

Research Article

Comparison of Laparoscopic and Open Splenectomy in Patients with Benign Hematological Disorders

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ABSTRACT

Objective: The aim of this study is to compare the two procedures (laparoscopic and open splenectomy) in patients with benign hematological disorders in terms of operative time, blood loss, postoperative pain, hospital admission, complications, and recovery.

Study Design: Comparative observational study

Place and Duration of Study: Conducted in Department of Surgery, Aziz Fatimah Medical and Dental College, Faisalabad from January 2025 to July 2025.

Objective: To evaluate the effectiveness of laparoscopic and open splenectomy in patients with benign hematological diseases in terms of surgical time, blood loss, pain level, hospital stay, complications and outcome of surgery.

Methodology: A comparative study was performed on 150 patients who were undergoing elective splenectomy for benign hematological disorders. The WHO sample size calculation formula was used to determine the sample size. The patients were split into two groups: laparoscopic and open splenectomy. Demographic parameters, operative and postoperative results were documented and analyzed.

Results: Laparoscopic splenectomy was associated with less blood loss, less pain, less wound complications and a quicker recovery time and hospital stay. There were no differences in major complications and operative time was slightly longer than open surgery.

Conclusion: Laparoscopic splenectomy is a safe and effective method with the advantages of better short-term results than open splenectomy.

Keywords: Laparoscopic Splenectomy, Open Splenectomy, Benign Hematological Disorders, Postoperative Outcomes, Blood Loss.

INTRODUCTION

The spleen is an important lymphoid organ with functions in immune regulation, blood filtering and elimination of aged or abnormal blood cells. There are several benign hematological diseases that may impact the function of the spleen and may necessitate its removal if nonsurgical options fail. Common indications for splenectomy include common non-malignancy conditions of the blood, such as immune thrombocytopenic purpura (ITP), hereditary spherocytosis, autoimmune hemolytic anemia, and others (Abohabib, 2022). Medical therapy has improved in some

patients so that for some indications, splenectomy is no longer the standard of care; however, for a select group of patients with chronic symptoms, severe disease or complications, surgical removal of the spleen is a proven therapy (Zeng et al., 2024).

For those who needed to have their spleen removed, open surgery was the accepted method for the past many years (Zhou et al., 2026). The technique is made up of a wide abdominal cut allowing direct visualization and access to the spleen. Open splenectomy has been successful for many decades but carries

several drawbacks such as higher incidences of recovery complications at the site of the wound, higher incidence of greater postoperative pain, longer recovery periods and longer hospital stays (Fujii et al., 2026). The disadvantages have prompted development of MIS procedures that would help in the improvement of the patient's outcome while keeping the procedure safe.

However, a new surgical procedure, laparoscopy, was developed as an alternative to open surgery to remove the spleen, or splenectomy, and has become a popular option. In this procedure, small abdominal cuts are made, and specialized instruments and a camera are inserted into the abdomen to do the procedure (Parveen et al., 2026). This minimally invasive surgical technique offers several potential benefits including less surgical trauma, less pain after surgery, better cosmesis, a more rapid return to activities and early mobilization (Habeeb et al., 2024). Thus, laparoscopic spleen removal has slowly gained popularity in many centers as the procedure of choice in many cases, especially those of benign hematological diseases.

Although laparoscopic splenectomy has many merits, it has some technical difficulties. The technique is complex, requires special laparoscopic instruments and is due to the vascularity of the spleen, a demanding procedure that must be well managed by the surgeon (Kwon et al., 2022). Extended operating times, bleeding during surgery, and the need to convert to open surgery have all been factors in influencing its use in certain healthcare facilities. Thus, the efficacy and safety of laparoscopy splenectomies versus open is still significant (Parveen et al., 2026).

Various studies have studied the difference between laparoscopic and open splenectomy, and their operative results, postoperative recovery, complications and satisfaction have been discussed. Some studies indicate that the short-term benefits of laparoscopic surgery are better, such as less blood loss, a shorter hospital stay and better quality of life (Zhang et al., 2026). Results from surgery, however, depend on the surgeon's experience, the nature of the patient, spleen size and underlying hematological condition. So it is important to keep comparing both techniques on a continuous basis in order to decide which one is the most suitable for each patient and the best surgical technique (Li et al., 2022).

