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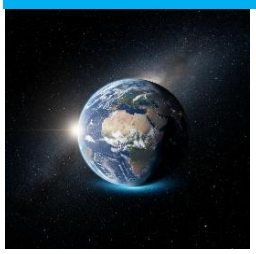

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Etiology Based and Stage Adapted Management of Hemorrhoidal Disease: Clinical Outcomes, Functional Impact, and Quality of Life — A Narrative Review

Zuzanna Tabor, ORCID https://orcid.org/0009-0001-9952-5514

E-mail zuzannatabor01@gmail.com

Cardinal Stefan Wyszynski University, Warsaw, Poland

Corresponding Author

Zuzanna Tabor, E-mail zuzannatabor01@gmail.com

Abstract
Background: Hemorrhoidal disease is a highly prevalent anorectal condition impacting quality of life and functional capacity. Historically viewed as simple varicosities, modern understanding highlights a complex interplay of mechanical, vascular, and inflammatory pathologies. Optimal management demands an etiology- and stage-specific approach.
Aim: This narrative review aims to integrate current evidence on the etiology, pathophysiology, and classification of hemorrhoidal disease to evaluate therapeutic strategies. It focuses on correlating treatment efficacy, recurrence rates, and functional outcomes with specific disease stages, including their impact on patient quality of life and engagement in active lifestyles.
Material and methods: A comprehensive literature search was conducted using PubMed, PubMed Central (PMC), MEDLINE, Embase, and the Cochrane Library for studies published between 2015 and 2025. Selected articles included randomized controlled trials, meta-analyses, systematic reviews, and clinical guidelines on hemorrhoid etiology, staging, and both physical and psychological treatment outcomes.
Results: Hemorrhoidal disease progresses from vascular congestion (Grades I-II) to significant connective tissue failure (Grades III-IV). Conservative and office-based interventions effectively manage early vascular-dominant disease with minimal downtime. Minimally invasive surgical techniques (e.g., DGHAL, stapled hemorrhoidopexy, LHP) balance efficacy with reduced morbidity for mixed vascular-structural pathologies (Grade III). Excisional hemorrhoidectomy remains the definitive treatment for severe structural collapse (Grade IV), offering the lowest recurrence. Treatment success, measured by physical relief and high patient-reported quality of life, strongly correlates with precise stage- and etiology-matched therapy, facilitating return to active lifestyles.
Conclusions: A tailored, etiology- and stage-adapted approach to hemorrhoidal disease management is crucial for optimizing clinical outcomes, preventing recurrence, and enhancing patient functional status and psychological well-being. Future research should prioritize advanced diagnostics and holistic care pathways that integrate both physical and emotional aspects of recovery.
Key words: Hemorrhoidal disease; Etiology; Stage-adapted therapy; Clinical outcomes; Functional impact; Quality of life

1.Introduction

Hemorrhoidal disease is one of the most frequent anorectal conditions worldwide, affecting an estimated 40% of adults at some point during their lives, with prevalence increasing in individuals exposed to chronic straining, sedentary routines, heavy lifting, pregnancy, or repetitive increases in intra-abdominal pressure. Although benign, hemorrhoids often impose a substantial burden on quality of life, productivity, and physical function. For physically active individuals—including recreational athletes, strength training participants, and endurance competitors—symptoms such as bleeding, pain, prolapse, or perianal swelling may interfere with training routines, alter lifting mechanics, or provoke exercise avoidance behaviours during symptomatic episodes.
Historically regarded as simple varicosities of the anal venous plexus, hemorrhoidal disease is now understood as a multifactorial disorder characterized by progressive degeneration of the anal cushions' supporting connective tissue, alterations in vascular flow dynamics, and inflammatory remodelling of the anorectal mucosa. This modern view is supported by clinical and histopathological evidence demonstrating abnormal dilation of the vascular channels, mechanical disruption of the submucosal anchoring fibers, and elevated expression of

inflammatory mediators and matrix degrading enzymes. Recent reviews highlight these mechanisms as central to symptom development and therapeutic decision making (Bharathi & Biradar et al., 2023).

The anal cushions serve a physiological role in fine continence, contributing approximately 15–20% of resting anal closure pressure. They consist of a complex structure of connective tissue, arteriovenous channels, smooth muscle fibers (including the muscularis submucosae), and specialized mucosa. Pathological hemorrhoids occur when this structure becomes enlarged, displaced, and symptomatic. Mechanical factors—including repeated Valsalva maneuvers, heavy resistance training, chronic constipation, prolonged sitting, and high-pressure breathing patterns in sports—can exacerbate downward shearing forces on the cushions, contributing to connective tissue fragmentation and prolapse. Vascular factors also play a significant role: impaired venous return, increased arterial inflow via hyperdynamic arteriovenous channels, and venous stasis promote engorgement and bleeding. Inflammatory stimuli further degrade tissue stability by increasing local concentrations of matrix metalloproteinases, cytokines, and growth factors involved in vascular remodeling.

Together, these mechanisms underlie the progressive nature of hemorrhoidal disease and explain why a single therapeutic approach cannot be applied universally. Instead, treatment must be matched to the dominant etiologic driver at each disease stage, whether vascular, structural, or inflammatory.

The most widely accepted system for staging internal hemorrhoids is the Goligher classification, which categorizes disease based on the degree of prolapse and reducibility. This staging system remains the cornerstone of treatment selection and is endorsed in the 2024 clinical practice guideline of the American Society of Colon and Rectal Surgeons (ASCRS). According to ASCRS, accurate staging not only facilitates optimal therapy choice but also aligns clinical decision making with the underlying anatomical failures driving symptom expression.

Grade I- hemorrhoids enlarge and bleed without prolapsing. Symptoms are predominantly vascular, and connective tissue support remains largely intact.

Grade II- hemorrhoids prolapse during straining but spontaneously reduce. This stage reflects early mechanical weakening combined with persistent vascular congestion.

Grade III- hemorrhoids prolapse and require manual reduction. Connective tissue support is significantly compromised, making vascular treatments alone insufficient.

Grade IV- hemorrhoids remain permanently prolapsed, often associated with mucosal ulceration, thrombosis, or chronic inflammation.

Understanding these distinctions is essential when determining the appropriate therapy. For example, dietary modification and venotonic agents can improve venous tone and reduce bleeding in Grade I–II hemorrhoids but have little effect on Grade III–IV disease, where structural failure predominates. Office based procedures—such as rubber band ligation and sclerotherapy—target vascular components effectively in milder grades but cannot correct prolapse in advanced disease. Minimally invasive surgical techniques, including Doppler guided hemorrhoidal artery ligation (DGHAL), stapled hemorrhoidopexy, and laser hemorrhoidoplasty, are best suited for intermediate disease where both vascular reduction and mechanical lifting are required. Excisional hemorrhoidectomy remains the most effective and durable therapy for advanced, irreducible prolapse, as it directly addresses irreversible connective tissue and mucosal deterioration.

This stage adapted management strategy is strongly reflected in professional guidelines, including the ASCRS recommendations for hemorrhoid care, which emphasize tailoring therapy to the specific grade and symptom burden of the patient. Similarly, recent pharmacological and pathophysiological reviews highlight the necessity of distinguishing early, vascular dominant disease from advanced structural failure to optimize outcomes.

