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Original Research Article

More Than Appendicitis: Laparoscopic Diagnosis and Graded Management of Mobile Caecum Syndrome- A Case Article

Article History:

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Abstract: Background: Mobile caecum syndrome is a rare congenital anomaly caused by incomplete retroperitoneal fixation of the caecum and ascending colon. It often presents with recurrent or chronic right iliac fossa (RIF) pain, clinically resembling acute appendicitis. Preoperative diagnosis is challenging, with intraoperative detection being the primary method of identification.
Objective: This observational study assessed intraoperative diagnosis, grading, and outcomes of laparoscopic caecopexy in mobile caecum syndrome, while identifying associated laparoscopic markers.
Methods: Thirty patients aged 18–40 years with RIF pain and ultrasonographic suspicion of appendicitis underwent diagnostic laparoscopy. Intraoperatively, mobile caecum was identified and graded using Gomes' classification. Associated findings, such as thickening of the ileocecal (IC) junction and distal ileum, were recorded. Laparoscopic caecopexy was performed in all cases. Symptom resolution was assessed using Visual Analog Scale (VAS) scores preoperatively and at 1, 3, and 6 months postoperatively. Data were analyzed using ANOVA ($p < 0.005$).
Results: Mobile caecum was confirmed in all patients (60% Grade I, 40% Grade II). IC junction and distal ileal thickening were noted in 53.3%, particularly in all Grade II cases. A suprapubic camera port allowed improved visualization, aiding diagnosis. Histopathology showed a normal appendix in 30% of cases. VAS scores significantly declined over time ($F = 65.23$, $p = 1.13 \times 10^{-99}$). No major complications occurred; eight patients had transient postoperative ileus.
Conclusion: Laparoscopic caecopexy is a safe, effective treatment for mobile caecum syndrome. Improved visualization and identification of IC thickening may support diagnosis. Routine intraoperative assessment is recommended.

Keywords: Mobile caecum, caecopexy, laparoscopic appendectomy, right iliac fossa pain, minimal access surgery, ileocecal thickening, suprapubic port.

INTRODUCTION

The mobile caecum is a congenital anatomical variant resulting from incomplete embryological fixation of the ascending colon and caecum to the posterior parietal peritoneum [1]. This anomaly occurs in approximately 10–20% of the population and often remains asymptomatic until complications arise [2]. Due to its mobility, the caecum may shift position and mimic or contribute to various clinical scenarios including right iliac fossa (RIF) pain, chronic constipation, flatulence, intermittent obstruction, or even caecal volvulus [3, 4]. The clinical presentation of mobile caecum syndrome often overlaps with that of acute appendicitis, making the diagnosis particularly challenging, especially in young adults where atypical symptoms are common [5]. Although imaging techniques such as ultrasonography (USG) and computed tomography (CT) may aid in identifying positional abnormalities [6, 7], definitive diagnosis is frequently established only during surgical exploration [8]. In most cases, the condition is encountered incidentally during laparoscopic appendectomy or evaluation for chronic abdominal pain [9].

Laparoscopy, due to its diagnostic and therapeutic capabilities, offers a unique advantage in the management of mobile caecum syndrome [10]. The technique of laparoscopic caecopexy—suturing the caecum to the lateral peritoneal wall—was first described in minimal access settings as a treatment for recurrent volvulus or persistent RIF pain associated with caecal mobility [11]. Although traditionally underdiagnosed, recent studies have suggested that mobile caecum may account for a significant proportion of cases with recurrent appendiceal pain or negative appendectomy findings [12]. This study aims to highlight the role of laparoscopy in both diagnosis and treatment of mobile caecum syndrome, emphasizing the importance of intraoperative vigilance, including the assessment of associated anatomical changes, and caecopexy in patients undergoing surgery for presumed appendicitis. By assessing 30 consecutive cases, we provide evidence for incorporating laparoscopic caecopexy into standard surgical protocols for RIF pain when anatomical mobility is evident and explore other concurrent laparoscopic findings.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted at the Department of Surgery, Jawaharlal Nehru Medical College, Belagavi, Karnataka, India, between March 2022 and March 2024. The study protocol was approved by the institutional ethics committee and written informed consent was obtained from all participants.

