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Piles and Surgery: A Review of Postoperative Outcomes, Complications, and Recurrence Rates

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Abstract

Hemorrhoids, also known as piles, are widespread anorectal disease and their prevalence is high in worldwide population. Surgical procedures are currently used as the treatment of choice for advanced conditions (stages III-IV) when non- surgical treatment has not been effective. BACKGROUND This manuscript aims to review the operative results, complications and the rate of recurrence of surgical therapy for haemorrhoids in the period between January 2011 and July 2012. Peer-reviewed journal articles were narratively reviewed for hemorrhoidectomy, stapled hemorrhoidopexy (SH), Doppler-guided hemorrhoidal artery ligation (DGHAL), and diode laser therapy. It appears that traditional hemorrhoidectomy still provides good outcomes, but is associated with a considerable amount of postoperative pain. SH and DGHAL provides faster recovery, less pain but perhaps higher recurrences. Laser treatments had encouraged results and few complications with a low rate of recurrence at 1-year postmanagement. Recurrence rates for all types of surgery ranged from 0-18%, and the most frequent complications were pain after surgery, bleeding and infection. Comparative studies indicate that patient satisfaction and postoperative quality of life are determined to a greater degree by complication rate and time of recovery than by surgical effectiveness alone. The review underlines the tendency to use more conservative procedures, effective and comfortable alternative to the patient. The next steps are the improvement in minimally invasion and the consensus on best approach. This paper offers an integrative summary to help guide clinicians in evidence-based decisions that are in the best interest of patients according to clinical context.

Keywords: Hemorrhoids; Piles; Hemorrhoidectomy; Stapled Hemorrhoidopexy; Postoperative Complications; Recurrence Rates; Laser Surgery; Doppler-Guided Ligation

INTRODUCTION

Hemorrhoidal disease also known as piles is one of the major anorectal conditions at the international level. It is defined by pathological enlargement and distal displacement of the normal anal cushions, which are vascular structures contributing to continence. Hemorrhoids are broadly divided into two categories, involving internal and external hemorrhoids, and internal hemorrhoids can

be further divided into four grades according to the severity of prolapse. Grades I and II respond well to non-operative and outpatient-based measures and grades III and IV usually require surgical treatment [17].

The worldwide incidence of symptomatic hemorrhoids in the general population is reported to be approximately 4–5%; it is higher for those aged 45–65 years. The illness is a source of medical and socioeconomic impact, mainly because of its pain, quality of life and work absenteeism implications. Common presenting symptoms are painless rectal bleeding, prolapse, mucus discharge, pain and perianal discomfort [17].

Several operative methods have developed over the years for the management of advanced hemorrhoidal disease, all of which have their own advantages and results. Open or closed, classic excision (Milligan-Morgan and Ferguson) still-and is considered the gold standard in several institutions for- common, given (co-procedure), definitive, hemorrhoidal tissue removal and low-recurrence rates [12]. However, these techniques are accompanied by increased postoperative pain, prolonged hospitalization, and a delayed recovery period.

In an effort to avoid these shortcomings, other, minimally invasive methods have been preferred. An alternative is stapled hemorrhoidopexy (SH), described by Longo in the 1990s, in which prolapsed tissue is repositioned and arterial blood supply diminished, with the advantage of minimal postoperative pain. As also in the DGHAL and its modifications and Hemorrhoidal Artery Ligation by Doppler, the principle here are ligation of vascular pedicles with only minimal tissue excision, which leads to less postoperative pain and a faster convalesce 11.

Recently, laser technologies, such as diode laser therapy, are finding an increased application with a minimally invasive, bloodless and sphincter-sparing procedure. In a large sample study of 341 patients, Jahanshahi *et al.* reported a very low rate of complication (3.5%) and no recurrence at one year, highlighting its safety and efficacy [14].

Nevertheless, there is not yet a single optimum method suitable for all patients. Etiology of hemorroidyal disease and the techniques used for its treatment. Postoperative results, complication records and rates of recurrence differ among methods and are significant factors for treatment considerations.

The goal is to create a comprehensive summary of the most current studies on the postoperative outcomes, complications, and long-term outcomes of hemorrhoid surgeries, which includes the review of articles published from January 2011 to July 2012. Ultimately the aim is to supply the clinician with

a unitary perspective to assist in the personalised and evidence linked treatment strategy of hemorrhoidal disease.

Importance and Relevance

Haemorrhoidal disease still represents one of the most common disorders in general as well in proctological surgical practice. While usually benign, its symptoms – including bleeding and prolapse to constant discomfort – can severely interfere with a patient's day-to-day life. With the worldwide distribution of CKD and its communication with quality of life, effective and safe interventions are warranted. The treatment paradigm, even for grade III and IV hemorrhoids, still changes, which means that it is necessary to evaluate and compare the efficacy and safety of the surgical procedures available.

Surgical intervention is generally indicated in whom conservative and office-based treatment fails or is not suitable because of the degree of prolapse and symptoms. Yet, although, there are several available alternatives (including open and closed hemorrhoidectomy, stapled hemorrhoidopexy (SH), Doppler-guided hemorrhoidal artery ligation (DGHAL), and newer, and controversial, approaches, such as diode laser therapy), their advantages over one another still remain debatable. These techniques, however, all vary in postoperative pain, recovery time, complication rate, and recurrence rate leading choosing the perfect technique is difficult, and very much a personal option [12, 14, 16].

