

Maternal, Perinatal and Postpartum Outcomes Associated with Couvelaire Uterus

Vitaly Tskhay^{1,2*}, Elvira Grebennicova², Alina Zhurkina², Eraterina Levanova³ and Yulia Glizina³

¹Department of Perinatology, Obstetrics and Gynecology, Medical Faculty, Professor V. F. Voino-Yasenetsky Krasnoyarsk State Medical University, Krasnoyarsk, Russia

²Federal Siberian Scientific and Clinical Center- FMBA of Russia, Krasnoyarsk, Russia

³Krasnoyarsk Regional Clinical Center of Maternity and Childhood, Krasnoyarsk, Russia

***Corresponding Author:** Vitaly Tskhay, Department of Perinatology, Obstetrics and Gynecology, Medical Faculty, Professor V. F. Voino-Yasenetsky Krasnoyarsk State Medical University, Krasnoyarsk, Russia.

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Abstract

Placental abruption occurs when the placenta partially or completely separates from the wall of the uterus and complicates ~1% of pregnancies. It is associated with typical clinical features and a variety of risk factors. Couvelaire uterus is a rare condition diagnosed by a direct visualization of the uterus, with the effects of ecchymosed discoloration, secondary to extravasations of blood into the myometrium and serosa. Until recently, the typical practice in obstetrics with this pathology was the removal of the uterus. With regard to our experience, we have shown that in most clinical cases such type of uterus can be preserved when the blood loss is fully replenished, an effective correction of the hemostasis disorders is carried out and uterine contractility favors.

Keywords: Placental Abruption; COUVELAIRE Uterus; Obstetric Complications; Hysterectomy; Rare Condition; Perinatal Outcomes

Introduction

Couvelaire uterus is a serious accident in the second stage of pregnancy and at birth, frightening condition for the mother and fetus that often lead to death. This phenomenon is a clinical entity known as Couvelaire uterus, so named because it was first described by French physician Alexandre Couvelaire in the early 20th century as “uteroplacental apoplexy” [1]. Its incidence is difficult to estimate because it has classically been diagnosed only by direct intraoperative visualization [2]. It is estimated that Kuveller’s uterus complicates 5% of all cases of placental abruption [3].

The pathological mechanism presumes conditions for a “special ground” capital for the “efficiency” of the acute intradecidual vascular accident with the rupture of the uterus-placental arterioles. The complete clinical picture of this severe form of retro placental hematoma - the placental abruption, observed and mentioned by the classics (vascular drama of Couvelaire) consists of five syndromes, 18 signs and symptoms. The rate of incidence of retroplacental hematoma is in between 0,13 - 1,38% [4].

Risk factors for premature placental abruption (PPA), including those leading to the development of the Couvelaire uterus, are well known, they should include previous placental abruption, smoking, trauma, cocaine use, multiple pregnancies, polyhydramnios, hypertension, preeclampsia, thrombophilia, late reproductive age of the mother, intrauterine infections [5-7].

Classic clinical features of PA include abdominal pain, vaginal loss (blood or bloody amniotic fluid), tender uterus present between contractions and increased uterine tone, classically described as a «woody uterus» [8,9]. According to the data from the New Jersey-Placental

Abruption study, the most common indication leading to a clinical diagnosis of abruption was retroplacental clot(s) or bleeding (77.1%), followed by vaginal bleeding with uterine hypertonicity (27.8%) and vaginal bleeding with non-reassuring fetal status (16.1%) [10].

Aim of the Research

To study clinical characteristics, risk factors for uteroplacental apoplexy, complicating severe placental abruption, pregnancy outcome for mother and fetus.

Materials and Methods

A retrospective analysis was carried out of all cases of premature placental abruption in which Couvelaire uterus appeared, registered at the Krasnoyarsk Regional Perinatal Center (Center for Maternal and Child Health, Krasnoyarsk, Russia) for the period between January 1, 2018 to October 30, 2022. All data for analysis were obtained from medical records of the patients. Such indicators of the mother as the area of placental abruption, the volume of blood loss, laboratory blood parameters, the total volume of infusion therapy, the number of transfused blood products, the frequency of hysterectomies were researched. Perinatal indicators such as antenatal fetal death, the presence and severity of asphyxia and fetal assessment on the Apgar scale were considered.

