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Oncological Adequacy of Emergency Hartmann Procedure for Obstructing Sigmoid Colon Cancer

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Abstract

Obstructing sigmoid colon cancer may require emergency surgery, and oncological quality remains important even when immediate relief of obstruction is the primary goal. This study evaluated the oncological adequacy of emergency Hartmann procedure using lymph node yield (LNY) and resection-margin status. This retrospective descriptive observational study included patients with obstructing sigmoid colon cancer who underwent emergency Hartmann procedure during 2023-2025 at a tertiary referral hospital in Medan, Indonesia. Medical records and histopathology reports were analyzed descriptively. Thirty-seven patients met the criteria. Mean age was 53.84 ± 12.46 years and 51.4% were male. LNY ranged from 2 to 5 nodes, with a mean of 3.62 ± 1.04 and median of 4; all patients had LNY <12. Nine patients (24.3%) had at least one positive node. R0 margins were reported in 35 patients (94.6%), whereas 2 patients (5.4%) had non-clear margins. These findings show discordance between a high rate of margin clearance and uniformly inadequate nodal evaluation, supporting stronger standardization of oncological resection, specimen handling, and pathological assessment.

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Introduction

Colorectal cancer is a major global malignancy and remains an important cause of cancer-related death. Global estimates place colorectal cancer among the most frequently diagnosed cancers worldwide, while Indonesian data also demonstrate a substantial burden and a notable proportion of distal colon and rectal disease (Puspitaningtyas et al., 2024; Sung et al., 2021). A clinically important subset of patients first presents with acute large-bowel obstruction, creating an immediate need for decompression or resection in a physiologically compromised setting.

For obstructing left-sided or sigmoid colon cancer, emergency surgical options include resection with primary anastomosis, diversion, stenting as a bridge to surgery in selected settings, and Hartmann procedure. Hartmann procedure removes the diseased sigmoid segment, closes the distal rectal stump, and creates a proximal end colostomy. It remains particularly relevant when hemodynamic instability, severe bowel distension, contamination, frailty, or a high risk of anastomotic failure makes primary reconstruction undesirable (Aras, 2025; Pavlidis et al., 2024; Vogel et al., 2022). Although the emergency objective is to control obstruction and sepsis, the resection should still aim to meet oncological principles whenever feasible.

Two practical pathological indicators of oncological adequacy are the resection margin and lymph node yield (LNY). A microscopically clear margin (R0) reflects local completeness of tumor removal, whereas adequate nodal assessment improves pathological staging and the identification of node-positive disease. Contemporary colon-cancer guidance commonly uses examination of at least 12 regional lymph nodes as a minimum quality threshold for reliable nodal staging (Del Paggio et al., 2017; Marunaka et al., 2025; Mroczkowski et al., 2024; Vogel et al., 2022). Inadequate node retrieval may result in stage migration, particularly when occult nodal metastases remain unsampled.

Whether emergency surgery inherently compromises LNY remains uncertain. Some observational studies have reported fewer nodes after emergency resection, while other cohorts and a recent meta-analysis found nodal harvest comparable with elective surgery (Bin Traiki et al., 2023; Costa et al., 2017; Nikolovski et al., 2022; Sandini et al., 2024; Tonini et al., 2020; Zhou et al., 2023). The discrepancy suggests that emergency physiology alone may not explain low LNY; surgical technique, extent of mesocolic excision, specimen characteristics, pathological node-search methods, and institutional workflow may all contribute.

Complete mesocolic excision (CME) seeks to preserve an intact mesocolic envelope through dissection along the appropriate embryological plane, while central vascular ligation can extend removal of regional lymphatic tissue along the vascular pedicle (Marunaka et al., 2025). Mesocolic specimen integrity and the quality of the surgical plane are therefore relevant to oncological assessment beyond the reported resection margin. Specimen orientation, fixation, systematic node identification, and pathology-processing techniques can also influence the measured LNY (Schnoz et al., 2024). Although these principles are relevant to emergency Hartmann surgery, the operative plane, vascular ligation level, and pathology-processing details were not systematically available for measurement in this retrospective series.

Data specifically describing oncological adequacy of emergency Hartmann procedure in Indonesian tertiary referral practice remain limited. Local evaluation is important because a technically successful emergency resection may achieve a clear margin while still providing insufficient nodal information for accurate staging. This

study therefore aimed to describe the oncological adequacy of emergency Hartmann procedure for obstructing sigmoid colon cancer using two pathological endpoints: LNY and resection-margin status.

