Case Report

Uterine Manipulation May Not Influence Ongoing Pregnancy: Case Report and Literature Review

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Abstract

Abdominal pain is a very common presentation in early pregnancy. Its cause may be gynecological or totally nonpregnancy related. While acute appendicitis is the most common nonobstetric cause of pain in pregnant women, diagnosis and differentiation from other causes, including ectopic pregnancy, remain challenging. In clinical situations of uncertainty, laparoscopy is a useful diagnostic tool, but uterine manipulation should be avoided if an intrauterine pregnancy is a possibility. In this report, we describe a case of complicated appendicitis in very early pregnancy where the patient ended with a full-term healthy pregnancy despite undergoing a diagnostic laparoscopy with inadvertent uterine manipulation.

Keywords: Abdominal pain in early pregnancy, appendicitis, laparoscopy, live birth, uterine manipulation

INTRODUCTION

Abdominal pain in early pregnancy remains a diagnostic challenge, and various differentials need to be considered to ensure investigations are performed appropriately. We describe a case of a successful full-term healthy pregnancy despite the patient undergoing a diagnostic laparoscopy with inadvertent uterine manipulation for complicated appendicitis in early pregnancy. This case may provide useful insights into inadvertent uterine manipulation in early pregnancy on which there is not much available in the literature.

CASE REPORT

The patient was a 34-year-old gravida two, para one, previous cesarean section (CS), who presented at 4 weeks 5 days amenorrhea with 1-day history of epigastric pain radiating to the lower abdomen. There were no associated symptoms.

She was apyrexial with stable vital signs. She had epigastric tenderness, but Murphy's and McBurney's signs were negative. Serum investigation revealed a white cell count of 13.54 and beta-human chorionic gonadotropin (b-hCG) of 523 IU/L. C-reactive protein was not performed. A pelvic ultrasound showed no evidence of an intrauterine pregnancy (IUP) [Figure 1], but there was a 1.2 cm left adnexal structure with minimal vascularity posterior to the left ovary and a small amount of free fluid in the pouch of Douglas (POD) [Figure 2]. Given the short duration of amenorrhea, absence of vaginal bleeding, b-hCG level below discriminatory zone, and empty uterus on scan, a diagnostic laparoscopy was offered for the possibility of an ectopic pregnancy (EP).

Routine laparoscopic entry of the peritoneum was performed. A uterine sound was used to estimate the uterine length before inserting a Zinnanti Uterine Manipulator-Injector (ZUMI

Access this article online	
Quick Response Code:	**Website:** https://journals.lww.com/gmit
	DOI: 10.4103/gmit.gmit_81_23

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How to cite this article: Wan K, Hameed MS, Wright A, Chern BS. Uterine manipulation may not influence ongoing pregnancy: Case report and literature review. Gynecol Minim Invasive Ther 2024;13:56-9.

4.5) (Cooper Surgical, Turnbull, CT, USA) [Figure 3]. On entry, there was neither evidence of hemoperitoneum nor EP even on uterine anteversion [Figure 4]. Pus was noted in the POD, with the source from the tip of the inflamed appendix [Figure 5]. On diagnosis of a ruptured appendix, the ZUMI was removed, and an appendicectomy was performed. No other abnormalities were noted on the inspection of the rest of the pelvic and abdominal cavity. Histology confirmed a diagnosis of acute appendicitis.

Postoperatively, the patient was briefed about the diagnosis of a ruptured appendix with a possible early ongoing pregnancy and that uterine instrumentation was performed to aid diagnosis. She was advised of the unknown risk including possible mechanical trauma to any IUP.

The patient proceeded with the pregnancy with progesterone support (baseline serum progesterone level of 54.3 nmol/L). Her postoperative recovery was uneventful. She completed 48 h of intravenous antibiotics and was discharged on postoperative day 3 with downtrending inflammatory markers with an appropriate corresponding rise in b-hCG markers.

A transvaginal ultrasound (TVUS) on postoperative day 4 revealed an intrauterine gestation sac (GS). A follow-up scan

3 weeks later confirmed a viable pregnancy of 6-week size. Her subsequent screening and growth scans were normal. She went on to have an uneventful antenatal course and was delivered a healthy baby by elective CS at 38 weeks.

Discussion

Appendicitis is one of the most common nonobstetric emergencies requiring surgery in pregnancy, occurring in 1 in 700–1500 live births.[1-3] It has a peak incidence in the second and third decades, coinciding with childbearing years.[2] Compared with the general population, pregnant women are more likely to experience appendicitis and its attendant complications, with rates as high as 57% compared with 4%–19% in the general population.[3] This may be due to delayed presentation, delay in diagnosis or treatment, or
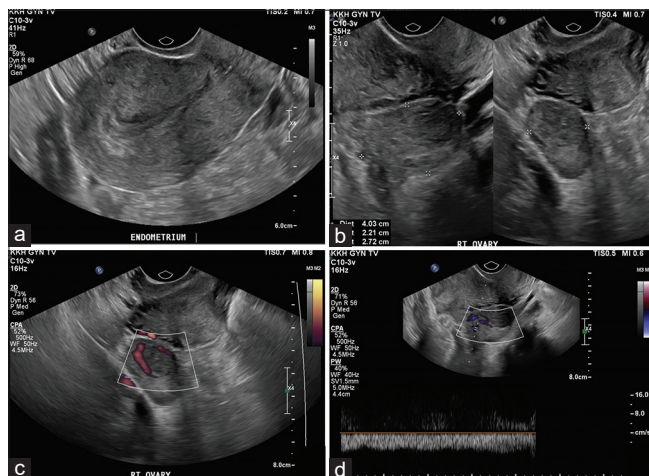

