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Rudimentary Horn Pregnancy: Early Diagnosis and Optimal Management of a Rare Obstetric Emergency

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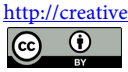

Abstract

Rudimentary horn pregnancy is a rare and high-risk form of ectopic pregnancy, often linked to Müllerian duct anomalies. Early diagnosis and timely intervention are critical to prevent life-threatening complications such as uterine rupture. We report the case of a 31-year-old nulligravida presenting with progressive left-sided pelvic pain and two months of amenorrhea. Transvaginal ultrasonography identified an 8-week gestation within a non-communicating rudimentary horn, measuring 4.5 cm × 3.2 cm with a myometrial thickness of 3 mm at the thinnest segment, prompting urgent surgical management. The patient underwent successful resection of the rudimentary horn and ipsilateral salpingectomy, with no postoperative complications. Histopathological findings confirmed the diagnosis. This case highlights the importance of early imaging and prompt surgical intervention in managing this rare condition, emphasizing the need for long-term obstetric follow-up to ensure optimal outcomes in future pregnancies.

Subject Areas

Gynecology & Obstetrics

Keywords

Ectopic Pregnancy, Rudimentary Uterine Horn, Uterine Malformation, Surgical Management, Ultrasound Diagnosis, Uterine Rupture

1. Introduction

Rudimentary horn pregnancy is an exceedingly rare and life-threatening form of ectopic pregnancy, resulting from congenital Müllerian duct anomalies. These

anomalies, which occur in approximately 3% - 4% of women, arise from incomplete fusion or developmental failure of the Müllerian ducts during embryogenesis, specifically due to failed canalization of the Müllerian duct between the 8th and 12th weeks of gestation, leading to a unicornuate uterus with a rudimentary horn [1]. Approximately 83% of rudimentary horns are non-communicating, predisposing them to ectopic implantation, with an estimated incidence of 1 in 76,000 to 1 in 150,000 pregnancies. **Recent meta-analyses suggest only 20% of cases are diagnosed before rupture, underscoring diagnostic challenges** [2].

This condition is particularly perilous due to the high risk of uterine rupture, attributed to the rudimentary horn's insufficient myometrial thickness **(typically <5 mm)** and inability to support gestational growth. Rupture most frequently occurs during the second trimester, often resulting in life-threatening hemoperitoneum and posing significant risks to both maternal and fetal survival [3]. Despite its rarity, rudimentary horn pregnancy represents a critical obstetric emergency, necessitating prompt diagnosis and intervention to prevent catastrophic outcomes.

Early diagnosis remains challenging due to the nonspecific nature of initial symptoms, such as abdominal pain or amenorrhea. Advances in imaging modalities, particularly transvaginal ultrasonography and magnetic resonance imaging (MRI), have significantly improved diagnostic accuracy, enabling timely and effective management [4]. Transvaginal ultrasonography serves as the first-line diagnostic tool, **with a sensitivity of 40% - 70% for rudimentary horn pregnancy**, while MRI is reserved for complex cases to confirm the diagnosis and guide surgical planning. **Three-dimensional ultrasound has emerged as a valuable adjunct for assessing myometrial integrity** [5].

Definitive treatment involves surgical resection of the rudimentary horn, with laparoscopy being the preferred approach in hemodynamically stable patients. However, in cases of significant hemorrhage or hemodynamic instability, laparotomy remains the procedure of choice. **Emerging data suggest that select cases may be managed with methotrexate, though this remains investigational** [6]. Early intervention is crucial, as delayed management can lead to severe maternal morbidity or mortality.

This case report highlights the diagnostic and therapeutic challenges associated with rudimentary horn pregnancy and underscores the importance of early recognition and intervention. By presenting this rare clinical entity, we aim to contribute to the existing literature, emphasizing the need for heightened clinical awareness and standardized management protocols to optimize maternal outcomes.

2. Case Presentation

We present the case of El-H, a 31-year-old nulligravida woman with no significant medical or surgical history. There was no history of pelvic inflammatory disease, endometriosis, tubal surgery, use of assisted reproductive technologies, intrauterine device placement, or smoking. The patient presented with progressively worsening left-sided pelvic pain **(VAS score: 7/10)** associated with two months of amenorrhea,

which led to her seeking medical evaluation.