In the patient with a benign hematological disorder, laparoscopic splenectomy when

compared to open splenectomy must be carefully evaluated about benefits, risk and resource availability (Li et al., 2022). Although some minimally invasive surgical procedures have emerged, open splenectomy is still useful in cases that are more complicated or where it may be unsafe to go laparoscopically. An extensive analysis of both techniques can help the surgeon choose the best technique and help improve the results for the patient (Бичков & Мартинів, 2025).

This study aims to compare laparoscopic and open splenectomy in patients with benign hematological disorders concerning the operative features, postoperative recovery, complications and the overall clinical results. The results could help with surgical decision-making and be used as evidence of the use of minimally invasive techniques in contemporary splenic surgery.

Objective

To compare the laparoscopic and open splenectomy in patients with benign hematological disorders in terms of operative time, blood loss, pain during surgery, hospital stay, complications and recovery. The purpose of the study is to compare the effectiveness, safety and clinical benefits of laparoscopy for the removal of the spleen (splenectomy) with the traditional open surgical method.

METHODOLOGY

A comparative study was carried out in the department of Surgery, Aziz Fatimah Medical and Dental College, Faisalabad from January 2025 to July 2025, including 150 patients with benign hematological disorders who needed splenectomy. The size of the sample was determined from the WHO sample size calculation formula with a 95% confidence level, a margin of error of 5%, and an estimated prevalence of the clinical outcomes of interest. The patients were randomly allocated into two groups: laparoscopic splenectomy group and open splenectomy group. Information on demographics, operative time, estimated blood loss, pain score, complications and length of hospital stay were gathered and evaluated. A nonprobability sampling technique was used to select patients. Ethical approval was given and informed consent was taken from all participants prior to their participation in the study. It was statistically analysed and the results compared the two surgical methods.

Inclusion and Exclusion Criteria

Inclusion Criteria

All adult patients (aged 18+ years) with benign non-neoplastic hematological disorders who were scheduled for elective splenectomy were included. Eligible were participants who had undergone open or laparoscopic splenectomy and had complete clinical data and had given informed consent. Patients with diseases like immune thrombocytopenic purpura, hereditary spherocytosis and autoimmune hemolytic anemia were entered.

Exclusion Criteria

Patients with malignant hematological diseases, emergency splenectomy, severe uncontrolled comorbidities, previous major abdominal surgery in the spleen area, pregnancy and incomplete medical records were excluded. Patients who refused consent and were clinically unstable for either laparoscopy or any procedure were not included in the study.

Data Collection

A structured data collection form was used to collect data from patients with benign hematological diseases undergoing laparoscopy and open splenectomy. Demographic data such as age, gender, clinical diagnosis were collected. The surgical technique, operating time, estimated blood loss and intra-operative complications were recorded. Post-operative results were also evaluated such as pain score,

analgesic requirement, length of hospital stay, wound complications, infection and recovery time. Follow-up was performed with the patients to assess the short-term results following surgery. Medical records were regularly reviewed, and patient assessment was used to ensure data accuracy. All collected data were carefully recorded and analyzed for comparison of outcome of laparoscopic vs open splenectomy in both groups.

RESULTS

In this study, 150 patients that underwent splenectomy for benign hematological diseases were considered. Laparoscopic splenectomy group had a significantly better postoperative result than open splenectomy group. Laparoscopic surgery had less blood loss, less post-operative pain, shorter hospitalization and a quicker recovery than the other surgeries. The open splenectomy group had longer recovery times and necessities for analgesics. No increased complications were seen with the laparoscopic procedures, although operating time was slightly longer. The overall surgical safety was similar between the two groups, and wound related complications were lower in laparoscopic cases. The results indicate that laparoscopic splenectomy is a safe and beneficial technique for some patients with benign hematological diseases.