Surgeons and patients need to be aware of the postoperative course and complication profiles for each operation. Postoperative pain, a common concern associated with conventional hemorrhoidectomy, can delay return to daily activity and reduce patient satisfaction. Procedures including SH and DGHAL provide minimal pain, yet might sacrifice long-term efficacy, or increase the likelihood of recurrence. For example, DGHAL exhibited good pain- and recovery-outcomes, but have been related to recurrence rates up to 18% [16]. In contrast, SH is associated with superior subjective satisfaction but is burdened with rare albeit potentially major complications including rectal perforation and pelvic sepsis [12].

Meanwhile, minimally invasive therapies, like diode laser treatment, are getting popular. Provisional data indicate that the diode laser is associated with a lower complication rate as well as decreased operative time and quicker resumption of normal activity, hence, making it an appealing treatment for certain patient groups [14]. However, larger comparative studies with long-term follow-up will be required to fully justify wider clinical application of this technique, an endeavor that was aimed to be addressed in our review by summarizing the recently published studies during the period of 2011– 2012.

Policy and medical practice by necessity require a better sense of the comparative advantages and disadvantages of surgical approaches to optimise resource use and promote high-value care. These less invasive surgeries, where patients spend less time in the hospital and have reduced complications, could save billions of dollars in health care costs and make operating room time more readily available. Secondly, in environments where specialist colorectal services are sparse, outcomes data can also guide the use of simpler more effective, straightforward to learn techniques.

This review is pertinent to many and not the least surgeons, gastroenterologists, health care planners and researchers. The aim of this article is an evidence-based analysis of the available literature to facilitate an informed decision making and evidence based clinical practice. It also demonstrates where there are insufficient and/or inconsistent data available, which will in turn guide future clinical trials and comparisons of hemorrhoid surgery.

Scope and Objectives

The main objective of this study was to undertake a critical appraisal of postoperative complications, recurrences and results following different surgical options for the treatment of hemorrhoidal disease. It specifically reviews evidence published from January 2011 to July 2012 to offer an updated view on the surgical undertakings during this period. With such a plethora of surgical techniques and no obvious consensus on the ideal method, a review of the contemporary surgical treatment for grade III and IV haemorrhoids provides an analysis of trends, benefits, and drawbacks.

The review is limited to the four most common surgical procedures: (1) conventional (open and closed) hemorrhoidectomy, (2) stapled hemorrhoidopexy (SH), (3) Doppler-guided hemorrhoidal artery ligation (DGHAL), and
(4) diode laser hemorrhoidoplasty. These methods differ widely in procedural difficulty, postoperative recovery, pain trajectory and long-term efficacy. Assessing these two variables simultaneously provides a complete view of patient outcome and increases evidence-based clinical decision making.

In order to accomplish that, the review examines:

- Early and late postoperative complications, such as bleeding, wound infection, urinary retention, pain, and, less frequently, severe complications such as pelvic sepsis and rectal perforation.
- Rate of symptomatic recurrence or surgical reintervention, as these are important measures of the durability and effectiveness of treatment.
- Comparative patient satisfaction and time to return to function.

- Procedural efficiency and resource issues, such as OR time and hospitalization duration, or cost implications where available.

The review has three purposes:

Synthesis: To aggregate and summarize information from high-quality peer-reviewed studies carried out in the selected period. This comprises the investigation of randomised trials, prospective cohort studies and comparative studies of at least two surgical procedures.

Comparison: To compare the surgical options directly and indirectly with a clinical output. The review contains tables and figures when available comparing the different techniques against various important metrics like VAS scores, recurrence rates, and complications.

Counsel: To provide guidance in the interpretation of procedure selection according to patient characteristics, severity of the disease and institutional resources. The results aim to help make informed decisions by clinicians, based on personalized-profiles conditions, for optimizing benefits and minimizing toxicity.

The review also aims to discern deficiencies in the literature, contrasts in findings, and matters needing further research. These findings might be important for the design of future clinical trials, for updating surgical guidelines and for promoting developments in minimally invasive hemorrhoid surgery.

Literature Selection

In this review, we used a systematic search to identify and analyze new literature on surgery for hemorrhoids published between January 1, 2011 and July 1, 2012. The search and selection strategy was developed to identify high- quality, peer-reviewed studies on the postoperative outcomes, complications, and recurrence rates of various surgical techniques for hemorrhoids grades III and IV through direct dealing with the patients.

Search Strategy

A comprehensive search was conducted using established academic databases including PubMed, Scopus, Web of Science, and ScienceDirect. Additional manual searches were performed in specialized surgical journals such as *Annali Italiani di Chirurgia*, *World Journal of Gastroenterology*, *Journal of Korean Society of Coloproctology*, and *Techniques in Coloproctology*. The keywords and MeSH terms used included: “hemorrhoidectomy,” “stapled hemorrhoidopexy,” “Doppler-guided hemorrhoidal artery ligation,” “diode laser,” “postoperative complications,” “recurrence,” “surgical

outcomes," and "hemorrhoid surgery."

