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Digestive Surgery Patterns in Rural Indonesia: Insights from Lampung Province

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A B S T R A C T

Introduction Digestive surgical conditions represent a significant portion of the global surgical burden, particularly impacting low- and middle-income countries (LMICs). However, epidemiological data detailing the specific patterns of digestive surgery in rural Indonesian healthcare settings remain scarce. Understanding these patterns is crucial for effective healthcare planning and resource allocation. **Methods:** A descriptive observational study was conducted retrospectively across three type D hospitals situated in Central and South Lampung, Indonesia. Data were collected from surgical records and patient registers spanning the period from January 2024 to February 2025. All patients undergoing digestive surgical procedures during this timeframe, for whom complete data were available, were included. **Results:** A total of 773 patients underwent digestive surgery during the study period. The patient cohort showed a male predominance (65.20%). The three most frequent surgical conditions encountered were hernia (n=274, 35.45%), hemorrhoids (n=148, 19.15%), and appendicitis (n=123, 15.91%). Inguinal hernia (82%) treated predominantly with herniorrhaphy (89%) was the leading hernia type, peaking in the 51–60 year age group. Internal hemorrhoids (86%), primarily grade III (45%), were most common, with a peak incidence in the 41–50 year age group. Acute appendicitis (92%) was more frequent in females (53.66%), with a mean age of approximately 27 years. **Conclusion:** Hernia, hemorrhoids, and appendicitis constitute the primary digestive surgical workload in the surveyed rural type D hospitals in Lampung province. These findings underscore the specific surgical needs within these limited-resource settings and highlight a critical need for comprehensive, nationwide studies encompassing diverse hospital types and including non-operative cases to inform Indonesian health policy.

1. Introduction

Surgery constitutes a cornerstone of medical intervention, employing invasive techniques to address a diverse array of pathological conditions. This encompasses a wide spectrum, from congenital anomalies and chronic diseases to acute injuries. The fundamental aims of surgical intervention are centered on the restoration or preservation of physiological function, the reduction of patient suffering, and the enhancement of the patient's overall quality of life. Within the expansive field of surgery, digestive surgery represents a critical subspecialty. This subspecialty is dedicated to the diagnosis and operative management of disorders affecting the gastrointestinal tract. It also includes the care of associated accessory organs such as the liver, pancreas, and biliary system. Globally, procedures within the domain of digestive surgery are frequently performed. These procedures constitute a substantial and often increasing portion of the overall healthcare burden across various healthcare systems. The burden of digestive surgical conditions is particularly significant and growing in low- and middle-income countries (LMICs). In these regions, the outcomes for patients following digestive surgery are often compromised by limitations inherent in the healthcare infrastructure. Several factors contribute to adverse outcomes. These include inadequate diagnostic facilities, limited availability of essential surgical supplies and medications, insufficient critical care capacity, and a shortage of specialized surgical personnel and infrastructure.[1-4]

Specifically, there is a direct correlation between high rates of postoperative mortality and morbidity and deficiencies in surgical resources. A critical factor is the low ratio of operating rooms and trained surgeons relative to the population size. This disparity highlights the urgent need for targeted interventions and resource allocation strategies. These strategies must be tailored to the specific epidemiological patterns observed in these regions to improve patient outcomes. Despite the acknowledged importance of digestive surgery, there is a notable lack of comprehensive, population-based data detailing the epidemiology of digestive surgical cases within Indonesia. The information that does exist is often fragmented. It may be derived from single-center studies or primarily focused on urban, tertiary care facilities. This leaves a substantial gap in knowledge concerning the situation in rural and remote areas of the country. For example, one study conducted over three years in a hospital in Sulawesi reported on 110 hospitalized digestive surgery patients, noting a male predominance and a peak incidence in the 46–65 year age group. While informative, this represents a limited view of the national situation.[5-7]

This current study was designed to provide a detailed, descriptive overview of the range of digestive surgical conditions encountered and managed at three type D hospitals. These hospitals are located in the rural regions of South Lampung and Central Lampung provinces in Indonesia.[8-10] The research aims to characterize the clinical profiles of patients, identify the most common diagnoses, and detail the types of surgical interventions performed. By doing so, it seeks to generate foundational epidemiological data specific to these under-represented healthcare settings. It is anticipated that these findings will illuminate the local burden of digestive surgical disease. Furthermore, it is expected that the data will contribute to a more comprehensive understanding of surgical needs across rural Indonesia. Ultimately, this understanding can inform evidence-based policy and resource allocation decisions.