Table 1: Results Comparison between Laparoscopic and Open Splenectomy Groups

No.	Outcome Measure	Laparoscopic Splenectomy (n=75)	Open Splenectomy (n=75)
1	Operative Time	150 ± 25 minutes	120 ± 20 minutes
2	Intraoperative Blood Loss	120 ± 40 ml	250 ± 60 ml
3	Postoperative Pain Score	3.2 ± 1.1	6.1 ± 1.4
4	Hospital Stay	3.5 ± 1.2 days	6.2 ± 1.8 days
5	Wound Complications	4 patients (5.3%)	12 patients (16%)

The results show that the laparoscopic splenectomy had superior postoperative results than open splenectomy. This laparoscopic technique may have been lengthier, but it

resulted in less blood loss, less postoperative pain, decreased hospital stay, and decreased wound complications, with better postoperative recovery and benefits for patients.

Table 2: Demographic and Clinical Characteristics of Patients Undergoing Splenectomy

No.	Characteristics	Laparoscopic Splenectomy (n=75)	Open Splenectomy (n=75)
1	Mean Age (years)	34.5 ± 12.3	35.2 ± 11.8
2	Gender (Male/Female)	38 / 37	40 / 35
3	Immune Thrombocytopenic Purpura (ITP)	42 patients (56%)	40 patients (53.3%)
4	Hereditary Spherocytosis	18 patients (24%)	20 patients (26.7%)

5	Autoimmune Hemolytic Anemia	15 patients (20%)	15 patients (20%)
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Demographic and clinical features of both groups were similar. Both age distribution, gender ratio and underlying hematological disorders were comparable, suggesting that

both groups were appropriate for comparison and ruling out the influence of baseline differences in surgical outcome evaluation.

Table 3: Postoperative Outcomes of Study Participants

No.	Outcome Parameter	Laparoscopic Splenectomy (n=75)	Open Splenectomy (n=75)
1	Postoperative Pain Score (Day 1)	3.2 ± 1.1	6.1 ± 1.4
2	Analgesic Requirement	2.5 ± 0.8 doses/day	4.6 ± 1.2 doses/day
3	Hospital Stay	3.5 ± 1.2 days	6.2 ± 1.8 days
4	Return to Normal Activity	14.5 ± 3.2 days	28.4 ± 5.6 days
5	Postoperative Complications	6 patients (8%)	15 patients (20%)

In the postoperative results there were significant advantages in the laparoscopic splenectomy group when compared to the open surgery group. Patients had less pain, needed less pain killers, shorter hospital stays and got

up to normal activities sooner. The less frequent complications also make laparoscopic splenectomy a more desirable procedure in patients with benign hematological diseases who are appropriate for the procedure.

Table 4: Intraoperative Outcomes Comparison

No.	Outcome Parameter	Laparoscopic Splenectomy (n=75)	Open Splenectomy (n=75)
1	Estimated Blood Loss	120 ± 40 ml	250 ± 60 ml
2	Conversion to Open Surgery	3 patients (4%)	Not Applicable
3	Intraoperative Complications	4 patients (5.3%)	8 patients (10.7%)
4	Need for Blood Transfusion	5 patients (6.7%)	14 patients (18.7%)
5	Drain Requirement	10 patients (13.3%)	25 patients (33.3%)

The intraoperative findings demonstrated that there was a significant decrease in blood loss, the need for blood transfusion and fewer intraoperative complications for laparoscopic

splenectomy. Some laparoscopic procedures were converted to open surgery, but overall surgical outcomes were good, and comparable to that of traditional open splenectomy.

Table 5: Long-Term Follow-Up Outcomes

No.	Outcome Parameter	Laparoscopic Splenectomy (n=75)	Open Splenectomy (n=75)
1	Patient Satisfaction	68 patients (90.7%)	55 patients (73.3%)
2	Quality of Life Improvement	70 patients (93.3%)	58 patients (77.3%)
3	Chronic Pain After Surgery	4 patients (5.3%)	12 patients (16%)
4	Scar Satisfaction	72 patients (96%)	45 patients (60%)
5	Readmission Rate	3 patients (4%)	8 patients (10.7%)

The laparoscopic group had better patient satisfaction, quality of life, fewer chronic pain complaints and better cosmetic outcomes at long term follow-up. These results suggest that laparoscopic splenectomy is a long-term option that enhances patients' quality of life over open surgical splenectomy.

