

Current approaches to treating acute appendicitis in the third trimester

Aaron Kleinertz,¹ Kenrick Manswell ,¹ Kent Peterson,² Colleen Flanagan,² Melissa Drezdzon,² Joshua Dilday,³ Patrick B Murphy ³

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/tsaco-2024-001495>).

¹Medical College of Wisconsin, Milwaukee, Wisconsin, USA
²Department of General Surgery, Medical College of Wisconsin, Milwaukee, Wisconsin, USA
³Division of Trauma and Acute Care Surgery, Medical College of Wisconsin, Wauwatosa, Wisconsin, USA

Correspondence to

Dr Patrick B Murphy;
 pbatesmurphy@gmail.com
 Dr Joshua Dilday; jdilday@mcw.edu

CASE PRESENTATION

Patient 1

A pregnant adult patient at 35 weeks and 5 days gestation with a medical history significant for morbid obesity status-post-Roux-en-Y gastric bypass, polycystic ovarian syndrome, and hypothyroidism presented with nausea and diffuse, progressive abdominal pain that started several hours after arrival, with no fever or vomiting reported. She reported good fetal movement without vaginal bleeding, loss of fluid, or contractions. Vital signs and laboratory analysis were unremarkable. Physical examination of the abdomen was significant for rebound tenderness in left lower quadrant and right lower quadrant. CT of the abdomen and pelvis demonstrated an inflamed, dilated appendix with periappendiceal stranding and edema without fecalith.

Patient 2

A pregnant adult patient at 33 weeks and 5 days gestation with a medical history significant for inflammatory bowel syndrome, status-post-Roux-en-Y gastric bypass, laparoscopic repair of internal hernia, laparoscopic cholecystectomy, gastroesophageal reflux disease, and systemic lupus erythematosus presented with 2 days of nausea, emesis, and right-sided epigastric pain that migrated to the right lower quadrant. The patient denied fever, chills, or cough, and reported regular fetal movement. The patient's presenting vital signs were unremarkable. Physical examination of the abdomen revealed focal tenderness to palpation in the right lower quadrant. Laboratory analysis showed a leukocytosis of $14.3 \times 10^3/\mu\text{L}$. CT of the abdomen and pelvis demonstrated

appendiceal wall thickening and periappendiceal stranding without fecalith.

What would you do?

1. Non-operative management with antibiotics
2. Cesarean section with concurrent appendectomy
3. Open appendectomy (OA)
4. Laparoscopic appendectomy (LA)

What did we do and why?

Both patients were consented for LA (online supplemental video 1). They were placed in a supine position with a right-side bump to alleviate pressure on the inferior vena cava, and then induced under general anesthesia. An epigastric, vertical 10 mm Hasson trocar was placed. The abdomen was insufflated to a lower pressure of 12 mm Hg. Two working ports were inserted after identifying the position of the appendix relative to external landmarks ([figure 1](#)).

No evidence of appendiceal perforation was noted in either case, consistent with The American Association for the Surgery of Trauma grade 1 uncomplicated appendicitis.¹ The appendix and associated structures were dissected using an electrocautery device, enabling independent stapling of the appendiceal base. The appendix was then removed via laparoscopic retrieval bag. Both procedures were well-tolerated without complication. Tocometry and fetal monitoring were appropriate throughout, with reassuring fetal heart tones at the time of surgery.

Acute appendicitis is the most common non-gynecological surgical problem during pregnancy,