Method

This was a retrospective, descriptive observational case-series study. Medical records were reviewed to identify patients with obstructing sigmoid colon cancer who underwent emergency Hartmann procedure between January 2023 and December 2025 at a tertiary referral hospital in Medan, Indonesia. The analysis focused on demographic data and pathological findings from resected specimens.

Eligible patients had histopathologically confirmed obstructing sigmoid colon cancer, underwent emergency/cito Hartmann procedure consisting of sigmoid resection, closure of the distal rectal stump, and end colostomy, subsequently underwent stoma-reversal surgery, and had retrievable histopathology reports in the electronic medical-record system. Patients who died on the operating table or within 24 hours after the index operation were excluded, as were patients with synchronous primary cancer in another organ at initial diagnosis. Consecutive sampling was used for all eligible cases during the study period.

The principal study variables were total LNY and resection-margin status. LNY was defined as the total number of regional lymph nodes identified and examined histopathologically. Nodal evaluation was categorized as <12 or >=12 nodes, using the commonly recommended minimum threshold for colon-cancer staging (Ryu et al., 2024; Vogel et al., 2022). The number of positive nodes was also recorded. Margin status was obtained from the pathology report and categorized as R0 when no microscopic residual tumor was identified at the resection margin; non-clear margins comprised reports classified as R1 or R2 in the source data.

Data were entered and analyzed using IBM SPSS Statistics version 26.0. Continuous variables were summarized as mean ± standard deviation, median, and range where appropriate. Categorical variables were summarized as frequencies and percentages. Because the study was descriptive and had no comparison group, no inferential hypothesis testing was performed.

The study was conducted after approval from the institutional research ethics committee. Only retrospective clinical and histopathological information required for the study objectives was analyzed, and no patient-identifying information is reported in this manuscript.

Result and Discussion

1. Result

Thirty-seven patients met the study criteria. Mean age was 53.84 ± 12.46 years, median age was 55 years, and the range was 31-83 years. Most patients were 31-65 years old (86.5%). Sex distribution was nearly balanced, with 19 men (51.4%) and 18 women (48.6%). The pathological findings showed a markedly low node count. Total LNY ranged from 2 to 5 nodes, with a mean of 3.62 ± 1.04 and a median of 4. All 37 patients (100%) had LNY <12. Twenty-eight patients (75.7%) had no positive node identified, whereas 9 patients (24.3%) had at least one positive node; the number of positive nodes ranged from 0 to 4. In contrast, margin clearance was high: 35 patients (94.6%) had R0 resection and 2 patients (5.4%) had a non-clear margin.

Table 1
Demographic and pathological characteristics of the study population

Characteristic	Value
Number of patients	37
Age, mean ± SD (years)	53.84 ± 12.46
Age, median (range), years	55 (31-83)
Age 31-65 years, n (%)	32 (86.5)
Age 66-100 years, n (%)	5 (13.5)
Male, n (%)	19 (51.4)
Female, n (%)	18 (48.6)
LNY, mean ± SD	3.62 ± 1.04
LNY, median (range)	4 (2-5)
At least one positive node, n (%)	9 (24.3)
R0 margin, n (%)	35 (94.6)
Non-clear margin (R1/R2), n (%)	2 (5.4)

LNY: lymph node yield; SD: standard deviation.

Four nodes were identified most frequently (17 patients, 45.9%), followed by 2 nodes in 8 patients (21.6%), 5 nodes in 7 patients (18.9%), and 3 nodes in 5 patients (13.5%). The absence of any specimen with >=12 examined nodes indicates that, according to the conventional nodal-quality threshold, adequate nodal staging was not achieved in this series.

Table 2
Distribution and adequacy of lymph node yield

Lymph node finding	n	%
2 nodes examined	8	21.6
3 nodes examined	5	13.5
4 nodes examined	17	45.9
5 nodes examined	7	18.9
LNY <12 nodes	37	100.0
LNY >=12 nodes	0	0.0

LNY: lymph node yield.

