



## Unruptured retroperitoneal pregnancy implanted in the left broad ligament: A case report

### Nerupturirana retroperitonealna trudnoća u levom širokom ligamentu

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#### Abstract

**Introduction.** Retroperitoneal ectopic pregnancy is extremely rare, but potentially fatal condition due to possible massive hemorrhage, representing a great challenge to clinicians. **Case report.** We presented early retroperitoneal pregnancy in a patient with previous caesarean section, diagnosed at the sixth gestational week, located in the left broad ligament, primary treated by laparoscopy, which had to be converted to laparotomy due to massive intraoperative bleeding from the implantation site. **Conclusion.** High index of suspicion, combined with carefully interpreted clinical and ultrasound findings are crucial for the timely diagnosis of retroperitoneal pregnancy, before the occurrence of severe bleeding. The rising, even plateau of serum  $\beta$ -human chorionic gonadotropin ( $\beta$ -HCG) levels without identification of uterine or ectopic (tubal) pregnancy should cause suspicion on ectopic pregnancy in unusual location.

#### Key words:

pregnancy, ectopic; retroperitoneal space; laparoscopy; intraoperative complications; gynecologic surgical procedures.

#### Apstrakt

**Uvod.** Retroperitonealna ektopična trudnoća je krajnje retko, ali moguće fatalno stanje zbog masivne hemoragije i predstavlja veliki izazov za kliničara. **Prikaz bolesnika.** Prikazali smo ranu retroperitonealnu trudnoću kod pacijentkinje sa carskim rezom u anamnezi, dijagnostikovane u šestoj nedelji gestacije, lokalizovanu u *ligamentum latum* sa leve strane, primarno lečenu laparoskopski, pri čemu je načinjena konverzija u laparotomiju zbog masivnog intraoperativnog krvarenja sa mesta implantacije. **Zaključak.** Da bi se na vreme postavila dijagnoza retroperitonealne trudnoće, pre pojave obilnog krvarenja, neophodno je da se ima na umu ova mogućnost i pažljivo interpretira klinički i ultrazvučni nalaz. Nivoi  $\beta$ -humanog horionskog gonadotropina ( $\beta$ -HCG) u serumu koji rastu ili održavaju plato, a da nije identifikovana trudnoća u uterusu ili vanmaterična u jajovodu, treba da navedu na pomisao da se radi o ektopičnoj trudnoći neuobičajene lokalizacije.

#### Ključne reči:

trudnoća, ektopična; retroperitonealni prostor; laparoskopija; intraoperativne komplikacije; hirurgija, ginekološka, procedure.

#### Introduction

Retroperitoneal pregnancy is a very rare form of ectopic pregnancy. It could be the result of primary retroperitoneal implantation with enigmatic pathogenesis or secondary following tubal rupture in the broad ligament. In modern literature there are less than 25 well-documented cases of primary retroperitoneal pregnancy<sup>1,2</sup>.

We presented a primary retroperitoneal pregnancy implanted in the left broad ligament.

#### Case report

A 21-year-old *gravida 1, para 1*, was admitted into our clinic due to a 6-week history of amenorrhoea, lower abdo-

minal pain and vaginal bleeding. Ectopic gravidity was suspected. Before 18 months the patient had term caesarean delivery performed due to breech presentation, oligoamnion and dystocia followed by an uneventful postoperative course. The women was otherwise healthy, had no history of pelvic inflammatory disease and use of intrauterine devices. Her menarche occurred at 12 and menstrual cycles were regular.

On admission the patient was hemodynamically stable. Examination of her cardiac and respiratory systems was unremarkable. Her abdomen was soft, but with mild inguinal tenderness on the left side. A speculum examination indicated the presence of a single cervix with scarce bleeding from external os and no other pathological findings. Bimanual pelvic examination revealed the slightly enlarged soft uterus