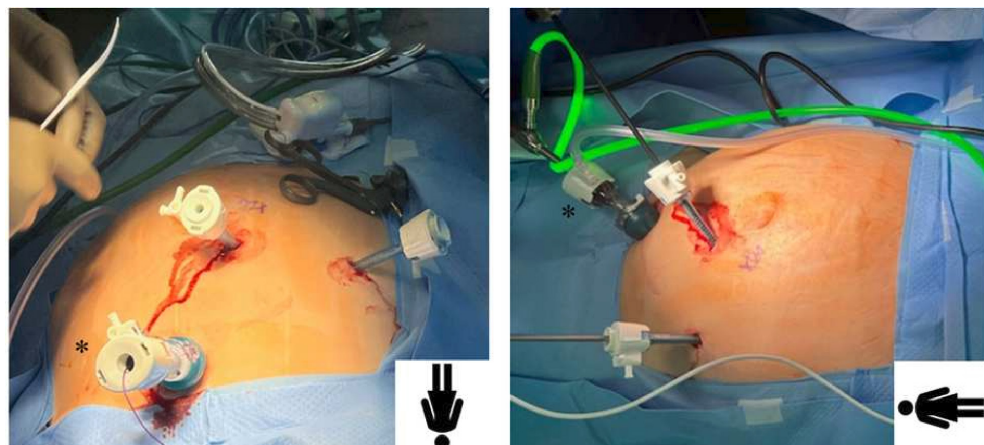


Figure 1 Laparoscopic approach using a 10 mm epigastric port placed using Hassan technique, and two additional caudolateral working ports placed following examination of the appendix relative to external landmarks.

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To cite: Kleinertz A, Manswell K, Peterson K, et al. *Trauma Surg Acute Care Open* 2024;**9**:e001495.

typically occurring in the second trimester.² Although less common in pregnant patients compared with non-pregnant ones,³ conserving fetal health adds complexity.² With advancing gestation, the gravid abdominal compartment introduces challenges to exposure and technical feasibility,⁴ while physiological perturbation and anesthesia can induce labor.⁵ Due to limited data, optimal third-trimester management is debated.

In broad terms, the treatment options can be categorized as either operative or non-operative. The failure rate of non-operative management ranges from 12% to 40%.^{2 6 7} Studies highlighting conservative treatment success are limited by treatment-group inequities⁸ and lack of histopathological confirmation for appendicitis,⁹ raising suspicion for false positives, which are more prevalent in pregnant patients.¹⁰

Operative management represents the standard of care.^{7 11} Numerous studies have compared OA versus LA in pregnancy.^{4 10 12–14} Regardless of technique, risk of preterm birth is nearly twice as high in third trimester versus first trimester or second trimester.⁵ Importantly, no link exists between general anesthesia and fetal development abnormalities.¹⁵ The Society of American Gastrointestinal and Endoscopic Surgeons and the World Society of Emergency Surgery agree that either approach is reasonable.^{7 11} Historically, OA is used more frequently in the third trimester, influenced by concern for iatrogenic injury, loss of domain and risk of preterm birth.^{4 14 16 17} Considering LA is more commonly administered in the first trimester,¹⁶ during which fetal loss rates are inherently higher regardless of appendicitis,¹⁸ the causal relationship between fetal demise and the condition is confounded. Recent publications have shown equivalent maternal and fetal outcomes for LA and OA.^{4 14} Few studies have evaluated the late third trimester,¹⁰ and our case further highlights the safety and efficacy of a minimally invasive approach even in the third trimester. LA reduces risk of wound infection, postoperative pain, and length of stay compared with OA.¹³ Alternatively, cesarean section with concomitant OA can be considered if the pregnancy has reached ‘term’ gestation, with rates of infection similar to OA alone.^{19 20}

The authors describe a laparoscopic surgical plan with justification focused on minimizing operative risks for mother and fetus in hopes that surgeons can feel comfortable attempting laparoscopic repair in the third trimester. Co-management with obstetrics, anesthesiology, and nursing staff is essential for positioning and monitoring. Pre-operative surgical planning, low insufflation pressure, and strategic port placement facilitate a safe dissection in a high-risk operation.

X Colleen Flanagan @_CFlanagan, Melissa Drezdzon @mdrezdzonmd, Joshua Dilday @joshua_dilday and Patrick B Murphy @pbatesmurphy

Contributors AK and KM contributed equally to this paper in the background research, data collection, writing, and editing of this case report. KM was involved in the care of patient 2. KP, CF, MD, and JD were involved in the care of both patients and contributed to planning, writing, editing of the case report. PM and JD were directly involved in the care of both patients and the planning, conceptualization, photo resourcing, video resourcing, writing, and editing of the case report. All authors provided final approval of the article and figures prior to submission.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; internally peer reviewed.

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ORCID iDs

Kenrick Manswell <http://orcid.org/0009-0005-5805-4022>

Patrick B Murphy <http://orcid.org/0000-0002-6086-8966>

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