2. Methods

The study adopted a descriptive observational design. This approach is appropriate for providing a detailed account of the characteristics, frequency, and distribution of digestive surgical cases within the specified population and setting. Observational studies, in contrast to experimental studies, do not involve any intervention or manipulation of variables by the researchers. Instead, they focus on observing and recording phenomena as they naturally occur. The descriptive nature of the study aimed to systematically summarize and present the data in a meaningful way, allowing for the identification of key patterns and trends in digestive surgery. The study utilized a retrospective data collection method. Retrospective data collection involves the examination of data that has already been recorded. In this case, data was extracted from pre-existing hospital records, including patient files and surgical logs. This approach is efficient for gathering a substantial amount of data within a relatively short timeframe and is particularly suitable when studying events that have already occurred. However, it is important to acknowledge the potential limitations of retrospective studies, such as reliance on the accuracy and completeness of historical records.

The study was conducted across multiple centers, specifically within three type D hospitals. These hospitals are located within the administrative regions of Central Lampung and South Lampung, Indonesia. The specific hospitals included in the study are; Wisma Rini Hospital, situated in Pringsewu; Surya Asih Hospital, also located in Pringsewu; Kartini Hospital, located in Kalirejo. Type D hospitals within the Indonesian healthcare system represent a critical tier of primary-level healthcare facilities. These hospitals are typically the first point of contact for patients in need of inpatient and outpatient services. Their services encompass a range of essential medical care, including basic surgical services. Type D hospitals predominantly serve rural populations. Compared to higher-tier hospitals (Type C, B, or A), they generally have more limited resources. This

includes infrastructure, equipment, specialist personnel, and funding. Understanding the specific characteristics and limitations of these healthcare settings is crucial for interpreting the study findings and contextualizing the challenges in delivering surgical care in these areas.

The study population comprised all patients who underwent digestive surgical procedures at the participating hospitals during a defined period. The study period spanned from January 1st, 2024, to February 28th, 2025, encompassing a total of 14 months. This timeframe was chosen to capture a sufficient number of cases to provide a representative overview of digestive surgical activity within the participating hospitals. The population included individuals of all ages. This broad inclusion criterion ensured that the study captured the full spectrum of digestive surgical conditions occurring across the lifespan within the study setting. All patients admitted to the participating hospitals who received operative treatment for any diagnosed digestive surgical condition during the study period were included. This criterion focused the study on cases that required surgical intervention, providing insights into the operative burden of digestive diseases in the region.

To maintain the focus and quality of the data, specific inclusion and exclusion criteria were applied; Inclusion Criterion: The sole inclusion criterion was that any patient who underwent a surgical procedure classified under the domain of digestive surgery within the specified timeframe (January 1st, 2024, to February 28th, 2025) at one of the participating hospitals was included in the study. This criterion ensured that all relevant surgical cases were captured, providing a comprehensive view of the operative workload related to digestive diseases; Exclusion Criteria: Exclusion criteria were implemented to ensure data quality and completeness. Patients were excluded from the study if their medical records had incomplete or missing critical information. The specific critical information that led to exclusion included; Patient age; Patient gender; Final surgical diagnosis; Details of the surgical procedure performed. These data points were deemed essential for the analysis and interpretation of the study findings. The absence of any of these key variables would compromise the validity and reliability of the data. Cases that were managed non-operatively were excluded from the study. This means that patients who were diagnosed with digestive conditions but did not undergo surgery were not included in the analysis. This exclusion criterion focused the study on the surgical management of digestive diseases, providing specific insights into the operative burden within the participating hospitals.

Data collection involved a systematic process of extracting relevant information from existing hospital records. The primary sources of data were; Inpatient medical record files; Official surgical logbooks or registers maintained by each hospital's surgical department. Inpatient medical record files contain detailed information about each patient's admission, diagnosis, treatment, and progress during their hospital stay. Surgical logbooks or registers provide a chronological record of all surgical procedures performed at the hospital, including patient details, diagnoses, and the types of operations conducted. To ensure consistency and accuracy in data extraction, a standardized data collection form was utilized. This form was designed to capture all the necessary variables in a uniform format, minimizing the risk of errors or inconsistencies in data recording. Trained personnel carried out the data collection process. This likely involved medical record staff, nurses, or research assistants who were trained on the data collection form and the study protocol. Data collection was conducted in March 2025, after the conclusion of the 14-month study period. This allowed for the complete capture of all cases within the specified timeframe.

