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Short- and Long-Term Outcomes of Laparoscopic and Open Resection in the Surgical Treatment of Dolichosigmoid

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Abstract; Dolichosigmoid is a congenital or acquired anatomical abnormality characterized by elongation, dilatation, and excessive looping of the sigmoid colon. It is one of the major causes of chronic constipation (coprostasis), abdominal pain, intestinal obstruction, and sigmoid volvulus. When conservative treatment fails, surgical resection of the sigmoid colon, and in selected cases left hemicolectomy or subtotal colectomy, is considered the most effective therapeutic option. This article presents a review of open-access scientific publications published between 2002 and 2026, comparing the short- and long-term outcomes of conventional open surgery, laparoscopic resection, robot-assisted surgery, single-incision laparoscopic surgery (SILS), and transvaginal hybrid Natural Orifice Transluminal Endoscopic Surgery (NOTES) in the treatment of dolichosigmoid and related sigmoid colon disorders. The analysis focused on operative time, intraoperative blood loss, length of hospital stay, postoperative complication rates, readmission, long-term functional and oncological outcomes, and economic considerations. The findings indicate that minimally invasive techniques, particularly laparoscopic resection, provide significant advantages over open surgery by reducing postoperative recovery time, shortening hospitalization, and decreasing complication rates. However, each surgical approach has specific technical requirements, a distinct learning curve, and economic implications that should be carefully considered when selecting the optimal surgical strategy for individual patients.

Keywords: dolichosigmoid, dolichocolon, chronic constipation, coprostasis, sigmoid colon resection, colectomy, laparoscopic surgery, open surgery, robot-assisted surgery, single-incision laparoscopic surgery (SILS), Natural Orifice Transluminal Endoscopic Surgery (NOTES), short-term outcomes, long-term outcomes

Introduction

Dolichosigmoid is a condition characterized by abnormal elongation of the sigmoid colon, often accompanied by dilatation and the formation of additional loops. It may be either congenital, resulting from abnormalities during embryonic development, or acquired as a consequence of chronic coprosthesis and age-related degenerative changes. Clinically, dolichosigmoid presents with chronic constipation, abdominal bloating, lower abdominal pain, and, in severe cases, partial or complete intestinal obstruction and sigmoid volvulus. In children, it is considered one of the most common anatomical causes of chronic constipation, whereas in adults it is an important predisposing factor for intestinal obstruction and volvulus, particularly in elderly patients[1].

Conservative management, including dietary modification, laxative therapy, physiotherapy, and bowel cleansing regimens, provides temporary symptom relief in many patients. However, in cases of recurrent disease or complications such as sigmoid volvulus, intestinal obstruction, or decompensated megacolon, surgical intervention remains the only definitive treatment. For several decades, open sigmoid colon resection performed through laparotomy has been regarded as the gold standard surgical procedure. Since the early 1990s, the introduction of laparoscopic techniques into colorectal surgery, followed by the development of robot-assisted surgical systems in the mid-2000s and, more recently, single-incision laparoscopic surgery (SILS) and Natural Orifice Transluminal Endoscopic Surgery (NOTES), has significantly transformed the surgical management of sigmoid colon disorders, including dolichosigmoid[2].

Nevertheless, most of the published literature on dolichosigmoid consists of individual case reports, case series, or studies conducted within the broader context of sigmoid colon diseases, such as diverticular disease and colorectal cancer. Large-scale randomized controlled trials directly comparing laparoscopic and open resection specifically for the treatment of dolichosigmoid remain scarce. Therefore, the aim of this study is to systematically review the available open-access literature and to comparatively evaluate the short- and long-term outcomes of the surgical approaches used in the treatment of dolichosigmoid and related sigmoid colon disorders[3].

The principles of treating chronic constipation associated with dolichosigmoid in children were analyzed by F. A. Khurramov and N. X. Kuraqboeva, who proposed a stepwise approach to conservative management and an algorithm for transitioning to surgical treatment when conservative therapy proves ineffective.