Research Outcomes

Among the known risk factors of the PPA, the distribution was as follows: kidney disease - 22.2% (4), arterial hypertension - 11.1% (2), preeclampsia - 11.1% (2), multiple pregnancy and large fetus - 11.1% (2), diabetes - 11.1% (2), thrombophilia - 11.1% (2), age over 40 years - 11.1% (2). Abdominal trauma was not noted among the causes of placental abruption.

N	Name	Indicators							
		Age (years)	Childbirth parity	Gestational age (weeks)	The area of abruption (%)	Volume of blood loss (ml)	Weight of newborn (g.)	Fetal APGAR scale for 1/5 min (points)	Fetal condition
	GEN	24	3	37	100	3400	2900	-	AFD
	BLA	31	4	22	100	2500	400	-	AFD
	KNA	37	2	38	30	2600	3300	-	AFD
	CSS	27	3	26	100	1800	500	-	AFD
	DAV	24	1	38	100	2500	2360	-	AFD
	KSA	40	3	38	100	3200	3180	-	AFD
	FUA	30	2	40	30	2500	3680	6/8	MA
	BSE	22	3	30	100	1500	1370	-	AFD
	RPV	19	1	35	75	3500	2070	1/5	SA
	ZNG	36	4	34	50	2000	2270	1/6	SA
	SES	36	2	35	25	1300	2880	6/7	MA
	RVS (MP)	21	1	36	50	2500	2570 2690	8/8 8/8	Normal
	MNS	29	2	35	30	1300	2710	7/9	Normal
	KEA	23	1	38	30	700	2490	8/8	Normal
	PM	32	2	34	100	2000	2200	1/3	SA
	CKE	21	2	30	30	1200	1250	-	AFD
	ENV (MP)	38	4	27	100 100	1500	1100 990	3/6 3/5	SA SA
	ZEG	40	3	38	50	1500	1990	1/3	SA

Table 1: Anamnestic and intraoperative data of patients with COUVELAIRE uterus.

Note: AFD: Antenatal Fetal Death; MA: Moderate Asphyxia; SA: Severe Asphyxia; MP: Multiple Pregnancy.

The average gestation period at which PPA occurred was 33.6 (from 22 to 40 weeks), while in most cases (13/18) PPA was observed in late pregnancy - after 34 weeks, which was 72.22%. The proportion of early preterm births that ended in PPA at 22 - 30 weeks gestation was only 27.77%.

Antenatal fetal death was noted in 38.8% of cases (7/18), in 27.7% of cases (5/18) child was born with severe asphyxia, in 11.1% of cases - in a condition of moderate asphyxia. Generally, antenatal fetal death is associated with total placental abruption and delayed timing of the operation.

The development of Couvelaire uterus was characterized by a large area of placental abruption from the uterine wall and the formation of a retroplacental hematoma. The average area of abruption in our practice accounted 66.66% (from 25 to 100%). Total blood loss, including preoperative and intraoperative, was massive in most cases (14/18) and averaged 2083.33 (from 1500 to 3500) ml (Table 1). The assessment of blood loss during the operation was carried out by collecting blood into measuring containers (in most cases, a Sal Saver blood reinfusion device was used). Additionally, in all cases, the gravidometric method of calculating blood loss was used (the technology of weighing surgical material - sheets and underwear). The fact of massive blood loss is confirmed by the data of laboratory parameters determined both during the operation and in the early postoperative period (Table 2). A decrease in hemoglobin level was common - an average value of 71.1 g/l (from 30 to 102), a decrease in hemotocrit level - an average value of 22.1% (from 12.9 to 31), a decrease in platelet level - an average value of 119.7 thousand. Units/ul (from 32 to 193), a decrease in the level of fibrinogen - an average value of 2.7 g/l (from 0.8 to 4.2). Such a large blood loss required its replenishment in large volumes, including transfusion of erythrocyte mass, freshly frozen blood plasma, cryoprecipitate (Table 2).