Boolean operators such as "AND," "OR," and "NOT" were used to refine searches. Only studies published in English and indexed within the review period (January 2011–July 2012) were included.

Inclusion Criteria

To ensure relevance and methodological rigor, studies were included based on the following criteria:

- The study population consisted of adult patients (≥18 years) diagnosed with grade III or IV hemorrhoids.
- The surgical techniques assessed included conventional (open/closed) hemorrhoidectomy, stapled hemorrhoidopexy (SH), Doppler-guided hemorrhoidal artery ligation (DGHAL), or diode laser hemorrhoidoplasty.
- The study reported quantitative data on postoperative complications, recurrence rates, pain outcomes, or recovery time.
- The study design was a randomized controlled trial, prospective or retrospective cohort, or a well-documented case series with ≥30 patients.

Exclusion Criteria

Articles were excluded if they:

- Focused solely on non-surgical treatments (e.g., sclerotherapy, rubber band ligation).
- Addressed hemorrhoid management in pediatric populations or patients with significant anorectal comorbidities (e.g., cancer, Crohn's disease).
- Lacked sufficient data on postoperative outcomes or were review/editorial/opinion articles without primary data.

Study Selection and Data Extraction

From the initial pool of 173 articles, 46 studies were retrieved for full-text review based on title and abstract relevance. Following full-text assessment, 19 studies met the eligibility criteria. These studies were evaluated independently by two reviewers to ensure objectivity. Discrepancies were resolved by consensus or a third-party reviewer.

Data extraction focused on:

- Study design and setting
- Sample size and demographics

- Type of surgical procedure performed
- Primary and secondary outcome measures (pain, bleeding, infection, recovery time, recurrence)
- Duration of follow-up
- Author conclusions and reported limitations

Additionally, several landmark studies prior to 2011 were selectively referenced for historical context or methodological relevance, though they were not included in outcome data synthesis.

Quality Assessment

The methodological quality of included studies was assessed using the Cochrane Risk of Bias tool for RCTs and the Newcastle-Ottawa Scale for cohort studies. Emphasis was placed on follow-up completeness, blinding (where applicable), and clarity of outcome definitions.

This rigorous selection framework ensures that the review is based on the most relevant, high-quality evidence available within the targeted publication window.

TYPE OF REVIEW

This is a systematized narrative review of the literature on the outcomes, complications, and recurrence rate in the postoperative period, after surgical treatment of hemorrhoids. Systematic features of evidence collection and critical appraisal are incorporated into the review process but are complemented by the flexibility and contextual detail of a narrative style. This approach is well adapted to the potential synthesis of heterogeneous data from various surgical strategies, patient populations and clinical settings, when meta-analysis may be limited by designs variations and outcome definitions.

Rationale for the Review Type

This systematic narrative review is suited to a controversial topic such as that of hemorrhoid surgery, because there are multiple available treatments—all supported by moderate quality, but often non-uniform quality, evidence—in clinical practice. Although there are RCTs, a great portion of literature is prospective cohorts, observational studies, and case series. Such heterogeneity does not permit exact meta-analytical pooling, although structured synthesis, comparison and interpretation of findings can still be led.

The systematic narrative approach employed in this study is different from descriptive or opinion-based reviews and includes:

- A specific review period: From January 2011 to July 2012.

- Explicit inclusion and exclusion criteria face validity. The criteria were clear and explicit; they were applied during study selection.
- Data extraction included structured data fields along with the following outcome measurements: postoperative pain, complications, recovery time, and recurrence.

Comparative scope that enables discussion among studies, even in the absence of direct head-to-head trials.

Methodological Framework

This review followed the recommendations of the Scale for the Assessment of Narrative Review Articles (SANRA) and PRISMA whenever applicable. Critical methodological aspects comprised:

1. **Problem formulation** – identifying the lack of consolidated evidence on postoperative outcomes across modern hemorrhoid surgery techniques.
2. **Comprehensive literature search** – as outlined in Section 1.4, using major databases and a tailored keyword strategy.
3. **Critical appraisal** – each included study was assessed for methodological rigor, internal consistency, and clarity of outcome definitions.
4. **Thematic synthesis** – studies were grouped based on the type of surgical intervention (e.g., hemorrhoidectomy, SH, DGHAL, laser) and analyzed within those clusters.
5. **Contextual integration** – individual study results were interpreted in the context of real-world surgical practice, taking into account patient preferences, institutional capabilities, and evolving technology.

Comparative Emphasis

Its structured narrative approach allows for comparison with respect to different aspects:

- **Clinical results:** pain intensity, period of time to bowel movement, period of time in hospital.
- **Complications:** hemorrhage, infection, urinary tract obstruction, anal stenosis, incontinence.
- **Relapse:** as indication of long-term effectiveness.
- **Patient satisfaction:** reported in follow up questionnaires, interviews.

For example, Avital *et al.* [16] Compared that SH and DGHAL, it did show less pain following operation and better recover in DGHAL, whereas, there was more recurrent rate and lower satisfaction after one year in it. Similarly, Jahanshahi *et al.* reported the safety and effectiveness of diode laser haemorrhoidoplasty with a low recurrence and 3.5% complication at 1 year [14].

