity, and restoration of bowel function.

Delorme's Procedure

Delorme's procedure is a transanal operation that involves removing the prolapsed rectal mucosa and folding the underlying muscular layer to reinforce rectal support. It is considered a minimally invasive perineal approach and may be suitable for

older patients with substantial anesthetic risk, selected children with primary rectal prolapse, and patients requiring repeat surgery [19–21]. The procedure is performed under general or regional anesthesia, with the patient in the lithotomy position. Traction sutures are placed in the prolapsed rectum to improve exposure. A circumferential incision is made in the mucosa below the prolapsed segment, and the mucosa is dissected from the underlying rectal muscle. The mucosal sleeve is separated over the required length, exposing the muscular layer. The exposed muscle is then folded and plicated with absorbable sutures to shorten and reinforce the rectal wall. The redundant mucosa is removed, and the remaining mucosal edges are sutured together. Delorme's procedure avoids abdominal access and bowel resection, which may reduce operative trauma in selected patients. It is commonly considered when the prolapse is relatively short, although favorable outcomes have also been reported in some patients with longer prolapses [22–24]. Recurrence remains a concern, and appropriate patient selection and follow-up are necessary. The procedure may also be considered for recurrent prolapse in selected cases [19,25].

Altemeier's Procedure

Altemeier's procedure, also known as perineal rectosigmoidectomy, involves resection of the prolapsed full-thickness rectum and, when necessary, part of the sigmoid colon, followed by a coloanal anastomosis. It is particularly useful for patients with substantial full-thickness prolapse, including selected individuals with incarcerated prolapse or those unable to tolerate abdominal surgery [26–30]. The operation is performed under spinal or general anesthesia with the patient in the lithotomy position. The prolapsed bowel is exposed, and a circumferential incision is made near the dentate line while preserving an appropriate distal margin. The rectum is dissected through its full thickness, and the supporting mesentery is divided with careful control of the blood vessels. If required, the pelvic peritoneum is opened to facilitate reduction and resection of the prolapsed bowel. The redundant rectum and selected sigmoid colon are removed, and the remaining colon is joined to the anal canal using an appropriate anastomotic technique. Altemeier's procedure offers direct removal of the prolapsed segment and may be repeated if recurrence occurs. It avoids the need for abdominal dissection and may provide a suitable option for frail patients. However, potential complications include anastomotic leakage, bleeding, infection, pelvic sepsis, and recurrent prolapse. Careful postoperative monitoring is therefore essential.

Perineal Stapled Prolapse Resection

Perineal stapled prolapse resection (PSPR) was introduced as an alternative method for removing redundant prolapsed rectal tissue using stapling devices. The technique was first described by Scherer

and colleagues in 2008 [31]. It has been considered for selected older or frail patients who cannot tolerate abdominal surgery, particularly when the prolapsed bowel has limited edema [32]. The operation is performed under general anesthesia with the patient in the lithotomy position. The prolapsed rectum is exposed and examined to ensure that adjacent organs are not trapped between the bowel walls. Stapling devices are used to divide and remove the redundant tissue, and the resulting staple lines are inspected and reinforced with sutures when necessary to achieve hemostasis and secure closure. The procedure is intended to reduce operative time and facilitate recovery. Nevertheless, careful patient selection is important because tissue edema, anatomical complexity, and the risk of bleeding may affect its suitability. Published reports have described short operative times and favorable recovery in selected patients, although outcomes depend on the technique and the characteristics of the treated population [33,34].

Thiersch's Operation

Thiersch's operation is an anal encirclement procedure designed to narrow the anal opening and provide additional support when the external anal sphincter is weak or lax. It may be used in selected patients with rectal prolapse and associated anal incontinence, either as an adjunct to another procedure or as a treatment for patients who cannot tolerate more extensive surgery [35–38]. The procedure involves placing a supporting material around the anal canal beneath the perianal tissues to restrict excessive anal dilation while preserving sufficient space for defecation. The encircling material must not be tightened excessively, because over-tightening may cause pain, constipation, fecal impaction, or difficulty evacuating stool. Potential complications include infection, material migration or erosion, and recurrence of prolapse. Thiersch's operation does not correct the underlying rectal descent and therefore has a limited role as a standalone definitive treatment. In summary, transperineal and transanal procedures provide several options for managing complete rectal prolapse, particularly in patients for whom abdominal surgery carries increased risk. Mikulicz's procedure is reserved mainly for selected complicated cases, Delorme's procedure removes mucosa and reinforces the rectal muscle, Altemeier's procedure removes the prolapsed bowel segment, PSPR uses stapling technology to resect redundant tissue, and Thiersch's operation provides anal support. Selecting the appropriate approach requires consideration of prolapse severity, patient fitness, bowel function, recurrence risk, and the potential for postoperative complications.