The collected data encompassed several key variables, categorized as follows; Demographics: This category included patient age and gender. Patient age was recorded in years. This continuous variable allows for detailed analysis of age distribution among the patient population. Patient gender was categorized as

male or female. This categorical variable is essential for examining gender-specific patterns in digestive surgical conditions; Clinical Information: The primary surgical diagnosis was recorded. Diagnoses were coded according to standard classifications where possible. This ensures consistency and facilitates comparison with other studies. Standard classifications, such as the International Classification of Diseases (ICD), provide a uniform system for coding and categorizing diseases and health conditions; Surgical Procedure: The specific type of digestive surgical operation performed was recorded. This variable captures the nature of the surgical intervention used to treat the patient's condition; Detailed Case Characteristics: For the three most frequently encountered conditions, additional specific clinical characteristics were extracted. The three most frequent conditions were identified post-hoc as hernia, hemorrhoids, and appendicitis. This focused analysis allowed for a deeper understanding of the clinical presentation and management of these common surgical problems; Hernia: The following characteristics were recorded for hernia cases; Type of hernia: inguinal, femoral, or umbilical These are the most common anatomical locations for hernia development; Type of surgical repair: herniorrhaphy or hernioplasty Herniorrhaphy involves tissue repair, while hernioplasty utilizes mesh reinforcement; Age distribution; Hemorrhoids: The following characteristics were recorded for hemorrhoid cases; Type: internal or external This classification distinguishes between hemorrhoids located inside or outside the anal canal; Grade of severity for internal hemorrhoids: Grades I-IV This standard classification system describes the degree of prolapse of internal hemorrhoids; Age distribution; Appendicitis: The following characteristics were recorded for appendicitis cases; Classification based on onset: acute or chronic This distinguishes between sudden-onset and long-standing appendicitis; Classification based on severity: complicated (e.g., perforated, gangrenous, abscess) vs. non-complicated This classification reflects the severity of the appendicitis and potential complications; Age distribution.

Prior to the commencement of data collection, ethical approval for the study protocol was obtained from the relevant hospital ethics committee. Hospital ethics committees are responsible for reviewing research proposals to ensure that they adhere to ethical principles and protect the rights and welfare of human subjects. To maintain patient confidentiality, all patient identifiers were removed during the data extraction process. This means that any information that could directly or indirectly identify a patient, such as names, identification numbers, or addresses, was not recorded. Records were anonymized using unique study codes. This process involves assigning a unique code to each patient's record, allowing for data analysis without revealing the patient's identity. The research adhered to the principles outlined in the Declaration of Helsinki. The Declaration of Helsinki is a statement of ethical principles for medical research involving human subjects, developed by the World Medical Association. Adherence to these principles ensures that the study was conducted in an ethical and responsible manner, respecting the rights and dignity of the patients involved.

The collected data were entered into a digital database. This likely involved using a software program designed for data management, such as Microsoft Access or a similar database application. The data were subsequently analyzed using IBM SPSS Statistics for Windows, Version 26.0 (Armonk, NY: IBM Corp). SPSS is a widely used statistical software package that allows for the analysis of data using various statistical techniques. Descriptive statistical methods were employed for data analysis. Descriptive statistics are used to summarize and describe the main features of a dataset. Categorical variables were described using frequencies and percentages. Categorical variables are those that can be classified into distinct categories, such as gender, type of hernia, or grade of hemorrhoid. Frequencies refer to the number of occurrences of each category, while percentages represent the proportion of occurrences relative to the total number of observations.

Continuous variables were described using mean and standard deviation. Continuous variables are those that can take on any value within a given range, such as age. The mean represents the average value of the variable, while the standard deviation measures the dispersion or variability of the data around the mean. Data were presented in tabular format. Tables were created using Microsoft Excel, a spreadsheet software program that allows for the organization and presentation of data in a clear and concise manner.