and a tender palpable mass about 4 cm in diameter, on the left adnexal region. Transvaginal ultrasound examination (Toshiba Nemio XG, 6 MHz) showed the empty uterus with 5 mm endometrial strip (Figure 1). A round cystic mass,  $4 \times 3 \times 2$  cm in diameter, filled with heterogeneous content and hypoechogenic structure inside, like gestational sac without fetal pole, 1 cm in diameter, was seen just behind the uterine corpus, on the left side (Figure 2). Color Doppler examination revealed reach vascularisation, with the typical “ring of fire”, low resistance blood flow around the described mass (Figure 3). Both ovaries appeared sonographically normal with *corpus luteum* on the left ovary. There was no intraperitoneal fluid in the pouch of Douglas. Her laboratory results were as follows: white blood cells (WBC)  $12.8 \times 10^9/L$ , red blood cells (RBC)  $4.48 \times 10^{12}/L$ , Hb 123 g/L, hematocrit (Ht) 37.5, platelets (PLT)  $368 \times 10^9/L$ . Serum electrolytes, coagulation profile and liver function tests were all within physiological limits. At the day of admission her serum  $\beta$ -human chorionic gonadotropin ( $\beta$ -HCG) level (Abbott test; Architect-Total- $\beta$ -HCG) was 28.643 mU/mL and

the next day quantitative  $\beta$ -HCG level decreased to 27,000 mU/mL. Ectopic gravidity was suspected and diagnostic laparoscopy was performed after the written informed consent was obtained.

Surgery was conducted under general anesthesia, induced by means of propofol as induction agent, fentanyl as an analgesic and rocuronium as a muscle relaxant. Anesthesia was maintained with 1–1.5% end-tidal sevoflurane in 50% : 50%  $O_2/N_2O$  mixture at 6 L/min flow. The lungs were ventilated to maintain end-tidal carbon dioxide concentration 30–35 mmHg.

Laparoscopy revealed that the omentum was in slight adhesions with anterior abdominal wall (adhesiolysis was immediately undertaken), the uterus was slightly enlarged and the round retroperitoneal mass, 3 cm in diameter, located in the left broad ligament, behind the left round ligament and the left Fallopian tube was superior (Figure 4). The overlying peritoneum was intact. The pouch of Douglas was empty.



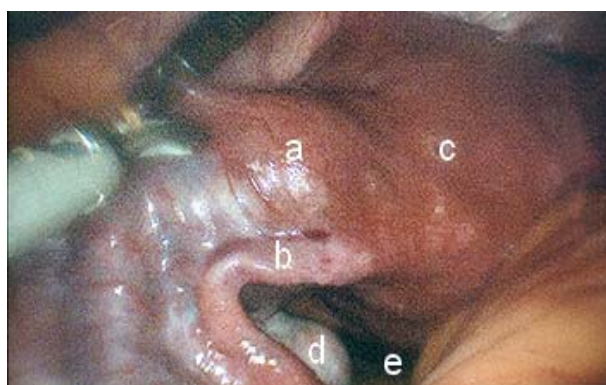
**Fig. 1 –** Ultrasound image of early retroperitoneal pregnancy in the left broad ligament, just behind the uterine corpus. The uterine cavity is empty.



**Fig. 2 –** Ultrasound image of early retroperitoneal pregnancy in the left broad ligament: a round cystic mass, filled with a heterogeneous content and the hypoechogenic structure inside, like a gestational sac without fetal pole.



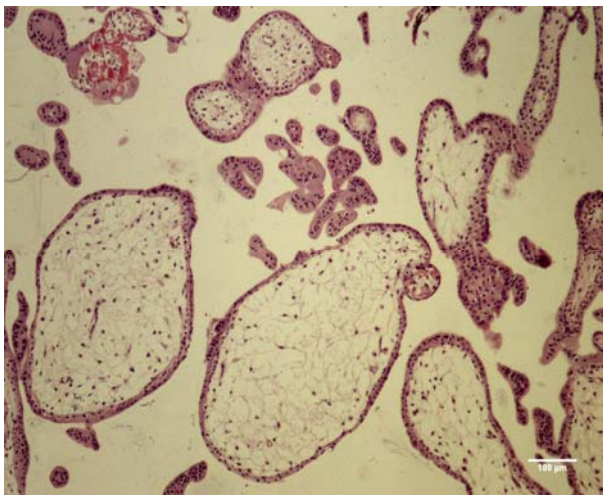
**Fig. 3 –** Retroperitoneal pregnancy in the left broad ligament: color Doppler examination revealed reach vascularisation with the typical “ring of fire”, low resistance blood flow around the described mass.