Surgical Management of Complete Rectal Prolapse

Introduction and Clinical Significance

Complete rectal prolapse is a condition in which the full thickness of the rectal wall protrudes through the anus, significantly affecting patients' quality of life. Its reported population incidence is approximately 0.5%, and women are affected about six times more frequently than men [4,11]. The underlying mechanisms are multifactorial and include pelvic floor weakness, anal sphincter dysfunction, rectal intussusception, pudendal nerve injury, and abnormalities associated with the sliding hernia theory [39]. Common clinical manifestations include visible rectal protrusion, mucus discharge, rectal bleeding, increased bowel movements, and incomplete evacuation. Constipation and fecal incontinence may occur concurrently, while severe cases can progress to incarceration or rectal necrosis [40]. Diagnosis relies primarily on clinical examination, although emergency presentations require careful assessment for complications and possible underlying malignancy [41]. Surgery remains the principal treatment for complete rectal prolapse. The primary objectives are to restore normal anatomy, prevent recurrence, improve bowel function, alleviate constipation, and address fecal incontinence [42,43]. The selection of an appropriate procedure depends on patient fitness, prolapse severity, bowel function, comorbidities, anal function, and the surgeon's expertise.

Abdominal and Perineal Surgical Approaches

Surgical treatment is broadly divided into abdominal and perineal approaches. Abdominal procedures are often preferred for patients who can tolerate major surgery because they may offer lower recurrence rates. Perineal procedures are commonly considered for older or frail patients, particularly when avoiding general anesthesia or extensive abdominal surgery is desirable [44]. Abdominal procedures include suture rectopexy and mesh-based rectopexy. In suture rectopexy, the rectum is mobilized and secured to surrounding structures using sutures to prevent further descent. This approach is relatively straightforward and can provide effective anatomical correction, although reported recurrence and complication rates vary. One summary reported a recurrence rate of 23.33% following transabdominal suture fixation. Potential complications include bleeding, infection, bowel injury, and prolonged recovery. Mesh rectopexy uses a prosthetic material to support and stabilize the rectum. Ventral mesh rectopexy is particularly relevant in patients with rectal prolapse accompanied by other pelvic organ prolapse. It has been associated with favorable outcomes and a reported recurrence rate of approximately 4%, although mesh infection, bowel obstruction, and other mesh-related complications remain concerns. Posterior mesh fixation techniques, including Wells rectopexy, may be used for extensive prolapse and poor pelvic support. Reported recurrence rates range from 6% to

12%. Ripstein rectopexy, which uses anterior mesh fixation, has been associated with recurrence rates of approximately 2% to 5%, but potential complications include constipation, bowel injury, and prolonged recovery. These figures are reported estimates and should not be interpreted as direct comparisons because outcomes depend on patient selection, operative technique, and follow-up [50–52].

Perineal procedures include Mikulicz's, Delorme's, Altemeier's, perineal stapled prolapse resection (PSPR), and Thiersch's operations. Mikulicz's procedure involves resection of the protruding bowel segment and may be considered in selected complicated cases. Delorme's procedure removes redundant rectal mucosa and plicates the underlying muscular layer, offering a less invasive option for selected patients. Altemeier's procedure, or perineal rectosigmoidectomy, removes the prolapsed full-thickness rectum and may include part of the sigmoid colon, followed by an anastomosis. It may be particularly useful for substantial prolapse and selected patients with bowel dysfunction. PSPR uses stapling devices to remove redundant prolapsed tissue and may facilitate shorter operating times and recovery. Thiersch's operation narrows the anal opening using an encircling support to improve anal support, but it has limited effectiveness for complex prolapse when used alone. Although perineal approaches may reduce operative burden, some studies report higher recurrence rates than abdominal procedures. Nevertheless, comparative evidence is not uniform. Studies comparing Delorme's and Altemeier's procedures have not consistently demonstrated significant differences in recurrence or postoperative complications. Similarly, a multicenter randomized trial comparing Delorme's procedure, Altemeier's procedure, suture rectopexy, and resection rectopexy found no significant differences in recurrence or complications [45–47]. In female patients, Altemeier's procedure has been associated with fewer complications in some studies and may improve bowel movements in patients with constipation [48]. Among male patients, abdominal surgery has been associated with longer operative times but lower recurrence, with complication rates similar to those of perineal procedures [49].