3. Results

Table 1 presents a summary of the participant demographics and the spectrum of digestive surgical cases managed at three Type D hospitals in Central and South Lampung. The table organizes data by "Surgical Condition" and includes the number of patients, percentage of the total cohort, the number and percentage of male and female patients, mean age with standard deviation, and the age range for each condition; Hernia: This was the most frequent surgical condition, with 274 patients, representing 35.45% of the total cases. There was a strong male predominance, with 264 male patients (96.4%) compared to only 10 female patients (3.6%). The mean age of hernia patients was 48.55 years, with an age range from 7 to 72 years; Hemorrhoids: The second most common condition, hemorrhoids, affected 148 patients (19.15% of the total). While still showing a male predominance, the gender distribution was more balanced than hernia, with 88 male patients (59.5%) and 60 female patients (40.5%). The mean age was 43.99 years, and the age range was 8 to 78 years; Appendicitis: Appendicitis accounted for 123 cases (15.91%). Interestingly, this condition showed a slight female predominance, with 66 female patients (53.7%) and 57 male patients (46.3%). The mean age of appendicitis patients was notably lower at 27.03 years, with an age range of 7 to 58 years; Peritonitis: Eighty-three patients (10.74%) were treated for peritonitis. The distribution showed a male predominance (59.0% male, 41.0% female), and the mean age was 49.81 years (range: 22-66 years); Obstructive Ileus: There were 68 cases of obstructive ileus (8.80%). The gender percentages for this condition are noted with an asterisk, indicating they are calculated based on n=68. The distribution was relatively balanced (47.1% male, 52.9% female), and the mean age was 45.22 years (range: 17-67 years); Cholelithiasis: Cholelithiasis affected 48 patients (6.21%). This condition showed a strong female predominance, with 39 female patients (81.2%) compared to 9 male patients (18.8%). The mean age was 36.88 years (range: 24-46 years); Abdominal Adhesion (Post-Gynecological Surgery): This condition affected 11 patients (1.42%) and was exclusively observed in female patients (100.0%). The mean age was 33.67 years (range: 27-40 years); Anal Fistula: There were 5 cases of anal fistula (0.64%), with a male predominance (80.0% male, 20.0% female). The mean age was 46.4 years (range: 27-56 years); Perianal Abscess: The least frequent condition, perianal abscess, occurred in 3 patients (0.38%). There was a female predominance (66.7% female, 33.3% male). The mean age was 30.0 years (range: 23-35 years).

Table 2 provides a comparative overview of the clinical characteristics of hernia, hemorrhoid, and appendicitis cases. It presents data for each condition across several key characteristics; Percentage of Total Cohort: Hernia cases constituted the largest proportion at 35.5%, followed by hemorrhoid cases at 19.2%, and appendicitis cases at 15.9%; Gender Distribution (%): Hernia cases showed a strong male predominance (96.4% male, 3.6% female). Hemorrhoid cases also showed a male predominance but were more balanced (59.5% male, 40.5% female). Appendicitis cases, in contrast, exhibited a slight female predominance (46.3% male, 53.7% female); Mean Age (Years ± SD): The mean age was highest for hernia cases (48.55 ± 15.87 years), followed by hemorrhoid cases (43.99 ± 13.30 years), and was lowest for appendicitis cases (27.03 ± 11.57 years); Age Range (Years): The age range was broadest for hemorrhoid cases (8-78 years), followed by hernia cases (7-72 years), and was slightly narrower for appendicitis cases (7-58 years); Peak Age Group (Years): The peak age group for hernia cases was 51-

60 years, for hemorrhoid cases was 41-50 years, and for appendicitis cases was 31-40 years; Predominant Type / Classification: The predominant type for hernia cases was inguinal hernia (82%), for hemorrhoid cases was internal hemorrhoid (86%), and for appendicitis cases was acute appendicitis (92%); Subtypes / Grades / Severity: Subtypes/grades/severity were not specified for hernia cases. For hemorrhoid cases, the internal hemorrhoids were further classified, with Grade III being the most common (45%), followed by Grade IV (29%) and Grade II (26%). For appendicitis cases, severity was categorized as complicated (53%) or non-complicated (47%); Most Common Surgical Procedure: The most common surgical procedure was specified only for hernia cases (herniorrhaphy, 89%) and appendicitis cases (appendectomy). The most common surgical procedure for hemorrhoid cases was not specified; Peak Incidence Period / Month: The peak incidence period for hernia cases was September 2024, for hemorrhoid cases was the first half of 2024, and no distinct peak was noted for appendicitis cases.

Table 1. Participant demographics and spectrum of digestive surgical cases managed at three type D Hospitals in Central and South Lampung.