Inclusion and Exclusion Criteria

- **Inclusion criteria:**
  - Patients aged 18–40 years o Clinical suspicion of appendicitis on examination of abdomen. o Radiological suspicion of appendicitis on ultrasonography (e.g., probe tenderness or inflamed appendix).
  - Underwent laparoscopic appendectomy.

- **Exclusion criteria:**
  - Age < 18 years; >40 years o History of previous abdominal surgery. o Diagnosed cases of inflammatory bowel disease, tuberculosis, malignancy, adnexal pathology, cecal volvulus, bowel obstruction or causes of RIF pain other than appendicitis and mobile caecum.

Surgical Technique

All patients were taken up for laparoscopic appendectomy under general anesthesia. A 10mm suprapubic port was introduced and utilized as the camera port. A supraumbilical port (e.g., 10mm) and a left iliac fossa port (e.g., 5mm) were established as working ports. After identifying the ileocaecal junction, mobility of the caecum and ascending colon was assessed. A mobile caecum was defined intraoperatively as free movement of the caecum without retroperitoneal tethering and graded using Gomes' classification [11]. Furthermore, visualized laparoscopically, thickening of the ileocecal junction along with distal ileal thickening, characterized by hypervascular serosa and palpable firmness at the ileocecal junction, emerged as an important observed marker in our study to identify potentially symptomatic mobile caecum, assessed independently of Gomes' criteria. Once diagnosed, a laparoscopic caecopexy was performed by placing 3–4 interrupted sutures (Vicryl 2-0) between the lateral taenia coli of the ascending colon and the right lateral peritoneal wall at approximately 5 cm intervals.

Postoperative Evaluation and Follow-Up

Patients were followed up at 1 month, 3 months, and 6 months. Symptom resolution, complications, and recurrence were documented. Histopathological reports of appendectomy specimens were recorded to determine the true incidence of appendicitis.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Continuous variables such as symptom scores were expressed as mean ± standard deviation. One-way ANOVA was used to compare preoperative and

postoperative symptom scores. Descriptive statistics were used for other findings. A p-value < 0.005 was considered statistically significant for ANOVA.

RESULTS

Patient Demographics and Clinical Presentation

A total of 30 patients were included in the study. The mean age was 28.6 ± 6.5 years, with a male-to-female ratio of 14:16. All patients presented with right iliac fossa (RIF) pain. Associated symptoms included nausea (60%), vomiting (40%), and constipation (30%). Ultrasonography revealed probe tenderness in all patients, with appendicitis reported in 70% (21/30). No radiological evidence of caecal mobility was documented.

Figure1: Mobile caecum syndrome with IC junction and ascending colon without fixation

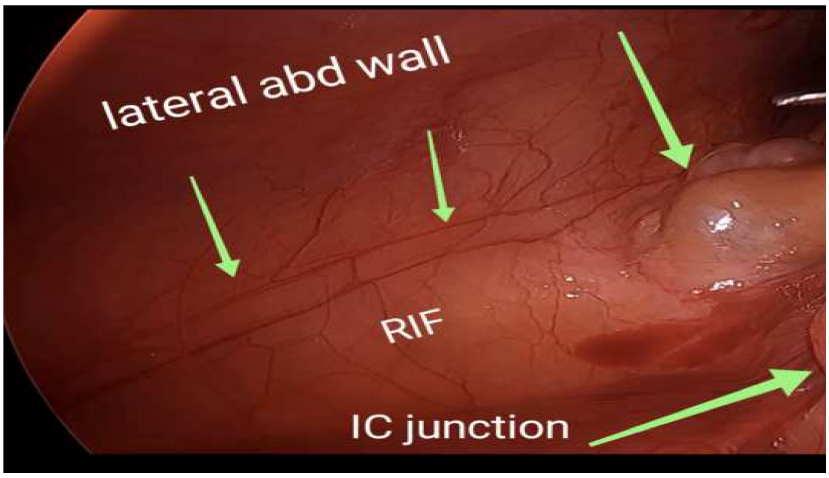

Table 1: Patient Demographics and Presenting Symptoms (n = 30)

