

New Insights Into Pre And Intraoperative Interventional Strategies To Reduce Pph During Cesarean Hystrectomy In Placenta Accreta Spectrum

Dr Sripathi Anusha¹, Dr Renu Sahani², Dr Shobha³, Dr Radha⁴, Dr Shreya Gaddam⁵, Dr Talla Ashritha Reddy⁶

¹Ms Obgyn Senior Resident, Gandhi Hospital , Anushasripathi8@Gmail.Com

²Ms Obgyn, Senior Resident , Gandhi Hospital, Renu1thati@Gmail.Cim

³Ms Obgyn, Hod & Professor Gandhi Hospital

Email ID : Shoba.Tirunagari@Gmail.Com

⁴Ms Obgyn, Superintendent, Malkagiri Area Hospital, Penagalradha@Gmail.Com

⁵Msobgyn, Senior Resident , Niloufer Hospital , Shreyagaddam4444@Gmail.Com

⁶Ms Obgyn, Senior Resident, Mrm

Email ID : Tallashritha5555@Gmail.Com

Corresponding Author

Dr Renu Sahani,

Ms Obgyn, Senior Resident , Gandhi Hospital,

Email ID : Renu1thati@Gmail.Cim

ABSTRACT

Placenta accreta spectrum (PAS) represents a recently recognised continuum of abnormal placental invasion, including placenta accreta, increta and percreta, which is a rare, life-threatening complication of pregnancy affecting both mother and foetus, characterised by placental invasion beyond the serosa, often involving adjacent structures such as the urinary bladder. The increasing incidence is associated with rising caesarean section rates and other related factors such as advanced maternal age and infertility treatments. Surgical management remains challenging due to the risk of extensive bleeding, urological injuries and increased maternal morbidity. This study aimed to assess the efficacy of various pre and intra op interventional strategies to reduce PPH during cesarean hysterectomy in PAS disorders. This study presented data of 50 women (2022-2025) who underwent cesarean hysterectomy (CH) for PAS disorders, from tertiary care center at Hyderabad. Women with ongoing pregnancy >24 weeks GA with previous one or more cesarean section & placenta previa with USG features of PAS were included. With all the above implemented strategies mean blood loss was 1.5- 2lts, bladder injury in 6 out of 50 patients, ICU admission for >24 hrs in 15 patients and all 50 patients were discharged healthy with no mortality seen. Our data supported that these simple approaches and maintaining a checklist effectively helped in reducing PPH without requiring any high-end Procedures like prophylactic uterine artery balloon Catheter placement thus can be implemented in developing countries..

Keywords: PAS (Placenta Accreta Spectrum), Cesarean Hysterectomy (CH), uterine stenting, internal manual aortic compression, PAC (Pailey Aortic Clamp).

How to Cite: Dr Sripathi Anusha, Dr Renu Sahani , Dr Shobha , Dr Radha, Dr Shreya Gaddam , Dr Talla Ashritha Reddy (2025) New Insights Into Pre And Intraoperative Interventional Strategies To Reduce Pph During Cesarean Hystrectomy In Placenta Accreta Spectrum, *Journal of Carcinogenesis*, Vol.24, No.10s, 93-100

1. INTRODUCTION

According to Government of India Ministry of Health and Family Welfare Statistics Division Health Management (HMIS) 2020-2021 and 2021-2022 Analytical Report in India -Total of 20.5 % of caesarean section deliveries is reported in 2019-2020. In 2020-21 it increased to 21.3% and 23.29% in 2021-22. The trends show that highest percentage of Caesarean section deliveries from Telangana -55.33% in 2020-2021 and 54.09% in 2021-2022. As per special bulletin on maternal mortality in INDIA 2018-20, SRS the Maternal mortality ratio in Telangana is 43 and maternal mortality rate is 2.3¹. If caesarean rates continue to increase, the annual incidence of placenta previa, placenta accreta, and maternal deaths will

also rise substantially². Thus, thereby proportionally increase the need for primary CH in Telangana. Hysterectomy remains as definitive surgical treatment for PAS disorders, especially for its invasive forms and a primary elective cesarian hystrectomy remains as safest and most practical option for low- and middle-income countries like India where diagnosis, follow up and additional treatments are meager³.

