

# Surgical Management of Placenta Accreta: A Six Year Experience at the King Hussein Medical Centre, Amman, Jordan

*Mitri Rashed MD, Njoud Al Taleb MD, Manar Abo Karaka MD, Ehab Al-Rayyan MD, Maher Maaita FRCOG*

## ABSTRACT

**Objectives:** The purpose of this study was to report our experiences in the surgical management of suspected placenta accreta.

**Methods:** This was a retrospective study of all patients with placenta accreta, who underwent a planned delivery, at King Hussein Medical Centre (KHMC), Amman, Jordan, from August 2012 to October 2018. Included patients' records were for those with sufficient antenatal history, available radiological and laboratory results and who had an elective delivery. Demographic characteristics, risk factors, intraoperative and postoperative findings and complications were collected from patient files. Ultrasound (U/S) and magnetic resonance imaging (MRI) were used for diagnosis and confirmed later by histopathology reports. All patients' surgery was performed by a multidisciplinary team.

**Results:** Eighty patients were identified; all women were multiparous, with one or more previous caesarean section deliveries. Diagnosis was suspected using U/S, and confirmed by histopathology after surgery. Twenty women required MRI. Twenty cases were initially managed conservatively with Bakri balloon, and required secondary hysterectomy because of bleeding. Ten cases underwent prophylactic internal iliac artery ligation, and four cases were managed by an interventional radiologist, who placed balloon catheters into the common iliac arteries before hysterectomy. Complications included bladder and ureteric injury, infection, disseminated intravascular coagulation (DIC), intensive care unit (ICU) admission and blood transfusion. One patient had a vesicovaginal fistula. The final pathological reports revealed accreta in 58 patients, increta in 18, and percreta in four patients.

**Conclusions:** Placenta accreta remains a high-risk obstetric condition. A primary hysterectomy for the management of placenta accrete is the mainstay of care accompanied by an adequate preoperative planning with a multidisciplinary team approach in order to reduce the associated complications. Conservative treatment should be adopted in highly selected cases after proper counselling about the potential morbidity and failure rate.

**Key words:** Accreta, hysterectomy, caesarean section delivery, haemorrhage.

**JRMS December 2020; 27(3): 10.12816/0057188**

---

## Introduction

Placenta accreta is a rare but catastrophic condition, with life threatening obstetric complications accompanied by massive bleeding, especially when not recognised until delivery.<sup>1</sup>

From the Department of Obstetrics and Gynaecology, King Hussein Medical Centre.

Correspondence should be addressed to Dr. Mitri Rashed: E-mail: [mitrirashed@yahoo.co.uk](mailto:mitrirashed@yahoo.co.uk).

Normally, the placenta adheres to the decidua basalis layer, allowing for a smooth separation of the placenta from the uterine wall after delivery. Abnormal placentation, termed “placenta accreta,” affects approximately 1 in 500 pregnancies<sup>2</sup>, and occurs when placental tissue invades the uterine wall. The most acceptable pathophysiology of placenta accrete is a failure of decidualization in the uterine scar causing abnormal trophoblast infiltration.<sup>3</sup> There are varying degrees of abnormal placentation; placenta accreta is the most common (80%) and occurs when the placenta adheres to the myometrium. Placenta increta is diagnosed when the placenta invades the myometrium (15%), and placenta percreta occurs by invasion of the placenta through the myometrium to the uterine serosa, into other pelvic organs (5%).<sup>2</sup>

The major risk factor is placenta previa, with a history of previous caesarean section delivery.<sup>2</sup> In women with this condition, the incidence for placenta accreta is 3%, 11%, 61%, and 67% with one, two, three, four, five or more caesarean section, respectively in women who have an anterior (or central) previa, and history of five previous caesarean deliveries.<sup>4,5</sup> Placenta accreta is becoming more common due to a number of factors, including advancing maternal age, and higher caesarean delivery rates.<sup>6</sup> the probability to have placenta previa spectrum increased from 0.3% with one previous caesarean delivery up to 6.74% for five or more uterine scars.<sup>7</sup>