Outcomes, Complications, and Individualized Treatment

Despite advances in surgical techniques, recurrence remains a major concern. Reported recurrence after surgery may reach 10%–20% or higher, while complications such as fecal incontinence and anal stenosis can adversely affect long-term quality of life [53,54]. The outcomes of individual procedures vary considerably, and no single operation has been established as universally superior. Preoperative assessment should therefore evaluate the anatomical extent and severity of prolapse, bowel symptoms, anal sphincter function, comorbidities, overall physical condition, and patient

preferences [55–58]. The surgeon's experience, technical difficulty, local resources, and economic considerations may also influence treatment selection. Postoperative care is equally important and should include dietary advice, wound management, appropriate physical activity, bowel-function monitoring, and early recognition of complications.

Advances in Minimally Invasive Surgery

Laparoscopic surgery has become an important approach to rectal prolapse management because it generally involves smaller incisions, less operative trauma, and faster recovery [5,59]. Evidence from the United Kingdom indicates that laparoscopic rectopexy increased substantially between 2001 and 2012 and was associated with favorable hospital-stay, mortality, and reoperation outcomes compared with other procedures [60]. Robotic surgery offers enhanced precision and smaller incisions but remains limited by its high cost and restricted availability [61,62]. The management of complete rectal prolapse requires individualized selection between abdominal and perineal procedures. Although abdominal approaches may reduce recurrence in suitable patients, perineal techniques remain valuable for older, frail, and high-risk individuals. Careful preoperative evaluation, surgeon expertise, minimally invasive techniques where appropriate, and effective postoperative care are essential to improve bowel function, reduce complications, and achieve durable clinical outcomes. Further comparative research is needed to clarify the relative effectiveness of available procedures and support evidence-based, patient-centered treatment decisions [10,63].

Conclusion:

Complete rectal prolapse requires individualized surgical management to restore anatomical support, improve bowel function, reduce incontinence, and prevent recurrence. Abdominal procedures, including suture and mesh rectopexy, may offer durable results and lower recurrence in appropriately selected patients. Conversely, perineal procedures, such as Delorme's and Altemeier's operations, remain important alternatives for older, frail, and high-risk individuals. Each technique has specific indications, advantages, and limitations, and potential complications must be considered during treatment planning. Current evidence does not establish one universally superior surgical approach, as outcomes vary according to patient characteristics, operative technique, and follow-up. Laparoscopic surgery has become increasingly important because of its minimally invasive nature and favorable recovery profile, while robotic surgery may offer technical advantages but remains constrained by cost and availability. Comprehensive preoperative assessment, surgeon expertise, appropriate postoperative care, and further high-quality comparative studies are essential to improve

treatment selection and achieve better long-term outcomes for patients with complete rectal prolapse.

References:

- 1.Oruc M, Erol T. Current diagnostic tools and treatment modalities for rectal prolapse. *World J Clin Cases.* 2023;11:3680–3693. doi: 10.12998/wjcc.v11.i16.3680.
- 2.Segal J, McKeown DG, Tavarez MM. Pediatric Rectal Prolapse. 2023 Jul 31. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-
- 3.Neshatian L, Lee A, Trickey AW, Arnow KD, Gurland BH. Rectal Prolapse: Age-Related Differences in Clinical Presentation and What Bothers Women Most. *Dis Colon Rectum.* 2021;64:609–616. doi: 10.1097/DCR.0000000000001843.
- 4.Bordeianou L, Paquette I, Johnson E, Holubar SD, Gaertner W, Feingold DL, Steele SR. Clinical Practice Guidelines for the Treatment of Rectal Prolapse. *Dis Colon Rectum.* 2017;60:1121–1131. doi: 10.1097/DCR.0000000000000889.
- 5.Tsunoda A. Surgical Treatment of Rectal Prolapse in the Laparoscopic Era; A Review of the Literature. *J Anus Rectum Colon.* 2020;4:89–99. doi: 10.23922/jarc.2019-035.
- 6.Gourgiotis S, Baratsis S. Rectal prolapse. *Int J Colorectal Dis.* 2007;22:231–243. doi: 10.1007/s00384-006-0198-2
- 7.Esteo C, Balciscueta Z, Uribe N. Perineal Approach for Complete Rectal Prolapse: Delorme and Altemeier Techniques. *Dis Colon Rectum.* 2024;67:e367–e368. doi: 10.1097/DCR.00000000000003202.
- 8.van der Schans EM, Boom MA, El Moumni M, Verheijen PM, Broeders IAMJ, Consten ECJ. Mesh-related complications and recurrence after ventral mesh rectopexy with synthetic versus biologic mesh: a systematic review and meta-analysis. *Tech Coloproctol.* 2022;26:85–98. doi: 10.1007/s10151-021-02534-4.
- 9.Campenni P, Marra AA, De Simone V, Litta F, Parello A, Ratto C. Tunneling of Mesh during Ventral Rectopexy: Technical Aspects and Long-Term Functional Results. *J Clin Med.* 2022;12:294. doi: 10.3390/jcm12010294.
- 10.van der Schans EM, Paulides TJC, Wijffels NA, Consten ECJ. Management of patients with rectal prolapse: the 2017 Dutch guidelines. *Tech Coloproctol.* 2018;22:589–596. doi: 10.1007/s10151-018-1830-1.
- 11.Cohee MW, Hurff A, Gazewood JD. Benign Anorectal Conditions: Evaluation and Management. *Am Fam Physician.* 2020;101:24–33.
- 12.Hajibandeh S, Hajibandeh S, Arun C, Adeyemo A, McIlroy B, Peravali R. Meta-analysis of laparoscopic mesh rectopexy versus posterior sutured rectopexy for management of complete rectal

prolapse. *Int J Colorectal Dis.* 2021;36:1357–1366. doi: 10.1007/s00384-021-03883-0.

- 13.Dyrberg DL, Nordentoft T, Rosenstock S. Laparoscopic posterior mesh rectopexy for rectal prolapse is a safe procedure in older patients: A prospective follow-up study. *Scand J Surg.* 2015;104:227–232. doi: 10.1177/1457496914565418
- 14.Thomas GP, Wong F, Vaizey CJ, Warusavitarne JH. Laparoscopic modified mesh rectopexy: medium-term results of a novel approach for external rectal prolapse. *Colorectal Dis.* 2023;25:2378–2382. doi: 10.1111/codi.16804.
- 15.Tjandra JJ, Fazio VW, Church JM, Milsom JW, Oakley JR, Lavery IC. Ripstein procedure is an effective treatment for rectal prolapse without constipation. *Dis Colon Rectum.* 1993;36:501–507. doi: 10.1007/BF02050018.
- 16.Schultz I, Mellgren A, Dolk A, Johansson C, Holmström B. Long-term results and functional outcome after Ripstein rectopexy. *Dis Colon Rectum.* 2000;43:35–43. doi: 10.1007/BF02237241.
- 17.Huber P Jr, Gregorczyk S. Anorectal Disease. *Curr Treat Options Gastroenterol.* 2000;3:229–242. doi: 10.1007/s11938-000-0026-7.
- 18.Waniczek D, Copija A, Janiszewska J, Maruszczak P, Raźnikiewicz A, Arendt J. Mikulicz's procedure with levator muscle and external anal sphincter plasty in the treatment of rectal prolapse. *Pol Przegl Chir.* 2012;84:626–631. doi: 10.2478/v10035-012-0103-3.
- 19.Albertsdottir E, Qvist N. Postoperative complications and long-term functional outcome in children operated for idiopathic rectal prolapse. *Pediatr Surg Int.* 2018;34:85–89. doi: 10.1007/s00383-017-4208-y.
- 20.Watts AM, Thompson MR. Evaluation of Delorme's procedure as a treatment for full-thickness rectal prolapse. *Br J Surg.* 2000;87:218–222. doi: 10.1046/j.1365-2168.2000.01342.x.
- 21.Shalaby M, Omar W, Elfeki H. How to treat rectal prolapse in a male patient with faecal incontinence: Delorme's procedure combined with levatorplasty - a video vignette. *Colorectal Dis.* 2021;23:1939. doi: 10.1111/codi.15666.
- 22.Cerdán Santacruz C, Gancedo Quintana Á, Cerdán Miguel J. Delorme's Procedure for Rectal Prolapse. *Dis Colon Rectum.* 2022;65:e956–e957. doi: 10.1097/DCR.0000000000002482.
- 23.Lonne MLR, Sakata S, Papas CP, Stevenson ARL. How to do a Delorme's sleeve mucosectomy and muscular plication for full-thickness rectal prolapse. *ANZ J Surg.* 2023;93:1694–1696. doi: 10.1111/ans.18448.
- 24.Hu B, Zou Q, Xian Z, Su D, Liu C, Lu L, Luo M, Chen Z, Cai K, Gao H, Peng H, Cao W, Ren D. External rectal prolapse: abdominal or perineal repair for men? A retrospective cohort study. *Gastroenterol Rep (Oxf)* 2022;10:goac007. doi: 10.1093/gastro/goac007.