2. Discussion

The central finding of this study is a marked discordance between two pathological dimensions of oncological adequacy after emergency Hartmann procedure. Margin clearance was achieved in 94.6% of patients, but every specimen had fewer than 12 examined lymph nodes, with a mean LNY of only 3.62. Thus, the series demonstrates that satisfactory local margin clearance can coexist with inadequate nodal evaluation. This distinction is clinically important because margin status and nodal staging answer different oncological questions: the former reflects local completeness of tumor removal, whereas the latter determines the reliability of pathological N classification and influences adjuvant-treatment decisions.

The observed LNY is lower than most contemporary emergency colorectal-cancer series. Nikolovski et al. (2022) reported a mean of 11.1 nodes after emergency surgery compared with 14.7 after elective resection, with significantly fewer emergency cases reaching the 12-node threshold. By contrast, Costa et al. (2017) found no significant reduction in nodal harvest after emergency surgery in a propensity-matched analysis, and Tonini et al. (2020) also reported comparable adequacy between emergency and elective resections. More recently, Sandini et al. (2024) reported median lymph-node counts of 18

in emergency and 19 in elective colon resections, with oncological standards achieved in most cases. The 2023 meta-analysis by Zhou et al. (2023), including more than 350,000 patients, similarly found no overall difference in LNY between emergency and elective colorectal surgery.

These comparisons suggest that an emergency indication does not inevitably lead to inadequate nodal harvest. Therefore, the uniformly low LNY in the present series should be interpreted as a quality signal requiring system-level evaluation rather than as an unavoidable consequence of emergency surgery. Potential contributors span the entire specimen pathway: extent and plane of mesocolic resection, level of vascular ligation, bowel distension and inflammation, specimen orientation, fixation, macroscopic node identification, fat-clearing techniques, and completeness of pathological reporting.

The importance of adequate nodal assessment is supported by multiple population-based and institutional studies. Del Paggio et al. (2017) demonstrated the association between node yield and staging performance in colon cancer, while Mroczkowski et al. (2024) reported prognostic associations involving nodal assessment after curative resection. Large contemporary cohorts have continued to show that lower node counts are associated with inferior survival or less reliable staging, although the exact optimal numerical cutoff remains debated (Cai et al., 2020; Lee et al., 2019; Wilkie et al., 2025). The current 12-node threshold should therefore be understood as a minimum quality benchmark rather than a biological boundary.

In this study, 9 of 37 patients (24.3%) had at least one positive node despite examination of only 2-5 nodes. Conversely, the 28 patients with no positive node identified cannot be assumed to have optimally assessed node-negative disease because the number of examined nodes was uniformly below the conventional threshold. This creates a plausible risk of understaging. The problem is not simply academic: pathological N status contributes to prognosis and selection of adjuvant chemotherapy. Given that only 2-5 nodes were examined per patient, secondary indices derived from the total node count would be highly sensitive to the small denominator and were not interpreted in this study.

Several modifiable factors may increase node recovery. More extensive mesocolic and central lymphatic dissection can improve the number and anatomical completeness of retrieved nodes, although such techniques must be balanced against the physiologic urgency and technical conditions of emergency surgery ((Marunaka et al., 2025). Pathology methods are equally important. Schnoz et al. (2024) demonstrated that acetone-based fat processing increased lymph-node yield and metastasis detection in colorectal specimens. Reports from tertiary settings also emphasize that adequacy reflects both surgical and pathological processes rather than one discipline alone (Aydoğdu et al., 2025; Jaleta et al., 2025). For cases with an initially low node count, structured re-examination of the specimen and standardized reporting may therefore be reasonable quality-improvement measures.

Margin outcomes were substantially more favorable. R0 resection was reported in 35 patients (94.6%), suggesting that gross and microscopic tumor clearance was usually achieved despite the emergency setting. This is clinically relevant because positive margins are associated with poorer local control and survival after colon-cancer surgery (Goffredo et al., 2020). Recent work has also shown that inadequate oncological surgery cannot necessarily be compensated for by adjuvant therapy alone, underscoring the importance of achieving an adequate index resection (Patel et al., 2024). Contemporary cohorts of obstructing colorectal cancer indicate that Hartmann procedure can achieve

oncological resection in selected patients, although patients receiving Hartmann procedure frequently have worse baseline risk profiles and more advanced disease (Aras, 2025; Bradea et al., 2023).

