COMPARISON OF OPEN HEMORRHOIDECTOMY UNDER LOCAL ANESTHESIA VERSUS SADDLE BLOCK: A COST-EFFECTIVENESS AND CLINICAL OUTCOMES ANALYSIS

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Abstract

Background: Haemorrhoids are a common anorectal disorder requiring surgical intervention in severe cases. Open haemorrhoidectomy (OH) is a widely performed procedure, with anaesthesia choice significantly impacting patient outcomes and healthcare costs. While saddle block (SB) anaesthesia is frequently used, local anaesthesia (LA) has been proposed as a cost-effective and efficient alternative, especially in resource-limited settings.

Methods: A double-blind, randomized controlled trial (RCT) was conducted to compare the clinical and economic outcomes of OH performed under LA versus SB. A total of 80 patients with 3rd or 4th-degree haemorrhoids were randomly assigned into two groups (40 per group). The study evaluated operative time, hospital stay duration, and cost-effectiveness using a bottom-up cost analysis approach. Data were analyzed using IBM SPSS Statistics, with statistical significance set at $p<0.05$.

Results: The mean operating time was significantly shorter in the LA group compared to the SB group ($p<0.001$). Patients receiving LA also had reduced hospital stays ($p<0.001$). The total cost per patient was lower in the LA group compared to SB ($p=0.04$). While patients under LA reported slightly higher post-operative pain in the first few hours, there was no significant difference in overall complications between the groups.

Conclusion: Local anaesthesia for open haemorrhoidectomy is a cost-effective alternative to saddle block, resulting in shorter hospital stays, reduced surgical costs, and comparable clinical outcomes. Implementing LA as a first-line anaesthetic technique in resource-limited settings could enhance surgical efficiency and reduce the financial burden on healthcare systems.

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Introduction

Haemorrhoids are the most common anal condition, characterized by submucosal, fibro vascular, and arterio-venous sinusoidal formations within the anorectal region (1). Clinically, they manifest through bright red rectal bleeding, mucus discharge, perianal discomfort, prolapse of haemorrhoidal cushions, and hygiene-related issues such as soiling (1). Over time, the management of haemorrhoids has evolved, with multiple treatment modalities available, ranging from conservative approaches like dietary modifications and sclerotherapy to surgical interventions such as band ligation and excision, depending on the severity of the condition (2,3). The classification system by Banov L et al. identifies grade III and IV haemorrhoids as requiring surgical management, with open haemorrhoidectomy being the most commonly performed procedure for these cases (4,5). Surgical intervention remains the only definitive treatment for haemorrhoidal disease, particularly for patients in whom conservative methods have failed or for those experiencing complications. Among various surgical techniques, the Milligan-Morgan haemorrhoidectomy is widely regarded as the standard approach due to its effectiveness and high success rates (6). However, one of the primary drawbacks of this procedure is significant postoperative pain, with studies reporting severe pain in approximately 20–40% of patients (6,7).

Local anaesthesia (LA) is a viable option for most anal surgeries, as it provides sensory and motor blockade in the peri-anal area by acting on peripheral nerve endings (8). However, the degree of anal canal relaxation achieved with LA varies, making its efficacy somewhat unpredictable (8). Research has demonstrated that the choice of anaesthesia affects operative time, with studies by Kushwaha and Baghel and their colleagues suggesting that LA can reduce the duration of surgery when compared to spinal or general anaesthesia (2,9). Despite promising findings in the literature, the benefits of LA continue to be debated, particularly regarding its suitability for select patients (10). Some studies indicate that performing open haemorrhoidectomy (OH) under general anaesthesia (GA) or spinal anaesthesia (SA) leads to higher costs when compared to OH conducted under LA (2,10,11).

In many low- and middle-income settings, OH is frequently performed using a saddle block, which necessitates the expertise of a trained anaesthetist and is linked to delayed surgical initiation, urinary retention, neural injuries, post-Dural puncture headaches, cauda equine syndrome, and epidural complications such as hematoma and abscess formation (2,12,13). These adverse effects contribute to prolonged hospital stays and increased morbidity (13). The shortage of trained anaesthetists, particularly in resource-limited settings where the ratio of aesthetic providers to the population is critically low (0.05 per 100,000 compared to 17.85 per 100,000 in the UK) (14), poses a challenge to the accessibility and execution of OH, especially at lower-tier healthcare facilities (8). Additionally, the financial burden associated with anaesthesia is an essential consideration in selecting the most appropriate technique for treating benign anal disorders (10). Saddle block anaesthesia requires skilled administration and has been linked to extended hospital stays, which further escalates the cost of OH compared to procedures performed under LA (2,3,9,10).