Surgical condition	Number of patients (n)	Percentage of total cohort (%)	Male patients (n, %)	Female patients (n, %)	Mean age (Years ± SD)	Age range (Years)
Hernia	274	35.45%	264 (96.4%)	10 (3.6%)	48.55 ± 15.87	7 – 72
Hemorrhoids	148	19.15%	88 (59.5%)	60 (40.5%)	43.99 ± 13.30	8 – 78
Appendicitis	123	15.91%	57 (46.3%)	66 (53.7%)	27.03 ± 11.57	7 – 58
Peritonitis	83	10.74%	49 (59.0%)	34 (41.0%)	49.81 ± 10.26	22 – 66
Obstructive ileus	68	8.80%	32 (47.1%)	36 (52.9%)	45.22 ± 12.55	17 – 67
Cholelithiasis	48	6.21%	9 (18.8%)	39 (81.2%)	36.88 ± 5.90	24 – 46
Abdominal adhesion (Post-Gynecological Surgery)	11	1.42%	0 (0.0%)	11 (100.0%)	33.67 ± 5.05	27 – 40
Anal fistula	5	0.64%	4 (80.0%)	1 (20.0%)	46.4 ± 12.66	27 – 56
Perianal abscess	3	0.38%	1 (33.3%)	2 (66.7%)	30.0 ± 8.49	23 – 35
Total cohort	**773**	**100.0%**	**504 (65.2%)**	**269 (34.8%)**	N/A	N/A

Notes: SD = Standard Deviation. N/A = Not Applicable or Not Available; *Gender percentages are calculated based on n=68.

Table 2. Comparative clinical characteristics of hernia, hemorrhoid, and appendicitis cases.

Characteristic	Hernia cases (n=274)	Hemorrhoid cases (n=148)	Appendicitis cases (n=123)
Percentage of Total Cohort	35.5%	19.2%	15.9%
Gender Distribution (%)	Male: 96.4; Female: 3.6	Male: 59.5; Female: 40.5	Male: 46.3; Female: 53.7
Mean Age (Years ± SD)	48.55 ± 15.87	43.99 ± 13.30	27.03 ± 11.57
Age Range (Years)	7 – 72	8 – 78	7 – 58
Peak Age Group (Years)	51–60	41–50	31–40
Predominant Type / Classification	Inguinal Hernia(82%)	Internal Hemorrhoid (86%)	Acute Appendicitis (92%)
Subtypes / Grades / Severity	Not specified	Internal Grades: Grade III (45%), Grade IV (29%), Grade II (26%)	Severity: Complicated (53%), Non-comp. (47%)
Most Common Surgical Procedure	Herniorrhaphy(89%)	Not specified	Appendectomy
Peak Incidence Period / Month	September 2024	First half of 2024	No distinct peak noted

Notes: SD = Standard Deviation. Percentages related to subtypes/grades/severity are calculated based on the number of cases within that specific condition group. Non-comp. = Non-complicated.

4. Discussion

The study's identification of hernia as the most frequently encountered digestive surgical condition, accounting for over 35% of all operative cases, is a finding that aligns broadly with global surgical data. Hernia repair consistently ranks among the most commonly performed surgical procedures worldwide, reflecting the ubiquitous nature of this condition across diverse populations and healthcare systems. The fact that such a significant proportion of the surgical workload in these rural Indonesian hospitals is dedicated to hernia repair underscores the importance of having adequate resources and surgical expertise available to manage this prevalent condition effectively. This high prevalence also points to potential areas for public health intervention focused on prevention and early management to possibly reduce the number of cases requiring surgical intervention. Further research could explore the specific risk factors and lifestyle elements contributing to the high incidence of hernia in this population. This could lead to targeted preventative strategies. Furthermore, the study's detailed characterization of hernia cases reveals that inguinal hernia represents the majority, comprising 82% of all hernia cases within the study cohort. This finding is consistent with international patterns, where inguinal hernias are widely recognized as the most common type of abdominal wall hernia requiring surgical intervention. The inguinal canal, a natural passage in the abdominal wall, presents an inherent area of potential weakness. Understanding the anatomical factors contributing to inguinal hernia development is crucial for surgical planning and patient counseling. The study also observed a striking male predominance in hernia cases, with 96.35% of hernia patients being male. This pronounced gender disparity is strongly consistent with established literature on hernia epidemiology. Male gender is a well-recognized and significant risk factor for the development of inguinal hernias. Epidemiological studies have reported male-to-female ratios in inguinal hernia incidence reaching as high as 6:1 or even 9:1 in some populations, highlighting the substantial difference in susceptibility between genders. The estimated lifetime risk of developing an inguinal hernia is considerably higher for males than for females, with reported differences often cited around 27% for males compared to approximately 3% for females. This marked disparity is largely attributed to fundamental anatomical differences related to the descent of the testicles through the inguinal canal during fetal development. This process can leave a potential point of weakness or incomplete closure in the abdominal wall, predisposing males to a higher risk of hernia formation. Hormonal and connective tissue variations between genders may also play a role. In terms of age, the mean age of hernia patients in this study was 48.55 years, with the peak incidence observed in the 51-60 year age group. This age distribution aligns with the understanding that inguinal hernia occurrence often follows a bimodal pattern, with peaks observed in infancy and later adulthood. The finding in this study corresponds to the second peak, which is typically observed after the fourth decade of life. This later-onset peak is often attributed to the gradual weakening of tissues and the cumulative effects of wear and tear on the abdominal wall over time. Factors such as occupation, lifestyle, and other comorbid conditions can contribute to this age-related increase in hernia risk. While previous studies have indicated that hernia risk continues to increase significantly with advancing age, particularly beyond 75 years, the maximum age of hernia patients in this study cohort was 72 years. This observation could potentially reflect several factors specific to the population and healthcare context of this study. These factors might include referral patterns within the healthcare system, where older patients with more complex conditions might be referred to higher-level facilities. It could also reflect the average life expectancy in the region, which might influence the age distribution of patients presenting for surgical care. Additionally, it is possible that there are differences in the timing of presentation for surgery in this specific population compared to some Western cohorts, with patients in this study