**Fig. 4 –** Laparoscopic finding of retroperitoneal pregnancy in the left broad ligament at the 6th gestational week: a) round retroperitoneal mass with the intact overlying peritoneum; b) the left Fallopian tube is superiorly, macroscopically normal in size and shape; c) the uterus is slightly enlarged; d) the part of the left ovary, without any pathological findings; e) the pouch of Douglas is empty.



dings. The *corpus luteum* was located on the left ovary. There was no bleeding from the fimbria bilaterally. The peritoneum was opened above the described mass using the ultracision, and evacuation of ovulatory tissue was started, but suddenly significant bleeding appeared and urgent laparotomy was immediately performed. There was about 500 mL of fresh blood in the abdomen. The bleeding was controlled by two finger digital compression of the left broad ligament and the remaining ovulatory tissue was removed. There were no macroscopic signs of communication or fistula between the described mass and the uterine cavity or the left Fallopian tube. Hemostasis was completed with hemostatic sutures and the abdomen was closed with drainage placed in the pouch of Douglas. Postoperative course was uneventful. Serum  $\beta$ -HCG levels decreased to 750 mU/mL two days after the surgery and became negative after seven days. The histopathology report confirmed ectopic gravidity (Figure 5).



**Fig. 5 – Histopathology report confirmed ectopic gravidity: chorionic villi (haematoxylin-eosin,  $\times 100$ ).**

### Discussion

The incidence of ectopic pregnancy is 0.25–1% of all pregnancies. More than 95% of all ectopic pregnancies are tubal pregnancies. The incidences of extratubal ectopic pregnancies are as follows: abdominal in 1.3%, ovarian and cervical in less than 1% of all ectopic pregnancies<sup>3</sup>. Retroperitoneal ectopic pregnancy, as a subcategory of abdominal pregnancy, is exceptionally rare. The true incidence of retroperitoneal pregnancy is unknown mainly due to false recognizing of abdominal pregnancies with trophoblast invasion as retroperitoneal<sup>1</sup>. The first report of retroperitoneal pregnancy was the case of the broad ligament ectopic pregnancy described almost two hundred years ago by Loschge<sup>4</sup>. Our own review of the literature (Medline data base, through electronic searches without language restriction) showed a total of 65 reported cases of retroperitoneal pregnancies during the last 57 years, with 26 well documented cases during the last 15 years (Table 1). The largest series of the broad ligament retroperitoneal pregnancies (62 cases) was reported by Champion and Tessitore<sup>6</sup> with the incidence of one in 183,900 pregnancies.

The sites of retroperitoneal ectopic implantation include the broad ligament, obturator fossa, areas around large retroperitoneal blood vessels, even the upper retroperitoneal space – attached to the head of pancreas and major blood vessels<sup>7–10</sup>. There have been also reports on broad ligament twin pregnancies<sup>11,12</sup> and heterotopic pregnancies involving the broad ligament and the uterus<sup>13</sup> or broad ligament and interstitial pregnancy<sup>14</sup>. Occurrence of partial hydatiform molla was also reported in intraligamentous pregnancy<sup>15</sup>.

The most often among retroperitoneal pregnancies is the one located in the broad ligament or intraligamentous pregnancy. The original anatomical relationships for diagnosing broad ligament ectopic pregnancy are: location of the uterus medially, the pelvic side walls laterally, the pelvic floor inferiorly and the Fallopian tube superiorly<sup>6</sup>. Recently, original criterions are fulfilled with the statement that overlying peritoneum should be intact in order to confirm the diagnosis of true retroperitoneal implantation<sup>1</sup>. Our reported case fulfills all the mentioned criteria.

Retroperitoneal ectopic implantation could appear after spontaneous conception<sup>1,4,8,11,16–26</sup>, intrauterine insemination<sup>27</sup> or after *in vitro* fertilization/pre-embryo transfer (IVF/ET)<sup>2,7,28</sup> (Table 1). Intrauterine device (IUD) *in situ* was found in 8% of abdominal pregnancies, so it is speculated that IUD could be a factor contributing to the development of abdominal pregnancy<sup>29</sup>.