Placenta accreta can lead to massive hemorrhage requiring hystrectomy and massive blood transfusion. Since mortality and morbidity is due to this hemorrhage, minimizing blood loss can effectively reduce mortality rates⁴.

Various surgical approaches to perform CH in PAS to reduce hemorrhage and its complications have been reported. These include preoperative [balloon catheterization of internal iliac arteries](#), retrograde hysterectomy with [bladder](#) flap dissection performed later, ligation of internal iliac arteries and use of a uterine stapling device^{5,6}. But it requires high end equipment and great surgical skill. In this study we like to demonstrate how simple Pre-op and intra-op interventions and maintaining a checklist effectively reduced hemorrhage during CH in PAS disorders, thus greatly helpful in resource poor settings

2. MATERIALS AND METHODS:

This prospective interventional study was conducted at Gandhi hospital, Hyderabad, a tertiary care centre for whole state of Telangana. Women with an ongoing pregnancy at >24 weeks of gestation with one or more [cesarean deliveries](#), [placenta](#) previa, and ultrasound features of [PAS](#) were included after obtaining informed consent. Diagnosis of PAS further confirmed with grey scale ultrasound, MRI and Doppler in all planned cases. Grade of PAS is classified per FIGO guidelines and histology AI confirmation. Both planned and emergency Caesarean Hysterectomy (CH) done for advanced PAS is included in the study. 3 cases of minor grade of PAS managed conservatively were excluded from this case series. One case who-underwent emergency CH by the available duty team-without considering these strategies is also excluded. These women were managed by a multidisciplinary team of obstetrician-gynecologists, radiologists, anesthesiologists, [transfusion medicine](#) specialists, urologists, and neonatologists.

Elective procedures were planned between 34-36 weeks and emergency based on clinical grounds. Antenatal corticosteroids for lung maturity are administered if delivery planned before 37 weeks GA⁷. After antibody screen, the following blood and blood products were arranged such as packed red blood cells (pRBC 4 units), fresh frozen plasma (4 units), and single-donor platelet [apheresis](#) (1 unit). Intraoperative invasive [hemodynamic monitoring](#) was performed in all cases. We recorded the amount of blood loss, need for transfusion, incidence of [bladder](#) or ureteric injuries, need for other procedures to control hemorrhage, such as [internal iliac artery](#) ligation, need for postoperative ventilation or [ICU](#) care, duration of postoperative hospital stay and neonatal outcome. All women were observed for 6 weeks after CH. Blood loss was quantified objectively by counting the fully (100 mL) or partially (50 mL) soaked surgical sponges and the suction output. Neonatal outcomes included [Apgar score](#), birthweight, need for [neonatal intensive care unit](#) (NICU) admission, and any other neonatal complications were monitored for.

Pre-op checklist comprising

- 1.optimising hb levels to 12-14g/dl
- 2.prophylactic ureteric stenting and inflating bladder with 3 way foleys Cather.
- 3.hemodynamics monitoring with central arterial line
- 4.Dissecting under spinal anesthesia, if necessary converted to general anesthesia

Intraoperative strategies like

- 1.Intra-op USG localization of upper border of placenta
- 2.Bladder first approach dissection,
- 3.prophylactic 1gm inj tranexa immediately after delivery
- 4.Clamping and ligating b/l uterine arteries, descending cervical branches before proceeding for hysterectomy.
- 5 Use of paily aortic clamps (PAC)or Internal manual aortic compression.