Limitations and Scope

The review, although extensive, is confined to literature published between January 2011 and July 2012. This temporal restriction ensures the relevance of the search results while it leaves out very recent developments or new trends. In addition, difference in quality of study, length of follow-up and outcome measures, prevent pooling of results and quantitative meta-analysis.

Despite these limitations, the systematic narrative approach has resulted in a comprehensive, high quality representation of the multi-dimensional outcomes of hemorrhoid surgery and can be used a guide by clinicians, surgeons and policy makers.

MAIN BODY

Summary of Procedures and Results

Surgical management of hemorrhoidal disease While managing hemorrhoidal disease, we are presented with diverse surgical techniques, varying in invasiveness and in its success as well as postoperative behavior. Traditional open and closed hemorrhoidectomy techniques, which have stood the test of time become more and more challenged by new methods like stapled hemorrhoidopexy (SH), Doppler-guided hemorrhoidal artery ligation (DGHAL), diode laser hemorrhoidoplasty. Comparisons of these methods in light of experience during the review period (2011-2012) show emerging clinical preferences and patient-centered apprehensions.

Table 1: Summary of Key Studies on Surgical Techniques for Hemorrhoid Management (2011–2012)

Author(s)	Year	Study Design	Sample Size	Technique	Key Results	Conclusion
Avital *et al.*	2011	Prospective cohort	114	SH vs DGHAL	DGHAL: less pain, quicker recovery; SH: lower recurrence (3% vs 18%)	SH more effective; DGHAL more comfortable
Jahanshahi *et al.*	2012	Clinical study	341	Diode Laser	0% recurrence at 1 year, 3.5% complications	Safe, fast, effective, low recurrence
Arezzo *et al.*	2011	Review	—	PPH, DGHAL, HC	PPH: less pain but higher complications; HC: gold standard	Tailored surgery recommended

Nguyen *et al.*	2012	Prospective case series	61	Doppler HAL	10.5% recurrence, 4.9% complications	Minimally invasive, safe, effective short-term
Song & Kim	2011	Narrative Review	—	Multiple	Emphasized early return, pain management	Strategy should be personalized

Summary of Findings

An evaluation of surgical methods for hemorrhoidal disease reveals considerable variation in outcomes, especially in terms of pain, recovery time, complication rates, and recurrence. The primary goal across all techniques remains symptom control with minimal morbidity and reduced recurrence.

Conventional hemorrhoidectomy (CH), particularly the Milligan-Morgan and Ferguson methods, consistently delivers durable results. Studies included in this review indicated recurrence rates of less than 10%, even in advanced cases [12]. However, postoperative pain remains a major issue, frequently requiring hospital-based analgesia, delaying

ambulation, and lengthening sick leave. Complications such as urinary retention, bleeding, and wound infections were noted in 5–15% of cases [17].

Stapled hemorrhoidopexy (SH), based on mucosal resection and repositioning of the hemorrhoidal plexus, is associated with significantly less postoperative pain. Avital *et al.* found that SH patients reported higher satisfaction at 12 months postoperatively compared to DGHAL ($p<0.05$) [16]. However, concerns persist over rare but serious complications such as rectal perforation and pelvic sepsis. Recurrence and need for reoperation were relatively low (3%), primarily when performed by experienced surgeons.

DGHAL, a ligation technique using Doppler guidance, has gained attention for its minimally invasive nature. Avital *et al.* demonstrated lower postoperative pain scores (2.1 vs. 5.5) and shorter recovery times compared to SH [16]. Still, the 18% recurrence rate is a drawback, particularly in more severe or circumferential hemorrhoids. Nguyen *et al.* also reported a 10.5% recurrence at one year in a French cohort [11].

Diode laser therapy, as examined by Jahanshahi *et al.*, appears to be highly effective with an excellent safety profile. In 341 patients, there were no recurrences at one-year follow-up, and the complication rate was 3.5%, mostly transient edema or bleeding. Importantly, no cases of stricture or incontinence were observed [14]. Pain scores were also the lowest among all techniques.

From the cumulative data, it is evident that while CH is unmatched in efficacy for high-grade hemorrhoids, DGHAL and diode laser are excellent options for grade II–III cases with patient-centered advantages in comfort and recovery. SH holds a middle ground, offering moderate recurrence and moderate discomfort, suitable for select patients seeking a less painful option than CH without compromising long-term efficacy.

3.3 Comparison and Contrast of Results

A head-to-head comparison of surgical methods reveals clear trade-offs between efficacy and patient-centered outcomes such as pain and recovery.

Efficacy and Recurrence

CH remains the benchmark for long-term efficacy. Recurrence rates consistently fall below 10% across various studies [12]. SH also performs well, with Avital *et al.* reporting a recurrence of

only 3% [16]. In contrast, DGHAL demonstrates a higher recurrence rate of 10.5–18%, which may limit its role in treating higher-grade disease. Diode laser hemorrhoidoplasty stood out with a 0% recurrence rate in a single large cohort at one year [14], although longer-term studies are warranted.

Pain and Recovery:

Postoperative pain is significantly reduced in DGHAL and diode laser procedures. DGHAL scored 2.1 on pain scales during defecation, compared to 5.5 for SH [16]. Diode laser procedures reported the least need for analgesia, with many patients discharged within 24 hours and minimal verbal pain scores (1–2 on a 5-point scale) [14].