Retroperitoneal pregnancy could be the result of primary retroperitoneal implantation or secondary following tubal rupture or trophoblast invasion in the broad ligament. There is also the possibility of primary interstitial and secondary retroperitoneal pregnancy<sup>20</sup>.

The pathogenesis of primary retroperitoneal pregnancy is quite obscure. It seems that in the majority of cases, primary retroperitoneal implantation could appear after uterine or tubal surgery that could develop a communication in the retroperitoneal space resulting with the passage of fertilized ovum after spontaneous conception or after IVF/ET (Table 1). The fistulous tract could be developed after termal injury during laparoscopic salpyngectomy<sup>1</sup>, after classical salpyngectomy or salpingoophorectomy or due to inappropriate healing of the uterine wall after cesarean section<sup>16,30</sup>. Spontaneous migration of the embryo from the uterus to the retroperitoneal space through these communications could result in retroperitoneal pregnancy.

There is also the possibility of false passage during embryo transfer and placement of embryos into the retroperitoneal space in cases of retroperitoneal pregnancies after IVF/ET<sup>7,28</sup>.

The theory of spontaneous migration of the embryo from the uterus to the retroperitoneal space along lymphatic channels was based on findings of trophoblast surrounded by lymphatic tissue<sup>10,31</sup>. The contrast-enhanced computed tomography was used to demonstrate the route of embryo migration in retroperitoneal ectopic pregnancy providing further evidence in support of the proposed embryo migration mechanism *via* lymphatic vessels<sup>32</sup>.

**Table 1**  
**Summarized cases of retroperitoneal pregnancies reported in the last 15 years**

Authors	History (previous surgery)	Duration of amenorrhoea / conception	Site of implantation	Treatment
Rama et al. (2015) <sup>16</sup>	caesarean section before 18 months	12 weeks / spontaneous	right broad ligament	laparotomy
Protopoulos et al. (2014) <sup>1</sup>	laparoscopic right salpingectomy for EP	6 weeks / spontaneous	right broad ligament	laparoscopy
Salomón et al. (2013) <sup>48</sup>	curetage	15 weeks live / spont.	right broad ligament	laparotomy
Sagili et al. (2013) <sup>17</sup>	unknown	20 weeks / spontaneous	broad ligament	MTX / laparotomy
Rudra et al. (2013) <sup>30</sup>	caesarean section before 4 years	39 weeks non viable fetus	right broad ligament	laparotomy
Singh et al. (2012) <sup>41</sup>	bilateral tubal laparo-ligation	36 weeks live birth	right broad ligament	planned cs
Yoon et al. (2012) <sup>18</sup>	no surgery	5 weeks 2 days / spont.	between the IVC and ureter.	laparotomy
Martinez-Varea et al. (2011) <sup>27</sup>	no surgery	6 weeks / after IUI	next to left uterosacral lig.	laparoscopy
Seekin et al. (2011) <sup>19</sup>	unknown	39 weeks live birth / spont.	broad ligament	planned cs
Persson et al. (2010) <sup>10</sup>	-	-	right obturator fossa	laparoscopy
Miličević et al. (2010) <sup>20</sup>	no surgery	* / spontaneous	**	laparotomy
Okorie et al. (2010) <sup>21</sup>	no surgery	6 weeks 5 days / spont.	close to the blood vessels	laparotomy
Abdul et al. (2008) <sup>22</sup>	right salpingo-oophorectomy	22 weeks / spontaneous	left iliac fossa	laparotomy
Abdul et al. (2008) <sup>22</sup>	no surgery	6 months / spontaneous	right iliac fossa	laparotomy
Bae et al. (2009) <sup>49</sup>	laparoscopic right cornual resection	7 weeks 5 days	anterior aspect of IVC	laparoscopy
Lin et al. (2008) <sup>8</sup>	appendectomy	7 weeks / spontaneous	right obturator foramen area	laparotomy
Chang et al. (2008) <sup>23</sup>	no surgery	spontaneous	left para-colic sulcus	laparoscopy
Holzhaecker et al. (2008) <sup>24</sup>	no surgery	18 weeks / spontaneous	right intraligamentary	laparotomy
Apantaku et al. (2006) <sup>28</sup>	bilateral salpingectomy	following IVF	broad ligament	laparotomy
Corrino et al. (2006) <sup>25</sup>	left salpingo-oophorectomy	spontaneous	left broad ligament	laparotomy
Lee et al. (2005) <sup>26</sup>	no surgery	6 weeks / spontaneous	left para-aortic region	laparotomy
Stow et al. (2004) <sup>5</sup>	unknown	10 weeks / spontaneous	right broad ligament	laparoscopy
Reid and Steel (2003) <sup>2</sup>	bilateral salpingectomy for EP	53 day / after IVF	bifurcation of the common IA	laparotomy
Phupong et al. (2003) <sup>30</sup>	two caesarean section	11 weeks	right broad ligament	laparotomy
Dmowski et al. (2002) <sup>7</sup>	bilateral salpingectomy	41 day after IVF/ET	the head of pancreas	laparotomy
Phupong et al. (2001) <sup>31</sup>	right salpingectomy	11 weeks / spontaneous	left broad ligament, twin	laparotomy