- 25.Tanabe T, Yamaguchi E, Nakada T, Nishio R, Okamoto K, Yamana T. Longer prolapsed rectum length increases recurrence risk after Delorme's procedure. *Ann Coloproctol.* 2022;38:314–318. doi: 10.3393/ac.2020.01032.0147.
- 26.Hora JA, Caiado A, Nahas SC. Altemeier's Procedure for Full-Thickness Rectal Prolapse. *Dis Colon Rectum.* 2023;66:e1133. doi: 10.1097/DCR.0000000000002638.
- 27.Bhattacharya P, Hussain MI, Zaman S, Randle S, Tanveer Y, Faiz N, Sarma DR, Peravali R. Delorme's vs. Altemeier's in the management of rectal procidentia: systematic review and meta-analysis. *Langenbecks Arch Surg.* 2023;408:454. doi: 10.1007/s00423-023-03181-z.
- 28.Zbar AP, Takashima S, Hasegawa T, Kitabayashi K. Perineal rectosigmoidectomy (Altemeier's procedure): a review of physiology, technique and outcome. *Tech Coloproctol.* 2002;6:109–116. doi: 10.1007/s101510200024.
- 29.Liu W, Ren X, Jiang C, Qian Q. Role of laparoscopic implementation in perineal operations for clinical decision making in patients with rectal prolapse less than 5 cm. *Int J Surg.* 2021;86:5–6. doi: 10.1016/j.ijso.2020.12.006.
- 30.Boccasanta P, Venturi M, Agradi S, Calabrò G, Bordoni L, Missaglia C, Favetta U, Vergani C. Is it possible to reduce recurrences after Altemeier's procedure for complete rectal prolapse? Twenty-year experience in 130 consecutive patients. *Langenbecks Arch Surg.* 2021;406:1591–1598. doi: 10.1007/s00423-021-02091-2.
- 31.Scherer R, Marti L, Hetzer FH. Perineal stapled prolapse resection: a new procedure for external rectal prolapse. *Dis Colon Rectum.* 2008;51:1727–1730. doi: 10.1007/s10350-008-9423-0.
- 32.Mistrangelo M, Tonello P, Brachet Contul R, Arnone G, Passera R, Grasso L, Rapetti L, Borroni R, Pozzo M, Roveroni M, Morino M, Perinotti R. Perineal stapled prolapse resection for full-thickness external rectal prolapse: a multicentre prospective study. *Colorectal Dis.* 2016;18:1094–1100. doi: 10.1111/codi.13328.
- 33.Fan K, Cao AM, Barto W, De Lacavalerie P. Perineal stapled prolapse resection for external rectal prolapse: a systematic review and meta-analysis. *Colorectal Dis.* 2020;22:1850–1861. doi: 10.1111/codi.15338.
- 34.Roy HM, Baig Z, Karimuddin AA, Raval MJ, Brown CJ, Phang PT, Gill D, Ginther DN. A comparison of perineal stapled prolapse resection and the Altemeier procedure at 2 Canadian academic hospitals. *Can J Surg.* 2023;66:E8–E12. doi: 10.1503/cjs.008421.
- 35.Gupta PJ. Radiofrequency coagulation with Thiersch's operation--a better palliative treatment in prolapse rectum. *Curr Surg.* 2002;59:567–569. doi: 10.1016/s0149-7944(02)00634-7.