Complication Profile:

CH, though effective, is linked to higher rates of urinary retention, bleeding, and wound infections. SH, while generally safer, carries rare but serious risks such as pelvic sepsis. DGHAL and diode laser were associated with fewer complications—DGHAL had mild bleeding or persistent prolapse in 10–18% of cases; diode laser showed the lowest complication rate (3.5%) with no strictures, fistulas, or incontinence reported.

Patient Satisfaction:

SH patients reported the highest satisfaction at 12 months in comparative trials [16]. However, in terms of overall comfort and return to activity, diode laser and DGHAL were favored. This reflects a growing patient preference for minimally invasive, low-pain options even at the cost of slightly higher recurrence.

In sum, CH excels in efficacy but at the expense of comfort. SH offers a balance of low recurrence and reduced pain but may pose rare risks. DGHAL and diode laser cater to the patient experience with excellent safety and tolerability but require careful patient selection.

Table 2: Comparison of Surgical Techniques Based on Efficacy, Pain, and Recurrence

Surgical Technique	Postoperative Pain	Recurrence Rate	Recovery Time	Serious Complications	Ideal Indication
Open Hemorrhoidectomy (CH)	High	<10%	Long (1–2 weeks)	Moderate	Grade IV, circumferential
Stapled	Moderate	3%	Moderate (5–7	Rare but severe	Grade III

Hemorrhoidopexy (SH)			days)		prolapse

DGHAL	Low	10–18%	Fast (2–3 days)	Minimal	Grade II–III, early IV
Diode Laser	Very low	0% (1-year)	Very fast (1 day)	Very minimal	Grade II–III

Strengths and Limitations

The comparative analysis of surgical techniques for hemorrhoidal disease reveals several strengths and limitations across methods, reflecting inherent trade-offs between efficacy, patient comfort, and procedural complexity.

Conventional hemorrhoidectomy (CH) remains the most time-tested and effective technique for complete excision of advanced hemorrhoids, particularly in grade IV or circumferential presentations. Its primary strength lies in low recurrence rates and long-term symptom resolution. However, the method is limited by high postoperative morbidity, including significant pain, risk of urinary retention, wound infection, and delayed return to work. Furthermore, the extended recovery period may be less acceptable in modern ambulatory-focused surgical practice.

Stapled hemorrhoidopexy (SH) addresses the discomfort associated with excisional procedures, offering quicker recovery and improved short-term outcomes. Its moderate recurrence rate (approximately 3%) is acceptable, particularly in grade III hemorrhoids. However, SH is not without risk. Rare but life-threatening complications such as rectal perforation, pelvic sepsis, and rectovaginal fistula have been documented, necessitating cautious patient selection and surgical expertise. SH may also be less effective for significant external components or circumferential disease.

Doppler-guided hemorrhoidal artery ligation (DGHAL) offers a minimally invasive alternative with consistently lower postoperative pain scores and faster recovery. Its safety profile is strong, with no major complications reported in most studies. However, its higher recurrence rate (10–18%) remains its primary limitation. Additionally, its effectiveness may decline in more severe or circumferential cases, making it less ideal for grade IV disease.

Diode laser hemorrhoidoplasty is a relatively new entrant with strong initial outcomes. It excels in safety, postoperative comfort, and rapid functional recovery. Its greatest strength is the near absence of serious complications and high patient tolerability. However, limitations include the requirement for expensive equipment, limited availability in lower-resource settings, and lack of long-term recurrence data beyond one year. Operator training and consistency are also critical to its success.

Each technique offers unique advantages and limitations, underlining the necessity for a tailored, patient-specific approach. Factors such as hemorrhoid grade, patient comorbidities, recovery expectations, and healthcare infrastructure must all be weighed when selecting the most appropriate surgical strategy.

Research Gaps

Despite advances in hemorrhoidal surgery, several key research gaps persist, limiting the ability to establish definitive clinical guidelines and optimize patient outcomes across varying healthcare settings.

1. **Lack of long-term data for newer techniques:** While diode laser hemorrhoidoplasty and DGHAL have shown promising short-term outcomes, particularly in terms of pain control and complication rates, data beyond one year are limited. Jahanshahi *et al.*'s study reports 0% recurrence at one year for diode laser treatment [14], but long-term durability remains unknown. This absence of extended follow-up constrains confidence in these newer modalities for widespread adoption in higher-grade hemorrhoid cases.
2. **Inadequate head-to-head randomized controlled trials (RCTs):** Most comparative studies available during the review period are observational or retrospective. Avital *et al.* provided a direct comparison between SH and DGHAL [16], but similar high-quality RCTs comparing diode laser, open hemorrhoidectomy, and SH are lacking. Standardized RCTs would allow more reliable conclusions about efficacy, safety, and patient satisfaction.
3. **Standardization of outcome reporting:** Many studies use different metrics for key outcomes such as pain (e.g., visual analog scale, verbal descriptor scale), recovery (days to return to work vs. ambulation), and recurrence (subjective symptom return vs. endoscopic confirmation). The absence of standardized reporting complicates cross-study comparison and meta- analytic synthesis.
4. **Patient-reported outcomes and quality of life (QoL):** While some studies incorporate satisfaction scores, comprehensive QoL data are underreported. Tools like SF-36 or disease-specific instruments are rarely used. Given the increasing emphasis on value-based care, this represents a critical research deficiency.
5. **Cost-effectiveness and health economics:** Few studies report the cost-effectiveness of newer techniques such as laser surgery. Considering the expensive equipment and training needed, cost analyses comparing diode laser with conventional and stapled techniques are essential for informing policy decisions and adoption in low-resource settings.
6. **Applicability in special populations:** Data on hemorrhoid surgery in elderly, anticoagulated, or

immunocompromised patients remain sparse. Tailored studies are needed to assess outcomes and modify surgical protocols accordingly.