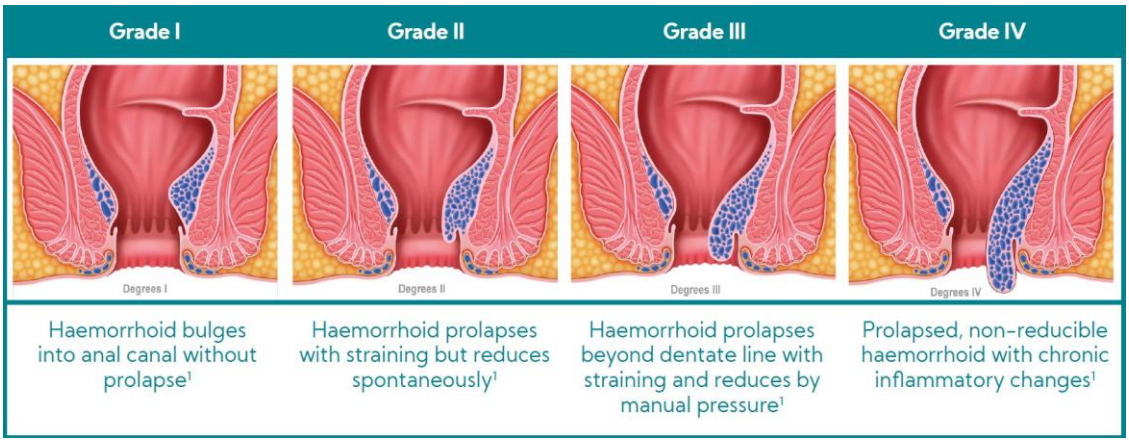

Figure 1. Golighter classification of hemorrhoid (www.smilesnopiles.co.za, 2022)

In addition to improving physical symptoms, appropriate therapy selection has significant implications for psychological well-being and functional performance. While hemorrhoidal disease is benign, its symptoms can cause embarrassment, social withdrawal, and anxiety, especially when bleeding occurs unpredictably or prolapse is visible externally. For individuals engaged in sports or regular training, episodes of pain or prolapse can lead to temporary cessation of exercise, altered bowel habits, and fear of exacerbating symptoms through movement, squatting, or straining. Choosing the correct therapy at the correct stage can therefore shorten time lost from physical activity, reduce the psychological burden of symptoms, and facilitate earlier return to normal training.

Furthermore, postoperative recovery varies widely among therapies. Office based interventions allow quick return to daily function but may be associated with higher long-term recurrence. Minimally invasive methods offer balanced recovery and durable results, making them appealing to active individuals seeking minimal downtime. Excisional hemorrhoidectomy is associated with postoperative discomfort that may temporarily hinder sports participation but provides the most definitive long-term outcome—a consideration particularly relevant for athletes whose training demands elevate intra-abdominal pressure and may predispose to recurrence if treatment is insufficient.

Collectively, contemporary literature demonstrates that an etiology based, stage adapted treatment model not only improves clinical outcomes but also enhances quality of life, functional performance, and psychological resilience, especially for physically active populations. This narrative review integrates current evidence from clinical practice guidelines, recent pathophysiologic analyses, and comparative therapeutic trials to evaluate how etiologic understanding and staging inform the selection of most appropriate therapy. A secondary aim is to highlight the functional and psychological implications of treatment and its relevance to sports and active lifestyles.

2.Methodology

2.1 Study Design

This work was conducted as a narrative, non-systematic review following the structure recommended for evidence based descriptive analyses of medical treatment pathways. The primary objective was to consolidate contemporary findings on the etiology, staging, and stage specific management of hemorrhoidal disease. Emphasis was placed on integrating recent innovations in conservative, minimally invasive, and surgical treatment modalities with clinical outcomes and patient reported measures of well-being.

2.2 Literature Search Strategy

A systematic electronic search of the databases PubMed, PubMed Central (PMC), MEDLINE, Embase, and the Cochrane Library was performed for studies published from January 2015 to February 2026. The search terms combined both MeSH and free text keywords, structured as:
("hemorrhoids" OR "haemorrhoids" OR "hemorrhoidal disease") AND ("etiology" OR "patho physiology" OR "risk factors" OR "staging") AND ("treatment" OR "management" OR "thera py" OR "surgery" OR "minimally invasive") AND ("outcomes" OR "recurrence" OR "quality of life").
Filters: human studies, English language, adult patients.
Reference lists of key papers and guidelines were hand searched to capture additional eligible sources.

2.3 Inclusion and Exclusion Criteria

Inclusion:
Randomized controlled trials (RCTs), prospective cohorts, case studies, meta-analyses, and systematic reviews investigating hemorrhoidal etiology, staging accuracy, or treatment outcomes.
High quality narrative reviews offering mechanistic insights.
Official clinical practise guidelines (American Society of Colon and Rectal Surgeons, European Society of Coloproctology).
Exclusion:
Experimental animal studies, and non-peer reviewed web sources.

2.4 Data Extraction

Extracted data included:
pathophysiologic mechanisms, molecular mediators, and risk factors;
classification systems and clinical staging definitions;
therapeutic modalities categorized as conservative, office based, minimally invasive, or surgical;
recurrence rates, complications, and quality of life outcomes;
patient satisfaction, pain scales, and return to activity metrics.
Information from comparable trials and reviews was cross referenced to confirm consistency. Meta analytic data were preferred where available.

2.5 Data Synthesis and Thematic Organization

Extracted information was grouped into four central themes:
1.Etiology and Pathophysiology: focusing on connective tissue remodeling, vascular dynamics, and inflammatory mechanisms.
2. Classification and Staging: describing progression from vascular to structural disease.
3. Therapeutic Approaches by Stage: analyzing conservative, minimally invasive, and excisional outcomes.
4. Functional and Quality of Life Outcomes: evaluating long term patient satisfaction, recurrence, and psychological recovery.

Trends were synthesized narratively and supported by summary tables comparing recurrence rates, complication profiles, and recovery time.

2.6 Ethical Considerations

No new patient or clinical data were collected. All referenced studies confirm ethical approval within their original contexts.

2.7 Limitations of the Review

This narrative approach lacks the statistical pooling of a meta-analysis. Heterogeneity across trials—particularly in outcome definitions (e.g., "recurrence," "prolapse," or "success")—limits direct comparison. Psychological and functional parameters are inconsistently reported in many older studies. Nevertheless, triangulation of multiple high level sources enhances validity.

3.Research results

3.1. Etiology and Pathophysiology of Hemorrhoidal Disease

The pathogenesis of hemorrhoidal disease is multifactorial, moving beyond the historical "varicose vein" theory. Current understanding points to a complex interplay of mechanical degradation of supporting structures, alterations in vascular dynamics, and local inflammatory processes. These contributing factors synergize to transform the physiologically normal anal cushions into symptomatic hemorrhoids.

3.1.1. Anatomical and Mechanical Predispositions

The anal cushions are sub-mucosal vascular cushions located within the anal canal, typically found at the left lateral, right anterior, and right posterior positions. These cushions are composed of a dense network of blood vessels, connective tissue (collagen and elastin), smooth muscle fibers (including the muscularis submucosae), and specialized anoderm. Their primary physiological role is to contribute to fine anal continence by swelling and sealing the anal canal during rest.