Variable	Value
Age (mean ± SD)	28.6 ± 6.5 years
Age range	18–40 years
Gender	14 males (46.7%), 16 females (53.3%)
Primary complaint	Right iliac fossa (RIF) pain (100%)
Associated nausea	18 patients (60%)
Associated vomiting	12 patients (40%)
Constipation	9 patients (30%)
Sonographic probe tenderness	30 patients (100%)
Radiological appendicitis*	21 patients (70%)

Intraoperative Findings and Surgical Management

All 30 patients underwent diagnostic laparoscopy followed by appendectomy.

Intraoperative evaluation of the ileocaecal unit revealed mobile caecum [figure 1] in 100% of cases, defined as free caecal and ascending colonic mobility due to lack of retroperitoneal fixation. With the change of camera port position to suprapubic, we achieved easy visualization of the ileocecal junction and appendix; thus, identification of the usually missed mobile caecum became easy. Based on the Gomes et al. Classification [11]:

- 18 patients (60%) were found to have Grade I mobility (free caecum with partial ascending colon fixation)
- 12 patients (40%) had Grade II mobility (caecum and entire ascending colon freely mobile)

Laparoscopically observed thickening of the ileocecal (IC) junction and distal ileum, characterized by hyper vascular serosa and firmness at the IC junction, was noted in 16 out of 30 patients (53.3%). This finding was consistently present in all 12 patients
(100%) with Grade II mobile caecum and in 4 out of the 18 patients (22.2%) with Grade I mobile caecum

Figure2: Laparoscopic caecopexy performed using vicryl 2-0 between lateral peritonealwall and lateral tenia coli of ascending colon

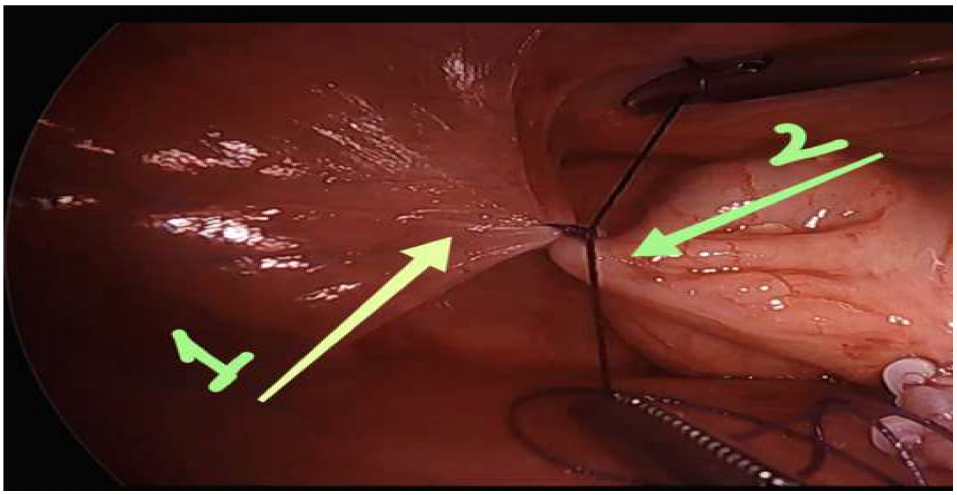

Figure 3: Post laparoscopic Caecopexy (depicting three sutures between lateralperitoneal wall and lateral tenia coli)