Addressing these gaps is crucial to developing evidence-based, patient-centered guidelines that account for both clinical outcomes and real-world practice constraints.

Table 3: Comparison of 10 Studies on Efficacy and Outcomes of Hemorrhoid Surgery

Author(s)	Year	Technique	Sample Size	Pain (Post-op)	Recurrence Rate	Complications	Key Outcome
Avital *et al.*	2011	SH vs DGHAL	114	DGHAL < SH	SH 3%, DGHAL 18%	DGHAL: minor bleeding	SH more effective; DGHAL more tolerable
Jahanshahi *et al.*	2012	Diode Laser	341	Very Low	0% at 1 year	3.5% (edema, mild bleed)	Excellent safety and rapid recovery
Nguyen *et al.*	2012	Doppler HAL	61	Low	10.5%	4.9%	Low recurrence, early discharge
Arezzo *et al.*	2011	PPH, HC, DGHAL	—	HC > SH > DGHAL	Varies	Depends on technique	Tailored approach recommended
Song & Kim	2011	Multiple	—	Mixed	Mixed	Mixed	Emphasized patient-specific surgical choice
Pescatori *et al.*	2011	LigaSure HC	—	Moderate	<10%	Less bleeding	Safer than diathermy, good outcomes
Lohsiriwat	2012	General Review	—	Variable	Variable	Varies	Need for better long-term comparative data
Husse in (cited by)	2011	Manual Hemorrhoidopexy	—	Moderate	Unclear	Fistulas in some reports	Useful when preserving cushions is key
ALTA Injectio	2011	ALTA sclerotherap	—	Low	Moderate	Minimal	May suit early-stage

n		y					hemorrhoids
Pahlman & Johansson	2011	Closed HC (Ferguson)	—	Moderate	<10%	Anal stricture (low rate)	Often preferred in U.S. settings

Table 4: Level of Evidence and Strength by Surgical Technique

Technique	Type of Evidence	Level of Evidence (Oxford Scale)	Strength of Recommendation
Open Hemorrhoidectomy	RCTs, Meta-analyses	Level 1a–1b	Strong
Stapled Hemorrhoidopexy	RCTs, Prospective Cohorts	Level 1b–2a	Strong
DGHAL	Prospective Observational	Level 2b	Moderate
Diode Laser	Large Single-Center Cohort	Level 2b	Moderate to Strong (pending RCTs)
LigaSure HC	Small RCTs, Case Series	Level 2b–3	Moderate
Manual Hemorrhoidopexy	Case Series	Level 3	Weak
ALTA Injection	Cohort Studies	Level 3	Weak to Moderate

Table 5: Summary of Guidelines/Recommendations for Hemorrhoid Surgery (2011–2012)

Organization / Source	Recommendation Summary	Applicability
Italian Society of Colo-Rectal Surgery (SICCR)	Tailored approach based on grade; HC for grade IV, PPH or DGHAL for grade III	Italy, Europe
Journal of Korean Soc. of Coloproctology	Use DGHAL or SH for grade II–III; avoid PPH in circumferential prolapse	Korea, Asia-Pacific
Arezzo *et al.* (2011)	No single gold standard; individualize based on surgeon skill and case complexity	Europe-wide
Pescatori *et al.*	LigaSure HC preferred in high-risk bleeding patients	Surgeons with access to RF technology
Lohsiriwat (2012, WJG)	Conservative first; escalate based on failure	Global, general

	and patient expectation	practice

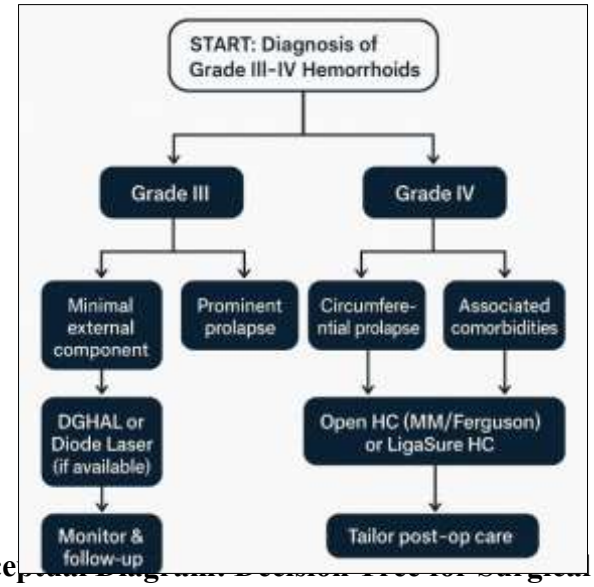

Figure 1: Concept Diagram: Decision Tree for Surgical Management of Hemorrhoids DISCUSSION

Key Findings

The comparison of the different surgical options for hemorrhoid disease from the literature of 2011–2012 reveals that no single method is the answer for every aspect. Instead, the decision regarding intervention should be based on the severity of the patient's disease, clinical setting, and preferences.