The outcomes of surgical treatment for Payr syndrome (a combination of colonic ptosis at the splenic flexure and dolichosigmoid) in children were discussed in a study published in a national scientific journal. The authors concluded that early surgical intervention provides more favorable clinical outcomes than delayed treatment and emphasized the advantages of timely operative management[4].

The terms dolichosigmoid and dolichocolon are often used interchangeably because of their close anatomical and clinical relationship. A case series published in the *EC Gastroenterology and Digestive System* journal demonstrated that laparoscopic resection achieved favorable and sustained clinical outcomes in patients with severe chronic constipation who were unresponsive to conservative treatment. A systematic review published in 2025 on dolichocolon highlighted that this condition is frequently underdiagnosed, has diverse clinical manifestations, and lacks standardized treatment strategies. Furthermore, a case report published in the *Journal of Surgical Case Reports* showed that dolichocolon may mimic the clinical presentation of acute appendicitis, emphasizing the importance of accurate differential diagnosis. In addition, the HCA Healthcare Scholarly Commons platform provides a comprehensive overview of the diagnostic criteria for dolichocolon[5].

A considerably larger body of research has compared laparoscopic and open resection in the management of sigmoid colon diseases in general, providing an important methodological foundation for the surgical treatment of dolichosigmoid. A published study on laparoscopic sigmoid colectomy for chronic diverticular disease demonstrated that this approach was associated with faster postoperative recovery and a lower rate of complications. In a retrospective study involving 211 patients that compared open, laparoscopic, and robot-assisted left colectomy, both laparoscopic and robot-assisted techniques improved short-term outcomes while maintaining oncological radicality. Similarly, a single-center retrospective study comparing robot-assisted and laparoscopic surgery for sigmoid colon and

rectal cancer found that both approaches achieved comparable long-term survival outcomes.

From an economic perspective, an analysis based on the United States Healthcare Cost and Utilization Project (HCUP) database demonstrated that robot-assisted sigmoid colectomy is associated with higher healthcare costs than laparoscopic surgery, although the clinical outcomes of the two approaches are comparable. A single-center study comparing robot-assisted and conventional laparoscopic sigmoid colectomy for diverticular disease found no significant differences in operative trauma between the two techniques; however, the robot-assisted approach incurred substantially higher costs. Furthermore, a comparative study of transvaginal hybrid Natural Orifice Transluminal Endoscopic Surgery (NOTES) and conventional laparoscopic sigmoid resection reported lower postoperative pain and superior cosmetic outcomes in the NOTES group, although the clinical application of this technique remains limited[6].

Thus, the literature review indicates a clear and continuing trend toward the adoption of minimally invasive surgical techniques in the management of sigmoid colon disorders, including dolichosigmoid. However, large-scale, multicenter comparative studies with long-term follow-up specifically focused on dolichosigmoid remain limited. Consequently, the currently available evidence from general colorectal surgery must be interpreted with caution and carefully extrapolated when applied to the surgical management of dolichosigmoid[7].

Materials and Methods

This study was conducted using a narrative review methodology. Scientific publications were identified through searches of PubMed/MEDLINE, PubMed Central (PMC), Google Scholar, ScienceDirect, and other open-access scientific databases covering the period from 2002 to 2026. Studies reporting the clinical outcomes of laparoscopic and open resection for dolichosigmoid and related sigmoid colon disorders were selected for analysis. The selected publications were comparatively evaluated with respect to operative time, intraoperative blood loss, length of hospital stay, postoperative complications, and long-term clinical outcomes.

Results and Discussion

A large retrospective study conducted at academic medical centers involving patients who underwent sigmoid colectomy for benign and malignant diseases demonstrated significant advantages of the laparoscopic approach over open surgery. The laparoscopic group had a significantly shorter hospital stay (5.4 vs. 7.4 days), a lower overall complication rate (19.7% vs. 26.0%), a reduced 30-day readmission rate (3.4% vs. 4.6%), and lower hospitalization costs[8].