3. STANDARD CARE PLAN

PREOPEARTIVE:

- 1.We optimized hemoglobin of all patients to 12-14g/dl using either hematinics or blood products depending on their interval to delivery.
- 2.In all elective cases, particularly if percreta with bladder invasion is suspected, prophylactic DJ ureteric stent inserted by urologists to avoid inadvertent bladder and ureteric injuries.
- 3.A 3-way Foley catheter was placed for retrograde filling & emptying of the bladder when required to keep the bladder

partially filled to better delineate its superior limit.

4. Graduated compression stockings were worn preoperatively for mechanical [thromboprophylaxis](#).

5. Antimicrobial prophylaxis was administered with intravenous [cefuroxime](#) (1.5 g), 30 to 60 minutes before the incision, and the dose was repeated after 3 to 4 hours. In addition, 1 dose of [metronidazole](#) (500 mg intravenously) was administered after delivery of the neonate.

6. Multidisciplinary team consisting of 2 senior obstetricians, 2 junior residents, one senior and junior anesthesiologist, 2 senior nursing staff, urologist and a CTVS surgeon.

7. Intraoperative invasive hemodynamic monitoring with central and arterial lines.

8. All patients were operated under regional anesthesia either spinal or spinal plus epidural, but if catastrophic hemorrhage necessitates conversion to general anesthesia, a rapid and effective induction must be planned.

4. INTRAOPERATIVE

1. A midline vertical [skin incision](#) extending up to or above the [umbilicus](#) was made.

2. Intraoperative USG to demarcate the upper border of placenta (Figure 1). The probe is a standard USS probe within a sterile probe cover. An assistant operates the ultrasound machine.

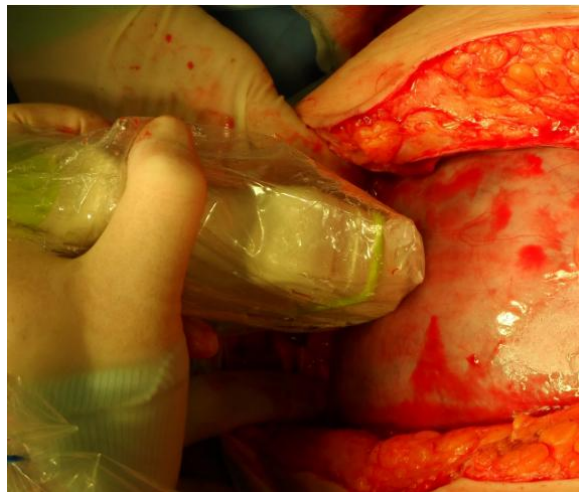


Figure 1. Intraoperative USG to demarcate the upper placental edge.

3. The lower segment is assessed for its vascularity, bulge sign, lateral invasion and bladder location. Dissection of the uterovesical fold (bladder-first approach) from the lower uterine segment to the [cervix](#) even before uterine incision (Figure 2) During this dissection, vascular areas were isolated (using artery forceps), coagulated with bipolar electrosurgery or ligated with a silk suture (2-0) if relatively large and then divided. This neovascularized area may contain blood vessels with poorly formed [tunica media](#). Hence, coaptive coagulation using [electrosurgery](#) may not always be effective⁸.

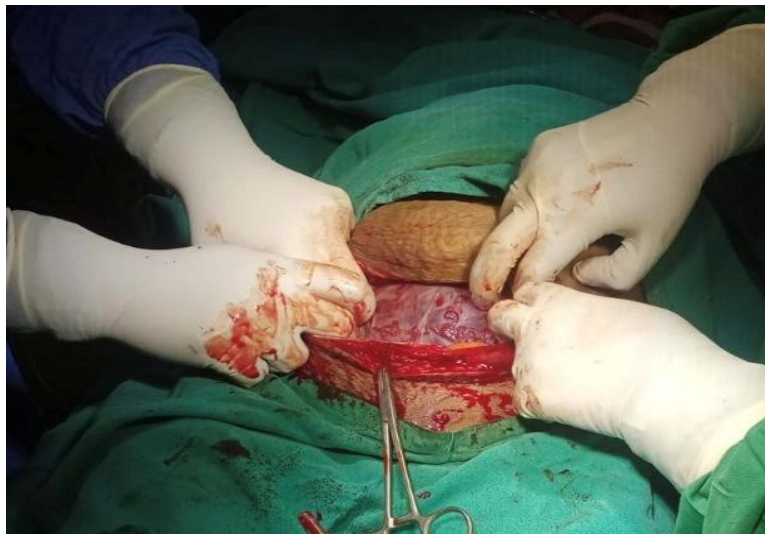


Figure 2. Percreta with neovasularised area proceeding for bladder first approach.