seeking surgical intervention at a somewhat younger age. The study also revealed that herniorrhaphy, a tissue repair technique, was the predominant surgical procedure performed for hernia repair, accounting for 89% of cases. This is notable because, in contemporary surgical practice, hernioplasty, which involves the use of mesh to reinforce the weakened abdominal wall, is often considered the standard of care, particularly for inguinal hernias. The reasons behind the high rate of herniorrhaphy in this study setting could be multifactorial. It might reflect limitations in resources within these type D hospitals, such as the availability or affordability of mesh materials. Hernioplasty often requires specialized mesh products, which may not be readily accessible or financially feasible in resource-constrained settings. Surgeon preference and training may also play a significant role. Surgeons trained in older techniques may be more comfortable and proficient with herniorrhaphy. There might also be a lack of specialized training or expertise in more advanced mesh repair techniques. Furthermore, patient-specific factors, such as the size and complexity of the hernia, may influence the choice of surgical procedure. A thorough understanding of the factors influencing the choice between herniorrhaphy and hernioplasty in this context is essential for optimizing surgical care and improving patient outcomes. Future research could investigate the long-term outcomes and recurrence rates associated with each surgical technique in this population.[11-13]

Hemorrhoidal disease requiring surgical intervention was identified as the second most common condition in this study, highlighting its significant contribution to the surgical burden in these rural hospitals. Hemorrhoids are a common anorectal condition that can cause significant discomfort and affect patients' quality of life. The fact that a substantial number of patients required surgical intervention for hemorrhoids underscores the need for effective management strategies and access to appropriate surgical care in this setting. The study's finding of a slight male predominance (59% male) in hemorrhoid cases adds to the somewhat conflicting body of literature on gender prevalence in hemorrhoids. The epidemiology of hemorrhoids can be complex, and various studies have reported differing findings regarding gender distribution. Some population-based studies have suggested minimal gender differences in hemorrhoid prevalence, indicating that the condition affects men and women with roughly equal frequency. Other studies have even reported a slight female predominance, possibly linked to hormonal fluctuations and the physiological stresses of pregnancy and childbirth. In contrast, some studies, particularly those focusing specifically on patients undergoing surgical treatment for hemorrhoids or those conducted within specific populations, have reported higher rates of hemorrhoids in males, which aligns with the findings of this study. Several factors likely contribute to these varied reports on gender prevalence. These include differences in healthcare-seeking behavior between men and women, where one gender might be more likely to seek medical attention for hemorrhoidal symptoms. Variations in the prevalence of specific risk factors, such as chronic constipation or heavy lifting, between genders can also influence the observed gender distribution. Additionally, differences in study methodologies, including patient selection criteria and data collection methods, can contribute to inconsistencies in the literature. Further research is needed to fully elucidate the complex interplay of factors that influence gender prevalence in hemorrhoidal disease. The study also observed that internal hemorrhoids (86%) were far more common than external hemorrhoids in the surgical cohort. This finding is noteworthy because there is limited epidemiological data that directly compares the true prevalence of internal versus external hemorrhoid types in the general population. Some studies that have focused on symptomatic presentation, where patients report their symptoms to healthcare providers, have suggested that external hemorrhoids are more frequently reported by patients. This might be due to the fact that external hemorrhoids, being