A population-based study including 13,683 patients, based on data from the Swedish Colorectal Cancer Registry and the National Patient Registry, evaluated patients who underwent elective surgery for right-sided and sigmoid colon cancer. The 30-day postoperative mortality rate was 0.9% in the laparoscopic group and 1.3% in the open surgery group (OR 0.89, 95% CI 0.62–1.29; $P = 0.545$). However, the 90-day mortality rate was significantly higher in the open surgery group ($P < 0.001$)[9].

A study comparing the outcomes of 1,197 open and 814 laparoscopic colorectal cancer resections demonstrated that the laparoscopic group experienced significantly lower intraoperative blood loss, fewer postoperative complications, lower postoperative mortality, and a shorter length of hospital stay. In particular, cardiovascular complications, pulmonary complications, and postoperative ileus were reported significantly less frequently in the laparoscopic group. Similarly, the multicenter COLOR (Colon cancer Laparoscopic or Open Resection) randomized controlled trial, which included 627 patients in the laparoscopic group and 621 patients in the open surgery group, reported a median intraoperative blood loss of 100 mL (range, 0–2700 mL) in the laparoscopic group compared with 175 mL in the open surgery group[10].

A Cochrane systematic review comparing laparoscopic and open resection for acute sigmoid diverticulitis associated with diverticular disease included three randomized controlled trials involving 392 participants. The review found no statistically significant differences between the two approaches in terms of 30-day mortality, overall and major postoperative complications, time to resumption of oral intake, or reoperation rates due to anastomotic leakage. However, one of the included studies reported that quality of life, assessed using the SF-36 questionnaire six weeks after surgery, was significantly better in the laparoscopic group. These findings also suggest that, in the surgical management of

dolichosigmoid, the choice of operative technique should be individualized according to patient characteristics and clinical circumstances[11-12].

Table 1. Comparative Short-Term Outcomes of Laparoscopic and Open Resection of the Sigmoid Colon

Parameter	Laparoscopic Approach	Open Approach
Length of hospital stay	5.4 days	7.4 days
Overall complication rate	19.7%	26.0%
30-day readmission rate	3.4%	4.6%
Treatment cost	USD 13,814	USD 15,626
30-day mortality (population-based study, n = 13,683)	0.9%	1.3%
Median intraoperative blood loss (COLOR randomized controlled trial)	100 mL	175 mL
Cardiopulmonary complications and postoperative ileus	Significantly lower	Relatively higher

A single-center study involving more than 100 patients with over 10 years of follow-up compared the long-term oncological outcomes of laparoscopic and open surgery for middle and lower rectal cancer. The results demonstrated that both surgical approaches provided equally satisfactory long-term oncological outcomes, while confirming the technical feasibility and safety of laparoscopic surgery[13]. A similar finding was reported in a propensity score-matched study comparing laparoscopic and open resection for gastric gastrointestinal stromal tumors (GISTs). After matching, the 5-year overall survival rate was 93.1% in the laparoscopic group and 91.9% in the open surgery group, with no statistically significant difference ($P = 0.69$). However, the incidence of postoperative complications was significantly lower in the laparoscopic group (5.6% vs. 22.5%; $P = 0.004$). Although these studies were not conducted specifically in patients with dolichosigmoid, they provide important methodological evidence supporting the long-term safety and oncological equivalence of minimally invasive resection techniques[14].

Studies conducted by Uzbek researchers on the long-term functional outcomes of dolichosigmoid surgery have primarily focused on the regression of chronic constipation symptoms, restoration of normal bowel function, and improvement in patients' quality of life after surgery. Patients who underwent laparoscopic resection demonstrated earlier postoperative mobilization and a faster recovery of gastrointestinal function. In addition, a study on children with Payr syndrome reported that patients who received early surgical intervention had a lower long-term recurrence rate than those whose treatment was delayed[15].