4. Transfundal transverse incision between the two round ligaments or midline vertical uterine incision above the level of the placenta is taken. Bleeding from the edges of the uterine incision is secured with Green Armytage and Paily T clamp. Fetus is delivered by breech extraction. Delayed clamping of the cord is practiced, early breast feeding initiated in all feasible situations, the free end of cord tied with black silk and replaced into the uterine cavity. Inj. Tranexamic Acid 1gm in 100ml infusion is given. No attempt made to separate placenta, uterotonics were not administered as to prevent placental separation, the cut end of umbilical cord tied with silk and placenta repositioned in uterine cavity. Uterine incision closed with 0- vicryl in single layer .
5. The [uterine arteries](#) and descending cervical branches were clamped bilaterally and lighted using a curved non-toothed clamp. During this procedure, the assistant compressed the uterus with both hands and performed gentle traction toward the opposite side and upward to prevent the tip of the clamp from injuring the thinned-out and friable uterine wall as this can trigger hemorrhage.
6. The lower end of abdominal aorta identified by palpation. Using a Babcock forceps aorta is gently lifted up and held in that position till aorta clamp is placed. Call out time by operating surgeon on application of aorta clamp is noted by the anesthetist. The retroperitoneal dissection free PAC is applied under good vision without any angulation making sure that the entire wall of aorta is between the arms. In cases of emergency hystrectomy and in cases if paily clamp can injure major vessels around, internal manual aortic compression was done.
7. The cardinal and uterosacral ligaments were divided and ligated with successive clamps placed parallel to the uterus until the cervix was reached.
8. The decision to perform total vs subtotal hystrectomy is decided based on the finding of palpating lower edge of the placenta by compressing the anterior and posterior walls of the lower segment, between the fingers. After transversely clamping and transecting the cervix the edges are held with long Allis forceps and inspected to ensure if lower edge of placenta is removed. The specimen is cut to reconfirm complete removal of placenta. This step is crucial to prevent post-operative haemorrhage and re laparotomy. Vault or cervix is closed with box sutures.
8. Hystrectomy was completed by placing clamps on the upper part of the cervix or vaginal angle. A supracervical hystrectomy is acceptable. The operating time was not increased to remove the entire cervix. Pailey clamp is removed and

ROC(return of circulation)is confirmed with femoral pulse.

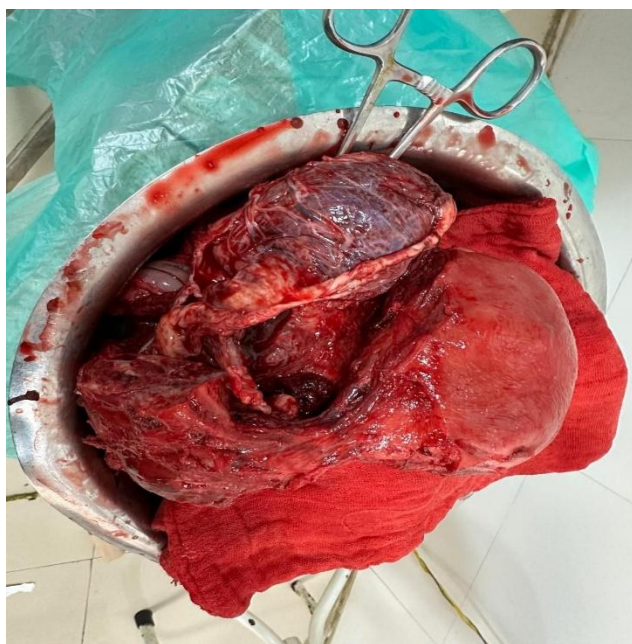


Figure 3. Hysterectomy specimen showing placenta percreta in lower segment.