On clinical examination, the patient was alert and hemodynamically stable, with normal vital signs: blood pressure of 120/80 mmHg, heart rate of 92 bpm, and normal body temperature. Gynecological examination revealed uterine tenderness on mobilization without vaginal bleeding or palpable masses. Abdominal examination indicated localized tenderness in the left iliac fossa without guarding or rebound tenderness.

Laboratory investigations confirmed pregnancy with positive beta-hCG levels. Other parameters, including complete blood count, C-reactive protein, and coagulation profile, were within normal limits.

Figure 1. Progressive ectopic pregnancy at 8 weeks of gestation.

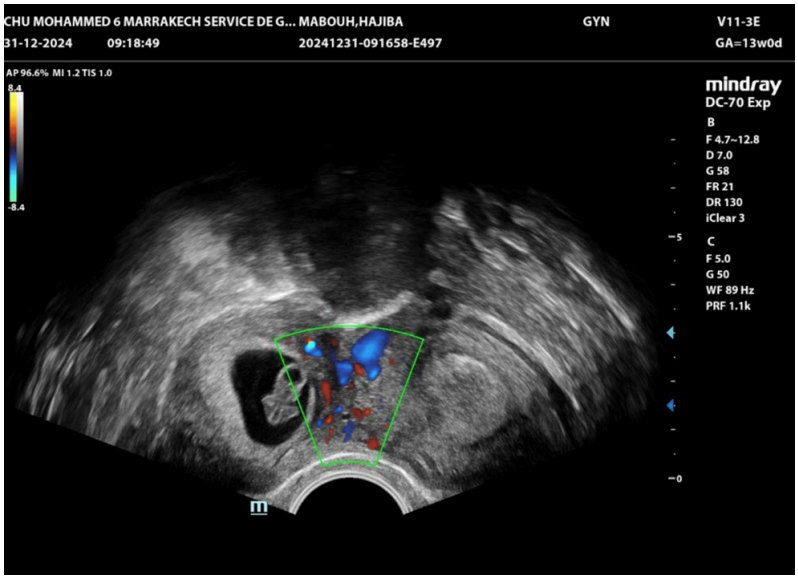

Figure 2. Rudimentary horn pregnancy with active trophoblastic vascularization on color Doppler.

Pelvic ultrasonography identified a unicornuate uterus with a non-communicating rudimentary horn on the left, containing an 8-week viable gestation **(measuring 2.2 cm in diameter) with a myometrial thickness of 3 mm at the implantation site** (Figure 1). Doppler imaging demonstrated active trophoblastic vascularization and fetal cardiac activity. No free fluid was observed in the pelvis or the Douglas pouch, and the contralateral fallopian tube appeared normal (Figure 2).

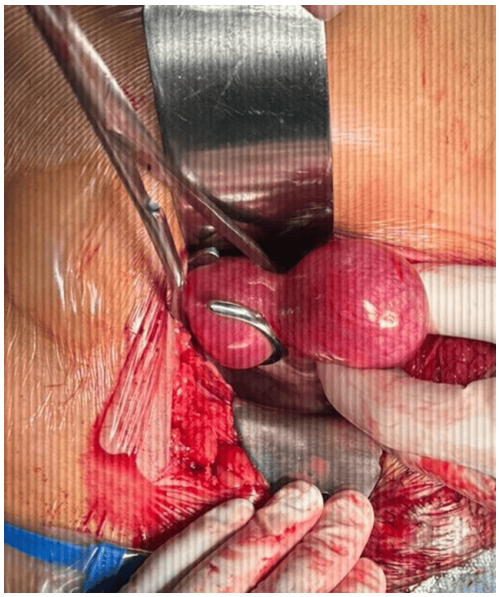

Figure 3. Surgical exposure of a rudimentary horn pregnancy.

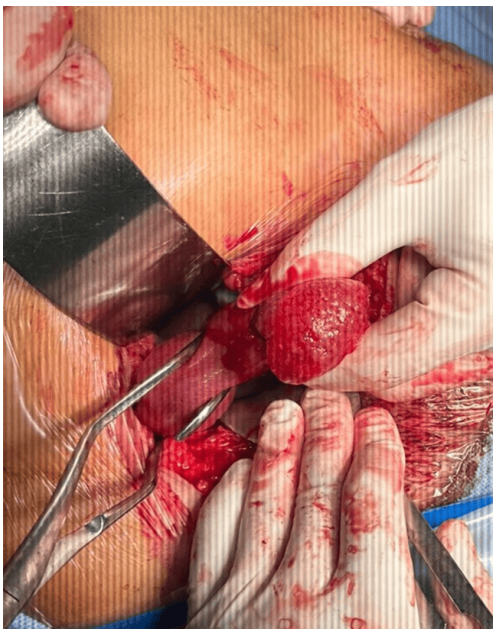

Figure 4. Extirpation of the conception product.