The relationship between margin status and nodal involvement also warrants specific attention. Although nine patients had at least one positive lymph node and two had non-clear margins, the available aggregated results do not identify whether either patient with a non-clear margin was node-positive. Accordingly, these data do not support a claim that non-clear margins were concentrated among node-positive patients. A case-level review and cross-tabulation of nodal status (positive versus no positive nodes identified) by margin status (R0 versus non-clear) are needed to examine this possible relationship. Even with linked data, the presence of only two non-clear margins would limit the precision of any subgroup comparison.

The coexistence of a high R0 rate and low LNY highlights why oncological adequacy should not be reduced to a single metric. Emergency cancer surgery is multidimensional: survival and recurrence depend on tumor biology, stage, physiologic reserve, complications, adjuvant therapy, margin status, nodal evaluation, and other pathological risk factors. Emergency cohorts can have worse long-term outcomes even when resection margins and nodal counts are comparable with elective surgery, indicating that technical adequacy is necessary but not sufficient for favorable prognosis (Bin Traiki et al., 2023; Sandini et al., 2024).

These findings have practical implications for local quality improvement. Operative reports for emergency colon-cancer resections should document tumor location, extent of resection, vascular ligation when identifiable, contamination or perforation, and specimen orientation. Pathology reports should consistently document total and positive nodes, margin status, tumor grade, lymphovascular and perineural invasion, tumor deposits, and pathological stage. Multidisciplinary communication between surgeons and pathologists is especially important when the initial node count is low. A standardized specimen pathway may allow a center to determine whether low LNY predominantly reflects resection extent, specimen handling, node-search technique, or incomplete documentation.

This study has several limitations. First, its retrospective single-center design and small sample size limit generalizability and preclude causal inference. Second, eligibility required subsequent stoma reversal, which may preferentially select survivors who were fit enough for a second operation; patients who died later, developed progression, or never underwent reversal may therefore be underrepresented. Third, the available dataset did not include detailed T stage, tumor grade, lymphovascular or perineural invasion, tumor deposits, level of vascular ligation, surgeon specialization, operative duration, pathological node-search technique, adjuvant therapy, recurrence, or survival. Fourth, the available summary tables did not provide linked patient-level nodal and margin data, preventing assessment of whether non-clear margins occurred in node-positive cases. Fifth, there was no elective or alternative-procedure comparison group. Finally, the study cannot distinguish the relative contributions of surgical resection and pathological processing to the low LNY. The results should therefore be interpreted as a descriptive audit of pathological oncological quality rather than a definitive assessment of long-term oncological effectiveness.

Study Limitations

This study has several limitations that should be considered when interpreting the findings. First, its retrospective, single-center design and relatively small sample size (n = 37) limit the generalizability of the results and preclude causal inference. Second, the inclusion criterion requiring subsequent stoma-reversal surgery may have introduced selection bias by preferentially capturing survivors who were clinically fit for a second procedure, potentially underrepresenting patients who experienced early mortality, disease progression, or permanent colostomy. Third, the retrospective dataset lacked detailed clinicopathological and perioperative variables, including T stage, tumor grade, lymphovascular or perineural invasion, tumor deposits, level of vascular ligation, surgeon specialization, operative duration, specific pathological node-search techniques, adjuvant therapy, recurrence, and long-term survival. Fourth, the absence of linked patient-level data between nodal status and resection-margin status prevented cross-tabulation of whether non-clear margins occurred in node-positive cases, and no elective or alternative-procedure comparison group was included. Finally, this study cannot distinguish the relative contributions of surgical resection extent versus pathological specimen processing to the uniformly low lymph node yield.

Conclusion

Emergency Hartmann procedure for obstructing sigmoid colon cancer in this series achieved a high rate of R0 resection, but nodal evaluation was uniformly below the conventional minimum of 12 examined lymph nodes. The findings indicate discordance between margin adequacy and nodal-staging adequacy and identify lymph-node evaluation as the principal quality gap in the available pathological data. Standardized emergency oncological resection documentation, specimen handling, and pathological node assessment should be strengthened, while future prospective studies should include complete pathological risk factors, perioperative variables, recurrence, and survival outcomes.

Declaration of AI Assistance

AI tools, specifically ChatGPT, were used during the preparation of this manuscript to assist with paraphrasing and language refinement. The authors reviewed and verified the final manuscript and take full responsibility for its accuracy and scientific integrity

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