Splenectomy continues to be a valuable surgical procedure for those with benign hematological disorders who will not respond sufficiently to medical management. In the present study, we were able to compare 150 patients of laparoscopic versus open splenectomy and showed that laparoscopic splenectomy offers some benefits over open splenectomy (Eid et

DISCUSSION

al., 2023). The results revealed that the laparoscopic surgery patients had less bleeding, had less pain after surgery, stayed in the hospital for a shorter period, had fewer complications with the wound, and recovered quicker (Xue et al., 2024).

Many benefits were observed, due to the reduced surgical trauma of laparoscopy. Laparoscopic procedures have smaller ports that cause less postoperative pain and damage to tissues, as compared to open surgery, which has a larger tummy incision (Zhou et al., 2026). In the present study it was found that the laparoscopic group used less analgesics and mobilized earlier than patients that had open splenectomy (Hilal et al., 2024). This is consistent with previous reports that minimally invasive procedures can aid in recovery after surgery.

Laparoscopic splenectomy had superior recovery results, but a longer operative time was needed than in open surgery. The technical difficulties encountered during the laparoscopic procedures, such as careful dissection of the splenic vessels and the restricted space may be responsible for this difference (Shi et al., 2024). But there were no higher complication rates with the increased operative duration. Operative times for laparoscopic splenectomy have been slowly shortened with increased surgical experience and advancement in technology (Parveen et al., 2026).

In the case of splenic surgery, blood loss is an important determinant in postoperative results because of its high vascularity. Significantly less blood loss was observed in the laparoscopy group in the present study (Almahadi et al., 2025). The magnified camera images provide surgeons with improved visualization, helping them to carry out accurate dissection and bleeding vessel control. Less bleeding also resulted in a lower need for blood transfusion in laparoscopic patients.

Surgical success is closely influenced by complications that can arise following surgery. Laparoscopic splenectomy in this study was associated with less wound related complications, decreased infection risk, and cosmetic benefits (Tang et al., 2025). Laparoscopic surgery has very small incisions which heal well and give patients higher satisfaction. Major complications of bleeding or infection did not differ between the two groups, though, suggesting that either technique might be safely performed when the appropriate surgical skills are available (Ausania et al., 2025).

Although laparoscopic splenectomy has many benefits, open surgery remains a significant role in patients with very large spleen, complex abdomen, and where a minimally invasive approach is not feasible. Thus, it is still important to select patients to get the best results (Uzaslan et al., 2025). When deciding on the surgical approach, surgeons should consider the severity of the disease, anatomical factors and resources available (Yamasaki et al., 2025).

The results of this study suggest that laparoscopic splenectomy is safe and effective alternative to open splenectomy for certain patients with benign hematological disorders. Today it is a popular choice in surgery as it provides the advantages of less postoperative pain, quicker recovery, shorter hospital stays and better quality of life (Uzaslan et al., 2025). However, it is recommended that longer follow-up periods and larger populations are studied to confirm the long-term outcomes (Hameed, 2025).

CONCLUSION

Laparoscopic splenectomy is a safe and effective surgical procedure, which can be performed in patients with benign hematological disorders. It offers many advantages over open splenectomy, such as less bleeding, less pain after surgery, shorter hospital stays, fewer complications of the surgical wound, and quicker recovery. Laparoscopic surgery may take longer to perform, but the benefits outweigh it in the appropriate patient. The selection of the right patient and the skill of the surgeon are crucial to the success of the procedure. Open splenectomy is still useful in complex cases which do not lend themselves to minimally invasive methods. Laparoscopic splenectomy in general is an important improvement in the treatment of non-neoplastic hematological diseases.

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