Given the imminent risk of uterine rupture, emergency surgical intervention was indicated. The procedure was performed under general anesthesia through a

mini Pfannenstiel incision. Intraoperative exploration revealed a normal-sized unicornuate uterus with a rudimentary left horn **(4.5 cm × 3.2 cm with focal myometrial thinning to <2 mm)** (Figure 3). An incision was made at the level of the rudimentary horn, and the conception products were successfully extracted (Figure 4). This was followed by complete resection of the rudimentary horn and an ipsilateral salpingectomy (Figure 5). **Hemostasis was achieved using interrupted polyglactin 910 sutures (Vicryl).** The procedure was carried out without complications, and the incision was closed in layers. The patient's postoperative recovery was uneventful (Figure 6).

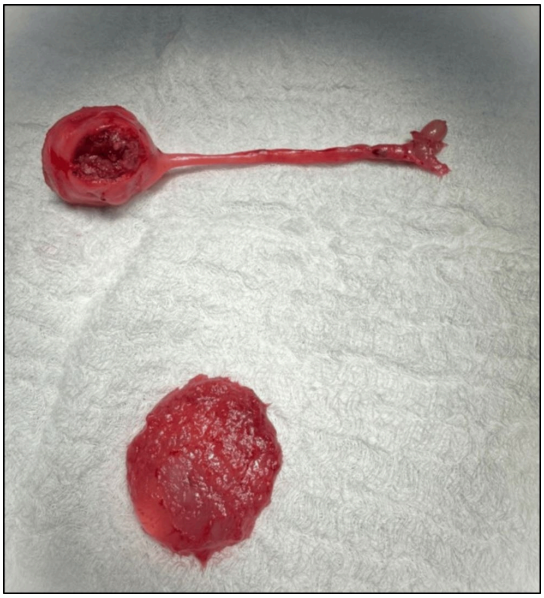

Figure 5. Excised ectopic pregnancy specimen with gestational sac and tubal structures.

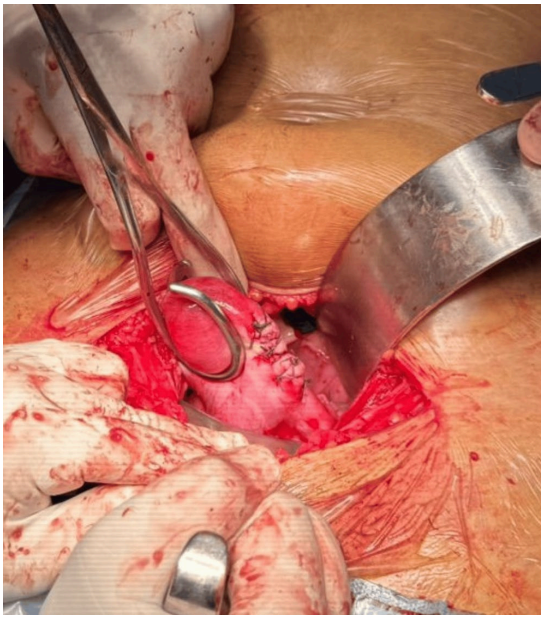

Figure 6. Postoperative view after achieving hemostasis.

Postoperative management included **prophylactic enoxaparin (40 mg/day for 7 days)**, **cefazolin 2g IV every 8 hours for 48 hours**, and analgesics. The conception products were sent for histopathological examination (Figure 7). The patient experienced a rapid recovery, with complete resolution of symptoms. Follow-up assessments confirmed the success of the intervention, and the patient was advised on the necessity of close obstetric surveillance in subsequent pregnancies **with mandatory cesarean delivery recommended**.