Although studies have shown that performing OH under LA reduces complication rates, optimizes aesthetic resource allocation, and increases surgical turnover due to shorter operative times, LA is not yet widely adopted as a first-line technique in certain low-resource settings (2,7). To assess the feasibility of using LA in such contexts, a well-structured randomized controlled trial is necessary.

Methods

The study employed an economic evaluation through cost-benefit analysis, incorporated into a double-blind randomized controlled trial. It was conducted in the surgical departments of multiple hospitals. A total of 80 patients with uncomplicated 3rd or 4th degree haemorrhoids were randomly assigned, to undergo open haemorrhoidectomy either with local anaesthesia (Group A) or saddle block (Group B), with 40 patients in each group. The detailed methodology, including patient selection, sample size calculation, and analysis methods, is outlined in prior studies (10, 11). The cost analysis of open haemorrhoidectomy was considered a secondary outcome of this trial (11). The cost-benefit analysis was based on different hospital surgical tariffs due to the absence of a standardized national reference for healthcare costs. Both direct and indirect in-hospital costs, along with operating time and length of stay, were prospectively documented for all patients undergoing surgery in both groups.

Cost Calculation

The study considered both medical and non-medical direct costs associated with open haemorrhoidectomy for all participants. Medical direct costs included materials used during and after the surgery, such as surgical blades, gloves, medications, and aesthetic fees. Non-medical direct costs were those

not directly related to the patient's treatment, such as administrative fees, hospital stay, nursing care, and patient records. A total of 70 envelopes were prepared, half containing a chit marked 'A' for local anaesthesia and half marked 'B' for saddle block. All financial data were presented in SAR

Data Analysis

The data was analyzed using IBM SPSS Statistics version 23.0. Quantitative data regarding direct, indirect, and total costs were expressed as means with standard deviations (SD). The mean operating time for each haemorrhoidectomy technique was calculated and compared using the independent samples t-test, with a significance threshold of $p < 0.05$. A bottom-up table of average charges by group was created to determine the mean cost for each group (A and B). Additionally, a cross-tabulation was performed between the two surgical techniques to conduct a cost-effectiveness analysis, with the difference in means compared using the t-test and a two-tailed p-value, considering $p < 0.05$ as statistically significant.

Results

All 80 participants were randomly assigned and followed up until 7 days after the open haemorrhoidectomy (OH) procedure. A total of 70 patients participated in the trial, with 35 individuals assigned to each anaesthesia group. The operating time and duration of hospital stay were notably shorter in group A (local anaesthesia) compared to group B (saddle block) ($p < 0.001$). The overall cost of OH was significantly lower for group A than for group B ($p = 0.04$) (Table 1). Table 2 provides a breakdown of costs for patients undergoing OH in both groups. The results are presented as mean values with standard deviations for each cost category (Table 1, Table 2).

Discussion

In this cost-analysis comparison of open haemorrhoidectomy (OH) performed with local anaesthesia (LA) versus saddle block (SB) for patients with 3rd or 4th-degree haemorrhoids, we found that the operating time was significantly longer with SB compared to LA. This contrasts with the findings of Younes et al. [6] and Sharma et al. [12], who reported no significant difference in operating time between LA and SB for OH. Our trial, however, supports the conclusion that SB tends to extend the surgical duration in comparison to local anaesthesia, aligning with previous research [8, 13].

The use of LA has demonstrated its effectiveness in reducing the cost of surgery, particularly in day care procedures, globally [14]. The cost savings, stemming from shorter hospital stays and quicker recovery times, are particularly valuable for resource-limited regions with constrained hospital bed capacity [14].