The "sliding anal cushion" theory is a cornerstone of modern pathophysiology. With chronic increases in intra-abdominal pressure (e.g., due to straining during defecation, chronic constipation, heavy lifting, or prolonged sitting), the connective tissue that anchors these cushions to the underlying internal anal sphincter begins to degenerate. Specifically, the ligament of Treitz, a crucial fibromuscular band, weakens, allowing the cushions to slide distally into the anal canal or prolapse beyond the anal verge. This mechanical descent initiates and exacerbates many hemorrhoidal symptoms. Factors such as pregnancy, obesity, and advanced age further contribute to this mechanical structural failure by increasing pressure on the pelvic floor and compromising tissue integrity.

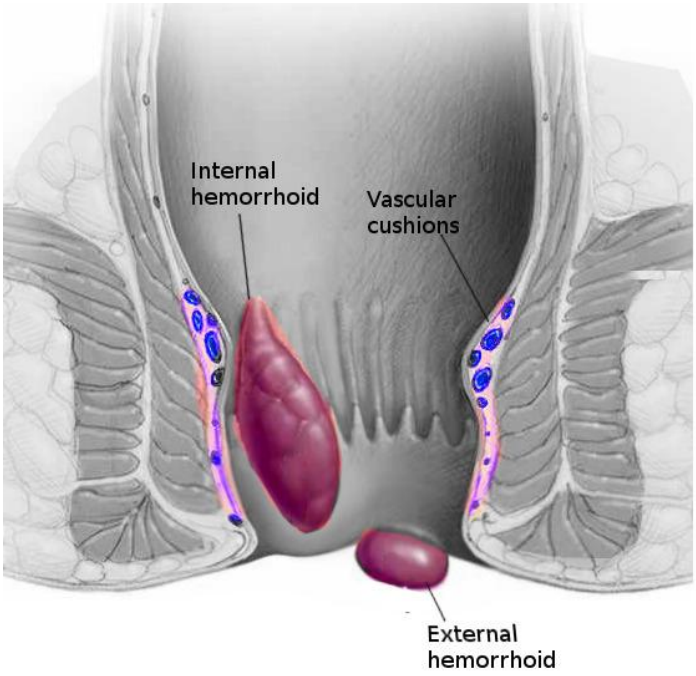

Figure 2. Internal and external hemorrhoid; vascular cushions. Contributed by S Bhimji, MD

3.1.2. Vascular Abnormalities and Hemodynamic Changes

Hemorrhoids are not mere varicose veins but rather represent a hypervascular state within the anal cushions. This involves an abnormal increase in size and number of arteriovenous anastomoses, directly connecting arterial and venous systems. This leads to an elevated arterial inflow into the cushions, causing them to engorge. Concurrently, impaired venous drainage, often exacerbated by elevated intra-abdominal pressure, leads to venous stasis and distension of the vascular plexuses.

The resulting high-pressure, low-flow state within the cushions further promotes vascular fragility and engorgement, which explains the characteristic bright red bleeding commonly associated with internal hemorrhoids. This bleeding is arterial in origin, as opposed to the dark, deoxygenated blood expected from venous varicosities. The impaired venous outflow also contributes to edema and local tissue swelling, fueling the cycle of prolapse and congestion.

3.1.3. Molecular and Inflammatory Mediators

The mechanical and hemodynamic stressors initiate and are perpetuated by a complex cascade of molecular and inflammatory changes. Histological analyses of surgically excised hemorrhoidal tissue reveal significant alterations in the extracellular matrix (ECM) composition and local inflammatory responses.

Connective Tissue Remodelling: There is an imbalance between matrix metalloproteinases (MMPs), enzymes that degrade ECM components like collagen and elastin, and their tissue inhibitors (TIMPs). Increased activity of MMP-2 and MMP-9 weakens the structural integrity of the anal cushions, making them more susceptible to mechanical shearing forces (Bharathi et al., 2023).

Angiogenesis and Vascular Growth Factors: Elevated levels of Vascular Endothelial Growth Factor (VEGF) have been consistently found in hemorrhoidal tissue. VEGF is a potent stimulant for angiogenesis (formation of new blood vessels) and vascular

permeability, contributing to the hypervascularity and edema characteristic of hemorrhoidal disease (Bharathi et al., 2023).

Inflammatory Response: Chronic mechanical stress and vascular stasis induce a local inflammatory reaction. Increased expression of pro-inflammatory cytokines such as Interleukin-6 (IL-6) and Tumor Necrosis Factor-alpha (TNF-α) contributes to mucosal edema, pain, and further ECM degradation. Nitric oxide (NO) dysregulation also plays a role in altering local vascular tone and exacerbating congestion.

These molecular pathways contribute to a vicious cycle: mechanical stress leads to tissue damage and inflammation, which in turn weakens connective tissue and promotes vascular changes, further compounding the susceptibility to prolapse and symptom expression.

3.1.4 Impact of Lifestyle and Functional Demands

Lifestyle factors interact critically with these intrinsic anatomical and molecular predispositions. Chronic constipation and excessive straining are primary drivers; however, for physically active individuals:

Heavy Lifting and Intra-abdominal Pressure (IAP): Activities like weightlifting, powerlifting, or strenuous core exercises, which involve frequent Valsalva maneuvers, acutely elevate IAP. This sustained pressure directly contributes to the downward displacement of anal cushions and engorgement of the vascular plexuses.

Prolonged Sitting: Cyclists, sedentary occupations, or prolonged travel can lead to venous congestion in the perianal region.

Dietary Deficiencies: Inadequate fiber intake, common in certain athletic populations or those on highly restrictive diets, can lead to harder stools and increased straining.

Understanding these intertwined etiologies—mechanical, vascular, molecular, and lifestyle—is paramount for not only treating existing hemorrhoids but also developing preventive strategies and offering targeted advice, particularly for individuals with high functional demands (Hawkin et al., 2024).