- 36.Warwick AM, Zimmermann E, Boorman PA, Smart NJ, Gee AS. Recurrence rate after Delorme's procedure with simultaneous placement of a Thiersch suture. *Ann R Coll Surg Engl.* 2016;98:419–421. doi: 10.1308/rcsann.2016.0148.
- 37.Eftaiha SM, Calata JF, Sugrue JJ, Marecik SJ, Prasad LM, Mellgren A, Nordenstam J, Park JJ. Bio-Thiersch as an Adjunct to Perineal Proctectomy Reduces Rates of Recurrent Rectal Prolapse. *Dis Colon Rectum.* 2017;60:187–193. doi: 10.1097/DCR.0000000000000723.
- 38.Lim CH, Kang WH, Lee YC, Ko YT, Yoo BE, Yang HK. Standardized Method of the Thiersch Operation for the Treatment of Fecal Incontinence. *World J Surg.* 2020;44:3141–3148. doi: 10.1007/s00268-020-05554-7.
- 39.Joubert K, Laryea JA. Abdominal Approaches to Rectal Prolapse. *Clin Colon Rectal Surg.* 2017;30:57–62. doi: 10.1055/s-0036-1593426.
- 40.Wijffels NA, Jones OM, Cunningham C, Bemelman WA, Lindsey I. What are the symptoms of internal rectal prolapse? *Colorectal Dis.* 2013;15:368–373. doi: 10.1111/j.1463-1318.2012.03183.x.
- 41.Jurić O, Lisica Šikić N, Žufić V, Matak L, Karlo R, Mihanović J. Rectal prolapse as the initial presentation of rectal cancer-A case report. *Front Surg.* 2023;10:1176726. doi: 10.3389/fsurg.2023.1176726.
- 42.Cunin D, Siproudhis L, Desfourneaux V, Berkelmans I, Meunier B, Bretagne JF, Bouguen G. No surgery for full-thickness rectal prolapse: what happens with continence? *World J Surg.* 2013;37:1297–1302. doi: 10.1007/s00268-013-1967-z.
- 43.Ng YY, Tan EJKW, Fu CWP. Trends in the surgical management of rectal prolapse: An Asian experience. *Asian J Endosc Surg.* 2022;15:110–120. doi: 10.1111/ases.12978.
- 44.Gallo G, Martellucci J, Pellino G, Ghiselli R, Infantino A, Pucciani F, Trompetto M. Consensus Statement of the Italian Society of Colorectal Surgery (SICCR): management and treatment of complete rectal prolapse. *Tech Coloproctol.* 2018;22:919–931. doi: 10.1007/s10151-018-1908-9.
- 45.Senapati A, Gray RG, Middleton LJ, Harding J, Hills RK, Armitage NC, Buckley L, Northover JM PROSPER Collaborative Group. PROSPER: a randomised comparison of surgical treatments for rectal prolapse. *Colorectal Dis.* 2013;15:858–868. doi: 10.1111/codi.12177.
- 46.Smedberg J, Graf W, Pekkari K, Hjern F. Comparison of four surgical approaches for rectal prolapse: multicentre randomized clinical trial. *BJS Open.* 2022;6:zrab140. doi: 10.1093/bjsopen/zrab140.
- 47.Tiengthanthum R, Jensen CC, Goldberg SM, Mellgren A. Clinical outcomes of perineal proctectomy among patients of advanced age. *Dis Colon Rectum.* 2014;57:1298–1303. doi: 10.1097/DCR.0000000000000225.