A single-center study from China comparing robot-assisted and laparoscopic surgery for sigmoid colon and rectal cancer in 109 patients found no significant differences in long-term survival outcomes between the two groups. However, the robot-assisted approach provided better operative visualization and greater precision in the dissection of delicate anatomical structures, highlighting its technical advantages despite comparable long-term clinical outcomes.

Table 2. Comparative Characteristics of Different Surgical Approaches

Surgical Approach	Main Advantages	Limitations
Open Surgery	Wide operative field, technical simplicity, reliable in complex cases	Longer recovery, higher risk of postoperative complications and wound infection
Laparoscopic Resection	Shorter hospital stay, reduced blood loss, faster postoperative recovery	Steep learning curve, technical difficulty in patients with extensive adhesions
Robot-Assisted Surgery	High precision, ergonomic advantages, superior fine tissue dissection	Higher cost, longer operative time
Single-Incision Laparoscopic Surgery (SILS)	Better cosmetic outcome, minimal scarring	Technical complexity, limited clinical applicability
Hybrid Natural Orifice Transluminal Endoscopic Surgery (Hybrid-NOTES)	Minimal external incision, reduced postoperative pain	Limited clinical experience, available only in specialized centers

Unlike other sigmoid colon disorders, determining the extent of bowel resection in dolichosigmoid surgery requires careful assessment of the length of the sigmoid colon, the degree of redundancy and torsion, and the condition of the mesosigmoid. These anatomical factors may complicate intraoperative orientation during laparoscopic surgery. Therefore, Kodirov Sh. N. and colleagues emphasized in their review that the surgeon's experience and the case volume of the medical center are critical determinants of successful surgical outcomes in the treatment of dolichosigmoid. Furthermore, a systematic review of single-incision laparoscopic surgery in pediatric practice concluded that this technique is safe and effective for the treatment of pediatric dolichosigmoid and other colorectal disorders. However, the authors also highlighted the need for large-scale randomized controlled trials to further validate its long-term efficacy and safety[16].

Overall, the findings of the present review indicate that laparoscopic resection offers clear short-term advantages over open surgery in the treatment of dolichosigmoid, including a shorter hospital stay, reduced intraoperative blood loss, fewer postoperative complications, and faster postoperative recovery. Regarding long-term outcomes, including the resolution of chronic constipation and improvement in quality of life, both surgical approaches provide satisfactory results. However, in complicated cases, such as sigmoid volvulus, extensive intra-abdominal adhesions, or decompensated megacolon, open surgery continues to play an important role in ensuring safe and effective surgical management[17-19].

Conclusion

The literature review demonstrated that laparoscopic resection provides significant advantages over open surgery in the surgical treatment of dolichosigmoid with respect to short-term outcomes, including a shorter length of hospital stay, reduced intraoperative blood loss, lower postoperative complication rates, and faster recovery. In terms of long-term functional outcomes and, where applicable, oncological outcomes, no statistically significant differences have been identified between the two approaches in most studies, confirming the safety and effectiveness of laparoscopic resection.

Nevertheless, the lack of large-scale, multicenter randomized controlled trials with long-term follow-up specifically addressing dolichosigmoid remains a major limitation. Current studies conducted in Uzbekistan, including those carried out at the Andijan State Medical Institute and other medical institutions, contribute to narrowing this knowledge gap. However, there remains a need to establish national multicenter registries and standardized clinical protocols to strengthen the evidence base and optimize surgical management.

From a practical perspective, the choice of surgical approach should be individualized according to the patient's overall clinical condition, the severity and complexity of the disease, the surgeon's experience, and the technical resources available at the treating institution. In uncomplicated

cases, laparoscopic resection should be considered the preferred first-line surgical approach when appropriate expertise and equipment are available. In contrast, for complicated or advanced cases, including volvulus, extensive adhesions, or decompensated megacolon, open surgery or conversion to an open procedure remains the safest strategy for achieving optimal clinical outcomes.

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