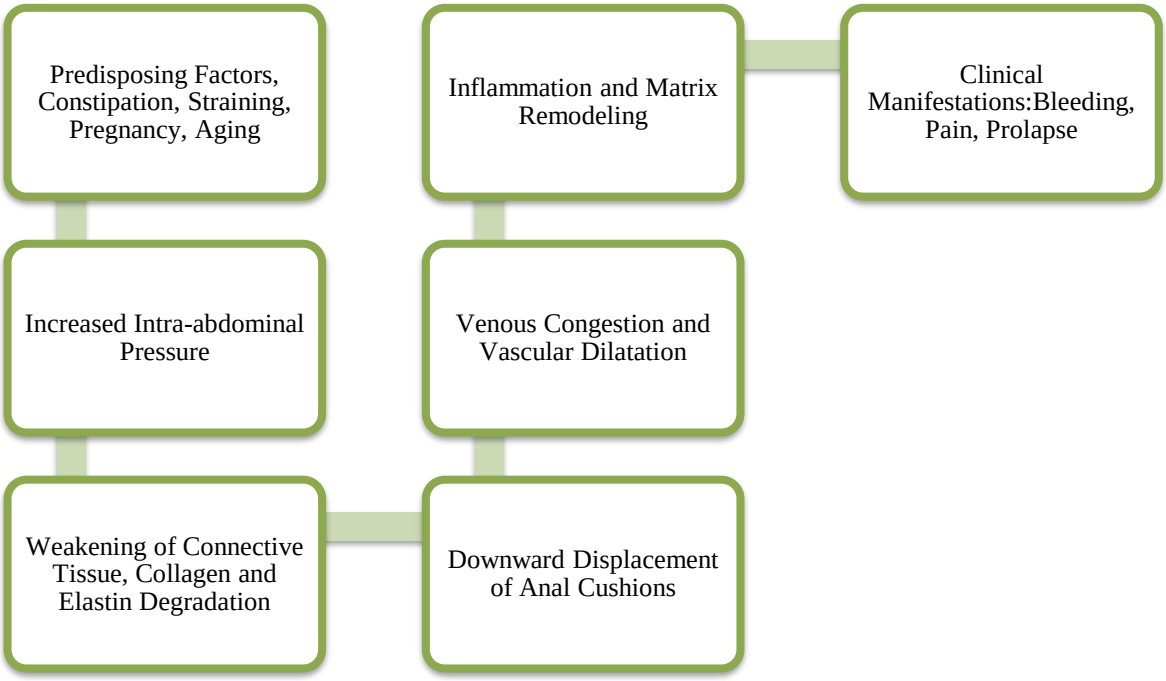

Figure 3. Sequential Progression of Hemorrhoidal Pathogenesis

3.2. Classification and Staging of Hemorrhoidal Disease

Accurate classification and staging of hemorrhoids are critical for guiding therapeutic decisions, standardizing research terminology, and predicting treatment outcomes. The most widely employed system for internal hemorrhoids, universally recognized in clinical practice and research, is the Goligher classification. This system categorizes internal hemorrhoids based on the degree of prolapse beyond the anal canal during defecation and their reducibility. External hemorrhoids, located distal to the dentate line, are typically managed differently and are not formally graded by the Goligher system, though thrombosis may warrant acute intervention.

3.2.1 Goligher Classification of Internal Hemorrhoids

Grade I Hemorrhoids. These are enlarged vascular cushions that bleed but do not prolapse outside the anal canal, remaining internal to the dentate line.

Etiological Emphasis: Primarily vascular engorgement and capillary fragility. The connective tissue framework is largely preserved.

Clinical Presentation: Patients typically present with painless, bright red bleeding during or after defecation, often noticed on toilet paper or in the toilet bowl. Mild itching or discomfort may also be reported.

Functional Impact: Minimal direct impact on daily physical activity or basic function, but bleeding can cause anxiety or iron-deficiency anemia if chronic.

Grade II Hemorrhoids. These hemorrhoids prolapse outside the anal verge during defecation or straining but reduce spontaneously (retract back into the anal canal) following bowel movements.

Etiological Emphasis: A combination of increased vascularity and early, reversible weakening of the connective tissue supports the cushions. Mechanical shearing forces overcome initial tissue resistance during straining.

Clinical Presentation: Bleeding, perianal irritation due to mucus discharge from prolapsed tissue, and a sensation of incomplete evacuation are common. Patients may feel a "lump" during defecation that resolves itself.

Functional Impact: Can cause acute discomfort during and immediately after bowel movements, potentially impacting post-exercise recovery or readiness for further physical activity due to residual "fullness."

Grade III Hemorrhoids. These hemorrhoids prolapse outside the anal verge during defecation or with increased intra-abdominal pressure (e.g., heavy lifting) and require manual reduction (digitally pushing them back inside the anal canal).

Etiological Emphasis: More pronounced structural failure of the anchoring connective tissue, alongside persistent vascular engorgement. The mechanical component is now significant and irrecoverable without intervention.

Clinical Presentation: Pain, bleeding, perianal soilage, and the presence of a reducible mass are typical. Manual reduction can be uncomfortable or difficult for the patient.

Functional Impact: Can severely restrict physical activity, especially those involving core engagement or straining (e.g., weightlifting, high-intensity interval training). The need for manual reduction can lead to significant embarrassment and social anxiety, impacting quality of life and adherence to exercise programs.

Grade IV Hemorrhoids. These hemorrhoids are permanently prolapsed and non-reducible. They always remain outside the anal canal, often leading to secondary complications.

Etiological Emphasis: Severe, irreversible damage to the connective tissue support, with chronic vascular engorgement, edema, ulceration, and potential thrombosis due to exposure.

Clinical Presentation: Constant pain, significant bleeding, severe pruritus, fecal soilage, and the risk of acute complications like strangulation (where the prolapsed tissue becomes irreducible and its blood supply is cut off).

Functional Impact: Profoundly debilitating, severely compromising daily activities, mobility, and any form of physical exercise. The chronic pain, hygiene issues, and inability to manage the prolapse lead to significant quality-of-life impairment and psychological distress.

3.2.2. The Role of Staging in Guiding Therapy

The Goligher classification is not merely descriptive; it serves as a critical determinant of treatment selection. The management strategy for hemorrhoidal disease typically follows an escalating ladder, where less invasive treatments are preferred for lower grades and more definitive surgical interventions are reserved for advanced stages. This hierarchy is based on the predominant pathophysiology at each grade:

Grade I & II: Where vascular components are prominent, non-surgical or office-based procedures focusing on reducing blood flow and inducing fibrosis are highly effective.

Grade III: As structural failure becomes significant, interventions requiring both vascular control and tissue repositioning or fixation are necessary.

Grade IV: Irreversible structural damage necessitates excisional removal of the diseased tissue to restore normal anatomy and function (Longfang & Xuelian, 2025).

Adherence to this stage-adapted approach is crucial for optimizing clinical outcomes, minimizing patient morbidity, and ensuring a sustainable return to physical and functional well-being.

Table 1. Classification of Internal Hemorrhoids (Goligher) with Therapeutic Implications, based on Hawkin et al. (2024), Bharathi & Biradar et al., (2023).

Grade	Description	Typical Symptoms	Predominant Etiology	Preferred Therapeutic Focus
I	Enlarged cushions, bleed but do not prolapse	Painless rectal bleeding, mild pruritus	Vascular engorgement, capillary fragility	Lifestyle, fiber, venotonics
II	Prolapse on straining, spontaneously reduces	Bleeding, mucus discharge, temporary prolapse	Vascular engorgement, early connective tissue laxity	Office-based procedures (RBL, Sclerotherapy, IRC)
III	Prolapse requires manual reduction	Pain, bleeding, persistent prolapse	Significant connective tissue failure	Minimally invasive surgery (DGHAL, PPH, LHP)
IV	Irreducible, permanent prolapse ± thrombosis/ulceration	Constant pain, severe bleeding, fecal soilage	Severe structural collapse, chronic inflammation	Excisional hemorrhoidectomy

3.3. Therapeutic Approaches to Hemorrhoidal Disease: An Etiology- and Stage-Adapted Review

Optimal management of hemorrhoidal disease necessitates a tailored approach, selecting interventions that effectively target the prevailing pathophysiological mechanisms pertinent to each disease stage. Therapeutic strategies range from conservative lifestyle modifications for early-stage disease to definitive surgical excision for advanced, refractory cases (Bharathi & Biradar et al., 2023). The choice is guided not only by symptomatic relief but also by considerations of recurrence, functional preservation, patient recovery, and quality of life.