located outside the anal canal, are more likely to cause noticeable symptoms such as pain, itching, and a palpable lump. However, it is crucial to consider that this study specifically included only patients who underwent surgical intervention for their hemorrhoids. This selection criterion can significantly influence the observed distribution of hemorrhoid types. It is plausible that higher grades of internal hemorrhoids, specifically Grade III and Grade IV, are more likely to lead to surgical referral compared to many cases of external hemorrhoids or lower-grade internal hemorrhoids. Internal hemorrhoids that are more severe often cause persistent symptoms such as prolapse (protrusion from the anal canal) and bleeding, which may be less responsive to conservative management and thus necessitate surgical intervention. In contrast, many cases of external hemorrhoids or lower-grade internal hemorrhoids might be effectively managed with conservative treatments, such as dietary modifications, topical medications, and lifestyle changes, without requiring surgery. Therefore, the predominance of internal hemorrhoids in this surgical cohort likely reflects the selection bias inherent in studying only surgically treated patients. The study further characterized the internal hemorrhoids, revealing that the most common grade necessitating surgery was Grade III (45%), followed by Grade IV (29%) and Grade II (26%). This distribution of hemorrhoid grades provides valuable insights into the severity of hemorrhoidal disease requiring surgical management in this population. The grading of internal hemorrhoids is a crucial aspect of clinical assessment, as it helps guide treatment decisions and predict patient outcomes. Grade III hemorrhoids are characterized by prolapse that occurs during defecation but requires manual reduction, while Grade IV hemorrhoids involve irreducible prolapse. The higher prevalence of Grade III and IV hemorrhoids in this surgical cohort suggests that patients in this setting may present with more advanced disease, potentially due to delays in seeking medical attention or limited access to early conservative management. Factors such as cultural attitudes towards seeking medical care for anorectal conditions, limited awareness of treatment options, and barriers to accessing healthcare services can contribute to delayed presentation and the progression of hemorrhoids to more severe stages. The study also examined the age distribution of patients undergoing surgery for hemorrhoids, finding that the age range was 11 to 67 years, with a mean age of 44.68 years, and the peak incidence occurring in the 41-50 year age group. This age profile aligns reasonably well with the established understanding that hemorrhoids are most prevalent in middle age. The incidence of hemorrhoids typically increases with age, peaking between 45 and 65 years, and often declining thereafter. Several factors contribute to the increased prevalence of hemorrhoids in middle age. These include the gradual weakening of supporting tissues in the anorectal region, chronic constipation, prolonged straining during bowel movements, and lifestyle factors such as sedentary behavior and a low-fiber diet. The decline in incidence after 65 years may be attributed to various factors, including changes in bowel habits, decreased physical activity, and potentially a higher threshold for seeking medical care in older individuals. However, it is important to note that the specific age distribution of hemorrhoids can vary across different populations and healthcare settings, influenced by factors such as genetics, lifestyle, and access to healthcare. The underlying etiology of hemorrhoids remains multifactorial and not fully elucidated. While several risk factors have been identified, the precise mechanisms by which these factors contribute to the development and progression of hemorrhoids are still under investigation. A deeper understanding of the pathophysiology of hemorrhoids is crucial for developing more effective prevention and treatment strategies. Future research could focus on exploring the genetic predisposition to hemorrhoids, the role of inflammation and vascular changes in their development, and the impact of lifestyle and dietary factors on their progression.[14-17]

Appendicitis was identified as the third leading cause for digestive surgery in the study population,