9. Bladder integrity test is done at the end of CH in difficult cases of bladder dissection. All cases are monitored in ICU for next 24 -48 hrs and then stepped down to HDU. The cut specimen is sent for histopathology and the histology is confirmed.

10. After 12 hours, if there was no bleeding, postoperative thromboprophylaxis was administered with Enoxaparine 0.4 mg subcutaneously once daily.

11. The [urinary](#) catheter was removed 48 to 72 hours after surgery if there was no [bladder injury](#).

Intraoperative estimated blood loss (EBL) is assessed periodically by the anesthetist. The decision on blood component transfusion is taken by the senior anesthetist after discussing with the operating surgeon. Gravimetric evaluation of intraoperative blood loss was found to be an accurate method, which can be recommended for use in a clinical setting. To avoid underestimation of EBL, blood collected in the suction containers, calculation of mops by gravimetric method and visual estimation of soaked drapes and floor spills is used to calculate total EBL.

1. The amount of blood collected in suction containers
2. Gravimetric method the weight of blood-soaked surgical pads (1gm = 1ml)
3. visual estimation of blood spilled over the floor

5. RESULTS:

The required maternal baseline characteristics, intraoperative, peri-operative and neonatal outcome are abstracted from the records and presented in tables. Most of the women in study are in 20-25 years age group with 2 previous cesarian sections. Planned sections were more. Total Caesarean Hysterectomy was required more than that of subtotal CH. (Table 1) The estimated intra-operative blood loss (EBL) of > 2 liters were 9 cases. 1 case did not require any transfusion and 8 required massive transfusion. (Table 2). Median transfusion components required were 3 ± 2 units of p RBC, 3 ± 1 units of fresh frozen plasma (FFP). The preoperative and post-operative difference in haemoglobin in 1 women who did not receive blood transfusion was 1g%. Time of Aorta Clamp minimum time was 15 minutes and maximum time was 42 minutes. 3 women of advanced PAS with left parametrial invasion required reclamping to manage active bladder base bleed. Bleeding was controlled successfully by ligating the bleeders without the need for internal iliac artery ligation. (Table 3) 6 cases suffered injury of the bladder dome while dissecting the densely adherent bladder. It was promptly identified and repaired by urologist. There was no case of ureteric injury. (Table 4) One maternal death underwent an emergency CH at odd hours by the available duty team for antepartum haemorrhage without considering for adequate preoperative optimization at the time of CH. The intraoperative EBL was around 3200ml leading to class 4 hemorrhagic shock. It was a deviation from the standard care plan. 10 neonates had NICU admission for 1 week, out of which one neonatal mortality reported due to

extreme prematurity. (Table 5)

Table 1: Maternal preoperative demographics

Maternal age	Number of patients
20-25yrs	23
26-30 yrs	18
31-35yrs	9

Table 2: Estimated blood loss and Number of blood products transfused

Estimated blood loss	Number of patients
<500ml	1
500-1000ml	1
>1000ml -1.5lts	15
>1.5lts -2lts	24
>2lts -2.5lts	9
Transfusions	
No transfusion	1
2components	1
>2- 4	21
>4 -7	19
8 or >	8
Cryo ,FFP	8

Table 3: Aorta clamp duration /Reclamping

Aorta clamp duration/reclamping	Number of patients
15min	2
16-30min	45
>30min -45 min	3
Reclamping	3

Table 4: Post-operative surgical outcomes of PAC

Complications	Number of patients
Bladder injury	6
ICU stay for >24hrs	15

Table 5: Neonatal outcome

Neonatal outcome	Number of patients
NICU stay	10
Neonatal death	2

6. DISCUSSION

Globally massive haemorrhage is tackled by various modalities which require greater skill and resources. One such strategy is placement of inflatable balloons within the pelvic

arteries, most commonly in the anterior divisions of the internal iliac arteries. As per the results of various studies, these prophylactic balloons does not seem to be promising as women undergoing prophylactic placement of endovascular balloons at caesarean hysterectomy for PAS disorders had a 10.6% procedure-related complication rate and increased total procedure time, with no decrease in blood loss compared to those undergoing surgical ligation^{9,10,11}.