3.3.1 Conservative Management: Foundation for Grades I and II

Conservative management forms the cornerstone for Grade I and many Grade II hemorrhoids, acting primarily on the vascular and mechanical factors that contribute to symptom genesis.

Dietary and Lifestyle Modifications

Mechanism: Increased dietary fiber (25–30g/day from fruits, vegetables, whole grains) and adequate fluid intake (2-3 liters/day) soften stool consistency, reduce straining during defecation, and decrease intra-abdominal pressure. This directly mitigates mechanical stress on the anal cushions and promotes venous drainage (Labidi et al., 2019). Avoidance of prolonged sitting on the toilet and limiting time spent in physically demanding positions that exert high intra-abdominal pressure (e.g., certain heavy lifting techniques) also contribute.

Procedural Course: Patient education is paramount. Emphasizes gradual increase in fiber, consistent hydration, and modifications to bowel habits (e.g., not delaying defecation).

Recovery: Immediate improvement in symptoms like bleeding and discomfort is often reported. No specific "recovery period" in the traditional sense, but adherence to changes is continuous.

Recurrence: Highly dependent on patient adherence. Studies suggest symptomatic control in most of Grade I-II patients. However, recurrence rates can be high if lifestyle habits revert.

Functional Impact: Positive; promotes regular bowel movements, reducing discomfort that interferes with training. For athletes, consistent fiber intake is vital for GI regularity under periods of high training stress.

Pharmacological Agents

Mechanism:

Flavonoids (e.g., Micronized Purified Flavonoid Fraction [MPFF], diosmin, hesperidin): These venotonic agents improve microcirculation, reduce capillary permeability and fragility, enhance venous tone, and exert anti-inflammatory effects. They achieve this by inhibiting prostaglandin synthesis, modulating leukocyte-endothelial interaction, and reducing inflammatory mediators (Perera et al., 2022).

Topical corticosteroids and local anesthetics: Temporarily alleviate pain, itching, and inflammation by reducing local tissue swelling and nerve sensitivity.

Procedural Course: Oral flavonoids are typically prescribed for short courses (e.g., 7-14 days during acute flare-ups) or longer-term prophylactic use. Topical creams are applied symptomatically.

Recovery: Rapid symptom relief (within 3-7 days for flavonoids). Ongoing use promotes sustained relief.

Recurrence: Flavonoids significantly reduce symptom recurrence for Grade I-II hemorrhoids, particularly for bleeding and itching.

Functional Impact: Directly reduces pain and inflammation, allowing a quicker return to comfortable daily activities and mild exercise.

3.3.2 Office-Based Procedures: Minimally Invasive for Grades I and II

These procedures offer a durable solution for Grade I and II hemorrhoids that are refractory to conservative treatment, primarily targeting the vascular component and inducing a local fibrotic reaction to fixate the anal cushions. They are generally performed in an outpatient setting with minimal anesthesia.

Rubber Band Ligation (RBL)

Mechanism: An elastic band is placed at the base of the hemorrhoidal column, approximately 1-2 cm above the dentate line. This occludes the arterial blood supply, leading to ischemic necrosis of the ligated tissue, which typically sloughs off within 7-10 days. The resulting ulcer heals through fibrosis, fixating the remaining hemorrhoidal tissue to the underlying anal canal wall, preventing further prolapse.

Procedural Course: Typically, one to three bands are individually placed during an anoscopy. Mild discomfort or sensation of fullness may be experienced.

Recovery: Patients usually return to normal activities, including most sports, within 24-48 hours. Analgesics may be required for 1-2 days.

Recurrence: RBL is highly effective for Grade II hemorrhoids. The success of therapy rates from 69%-97%. Recurrence is reported in 6.6-18%. It may require repeat sessions. (Albuquerque, 2016)

Functional Impact: Minimal downtime makes it a favored option for active individuals who need quick return to training.

Injection Sclerotherapy

Mechanism: A sclerosing agent (e.g., 5% phenol in almond oil, quinone urea, or polidocanol 3%) is injected into the submucosa at the base of the hemorrhoidal column. The agent induces a chemical inflammation, thrombosis of venules, and subsequent fibrotic scarring, which fixates the hemorrhoid to the musculature of the anal canal. This reduces the vascular engorgement and prevents prolapse (Lan et al., 2023).

Procedural Course: A small amount of solution (2-5 mL per hemorrhoid) is injected into the submucosa, typically 1 cm above the dentate line. Minimal discomfort during injection.

Recovery: Almost immediate return to daily activities. Minor discomfort, transient bleeding, or sensation of fullness may occur.

Recurrence: Comparable to RBL in Grade I hemorrhoids, but generally less effective for Grade II. It results in clinical improvement or complete cure in 89.9% of the patients.

(Rybak, 2016). Recurrence rates of 4,3% after 3 months. Repeat injections may be necessary.

Functional Impact: Like RBL, minimal interruption to physical activity.

Infrared Coagulation (IRC)

Mechanism: A focused beam of infrared light is applied to the apex of the hemorrhoidal tissue, causing coagulation of the blood vessels and inducing a localized transmural fibrosis. The intense, brief heat causes protein denaturation and cellular damage, leading to scarring and tissue fixation.

Procedural Course: Quick procedure, applying the probe for 1-2 seconds per point, typically 1 cm above the dentate line. Usually painless.

Recovery: Immediate return to normal activities.

Recurrence: Effective for Grade I and smaller Grade II hemorrhoids with recurrence of approximately 20% in 2 moths, necessitating repeat treatments in some cases (Nikshoar, 2017).

Functional Impact: No impact on activity or training.

3.3.3 Minimally Invasive Surgical Techniques: Balancing Efficacy and Morbidity for Grades II and III

For Grade II hemorrhoids unresponsive to office-based therapies and most Grade III hemorrhoids, interventions that both reduce vascularity and provide mechanical repositioning offer an optimal balance between efficacy and reduced postoperative pain compared to conventional surgery.

Doppler-Guided Hemorrhoidal Artery Ligation (DGHAL) / Haemorrhoidal Artery Ligation and Recto-Anal Repair (HAL-RAR)

Mechanism: DGHAL employs a proctoscope equipped with a Doppler ultrasound transducer to precisely identify and ligate the distal branches of the superior rectal artery supplying the hemorrhoidal cushions. This significantly reduces arterial inflow, causing the cushions to shrink. The HAL-RAR technique combines this ligation with a mucopexy (plication/suture) to uplift and fixate the prolapsed hemorrhoidal tissue back to its anatomical position, directly addressing the underlying structural laxity.

Procedural Course: Performed under general or regional anesthesia. Typically takes 20-45 minutes.

Recovery: Significantly less painful than excisional hemorrhoidectomy due to no tissue excision in the pain-sensitive anoderm. Most patients experience mild to moderate discomfort (VAS 1-3/10) for 3-7 days. Return to normal activity often within 4-6 days, with sports activities resuming within 1-2 weeks.