further emphasizing its clinical significance in this setting. Appendicitis, the inflammation of the appendix, is one of the most common surgical emergencies worldwide, and its management places a considerable burden on healthcare resources. Understanding the epidemiological characteristics of appendicitis in specific populations is essential for optimizing diagnostic and treatment pathways. Interestingly, this study observed a female predominance (53.66%) in appendicitis cases. This finding presents a contrast to several large-scale systematic reviews and global burden studies, which generally report a higher incidence of appendicitis, particularly complicated appendicitis (such as perforation), in males. The reasons for this observed male predominance in many global studies are not fully understood but may involve hormonal, immunological, or lifestyle factors. However, it is important to acknowledge that the epidemiology of appendicitis can vary across different populations and geographical regions. This study's finding of a female predominance is consistent with at least one other study conducted in a different region of Indonesia, specifically Papua, which also reported a greater prevalence of appendicitis among females. This suggests the possibility of regional variations in the epidemiology of appendicitis within Indonesia. Some studies have also noted age-specific variations in gender distribution, with males predominating overall but potential female peaks observed in certain age brackets, such as the 30-39 year age group. This observation is particularly relevant because it overlaps with the peak age group (31-40 years) identified in this study. The reasons for these potential regional or setting-specific variations in the gender distribution of appendicitis warrant further investigation. Several factors could contribute to these differences, including variations in healthcare access and seeking behavior between genders, potential differences in the timing of presentation with appendicitis symptoms, and variations in diagnostic pathways and criteria. It is also possible that there are underlying genetic or environmental factors that influence gender-specific susceptibility to appendicitis in certain populations. Further research is needed to explore these potential explanations and gain a more comprehensive understanding of the factors that contribute to gender differences in appendicitis incidence. The study also examined the age distribution of appendicitis patients, revealing that the mean age was 27.03 years, with the age range spanning from 7 to 58 years. This age profile aligns squarely within the typical age range cited for peak appendicitis incidence, which most commonly occurs between the ages of 5 and 45 years, with a particular concentration during adolescence and early adulthood. Appendicitis is a condition that affects individuals across a wide age spectrum, but it is particularly prevalent in younger populations. The reasons for this age-related susceptibility are not fully understood but may involve developmental factors, changes in the appendix's anatomy or function, or variations in immune responses. The study's finding that the most frequently affected age group was 31-40 years, followed closely by the 21-30 and 11-20 year age groups, further supports this pattern of appendicitis being a common concern in young adults. The study also characterized appendicitis cases based on their clinical presentation and operative findings. The overwhelming majority of cases were classified as acute appendicitis (92%), with chronic or recurrent appendicitis accounting for only a small proportion (8%). This finding is consistent with the general understanding of appendicitis as primarily an acute condition. Acute appendicitis is characterized by the sudden onset of abdominal pain and inflammation of the appendix, typically requiring prompt surgical intervention. Chronic appendicitis, on the other hand, is a less common and more controversial entity, with some debate about its distinct clinical features and diagnostic criteria. The study's low incidence of chronic appendicitis in the surgical cohort is expected, as this condition is often managed non-operatively or may be difficult to definitively diagnose. Furthermore, the study examined the severity of appendicitis cases at the time of surgery, revealing that approximately 53% of cases were classified as complicated

appendicitis, while 47% were classified as non-complicated. Complicated appendicitis is typically defined by the presence of findings such as perforation (rupture of the appendix), gangrene (tissue death), or abscess formation. These complications indicate a more severe and advanced stage of appendicitis, often associated with increased morbidity and a higher risk of postoperative complications. Non-complicated appendicitis, on the other hand, usually refers to simple phlegmonous inflammation of the appendix, without evidence of perforation or other severe complications. The study's finding that a significant proportion (53%) of appendicitis cases were classified as complicated might reflect several factors specific to the study setting. It is possible that there are delays in presentation or diagnosis of appendicitis in this rural population, potentially leading to a higher rate of progression to perforation or abscess formation by the time surgery occurs. Factors such as limited access to healthcare facilities, lack of awareness of appendicitis symptoms, or delays in seeking medical attention can contribute to these delays in diagnosis and treatment. However, it is important to acknowledge that this is a preliminary observation, and further comparative data from similar settings are needed to confirm this hypothesis. It would be valuable for future research to explore the factors contributing to the higher rate of complicated appendicitis in this population, such as time to presentation, diagnostic accuracy, and access to timely surgical intervention.[18-20]

5. Conclusion

In conclusion, this study provides valuable insights into the spectrum of digestive surgical conditions encountered in rural type D hospitals within the Lampung province of Indonesia. The findings highlight that hernia, hemorrhoids, and appendicitis constitute the primary surgical workload in these limited-resource settings. Hernia emerged as the most frequent condition, with a strong male predominance, and inguinal hernia being the most common type. The predominance of herniorrhaphy as the surgical procedure for hernia repair suggests potential resource limitations or variations in surgical practice compared to contemporary standards. Hemorrhoids represented the second most common surgical condition, with a notable proportion of Grade III and IV internal hemorrhoids, indicating that patients often present with advanced disease. Appendicitis was the third most frequent cause of digestive surgery, with an interesting observation of female predominance, contrasting with some global reports. These findings underscore the specific surgical needs within these rural healthcare settings and emphasize the importance of understanding local epidemiological patterns for effective healthcare planning and resource allocation. The study also highlights the need for further research, including comprehensive, nationwide studies encompassing diverse hospital types and non-operative cases, to provide a more complete picture of the digestive surgical burden in Indonesia and inform evidence-based health policy.

6. References

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