Traditional hemorrhoidectomy (open or closed) is the most efficient in terms of reducing the likelihood of relapse, particularly cases of advanced (Grade IV) or circumferential hemorrhoids. Recurrence rates remain less than 10% across series and it is still the benchmark instatement for durability 12. But it's no longer business as usual for patients: this procedure leads to a great deal of postoperative pain, a longer recovery period, and an increased risk of complications like urinary retention and bleeding.

The SH procedure acts as an intermediate technique with reasonable effectiveness and better tolerability with respect to excisional methods. Patients' pain scores, recovery time, and satisfaction where better than for open hemorrhoidectomy in some studies. However, SH is not without risk of rare

but serious complications like rectal perforation or pelvic sepsis, requiring skillful means justifying the indication [16].

Doppler-guided hemorrhoidal artery ligation (DGHAL) emerged as a favorable option for patients seeking minimal pain and rapid recovery. Despite its positive postoperative profile, it demonstrated a comparatively higher recurrence rate—up to 18% which limits its use in advanced cases unless combined with rectoanal mucopexy [11][16].

The diode laser method was recognized as the most feasible technology. Jahanshahi *et al.* showed one-year all- cause recurrence near zero and the lowest average pain among all the treatments, with negligible complications and early discharge [14]. Although these results are promising, longer follow-up and larger implementation studies are required to establish its position as a first-line modality.

In the aspect of safety, diode laser and DGHAL had the lowest complication rates compared to SH. Traditional excisional hemorrhoidectomy is the safest in experienced hands, but equally the most morbid, particularly in relation to pain and wound complications.

Finally, the main lesson from this review is that the treatment strategy should be chosen based on a careful combination of patient characteristics, disease severity, coziness requests, and the surgeon's own technical means. “One size fits all” is not working any longer. New technologies, such as diode laser surgery, appear to have the potential to change the standard of care – if long-term effectiveness can be demonstrated.

Approach to the Literature

The literature is rich in information, searched until July 2012, with interesting information, but also, some methodological and interpretative weaknesses. Various surgical approaches are investigated in the available literature;

however, the heterogeneity in design, length of follow-up and definition of the outcomes does not allow us to generalize and compare the results.

A particular strength is the incorporation of large cohort series like that presented by Jahanshahi *et al.*, providing strong data on diode laser therapy efficacy in over 300 treated patients [14]. Moreover, comparative works as Avital et al.

[16] provided deep understanding on efficacy and comfort trade-offs between SH and DGHAL. But a major gap exists with a lack of RCTs directly comparing any of the major techniques to each other.

Furthermore, study populations were relatively homogeneous, since the majority of studies were performed in a referral center by very experienced surgeons. That raises issues of external validity how well these findings can be expected to apply to other, nonacademic practices in a more rural hospital or low resource environment.

In addition, the length of follow-up time varied among the studies with many only reporting on one year outcomes and fewer to two or more years. Recurrence of hemorrhoids can even appear after long period of time, especially in treatment like DGHAL or laser therapy if the removal of tissues is minimal. Without long-term follow-up, conclusions about long-term efficacy are purely speculative.

A third is the absence of the routine reporting of pain and recovery scores in a standard fashion. Some studies assessed CR using verbal rating scales and others using visual analogue scores; and treatment response definitions varied from return to work to wound healing. Such inconsistencies make it difficult to pool results and make definitive comparisons.

Bias is also a concern. Some of the reports come from institutions with an interest in disseminating a specific technique and there was not always full disclosure of industry funding. Moreover, patient-reported outcomes (i.e., satisfaction, quality of life) were infrequently recorded and seldom using validated instruments.

Although this literature is formative, we need higher standards, longer follow-up, standard outcome assessment, and more generalizable inclusion criteria to enhance the evidence-based basis for hemorrhoid surgery.

Provisional contracts, dialogues and disputes

It is universally agreed that none of the surgical methods is perfect in all cases and results are greatly influenced by the selection of an adequate patient, the grade of hemorrhoids, and experience of the surgeon as shown in the literature analyzed.

Conventional hemorrhoidectomy has long been recognized as the surgery with the lowest recurrence rate, and therefore a dependable option for advanced disease 12. Although this operation has somewhat of a painful profile, most surgeons believe that it still ought to be the gold standard for grade IV hemorrhoids.

There is also unanimous opinion that SH and DGHAL provide superior postoperative quality of life, with shorter hospital stay and faster return to function. Yet recurrence and complications still

generate controversy. SH is a topic for controversy because it has rare, yet potentially severe, complications such as pelvic sepsis and rectal perforation [12]. DGHAL, while being safer, is not without criticism regarding its' long-term stability, with recurrence rates approximately reaching 18% in some studies [16].