N	Indicator						
	Hb level (g/l)	Ht level (%)	Platelets level (thsd units/ul)	Level of fibrinogen (g/l)	Total transfusion volume (ml)	Transfused blood products (ml)	Methods of surgical hemostasis
1	49	20.3	32	2.1	Not specified	RCM- 1705 FFP- 2385	GE
2	30	16.3	70	1.2	Not specified	RCM- 2100 FFP- 2400	GE
3	75	22.2	53	3.7	Not specified	RCM- 800 FFP- 1600	GE
4	61	19.5	153	1.8	2425	RCM- 925	Not conducted
5	55	29.4	55	2.4	Not specified	RCM- 900 FFP- 600	-
6	43	12.9	163	0.8	6015	RCM- 1310 FFP- 1105 Cryo- 20	CS
7	86	22.8	146	3.7	2250	RCM- 670	CS
8	64	18.9	174	2.6	2000	RCM- 635	Not conducted
9	75	21	80	2.4	4000	RCM- 1050 FFP- 1320 Cryo-150	GE
10	61	17.1	54	2.06	2500	RCM- 640	CS
11	83	24.6	193	4.2	2000	Not conducted	CS
12	77	25.5	72	4.2	2400	RCM- 685	CS+ UAL
13	83	24.1	184	3.2	2000	Not conducted	CS+ UAL
14	102	31	151	3.9	1250	Not conducted	-
15	63	18.9	171	3.01	3538	RCM- 630 FFP- 590	CS+ UAL
16	92	27	64	2.4	2000	Cryo-200	Not conducted
17	96	26	151	4.1	1500	Not conducted	Not conducted
18	85	22.4	90	2.1	1800	Not conducted	Not conducted

Table 2: Intraoperative data of laboratory parameters, volume of transfusion therapy and methods of surgical hemostasis.

Note: RCM: Red Cell Mass; FFP: Freshly Frozen Blood Plasma; Cryo: Cryoprecipitate; GE: Hysterectomy; CS: Compression Sutures on the Uterus; UAL: Uterine Artery Ligation.

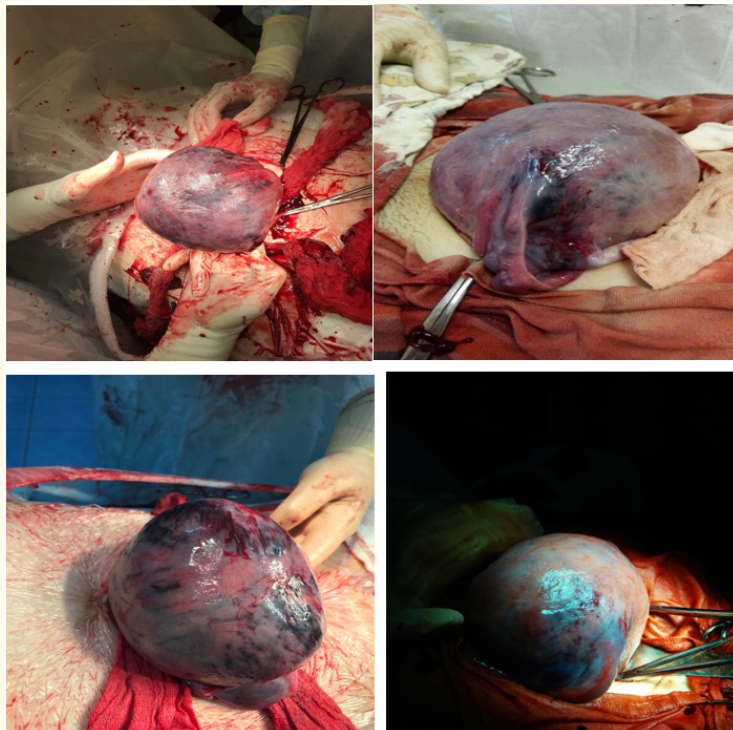


Figure 1: Example of preserved Couvelaire uterus: A (ZEG) - gestational age of 40 weeks, placenta abruption area of 50%, blood loss - 1500 ml, severe fetal asphyxia; B (PM) - gestational age of 34 weeks, abruption area of 100%, blood loss - 2000 ml, severe fetal asphyxia; C (DAV) - gestational age 34 weeks, abruption area 100%, blood loss 2500 ml, antenatal fetal death; D (KSA) - gestational age of 35 weeks, abruption area 75%, blood loss - 3500 ml, severe fetal asphyxia.