Another commonly practiced procedure to minimize the massive bleed is ligation of

internal iliac artery which needs retroperitoneal dissection. The results of this procedure was found to have variable results in reducing blood loss, a brief window of 20 minutes of reduced [mean arterial pressure](#) (by 24%) and blood flow (by 48%) as collaterals from the branches of its posterior division or the external iliac artery offset this benefit¹². However, this approach may be helpful when the placenta invades the broad ligament, and isolating the uterine arteries may be challenging. However, it can occasionally result in complications, such as hypogastric [vein injury](#) or unintentional ligation of the external iliac artery^{13,14,15}.

In spite of this, substantial [collateral circulation](#) of the pelvic vasculature, internal iliac artery ligation is promptly followed by blood flow from the anastomotic channels below the occlusion^{16,17}.

In this article, we present a simple but effective strategies and checklist for CH in PAS disorders, which helped to reduce intraoperative hemorrhage and complications, such as bladder and ureteric injuries, ICU admission, and extended hospital stay.

Compared with previous literature reports, our series has much lower rates of blood loss, transfusion requirements, bladder/ureteric injury, and postoperative ICU stay. During a CH for PAS, the mean typical blood loss was 4061 mL (range: 500–30,000 ml. In our institute, with implementing such simple measures, avg blood loss is 1.5 to 2 litres^{18,19}.

7. STRENGTHS AND LIMITATIONS

The strengths of the current study include its prospective design, relatively large sample size, and the simple approach that does not require any high-end equipment.

8. CONCLUSION

Our data supported that these simple approaches and maintaining a checklist effectively helped in reducing PPH without requiring any high end Procedures like prophylactic uterine artery balloon Catheter placement thus can be implemented in resource poor setting. To summarize, we advocate these simple effective measures in women with PAS disorders as the outcomes in the current study were good for the mother and neonate, with a very low rate of complications.

REFERENCES

- [1] . GOI ministry of health and family welfare statistics division health
- [2] management(HMIS)2020-2021 and 2021-2022,analytical report.
- [3] Solheim KN, Esakoff TF, Little SE, Cheng YW, Sparks TN, Caughey AB. The effect of cesarean delivery rates on the future incidence of placenta previa, placenta accreta, and maternal mortality. *J Matern Fetal Neonatal Med.* 2011 Nov;24(11):1341-6. doi: 10.3109/14767058.2011.553695. Epub 2011 Mar 7. PMID: 21381881.
- [4] .Allen L, Jauniaux E, Hobson S, Papillon-Smith J, Belfort MA; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: Nonconservative surgical management. *Int J Gynaecol Obstet.* 2018 Mar;140(3):281-290. doi: 10.1002/ijgo.12409. PMID: 29405317.
- [5] .Silver RM, Branch DW. Placenta Accreta Spectrum. *N Engl J Med.* 2018 Apr 19;378(16):1529-1536. doi:

- 10.1056/NEJMcp1709324. PMID: 29669225.
- [6] . M. Knight Peripartum hysterectomy in the UK: management and outcomes of the associated hemorrhage *Obstetgynecol*, 63 (2008), pp. 133-134
- [7] . CH Tan, KH Tay, K Sheah, et al. Perioperative endovascular internal iliac artery occlusion balloon placement in management of placenta accrete. *AJR Am J Roentgenol*, 189 (2007), pp. 1158-1163
- [8] . McGoldrick E, Stewart F, Parker R, Dalziel SR. Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. *Cochrane Database Syst Rev*. 2020 Dec 25;12(12):CD004454. doi: 10.1002/14651858.CD004454.pub4. PMID: 33368142; PMCID: PMC8094626.
- [9] JM Palacios-Jaraquemada Placental adhesive disorders (hot topics in perinatal medicine)
- [10] (1st ed.), De Gruyter, Berlin, Germany (2012) vol. 1
- [11] . Dr.Ashraf Aly H. Dr. Hisham M. Ramadani, Assessment of Blood Loss During Cesarean Section Under General Anesthesia and Epidural Analgesia Using Different Methods. *Alexandria Journal of Anaesthesia and Intensive Care AJAIC-2006: Vol. (9) No. 1.*
- [12] . John C. Kingdom, Sebastian R. Hobson, Ally Murji, Lisa Allen, Rory C. Windrim, Evelyn Lockhart, Sally L. Collins, Hooman Soleymani Majd, Moiad Alazzam, Feras Naaisa, Alireza A. Shamsheersaz, Michael A. Belfort, and Karin A. Fox, MMed Minimizing surgical blood loss at cesarean hysterectomy for placenta previa with evidence of placenta increta or placenta percreta *Am J Obstet Gynecol*. 2020 Sep; 223(3): 322–329.
- [13] . Papillon-Smith J, Hobson S, Allen L, Kingdom J, Windrim R, Murji A. Prophylactic internal iliac artery ligation versus balloon occlusion for placenta accreta spectrum disorders: A retrospective cohort study. *Int J Gynaecol Obstet*. 2020 Oct;151(1):91-96.
- [14] . Nieto-Calvache, Albaro José1,2,*; Palacios-Jaraquemada, José M.3; Aryananda, Rozi Aditya4; Basanta, Nicolás5; Burgos-Luna, Juan Manuel1,2; Rodriguez, Fernando1; Ordoñez, Carlos1; Sarria-Ortiz, Daniela6; Muñoz-Córdoba, Laura6; Quintero, Juan Carlos7,8; Galindo-Velasco, Valentina9; Messa-Bryon, Adriana1,2. Ligation or Occlusion of the Internal Iliac Arteries for the Treatment of Placenta Accreta Spectrum: Why Is This Technique Still Performed?. *Maternal-Fetal Medicine*:2023: 5(3):p 131-136
- [15] JC Kingdom, SR Hobson, A Murji, et al. Minimizing surgical blood loss at cesarean hysterectomy for placenta previa with evidence of placenta increta or placenta percreta: the state of play in 2020. *Am J Obstet Gynecol*, 223 (2020), pp. 322-329
- [16] . AD Hull, R. Resnik. Placenta accreta and postpartum hemorrhage. *Clin Obstet Gynecol*, 53 (2010), pp. 228-236
- [17] . JM Palacios-Jaraquemada Caesarean section in cases of placenta praevia and accrete. *Best Pract Res Clin Obstet Gynaecol*, 27 (2013), pp. 221-232
- [18] . OM Turan, A Shannon, MR Asoglu, KR. Goetzinger. A novel approach to reduce blood loss in patients with placenta accreta spectrum disorder. *J Matern Fetal Neonatal Med*, 34 (2021), pp. 2061-2070.
- [19] . CG Smith, HM Cottrill, JR. Barton Reloadable stapler use during peripartum hysterectomy for placenta accreta spectrum: a novel surgical technique and case series. *Am J Perinatol*, 39 (2022), pp.265-271.
- [20] . AG Eller, TF Porter, P Soisson, RM. Silver. Optimal management strategies for placenta accrete. *BJOG*, 116(2009), pp.648-654.
- [21] . MS Hoffman, RA Karlnoski, D Mangar, et al. Morbidity associated with nonemergent hysterectomy for placenta accrete. *Am J Obstet Gynecol*, 202 (2010) 628.e1–5