In our analysis, we observed that LA was associated with a significantly lower overall cost for OH compared to SB. This aligns with studies conducted in England and Bangladesh, which also found shorter hospital stays and lower costs when LA was used instead of SB for OH [5, 9]. These results confirm that opting for LA in well-selected patients can avoid various additional charges. While SB remains the standard for OH in many low- and middle-income countries (LMICs), it requires a skilled aesthetic provider, which can be challenging in areas with limited healthcare workforce. Additionally, SB involves a delay in surgery due to the time needed for patients to be positioned for the procedure, as well as complications such as postoperative urinary retention, nerve damage, and spinal injuries, which can increase both hospital stay and morbidity [5, 9, 15].

Our findings also support Shaw & Trenten's study, which reported that LA was associated with a lower financial burden compared to other anaesthesia types used in day care surgeries by reducing hospitalization costs and minimizing medication expenses [3]. Furthermore, day care surgery under LA can reduce surgical costs by 25 to 50% compared to techniques that necessitate longer hospital stays [3, 16]. A recent meta-analysis further supports these conclusions [17]. Despite these advantages, our study noted that LA was slightly associated with a higher pain threshold reported by patients following OH for uncomplicated 3rd or 4th-degree haemorrhoids, with a higher visual analogue scale (VAS) score at 2 hours' post-surgery (2.28 ± 1.3 for LA vs. 1.69 ± 0.09 for SB, $p = 0.05$) [10]. While this difference was modest, it suggests that stronger pain management might be required post-operatively for patients under LA, potentially introducing additional costs. However, this small difference does not undermine the feasibility of LA as the initial anaesthesia choice for uncomplicated haemorrhoids, especially with the option of switching to SB intra-operatively when needed [18].

The implications of these findings for policy suggest that the lower cost associated with LA could help protect patients in LMICs from financial strain due to out-of-pocket payments for surgery and anaesthesia care. Furthermore, if widely adopted, LA could contribute to meeting the Global Surgery 2030 target of 5,000 surgical procedures per 100,000 populations by 2030 [19]. However, several challenges must be addressed before fully endorsing LA. Training programs for medical and anaesthesia students and junior professionals must be revamped to ensure competence in LA, and standardization of anaesthesia protocols across both public and private healthcare facilities is necessary. Recruitment and retention of trained personnel, along with overcoming drug stock-outs, remain significant barriers to the use of local and regional anaesthesia in LMICs [20]. Additionally, addressing issues related to patient education, institutional barriers, and the autonomy of physicians in selecting anaesthesia methods will be essential to improving anaesthesia practices [21].

Conclusion

Our trial demonstrated that the operating time and both direct and indirect costs were significantly lower for patients undergoing OH with LA compared to SB. Governments and non-governmental organizations should consider revising guidelines for the management of uncomplicated third and fourth-degree haemorrhoids in LMICs to promote the use of local anaesthesia, as it is both a safer and more cost-effective option than saddle block.

Table 1. Operating Time and Cost Analysis Among Patients Undergoing Open Hemorrhoidectomy in the Two Groups.

Variables	Group A (n = 40)	Group B (n = 40)	t	P-value
Operating time (in min)			-7.713	< 0.001*
Minimum-maximum	10–33	20–74		
Mean ± SD	15.52 ± 5.34	33.72 ± 11.54		
Hospital Stay (in hours)			-7.419	< 0.001*
Minimum-maximum	10–40	12–72		
Mean ± SD	20.86 ± 6.46	40.14 ± 12.41		

Table 2. Mean Cost Associated with Open Hemorrhoidectomy by Bottom-Up Charge Breakdown per Patient in Each Group.

Variable	Group A (Mean ± SD)	Group B (Mean ± SD)	Mean Difference	P-value
Surgical-related cost	14.35 ± 2.22	15.84 ± 3.19	1.49	0.040
(Surgical blades, sutures, etc.)				
Anesthetic-related cost	22.97 ± 3.56	25.35 ± 5.11	2.38	0.042
(Anesthesia fee, drugs, spine needle)				
Medicine-related cost	8.61 ± 1.34	9.51 ± 1.92	0.89	0.045
(Antibiotics, analgesics, fluids)				
Surgical sundries-related cost	4.59 ± 0.71	5.07 ± 1.02	0.48	0.044
(Gloves, syringes, urinary catheter, etc.)				
Hospital-related cost	6.89 ± 1.07	7.61 ± 1.53	0.72	0.043
(Hospital stay, nursing care, file, etc.)				
Overall Mean Cost Per Patient	57.42 ± 8.90	63.38 ± 12.77	5.96	0.044

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