Abbreviations: \* discovered in the 18th week, laparotomy in the 39th week, viable fetus; \*\* primary interstitial and secondary intraligamentous; EP – ectopic pregnancy; MTX – methotrexate; IA – iliac artery; IVC – inferior vena cava; IVF – *in vitro* fertilization; ET – embryo transfer; IUI – intrauterine insemination; spont. – spontaneous; planned cs – planned caesarean section.

In the case we reported here, lymphatic tissue was not found around the trophoblast, even after careful histopathological examination, so we speculate that the development of the described left broad intraligamentous pregnancy could be explained by spontaneous migration of the embryo from the uterus to the retroperitoneal space through the microscopic fistulous tract caused by inappropriate healing of the uterine wall after the previous caesarean section. Still, we could not exclude with the certainty the possibility of embryo migration *via* lymphatic vessels, taking into account the localization of described retroperitoneal pregnancy.

The preoperative diagnosis of retroperitoneal pregnancy represents the challenge for clinicians. In fact, in the most cases, the diagnosis is made during surgery.

Maternal morbidity and mortality associated with abdominal, especially retroperitoneal, pregnancies could be reduced by early diagnosis. Transvaginal ultrasound examination is the main tool in the diagnostic of an early abdominal (and retroperitoneal) pregnancy. The proposed criteria are: the absence of an intrauterine gestational sac; the absence of tubal dilatation or complex adnexal mass; a gestational sac surrounded by loops of the bowel and separated from the uterus; and a wide mobility of the gestational sac<sup>33,34</sup>. In fact, sonographic appearance of an early retroperitoneal pregnancy depends on its location. Usually it is fixed deep within the pelvis and not mobile as pregnancy in the non-communicating horn of the unicornuate uterus (cornual pregnancy)<sup>35</sup>. The absence of communication between gestational sac and endometrial cavity differentiates the retroperitoneal broad ligament pregnancy from the pregnancy in non-communicating horn of the unicornuate uterus (cornual pregnancy) and interstitial ectopic pregnancy<sup>35</sup>, which was also the truth in the case we reported here. The absence of myometrial layer around this retroperitoneal broad ligament pregnancy differentiates it from interstitial pregnancy. If early retroperitoneal pregnancy is located outside the pelvis, transvaginal ultrasound examination is helpless, and other diagnostic tools, as magnetic resonance imaging (MRI) and other imaging techniques, must be applied.

The suspicion is crucial for the timely diagnosis of retroperitoneal ectopic pregnancy. Rising  $\beta$ -HCG levels, or plateau, without identification of uterine or ectopic (tubal) pregnancy should cause suspicion on ectopic pregnancy in unusual location. In case we reported here, the diagnosis of ectopic pregnancy was made when the patient was still hemodynamically stable, so we opted for laparoscopic treatment during which the definitive diagnosis of left broad ligament pregnancy was confirmed.