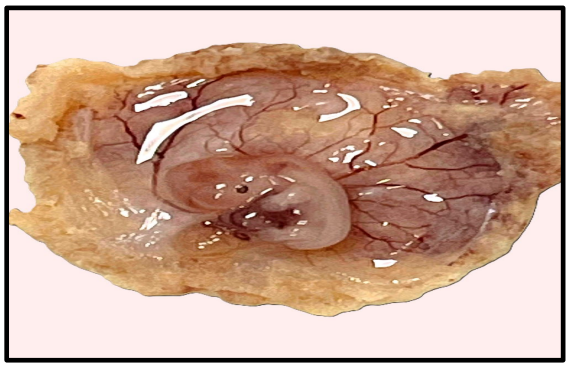

Figure 7. Macroscopic examination of conception products.

3. Discussion

The management of rudimentary horn pregnancy relies on a combination of early diagnosis and prompt surgical intervention to prevent life-threatening complications. Although transvaginal ultrasonography is the first-line diagnostic tool, its limited sensitivity (approximately 40%) may necessitate the use of magnetic resonance imaging (MRI) in complex cases [7] [8]. In this case, transvaginal ultrasound successfully identified an 8-week gestation within a non-communicating rudimentary horn, **with precise measurements of myometrial thickness (3 mm) guiding the urgency of intervention**, highlighting its critical role in early diagnosis. However, as demonstrated in the literature, MRI remains a valuable adjunct for confirming the diagnosis and planning surgical management, particularly in cases where ultrasound findings are inconclusive. **Three-dimensional ultrasound may further improve preoperative assessment of myometrial integrity** [9] [10].

Surgical intervention is the cornerstone of management, with resection of the rudimentary horn and ipsilateral salpingectomy being the gold standard. This approach not only prevents uterine rupture but also reduces the risk of recurrence [11] [12]. In hemodynamically stable patients, laparoscopy is preferred due to its lower morbidity and faster recovery [13]. However, in cases where laparoscopy is unavailable, or in the presence of massive hemorrhage or hemodynamic instability, laparotomy remains the procedure of choice to ensure rapid and effective control of bleeding [14]. **In our case, the Pfannenstiel incision provided optimal exposure while minimizing postoperative pain**.

The long-term implications of this condition require careful consideration. Patients should be informed of the increased risk of uterine rupture in future

pregnancies and require rigorous obstetric monitoring. A thorough evaluation of the contralateral fallopian tube and uterine cavity is essential before planning subsequent pregnancies. Planned cesarean delivery is recommended to minimize risks, as vaginal delivery may pose significant dangers due to the potential for uterine rupture [15]. Maternal mortality associated with rudimentary horn pregnancy has significantly declined over the decades, from 23% in the early 20th century to less than 0.5% today, thanks to advances in diagnostic and surgical techniques [16]. Nevertheless, fertility prognosis and recurrence risk depend largely on the condition of the contralateral tube, underscoring the importance of comprehensive preoperative assessment [17].

Emerging therapies, such as localized methotrexate injection, offer promising alternatives for the management of selected cases of rudimentary horn pregnancy. These approaches may be particularly beneficial for patients wishing to preserve fertility, although further research is needed to evaluate their safety and efficacy [18]. Additionally, the use of three-dimensional ultrasound and advanced imaging techniques has improved diagnostic accuracy, enabling better preoperative planning and reducing the risk of complications [19] [20].

In summary, rudimentary horn pregnancy is a rare but potentially catastrophic condition that necessitates a multidisciplinary approach for optimal management. Early diagnosis, timely surgical intervention, and meticulous long-term follow-up are essential to ensure favorable maternal and fetal outcomes. Increased awareness among clinicians and the implementation of standardized management protocols are crucial for reducing the morbidity associated with this rare obstetric emergency.

4. Conclusions

Rudimentary horn pregnancy represents a life-threatening obstetric emergency that demands heightened clinical vigilance and prompt intervention. This case underscores the critical role of advanced imaging techniques in achieving an accurate diagnosis and highlights the importance of a multidisciplinary approach to optimize patient outcomes. By sharing this case, we aim to contribute to the growing body of literature on this rare condition and advocate for improved diagnostic tools and standardized management protocols.

Long-term follow-up and careful obstetric monitoring are indispensable for ensuring safe outcomes in future pregnancies. Furthermore, future research should focus on exploring emerging therapies, such as localized methotrexate injection, to expand treatment options and improve outcomes for patients with this rare condition. Increased awareness among healthcare providers and continued advancements in diagnostic and therapeutic strategies are essential to further reduce the morbidity and mortality associated with rudimentary horn pregnancy.

Conflicts of Interest

The authors declare no conflicts of interest.

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