Recurrence: Highly effective, especially for Grade II and III hemorrhoids. Recurrence rates range from 4-10% at 6 months, with better outcomes observed when combined with mucopexy (HAL-RAR).(Shehata et al. 2016).

Functional Impact: Rapid reduction in pain and prolapse allows quick return to physical training. Preferred for athletes due to minimal disruption to routine.

Stapled Hemorrhoidopexy (Procedure for Prolapse and Hemorrhoids - PPH)

Mechanism: The procedure uses a circular stapling device to excise a circumferential ring of redundant rectal mucosa and submucosa approximately 2-4 cm above the dentate line. This simultaneously repositions the prolapsed hemorrhoidal tissue back into the anal canal (mechanically lifting it) and interrupts the blood supply from the superior rectal artery to the hemorrhoidal plexus. It is more of a "pexy" (fixation) than an "ectomy" (excision) in the pain-sensitive anoderm.

Procedural Course: Performed under general or regional anesthesia. Takes 20-30 minutes.

Recovery: Postoperative pain is significantly less than conventional hemorrhoidectomy (VAS 1-3/10) due to incision above the dentate line, where pain fibers are sparse. Hospital stay is typically 1-2 days. Return to normal activities often within 7-10 days, with sports resuming within 2-3 weeks.

Recurrence: Effective for Grade II and III hemorrhoids with recurrence rates of approximately 9% at 1 year. Some studies suggest a slightly higher long-term recurrence compared to conventional hemorrhoidectomy but with better short-term pain control (Zhang et al. 2022)

Functional Impact: Reduced pain and quicker return to activity compared to conventional surgery. However, rare complications like persistent rectal urgency or sensation of incomplete evacuation can impact comfort.

Laser Hemorrhoidoplasty (LHP) / Hemorrhoid Laser Procedure (HeLP)

Mechanism: A diode laser fiber is inserted into the hemorrhoidal mass, delivering controlled laser energy that causes photocoagulation of the vascular plexus and shrinkage of the hemorrhoidal cushion. The thermal effect also causes fibrosis and tissue contraction, providing long-term structural support without excising tissue.

Procedural Course: Performed under local, regional, or general anesthesia. One to three hemorrhoidal cushions are treated.

Recovery: Often described as one of the least painful surgical techniques (VAS 1-3/10). Patients can typically return to normal activities within 2-3 days and sports within 1-2 weeks. It is often performed on an outpatient basis.

Recurrence: Promising short- to medium-term results, with recurrence rate of about 18% at 1 year, comparable to DGHAL and stapled hemorrhoidopexy. Long-term data are still evolving (Dursun et al., 2023).

Functional Impact: Offering rapid pain reduction and minimal disruption to functional activity, making it highly attractive to active individuals.

3.3.4 Excisional Surgical Techniques: Definitive for Grades III and IV

Conventional excisional hemorrhoidectomy remains the gold standard for Grade IV hemorrhoids and for Grade III hemorrhoids refractory to less invasive treatments or associated with extensive external components. These procedures directly remove the irreversibly damaged tissue, addressing both the vascular and structural components comprehensively.

Open Hemorrhoidectomy (Milligan-Morgan)

Mechanism: Three distinct hemorrhoidal cushions are excised, including the primary vascular pedicle and the overlying skin and mucosa. The resulting wounds are left open to heal by secondary intention, preventing stenosis.

Procedural Course: Performed under general or regional anesthesia. Operative time is typically 30-60 minutes.

Recovery: Known for significant postoperative pain (VAS 5-7/10) for 2-3 weeks, managed with strong analgesics. Full recovery and return to normal activities and sports can take 3-6 weeks. Hospital stay typically 1-3 days.

Recurrence: Offers one of the lowest recurrence rate of all modalities, typically around 5% at 2,5 years, due to complete removal of the diseased tissue

Functional Impact: The extended recovery and pain can significantly interrupt training and daily physical activities. However, the definitive nature of the cure ultimately leads to a complete and lasting return to prior functional levels.

Closed Hemorrhoidectomy (Ferguson)

Mechanism: Similar to the open technique, but the resulting wounds are carefully closed with absorbable sutures. This aims to reduce postoperative pain and achieve faster healing compared to the open technique.

Procedural Course: Similar to open technique.

Recovery: Postoperative pain is generally reported to be slightly less than open hemorrhoidectomy, but still significant (VAS 4-6/10), requiring 2-3 weeks for full activity despite wound closure.

Recurrence: Recurrence rate is significantly lower comparing to Milligan-Morgan hemorrhoidectomy, typically around than 1,2% at 2,5 years (Run-Yi Geng et al. 2026).

Functional Impact: Similar extended recovery to open hemorrhoidectomy.

3.3.5 Summary of Therapeutic Outcomes and Etio-Stage Correlation

The detailed review of therapeutic modalities underscores a fundamental principle in hemorrhoid management: successful long-term outcomes are intrinsically linked to the accurate assessment of disease stage and the identification of the predominant pathophysiological driver. As the disease progresses from early-stage vascular engorgement to advanced structural collapse, the therapeutic approach must correspondingly escalate from conservative and office-based interventions to more complex minimally invasive procedures and, finally, to excisional surgery. Each modality targets specific aspects of the disease etiology, from modulating vascular tone and inducing localized fibrosis in milder grades, to performing comprehensive re-ligation, repositioning, or complete excision in more advanced cases.

Recurrence rates, an essential metric of therapeutic success, consistently demonstrate that under-treating advanced disease or over-treating early disease invariably leads to suboptimal results, persistent symptoms, or avoidable complications. Furthermore, while the physical outcomes are paramount, the functional implications—particularly the duration of recovery, management of postoperative pain, and readiness to return to an active lifestyle—represent significant considerations for patients. These factors directly influence patient satisfaction and overall quality of life, which extends beyond mere symptom abatement to encompass the psychological and social dimensions of recovery.

The evidence firmly supports the ASCRS guidelines: optimal therapeutic selection hinges on a precise etio-stage-adapted algorithm, ensuring that the chosen intervention aligns with the true nature and extent of the hemorrhoidal pathology. This approach not only provides the highest clinical efficacy but also minimizes patient morbidity and facilitates a swifter, more comfortable return to daily activities and physically demanding pursuits.

Table 2. Summary of Non-Conservative Treatments for Hemorrhoidal Disease: Procedural Course, Recovery, and Outcomes,

Procedure	**Average Pain (VAS*)**	**Return to Normal Activity**	**Reported Recurrence (Approx.)**	**Representative Sources**
Rubber Band Ligation (RBL)	5 / 10	1–2 days	6.6–18% at 1–3 years 9.7% at 3 months	Albuquerque et al. (2016) Yilmaz et al. (2017) Wang et al. (2025)
Sclerotherapy	2-3 / 10	Same day	11.6 % at 3 months	Wang et al. (2025) Samrobinson et al. (2024)
IRC (Infrared Coagulation)	2-3 / 10	Immediate	20% at 2 months	Nikshoar et al. (2017)
DGHAL/HAL-RAR	0-1/ 10	4–6 days	DGHAL 4–10% at 6 months HAL-RAR 17.6% at 2 years	Shehata et al. (2016) Gosavi et al. (2025) Lopez et al. (2019)
Stapled Hemorrhoidopexy	1-3 / 10	7–10 days	9% at 1 year	Zhang et al. (2022)
Laser Hemorrhoidoplasty	1–3 / 10	2–3 days	18% at 1 year	Dursun et al., (2023)
Excisional Hemorrhoidectomy	5–7 / 10	3–6 weeks	5% at 2 months 1,2-5% at 2,5 years	Nikshoar et al. (2017) Run-Yi Geng et al. (2026)

3.4 Consequences of Inadequate Therapy Selection

Choosing a therapeutic modality without due consideration for the predominant etiology or the current disease stage can lead to suboptimal outcomes, higher recurrence rates, and potentially compromise anorectal function and patient satisfaction. Each intervention targets specific pathophysiological components; misapplication can lead to predictable and often avoidable negative consequences.