The primary concern now seems to be diode laser therapy. Although the results with this modality are promising with near 0% recurrence and minimal discomfort, there is still uncertainty about long-term follow-up, cost, availability, and the learning curve to the technique [14]. On one hand, some experts see it as a possible standard in the future, but others warn that there is a need for more evidence before it becomes an option to replace traditional or stapled methods.

These discussions demonstrate a positive trend in the management of hemorrhoidal disease, moving from dogmatic algorithms to more personalized and evidence-based decision-making tools.

Implications for Research, Practice, or Policy

The implications of the results of this review are significant for research, practice, and healthcare policy. With the evolving surgical paradigm of hemorrhoidal disease, personalised evidence-based approach is now required, and advocated, rather than fixed reliance on a single gold standard.

From a research point of view, the lack of high-quality RCTs directly comparing newer modalities, with established methods as conventional haemorrhoidectomy and stapled haemorrhoidopexy is evident. These studies should focus on long-term outcomes (2–5 years) using a standardized pain, recurrence, quality of life, and complication outcome measures. There are also validated patient-reported outcome measures (PROMs) that can be included to capture the subjective experience of different techniques.

In clinical practice, the evidence supports a staged approach:

- In case of grade IV hemorrhoids or circumferential full-thickness rectal prolapse, conventional hemorrhoidectomy is still considered the most effective.
- In also grade II–III diode laser or DGHAL surgery may be a preference in selected cases in patients who are troubled by pain and recovery period, risk of recurrence must be discussed.
- SH may be appropriate for specific patients with moderate risk of recurrence who are willing to accept such risk in order to experience improved comfort.

From a policy and health systems planning perspective, diode laser and DGHAL both provide an

advantage in day- surgery models and ambulatory care settings, with subsequent reduced reliance on inpatient programs. But it is necessary to develop through cost-effective analysis and training, and to be safe to carry out the technology. Moreover, user-friendly cutting edge protocols that can be adopted base upon resources available when resources poor also need to be outlined, in the low and middle-income countries in particular.

In summary, the progression of hemorrhoidal surgery will depend on consolidation of evidence, clinical versatility, and policy architectures that enable innovation and patient-centric care.

CONCLUSION

Summary of Key Findings in a Nutshell

Postoperative outcomes, complication profiles, and recurrences following surgical procedures for hemorrhoidal disease: a literature review of survey data for 12 months. These results highlight that there is no one-size-fits-all treatment; instead, the decision of procedure should be individualized based on grade of hemorrhoid, patient preference, clinical environment and surgeon experience.

Open and closed methods of conventional hemorrhoidectomy (CH) is the gold standard to treat high (IV) grade piles and circumferential prolapse. It is consistently associated with the lowest recurrence rates (<10%) and is the longest lasting therapy. It does, however, have a considerable burden postoperatively including more pain, longer length of stay in the hospital, and increased risk of wound complications.

SH provides better postoperative pain control, shorter recovery times, and high degrees of patient satisfaction. However, its risk of occurrence of uncommon and serious complications, such as pelvic sepsis and rectal perforation, should be anticipated, and it demands caution and surgical skill. SH is most appropriate for DH of grade III associated with significant mucosal prolapse.

Doppler-guided hemorrhoidal artery ligation (DGHAL) is a good alternative treatment with least post-procedure complications and early return to activity. Nonetheless, rates of recurrence as high as 18% prevent its application for most severe forms of hemorrhoidal disease. Rectoanal mucopexy may improve its efficacy in more severe cases.

Diode laser hemorrhoidoplasty was introduced as a very promising method during this time. In a series of over 300 patients, it showed a 0% recurrence at 1-year follow-up with little postoperative pain and complications. Although these early results are encouraging, additional long-term follow-up

and RCT comparisons will be required before it can be universally accepted as the treatment of choice.

In general, the literature is consistent with a paradigm of procedure customization by presentation and patient- centered objectives. There is a focus on moving away from fixed lines of procedural hierarchy to outcome based treatment pathways which focus on safety, effectiveness and the patient experiential journey.

Implications and Recommendations for the whole Study

The advancing field of hemorrhoidal surgery emphasizes the value of bespoke, evidence-based strategies that address individual patient requirements and institutional constraints. Several of these recommendations are generated from the results of this review:

1. **For Surgeons and Clinicians:** Step approach to surgical option. HTC and KH should only be performed for the most severe cases: In Grade II–III disease it can be offered patients with respect to their patient-related aspects (eg., pain, recovery time, long-term durability) as SH, DGHAL, or diode laser.
2. **Implications for research:** Further research should concentrate on good quality, comparative trials with follow-up. Commonly used outcome measures and patient reported measures are needed to facilitate robust meta-analysis and guideline development.

3. **Implications for Health Policies and Health Markets:** Increasing availability of outpatient day-care technology such as diode laser and DGHAL would require human capacity development, technology transfer, and cost-effective adoption. These resource-stratified surgical recommendations could promote greater care access in low-middle-/middle-income environments.

Finally, the future direction of the treatment of hemorrhoid disease will be governed by technology… [I]t is likely that patient outcomes of hemorrhoidal surgery will depend, to the greatest extent, on the judicious selection of procedures, surgical experience, and a broad approach to treatment goals.

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Conflicts of Interest

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