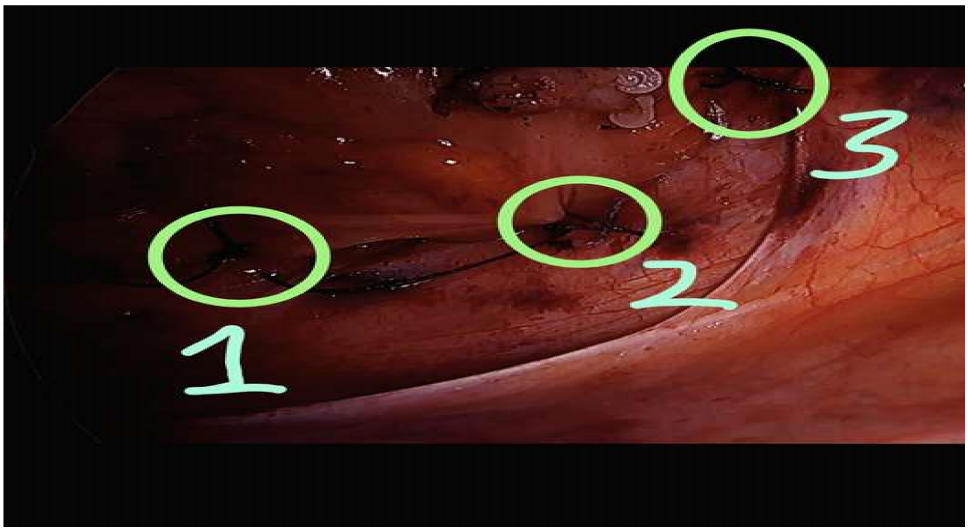

Table 2: Correlation of IC Junction/Distal Ileal Thickening with Gomes' Grade of Mobile Caecum (n=30)

Gomes' Grade of Mobility	Total Patients	Patients with IC Junction/Distal Ileal Thickening	Percentage with Thickening within Grade	Total
Grade I	18	4	22.20%	| 30 | 16 | 53.3% (Overall) |
Grade II	12	12	100%	

Laparoscopic caecopexy was performed in all patients, regardless of grade, by placing 3–4 interrupted 2-0 Vicryl sutures at an interval of 5cm, between the lateral taenia coli of ascending colon and right lateral peritoneal wall [figures 2,3]. No conversions or intraoperative complications occurred, including no bowel perforation or vascular injury.

Histopathological Examination Histopathological evaluation of the appendix revealed:

1.Acute appendicitis in 18 patients (60%)
2.Chronic appendicitis in 3 patients (10%)
3.Normal appendix in 9 patients (30%)

Symptom Scores and Follow-Up
Postoperative follow-up was conducted at 1 month, 3 months, and 6 months. Each patient rated their abdominal pain using a Visual Analog Scale (VAS) from 0 (no pain) to 10 (maximum pain).