3.4.1 Overuse of Conservative Therapy in Advanced Disease

Relying solely on dietary modification or pharmacological agents for Grade III or Grade IV hemorrhoids often results in transient or partial symptom relief. The core problem in these advanced stages is an irreversible mechanical failure of connective tissue support rather than mere vascular distension. Consequently, persistent prolapse and mucosal exposure lead to chronic inflammation, recurrent bleeding, and potential mucosal ulceration, causing significant ongoing distress and functional impairment. Delaying definitive treatment can permit extensive fibrotic scarring, anal skin tags, or even stenosis, all of which complicate subsequent operative repair. Observational studies have reported recurrence rates exceeding 50% when advanced prolapse is managed non-operatively (Lawrence & McLaren, 2025).

3.4.2 Aggressive Surgical Intervention in Early Stages

Conversely, performing excisional hemorrhoidectomy for Grade I or Grade II disease is generally considered overtreatment. These early-stage hemorrhoids do not exhibit the extensive structural damage that necessitates excision. Submitting patients to the significant postoperative pain and prolonged recovery of excisional surgery when less invasive options would suffice exposes them to unnecessary risks of complications, including anal stenosis, temporary urinary retention, infection, or even iatrogenic anal fissure. While excisional surgery provides a definitive cure, for low-grade disease, it does not demonstrate superior long-term recurrence rates compared to minimally invasive methods, yet involves a substantially higher morbidity, lower short-term patient satisfaction, and longer absence from physical activities (Tavani et al. 2025).

3.4.3 Inadequate Procedures for Mid-Stage and Irreversible Prolapse

Applying limited procedures, such as repeated RBL or sclerotherapy, to Grade III hemorrhoids often fails to adequately address the mechanical component of prolapse. While these methods may temporarily reduce swelling or stop bleeding, they do not sufficiently correct the underlying structural laxity or reposition the prolapsed tissue. This leads to early recurrence of prolapse-related discomfort, with repeated interventions causing increasing fibrosis in the perianal area, which can distort anatomy and complicate future, more definitive surgical efforts. Similar issues arise when minimally invasive procedures like DGHAL or LHP are applied to Grade IV hemorrhoids. These techniques rely on some residual tissue elasticity and anchorage. In the context of permanent, irreducible prolapse, they may fail to achieve adequate reduction or stabilization, leading to incomplete symptom resolution, chronic edema, and necessitate early re-operation.

3.4.4 General Consequences Across Stages

Across all grades, inappropriate therapy selection consistently leads to:

Increased Recurrence: Due to incomplete pathological correction.

Prolonged Suffering: Unrelieved symptoms, pain, and psychological distress.

Higher Economic Burden: From repeated consultations and procedures.

Reduced Patient Confidence: Mistrust in medical interventions and non-adherence.

Compromised Functional Status: Prolonged disruption to daily activities and active lifestyles.

Table 3. Examples of Stage-Specific Mismanagement and Their Consequences, based on data from American Society of Colon and Rectal Surgeons 2018; Diseases of Colon and Rectum; World Journal of Gastroenterology.

Disease Stage	Inappropriate Therapy	Pathophysiologic Mismatch	Common Negative Outcomes
Grade I–II	Excisional Hemorrhoidectomy	Removes normal support tissue; overtreatment	Postoperative pain, anal stenosis, prolonged recovery, potential incontinence
Grade III	Only Conservative or Repetitive RBL /Sclerotherapy	Ignores significant connective tissue failure and established prolapse	Early recurrence, persistent or worsening prolapse, perianal fibrosis, complicates future surgery
Grade IV	DGHAL / LHP / PPH alone (without adequate reduction/excision)	Insufficient to address severe structural collapse and fixed prolapse	Incomplete reduction, chronic edema, early re-operation, persistent pain, risk of thrombosis
General	Repeated Ineffective Procedures	Inadequate root cause addressal	Patient frustration, increased scar tissue, psychological distress, higher economic burden

4. Discussion: Interpretations, Functional Impact and Quality of Life in Active Individuals

This narrative review highlights the evolving understanding of hemorrhoidal disease as a complex condition driven by intertwined mechanical, vascular, and inflammatory aberrations, rather than a simple venous disorder. The robust correlation between disease etiology, anatomical stage, and therapeutic success is a central finding, underscoring that a precise, stage-adapted management strategy is paramount for achieving optimal clinical outcomes, minimizing recurrence, and enhancing patient well-being, particularly for active individuals.

4.1 Etiological Insights Driving Treatment Efficacy and Recurrence

The differential efficacy of therapeutic modalities is directly attributable to their specific mechanistic targets aligning with the predominant pathophysiology at each stage. In Grade I and early Grade II hemorrhoids, where vascular distention and fragility are the primary drivers, conservative measures (dietary fiber, venotonics) and office-based procedures (RBL, sclerotherapy, IRC) prove highly effective. These interventions either facilitate venous flow through reduced straining, locally coagulate vessels, or induce fibrotic fixation. Their success lies in addressing the primary vascular hyper flow and mild tissue laxity. Recurrence in these stages is often linked to the persistence of initiating factors (e.g., chronic constipation, heavy lifting without proper technique) or inadequate fibrotic response. This emphasizes the need for continuous lifestyle adherence and, for athletes, a careful review of training techniques that might elevate intra-abdominal pressure.

As the disease progresses to Grade III, mechanical failure of the suspending ligaments becomes equally significant alongside vascular engorgement. Here, purely ablative or flow-reductive methods (like sclerotherapy or RBL alone) are less sustainable, resulting in higher recurrence rates as they fail to adequately reposition the prolapsed tissue. Minimally invasive surgical techniques (DGHAL, stapled hemorrhoidopexy, LHP) are superior because they simultaneously reduce arterial inflow and mechanically lift or fixate the prolapsed cushions. This allows for treatment tailored to both vascular and structural etiologies.

For Grade IV hemorrhoids, where irreversible structural collapse and often chronic inflammation prevail, only excisional hemorrhoidectomy provides definitive remission with recurrence rates below 5% at 2 years (Run-Yi Geng et al. 2026). This procedure directly removes the entire compromised tissue, fundamentally restoring normal anorectal anatomy and function. The high long-term success of excisional hemorrhoidectomy, despite its higher immediate morbidity, validates its role as the ultimate solution for end-stage mechanical disease.