Our experience shows that in most cases, even in case of Couvelaire uterus, it is possible to preserve the organ; hysterectomy was performed just in 4 out of 18 cases that made 22.2%. In 14 out of 18 cases we managed to preserve the uterus in women with formidable gestational complications. In those cases where an organ-sparing tactic was chosen to achieve surgical hemostasis, compression sutures on the uterus were used in half of the cases (7 out of 14). It is obvious, that organ-sparing surgery tactics is achievable only with well-coordinated teamwork of obstetricians-gynecologists, anesthesiologists-resuscitators and transfusiologists to replenish the volume of the lost blood and its qualitative composition. The application of modern medications like uterotonics, plasma and blood substitutes, recombinant coagulation factors is a necessary condition for performing this kind of surgery.

Post surgery complications of patients with the syndrome of Couvelaire uterus were also analyzed. There were no cases of uterine subinvolution, hematometry, prolonged fever (for more than three days). Only a single case of endometritis complication was reported in a postpartum period and was successfully eliminated using sanitizing hysteroscopy and prescription of antibacterial therapy for 5 days.

In the early postoperative period, all the patients included in our study underwent intensive drug and infusion therapy in the intensive care unit (ICU). The average stay in the ICU accounted 2.6 days (from 1 to 4 days). All patients were discharged from hospital in a satisfactory condition; the average length of stay in the hospital accounted 8 days (from 5 till 14 days).

Discussion

The existing clinical criteria of severity rely exclusively on fetal (fetal distress or fetal death) and maternal complications. According to C. Ananth., *et al.* severe abruption was defined as an abruption accompanied by at least 1 of the following events: maternal (disseminated intravascular coagulation, hypovolemic shock, blood transfusion, hysterectomy, renal failure, or in-hospital death), fetal (nonreassuring fetal status, intrauterine growth restriction, or fetal death), or neonatal (neonatal death, preterm delivery or small fetus for gestational age) complications [11].

Analysis of severe placental abruption cases, in which Couvelaire uterus was visually diagnosed during the surgery, showed that with the development of this complication, placental abruption occurs over a large area, on average equals to 66% of its entire area. At the same time, total placental abruption was noted by us in 44.4% (8/18) of cases.

In many cases, even in the presence of the Couvelaire uterus, it is possible to preserve the organ excluding hysterectomy surgery. At the same time, the tactics of an obstetrician, when Couvelaire uterus developed with the patient and seen during cesarean section, should be individual and depends on the severity of symptoms, the occurrence of complications in the form of DIC or hemorrhagic shock, as well as the contractility of the uterus in response to the uterotonic drugs [12]. At the same time, the mandatory conditions are high-levelled equipment of the medical institution and technical skills of the surgeon.

Conclusion

Currently, up to the data references, in many countries of Western Europe and the USA, Couvelaire uterus is considered to be an absolute indication for radical surgery. Though, in recent years, organ-preserving techniques have been developed and successfully used, becoming increasingly widespread. The main indicator for this type of surgery is the absence of DIC syndrome, good contractile ability of the uterus and the presence of stable hemodynamic parameters. Regarding Russian Federation, the occurrence of Couvelaire uterus is not an absolute indication for hysterectomy, which is reflected in the regulatory acts of 2022. At the same time, hysterectomy is performed in the vast majority of cases.

Along with general condition of the woman and her desire to preserve the uterus, the mandatory terms are - a high level of equipment of the medical institution, the possibility to provide round-the-clock assistance by the multidisciplinary team of doctors as well as high qualification and technical skills of the surgeon. Only the complex of these necessary conditions makes it possible to ensure not only the success of surgical intervention in women with Couvelaire uterus, but also to ensure the safe course in postoperative period.

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