Figure 4: A visual chart summarizing the VAS trends for all 30 patients

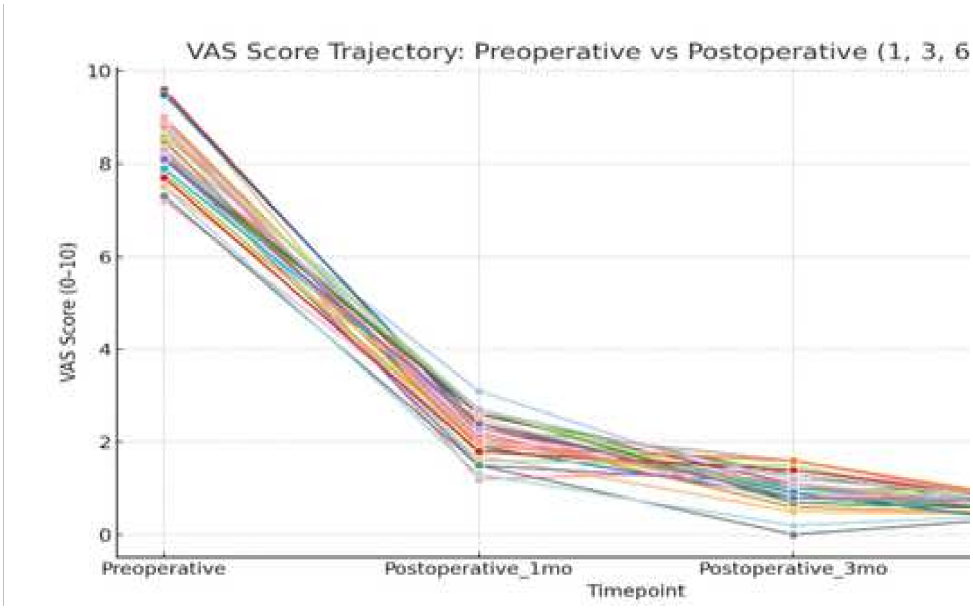

Table 3: Mean VAS Scores Across Timepoints (n = 30)

Time Point	Mean VAS Score ± SD
Preoperative	8.4 ± 1.2
Postoperative – 1 Month	2.2 ± 0.5
Postoperative – 3 Months	1.0 ± 0.4
Postoperative – 6 Months	0.5 ± 0.2

Statistical Analysis
A one-way ANOVA was conducted to compare VAS scores across the four time points. The results demonstrated a highly significant reduction in symptoms over time: F-value = 65.23 p-value = 1.13×10^{-99}
This confirms that the reduction in pain post-laparoscopic caecopexy was statistically significant ($p < 0.005$).
A visual chart summarizing the VAS trends for all 30 patients is presented in [Figure 4].
It demonstrates a consistent and steep decline in VAS scores over time across the cohort.

Secondary Outcomes
In addition to pain reduction, several key postoperative observations were noted:

Table 4: Secondary Outcomes in 30 Patients Following Laparoscopic Caecopexy

Parameter	Findings
Volvulus Recurrence	0/30 (0%)
Postoperative Ileus	8/30 (26.7%), POD 3–9
Iatrogenic Bowel Perforation	0/30 (0%)
Retroperitoneal Vessel Injury	0/30 (0%)
Wound Infection at Fixation Site	0/30 (0%)
Adhesive Bowel Obstruction	0/30 (0%)
Duration of Ileus Recovery	POD 7–9 (all resolved)

- Volvulus recurrence: No patients experienced caecal volvulus within 6 months.
- Postoperative ileus: 8 patients (26.7%) developed ileus by POD 3. These patients were managed conservatively with early ambulation, gradual initiation of feeds, and supportive care. Ileus resolved spontaneously in all by POD 7 to POD 9.
- Retroperitoneal vessel injury: No such complications occurred.
- Iatrogenic bowel perforation: No cases were observed intraoperatively.
- Wound infection or fixation site complications: None of the patients developed wound infections at the suture fixation site.
- Adhesive bowel obstruction: No instances of postoperative adhesive obstruction were documented.

DISCUSSION

Mobile caecum syndrome remains a challenging diagnosis due to its nonspecific symptoms and often normal preoperative imaging. Our study highlights the critical role of laparoscopy not only for definitive diagnosis and grading according to Gomes et al. [11] but also for identifying other associated pathological changes.

The strategic use of a suprapubic port for the camera, as implemented in our study, facilitated enhanced visualization of the ileocecal region. This improved view was crucial for accurately assessing caecal mobility, identifying the subtle signs of thickening at the ileocecal junction and distal ileum, and subsequently simplifying the execution of laparoscopic caecopexy. Some authors have previously reported ergonomic and cosmetic advantages of using a suprapubic camera port in other laparoscopic procedures like appendicectomy [13].