Figure 1: (a) Empty uterus with normal endometrial thickness. (b-d) Normal right ovary with normal Doppler flow
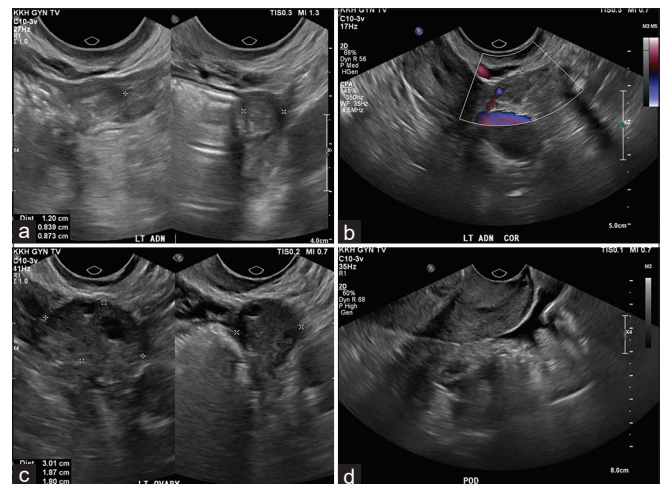

Figure 2: (a and b) Left adnexal structure with minimal vascularity posterior to the left ovary, (c) normal left ovary, (d) small amount of free fluid in the pouch of Douglas

Figure 3: Zinnanti Uterine Manipulator-Injector (ZUMI 4.5) (Cooper Surgical, Turnbull, CT, USA)
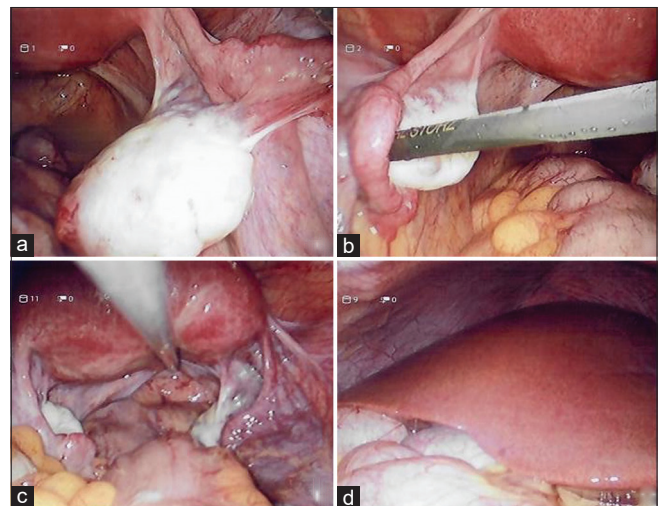

Figure 4: (a-c) Normal pelvic anatomy with no evidence of hemoperitoneum or ectopic pregnancy, (d) normal liver surface, no evidence of hemoperitoneum
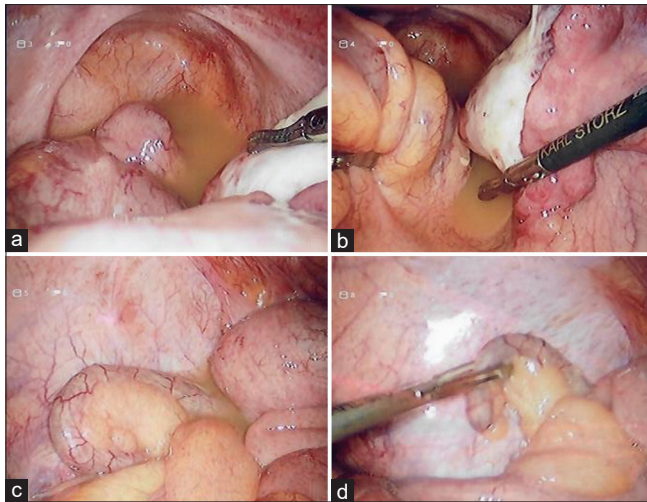
Figure 5: (a and b) Pus noted in the Pouch of Douglas. (c and d) Pus noted from tip of the inflamed appendix

biological differences in pregnancy. This delay results in increased risks of complications such as perforation, maternal sepsis, preterm labor, and risk of fetal or maternal loss. Maternal mortality has been reported to be up to 2%, whereas fetal loss has been reported to be up to 36% (compared with 1.5%–9% in unruptured appendicitis).[1,2,4]