48. Trompetto M, Tutino R, Realis Luc A, Novelli E, Gallo G, Clerico G. Altemeier's procedure for complete rectal prolapse; outcome and function in 43 consecutive female patients. *BMC Surg.* 2019;19:1. doi: 10.1186/s12893-018-0463-7.
49. Emile SH, Wignakumar A, Horesh N, Garoufalia Z, Strassmann V, Boutros M, Wexner SD. Systematic literature review and meta-analysis of surgical treatment of complete rectal prolapse in male patients. *Tech Coloproctol.* 2024;28:158. doi: 10.1007/s10151-024-03039-6.
50. Kumari M, MadhuBabu M, Vaidya H, Mital K, Pandya B. Outcomes of Laparoscopic Suture Rectopexy Versus Laparoscopic Mesh Rectopexy: A Systematic Review and Meta-Analysis. *Cureus.* 2024;16:e61631. doi: 10.7759/cureus.61631.
51. Muñoz F, del Valle E, Rodríguez M, Zorrilla J. [Rectal prolapse. Abdominal or perineal approach? Current situation] *Cir Esp.* 2005;78 Suppl 3:50–58. doi: 10.1016/s0009-739x(05)74644-3.
52. Murphy PB, Schlachta CM, Alkhamesi NA. Surgical management for rectal prolapse: an update. *Minerva Chir.* 2015;70:273–282.
53. Funahashi K, Kurihara A, Miura Y, Ushigome M, Kaneko T, Kagami S, Yoshino Y, Koda T, Nagashima Y, Yoshida K, Sakai Y. What is the recommended procedure for recurrent rectal prolapse? A retrospective cohort study in a single Japanese institution. *Surg Today.* 2021;51:954–961. doi: 10.1007/s00595-020-02190-5.
54. Cadeddu F, Sileri P, Grande M, De Luca E, Franceschilli L, Milito G. Focus on abdominal rectopexy for full-thickness rectal prolapse: meta-analysis of literature. *Tech Coloproctol.* 2012;16:37–53. doi: 10.1007/s10151-011-0798-x.
55. Murphy PB, Wanis K, Schlachta CM, Alkhamesi NA. Systematic review on recent advances in the surgical management of rectal prolapse. *Minerva Chir.* 2017;72:71–80. doi: 10.23736/S0026-4733.16.07205-9.
56. Anorectal Branch of Chinese Medical Doctor Association; Pelvic Floor Surgery Committee, Anorectal Branch of Chinese Medical Doctor Association; Clinical Guidelines Committee, Anorectal Branch of Chinese Medical Doctor Association. [Chinese expert consensus on the diagnosis and surgical treatment of rectal prolapse (2022 edition)] *Zhonghua Wei Chang Wai Ke Za Zhi.* 2022;25:1081–1088. doi: 10.3760/cma.j.cn441530-20220425-00179.
57. Gurland BH, Olson CH, McCarthy MS, Bordeianou LG Pelvic Floor Disorders Consortium Work Group. Core Descriptor Sets for Rectal Prolapse Outcomes Research Using a Modified Delphi Consensus. *Dis Colon Rectum.* 2024;67:841–849. doi: 10.1097/DCR.0000000000003187.
58. Michalopoulos A, Papadopoulos VN, Panidis S, Apostolidis S, Mekras A, Duros V, Ioannidis A, Stavrou G, Basdanis G. Surgical management of rectal prolapse. *Tech Coloproctol.* 2011;15 Suppl 1:S25–S28. doi: 10.1007/s10151-011-0747-8.
59. Reche F, Faucheron JL. Laparoscopic ventral rectopexy is the gold standard treatment for rectal prolapse. *Tech Coloproctol.* 2015;19:565–566. doi: 10.1007/s10151-015-1358-6.
60. El-Dhuwaib Y, Pandyan A, Knowles CH. Epidemiological trends in surgery for rectal prolapse in England 2001–2012: an adult hospital population-based study. *Colorectal Dis.* 2020;22:1359–1366. doi: 10.1111/codi.15094.
61. van Iersel JJ, Paulides TJ, Verheijen PM, Lumley JW, Broeders IA, Consten EC. Current status of laparoscopic and robotic ventral mesh rectopexy for external and internal rectal prolapse. *World J Gastroenterol.* 2016;22:4977–4987. doi: 10.3748/wjg.v22.i21.4977.
62. Formisano G, Ferraro L, Salaj A, Giuratrabocchetta S, Pisani Ceretti A, Opocher E, Bianchi PP. Update on Robotic Rectal Prolapse Treatment. *J Pers Med.* 2021;11:706. doi: 10.3390/jpm11080706.