A significant finding in our article was the laparoscopic observation of ileocecal junction and distal ileal thickening, characterized by hypervascular serosa and palpable firmness, in over half of the patients (53.3%). Notably, this was present in all patients with Grade II mobility and nearly a quarter of those with Grade I. While ileocecal thickening is a known radiological and pathological finding associated with various conditions such as inflammatory bowel disease, infections (e.g., tuberculosis), or even malignancy [14], its direct association with uncomplicated mobile caecum as a primary laparoscopic marker has not been extensively reported. The consistent presence of these changes, particularly in higher grades of caecal mobility in our symptomatic cohort, suggests they may represent sequelae of chronic intermittent torsion, friction, or subclinical inflammation due to the abnormal mobility, leading to chronic changes in the bowel wall. This observation from our study warrants further investigation to determine its specificity and predictive value for symptomatic mobile caecum syndrome. It may serve as an additional visual cue for surgeons to suspect and confirm mobile caecum, especially when symptoms are atypical.

In our article, 30% of patients had a histologically normal appendix yet experienced significant symptom relief post-caecopexy, reinforcing that mobile caecum can be an independent cause of RIF pain [10, 11, 15]. The uniform symptomatic resolution across all patients undergoing caecopexy, regardless of the grade of mobility or the presence of appendicitis, underscores the efficacy of this intervention. Our results, showing a significant decline in VAS scores ($p < 0.001$), align with previous studies [12, 16]. The safety profile of laparoscopic caecopexy in our study was excellent, with no major intraoperative complications or long-term volvulus recurrence during the follow-up period. Transient postoperative ileus was observed in

26.7% of patients, a known potential occurrence after colonic manipulation [3], which resolved conservatively. Our findings are consistent with other reports emphasizing low morbidity after laparoscopic caecopexy [17, 18].

Limitations of our study include its observational nature, single-centre setting, and relatively short follow-up. While the observed ileocecal and ileal thickening is an interesting finding, further histopathological correlation from these thickened areas (if biopsies were ethically justifiable and clinically indicated) and studies with larger cohorts would be needed to establish a definitive causal link and its pathological basis in the context of mobile caecum syndrome.

CONCLUSION

Mobile caecum syndrome is a clinically significant entity that can be effectively diagnosed and managed laparoscopically. Our study not only confirms the efficacy of laparoscopic caecopexy in providing symptom relief but also introduces an important intraoperative observation: the frequent presence of ileocecal junction and distal ileal thickening, particularly in higher grades of caecal mobility. This finding, along with the grading of mobility itself, may aid surgeons in identifying patients who would benefit most from caecopexy.

The use of a suprapubic port for the camera was an additional advantage in our study, enhancing visualization for both diagnosis and therapeutic intervention, as summarized below

- Easier visualization of Ileocecal Junction
- Easier identification of Mobile Caecum
- Improved clarity in assessment of Associated Pathological Changes (e.g., thickening)
- Enhanced ease of performing Laparoscopic Caecopexy

We recommend active intraoperative evaluation for caecal mobility and associated signs like ileocecal thickening during any laparoscopy for unexplained RIF pain. Laparoscopic caecopexy offers a durable solution for symptomatic mobile caecum. The observed association of ileocecal/ileal thickening with symptomatic mobile caecum in this study is a novel aspect that merits further multicentre research to validate its role as a diagnostic adjunct.

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Legends to figures

Figure 1.: Mobile caecum syndrome with IC junction and ascending colon without fixation
Figure 2. Laparoscopic caecopexy performed using vicryl 2-0 between lateral peritoneal wall and lateral tenia coli of ascending colon
Figure 3. post laparoscopic Caecopexy(depicting three sutures between lateral peritoneal wall and lateral tenia coli)
Figure 4. A visual chart summarizing the VAS trends for all 30 patients.

Declaration of Interest Statement

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☒ The author is an Editorial Board Member/Editor-in-Chief/AssociateEditor/Guest Editor for this journal and was not involved in the editorial review or the decision to publish this article.

☒ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: NONE