The diversity of clinical presentations and challenge of diagnosing acute appendicitis in pregnancy has been well documented as there are no typical risk factors.[3,5] Several of the classic symptoms of abdominal pain, nausea, and vomiting maybe seen in early pregnancy or absent.[4] Furthermore, leukocytosis may be physiological in pregnancy. Guidelines recommend magnetic resonance imaging to confirm the diagnosis if the clinical suspicion for appendicitis is high.[6]

Maternal and perinatal morbidity and mortality following appendectomy are low and comparable to nonpregnant women. Studies suggest that surgical management for appendicitis is safe in pregnancy. In particular, laparoscopic appendectomy correlates with reduced overall postoperative morbidity, lower rate of wound infections, less postoperative pain, reduced hospital stay, and early postoperative recovery.[7] Depending on the locoregional surgical practice and regulations, laparoscopic appendicectomy has also been described and performed well by gynecologists in other countries.[7]

Abdominal pain may also be a feature of early pregnancy complications including EP which occurs in approximately 2% of all pregnancies. These are typically in the fallopian tube or in rarer locations such as a cornual or ovary, which accounts for 2%–4% and 0.5%–3%, respectively, of all EP.[5,8,9] A high index of clinical suspicion for EP is required, for patients who present with abdominal pain and found to have a positive urine pregnancy test (UPT) with adnexal mass

or free fluid on imaging. As for cases of acute appendicitis, early diagnosis and appropriate treatment of EP is key to significantly reducing maternal morbidity and mortality as well as preserving fertility.[8,9]

Laparoscopy is a useful tool for determining surgical or gynecological causes for abdominal pain.[7] Uterine manipulators such as ZUMI may be used to facilitate the identification of pelvic anatomy and any dissection required to improve exposure. Their use has not shown to increase operative complications,[9] although the accepted practice is to avoid use in patients who may have an ongoing IUP.[10]

Given the presence of free fluid and the absence of an IUP on the ultrasound in our patient coupled with worsening pain, a diagnostic laparoscopy was a reasonable choice to exclude an EP with a view to proceeding to salpingectomy if the diagnosis was confirmed. Unfortunately, because other causes of her symptoms had been overlooked, both a uterine sound and ZUMI were inserted before an intraoperative diagnosis being made. The ZUMI was removed as soon as she was diagnosed with a ruptured appendix.

There are several possible reasons why the manipulator did not affect the pregnancy. It is remotely possible that the conceptus was delayed in the tube although 80% of successful pregnancies are thought to implant between 8 and 10 days after conception.[11] Therefore, at 4 weeks 5 days amenorrhea in a patient with regular cycles, the conceptus would be expected to already be in the uterus at the time of surgery, but the implantation site would probably be small and could be missed.

In a similar case, Yamasaki *et al*. reported the use of a uterine manipulator during a laparoscopic ovarian cystectomy in a patient who denied any possibility of pregnancy when the surgery was performed at 4 weeks and 3 days amenorrhea. Six days later, she had a positive UPT and a TVUS confirmed a GS. Her postoperative and pregnancy course were uneventful, and she delivered a healthy baby.[12] Case reports from Fielding *et al*. and Ricciotti *et al*. reported successful pregnancy outcomes despite termination of pregnancy (TOP) at early gestations; which suggested that the earlier the pregnancy, the greater the possibility that the uterine contents will be missed at TOP with the risk of failure being 6 times greater at 6 compared to 9-week gestational age.[13,14]

ZUMI insertion in early pregnancy can be likened to the mechanical intervention on early-stage/developing embryos during pre-implantation genetic diagnosis or chorionic villous sampling (CVS), both of which are acceptable practices. The blastocyst can be relatively resistant to controlled physical manipulation although there are studies reporting higher rates of fetal loss and limb defects following

CVS before 10 weeks.[10,15] Our patient's baby had no obvious anomalies.

Similarly, comparisons can be made between the mechanical intervention of intraoperative ZUMI insertion in early pregnancy and the effects of copper intrauterine device (Cu-IUD) inserted for emergency contraception, usually within 5 days of ovulation before implantation or within 120 h of unprotected coitus.[11,16-18] The presence of a Cu-IUD is thought to cause a local inflammatory response, leading to spontaneous abortion and/or preterm labor.[17-19] However, there are reports of continuing pregnancy despite the presence of a Cu-IUD. Fulcheri *et al*. reported that if the embryo becomes firmly attached during the 1st weeks of gestation, despite the Cu-IUD, the pregnancy usually continues to term.[20-22]

ZUMI manipulation would be anticipated to represent an even shorter term disturbance to the early embryo than a Cu-IUD inserted as emergency contraception. Moreover, as it is made of an inert material, it is less likely to cause a local reaction.

This case may provide useful insights into inadvertent uterine manipulation in early pregnancy on which there is not much available in the literature. In this report, we describe a case of complicated appendicitis in very early pregnancy where the patient fortuitously ended with a full-term healthy pregnancy despite undergoing a diagnostic laparoscopy with inadvertent uterine manipulation.

Nonetheless, we hope that this case serves as a caution to clinical evaluations of abdominal pain in patients of childbearing years.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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