The treatment of retroperitoneal pregnancy also represents a great challenge for clinicians. The most of retroperitoneal pregnancies are diagnosed and removed during the early stages of gravidity, but there are reports on broad ligament pregnancies with viable term fetuses<sup>19, 20, 30, 36-41</sup>, even *post term*<sup>42</sup>.

The great majority of such cases are discovered on surgery for caesarean section.

In spite of many reports on abdominal pregnancies with viable fetuses advanced to term, the risk for the mother is

still very high, especially in cases of retroperitoneal pregnancies with the close proximity to large vessels. Immediate surgery is indicated for abdominal pregnancies prior to 23 to 24 weeks because of the high incidence of maternal morbidity and a poor prognosis for the fetus<sup>43</sup>.

Fetal anomalies or deformities (facial and cranial asymmetry, joint deformities, CNS anomalies) are associated problem in such pregnancies<sup>41</sup>. However, there is a reported case of successful secondary retroperitoneal pregnancy in which the diagnosis had been suspected during the 18th week, discarded due to lack of symptoms and advanced to term with normal course<sup>20</sup>.

The main concern with retroperitoneal pregnancy is associated with possible fatal bleeding due to the proximity of large blood vessels. This is also the possibility during the surgery after the attempt to remove the ectopic pregnancy. In the most of the reported cases laparotomy was the treatment. Nowadays, it seems that most unruptured early nontubal pregnancies could be managed laparoscopically. Laparoscopic treatment of ectopic pregnancy is minimally invasive procedure associated with lower cost, shorter hospital stay and faster recovery. However, the minority of reported cases of retroperitoneal pregnancies are treated laparoscopically. Laparoscopy is suitable for hemodynamically stable patients. Laparoscopic surgery has limitations as unnatural hand-eye coordination and impossibility to palpate the organs, especially retroperitoneal, but with improved skills that should not be a problem.

Hemorrhagy during surgery is the most serious complication. Laparoscopically, it could be controlled by instillation of vasopressin<sup>1</sup> or with bipolar electrodes, monopolar scissors and laparoscopic bowel grasper applied across the corneal edge of the uterus<sup>5</sup>, or with temporary occlusion of the right hypogastric artery by removable vessel clips to diminish the risk of bleeding complications<sup>10</sup>. There is also the possibility to apply stitches and close the implantation site inside the broad ligament to achieve hemostasis<sup>44</sup>. In spite of that, there is still the risk of massive intraoperative hemorrhage, which was also happened in the case of our patient, so laparoscopy had to be converted to laparotomy. It seems logical that the extent of intraoperative bleeding depends on the viability and vascularisation of retroperitoneal pregnancy. In the case of our patient, color Doppler ultrasound examination revealed reach vascularisation and the level of serum  $\beta$ -HCG before the surgery was high for ectopic pregnancy at 6th gestational week (over 20 000 mU/mL), both suggesting the vitality of pregnancy which could explain massive intraoperative hemorrhage. Histopathological examination excluded gestational trophoblast disease in the reported case, already extremely rare in ectopic pregnancy<sup>45</sup>, with the prevalence of 0.16 : 1000 deliveries<sup>46</sup>.

Preoperative use of methotrexate in cases of nonruptured retroperitoneal ectopic pregnancies could diminish intraoperative blood loss<sup>47</sup>. Medical treatment of retroperitoneal pregnancy with methotrexate was reported with variable success<sup>17, 21</sup>. In cases of ectopic tissue adherent around the major vessels, not removed *in toto*, methotrexate treatment is possible<sup>2</sup>.

## Conclusion

Retroperitoneal ectopic pregnancy is rare, but potentially fatal condition due to possible massive hemorrhage, representing a great challenge to clinicians. The early diagnosis and appropriate surgery are *conditio sine qua non* for successful treatment.

High index of suspicion, combined with carefully interpreted clinical and ultrasound findings are crucial for the timely diagnosis, before the occurrence of severe bleeding.

The rising even plateau of  $\beta$ -HCG levels without identification of uterine or ectopic (tubal) pregnancy should cause suspicion on ectopic pregnancy in unusual location.

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Received on July 23, 2015.

Revised on August 30, 2015.

Accepted on August 31, 2015.

Online First June, 2016.