4.2 Functional Impact and Quality of Life in Active Individuals

Beyond clinical cure, the impact of hemorrhoidal disease and its treatment on a patient's functional capacity and quality of life is profound. This is particularly salient for individuals engaged in sports or physically demanding professions. Any compromise to anorectal function (e.g., pain during defecation, bleeding, prolapse) can directly inhibit training sessions, alter exercise patterns, and lead to temporary or permanent withdrawal from physical activities.

4.2.1. Pre-treatment Functional Limitations

Before intervention, symptoms can manifest as direct physical barriers: pain during weightlifting, discomfort on a bicycle saddle, fecal soilage affecting endurance runs, or overall self-consciousness hindering social interaction related to sports. The recurrent nature of symptoms can also lead to chronic anxiety regarding physical activity, with individuals developing fear-avoidance behaviours for certain movements or sports.

4.2.2. Post-treatment Recovery Trajectories and Return to Sport:

Conservative therapies (diet, venotonics): Offer immediate short-term relief, allowing for continuous, albeit often restricted, participation in mild physical activities. The impact on

return-to-sport is minimal, but the need for continuous adherence and the risk of relapse can create anxiety regarding strenuous activity.

Office-based procedures (RBL, sclerotherapy, IRC): Characterized by rapid return to daily activities (1-2 days) and physical activity. These are highly favored by athletes as they allow almost uninterrupted training schedules, ideal for in-season or competitive periods. However, the higher recurrence rate means repeated interruptions, which can collectively impact long-term training consistency.

Minimally invasive surgical techniques (DGHAL, stapled hemorrhoidopexy, LHP): Represent a strategic balance. Postoperative pain is significantly lower than excisional surgery and return to full training is typically within 1-3 weeks. This makes them excellent options for athletes needing durable symptom relief without the prolonged downtime of conventional surgery. They allow for substantial improvement in functional capacity and restoration of confidence in performing high-intensity activities without fear of symptoms. The quick healing and minimal pain permit earlier engagement in sports-specific rehabilitation.

Conventional Hemorrhoidectomy: While associated with significant acute postoperative pain (up to 3-6 weeks), the definitive nature of the cure ultimately offers the most unrestricted and symptom-free return to full physical performance. For athletes whose careers or serious recreational pursuits depend on uncompromised function, the long-term benefits of excisional surgery often outweigh the temporary discomfort, provided adequate pain management and a structured post-operative rehabilitation program are in place. Studies on patient-reported outcomes show that despite initial pain, long-term satisfaction and quality of life are highest with excision, as it eliminates the worry of recurrence.

4.2.3 Psychological Well-being and Treatment Selection

The psychological burden of hemorrhoidal disease extends beyond physical symptoms to affect self-esteem, body image, and social engagement. Patients frequently report embarrassment, fear of public bleeding, and anxiety about surgical outcomes. This emotional landscape significantly influences treatment selection and compliance.

Impact of Recurrence: Recurrent symptoms, especially after less invasive procedures, can lead to patient frustration, distrust in medical interventions, and a reduction in overall well-being. The psychological impact of recurring symptoms can be particularly demoralizing for athletes who perceive these setbacks as direct threats to their performance and active identity.

Anxiety and Fear: Pre-operative anxiety is common across all surgical interventions. However, the anxiety associated with hemorrhoidectomy, driven by perceptions of severe pain and a prolonged recovery time, is notably higher. Structured pre-operative counseling and realistic expectation setting are crucial to mitigate this.

Body Image and Confidence: For many, the complete elimination of prolapse, especially in Grade III-IV disease, brings a profound psychological relief, restoring body image and confidence in social and intimate situations. The resolution of chronic pain and hygiene issues removes a significant source of daily stress.

4.3 Future Directions: Precision Medicine and Holistic Care in Active Populations

Future research must prioritize understanding the interplay between specific etiological factors and the functional demands of active lifestyles. This includes:

Biomechanics of IAP and Pelvic Floor: More detailed analyses of how different sports (e.g., powerlifting, cycling, running) influence intra-abdominal pressure and pelvic floor dynamics could inform tailored preventive strategies and modify training regimens for individuals prone to hemorrhoids.

Biomarker-Guided Therapy: Development of biomarkers (e.g., specific MMPs, VEGF isoforms) that can predict disease progression or response to particular therapies would enable even more personalized 'precision' interventions.

Patients Reported Outcome Measures: Integrating patient-reported outcome measures (PROMs) that specifically assess return to sport, exercise intensity, and quality of life related to physical activity (e.g., impact of pain on squat depth, comfort during prolonged cycling) would provide invaluable data.

Psychological Support Pathways: Establishing structured psychological support and counseling within hemorrhoid clinics can address the emotional components of the disease and its recovery, particularly for individuals struggling with body image, perceived physical limitations, or chronic pain.

5. Conclusions

Hemorrhoidal disease, a highly prevalent anorectal condition, significantly impacts patient well-being and functional capacity, particularly for individuals engaged in sports and active lifestyles. This narrative review underscores that effective and durable management hinges critically on an etiology-based and stage-adapted therapeutic strategy. Modern understanding elucidates hemorrhoids as a progressive disorder driven by mechanical degradation of connective tissue, deranged vascular hemodynamics, and local inflammatory processes.

The Goligher classification remains the indispensable diagnostic framework guiding treatment selection. Early-stage (Grade I-II) disease, primarily characterized by vascular dysfunction, responds optimally to conservative measures and office-based procedures such as rubber band ligation or sclerotherapy. These interventions mitigate vascular congestion with minimal interruption to physical activity. For intermediate-stage (Grade III) disease, where both structural compromise and vascular engorgement contribute to persistent prolapse, minimally invasive surgical techniques, including Doppler-guided hemorrhoidal artery ligation, stapled hemorrhoidopexy, and laser hemorrhoidoplasty, offer a crucial balance. These methods not only reduce arterial inflow but also mechanically reposition and fixate the cushions, facilitating a swift return to demanding physical routines without the significant morbidity of conventional surgery. Finally, for advanced-stage (Grade IV) disease, characterized by irreversible structural collapse and often acute complications, excisional hemorrhoidectomy remains the gold standard, providing the most definitive cure and the lowest long-term recurrence rates.

Crucially, mismatched therapy — either over-treating early disease or under-treating advanced disease — leads to suboptimal outcomes, higher recurrence, prolonged suffering, and increased psychosocial distress. The functional and psychological impacts of hemorrhoidal disease and its treatment are profound, influencing activity levels, personal confidence, and overall quality of life. Tailoring therapeutic interventions to accurately address the predominant pathophysiological mechanisms at each stage not only ensures higher clinical efficacy and reduced recurrence but also significantly enhances patient-reported well-being, shortens recovery time, and enables a more confident and sustained return to sports and active lifestyles.

Future research should focus on developing advanced diagnostic tools to precisely delineate the vascular and structural components of hemorrhoidal disease, thereby refining personalized treatment algorithms. Paramount to advancing care is also the routine integration of patient-reported outcome measures (PROMs) and dedicated psychological support pathways, acknowledging that optimal management extends beyond mere symptom eradication to encompass the complete functional and emotional restoration of the individual.

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