A placenta accreta diagnosis often goes unrecognised, until attempts to remove the placenta after delivery. The advent of high-resolution U/S has expanded the criteria for the sonographic diagnosis of placenta accreta, with the condition detected prenatally for most patients.<sup>8</sup>

The prenatal diagnosis of placenta accreta can help minimise complication rates, by enabling surgical teams to plan for resources at delivery. Such resources include a fetomaternal specialist, gynaecologist oncologist, obstetric anaesthetist, neonatologist, interventional radiologist, urologist, blood products and postoperative intensive care access.

This study is a comprehensive report of our experiences in the surgical management of suspected placenta accreta at KHMC, over a period of six years.

## Methods

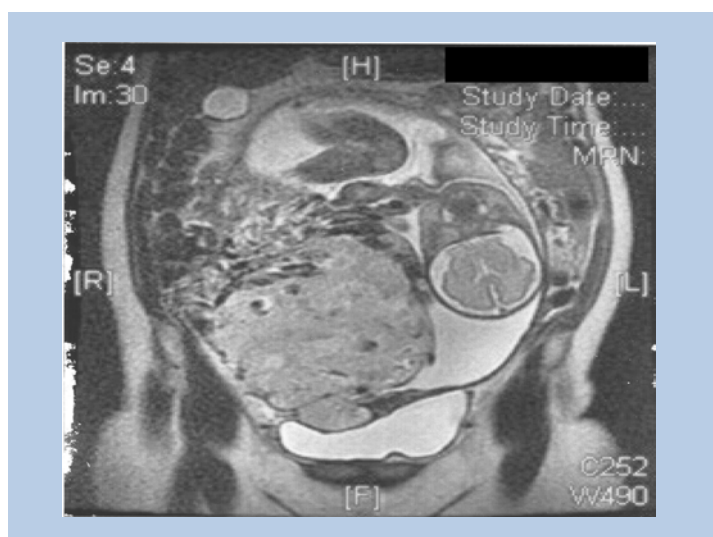
This is a retrospective study of all patients with placenta accreta, who underwent planned deliveries at KHMC from August 2012 to October 2018. Inclusion criteria involved availability of antenatal care history, blood tests, U/S and colour Doppler studies or MRI reports which were undertaken and interpreted by the same fetomaternal expert or radiologist to remove inter-observer variations, confirmed diagnosis of invasive placental attachment and elective delivery. Patients with liver or renal impairment and those with coagulation disorders were excluded. All emergency cases were not included in this study as well, as they lack time to coordinate the multidisciplinary team response. The U/S and MRI findings which were considered abnormal for implantation signs are listed in (Table I).<sup>9, 10, 11</sup>

**Table I:** Ultrasound and magnetic resonance imaging findings indicating abnormal placental implantation

Ultrasound findings suggestive of abnormal implantation	
1	Loss of retro-placental hypoechoic zone
2	Progressive thinning of the retro-placental hypoechoic zone
3	Presence of multiple placental lakes ("Swiss cheese" appearance)
4	Thinning of the uterine serosa-bladder wall complex (percreta)
5	Elevation of tissue beyond the uterine serosa (percreta)
Colour Doppler signs suggestive of placenta accreta	
1	Dilated vascular channels with diffuse lacunar flow
2	Irregular vascular lakes with focal lacunar flow
3	Hypervascularity linking placenta to bladder
4	Dilated vascular channels with pulsatile venous flow over cervix
MRI indications suggestive of abnormal implantation	
1	Uterine bulging
2	Heterogeneous signal intensity within the placenta
3	Dark intra-placental bands on T2-weighted images

Collected data included patients' demographic characteristics involving maternal age, parity, obstetric history, gestation at delivery, history of previous caesarean delivery, and transfer from another hospital. In addition, patients' risk factors, tools for diagnosis, placental location, histopathology results, blood loss, blood products requirements, and complications including ureteral injury, bladder injury, re-opening, infection, intensive care unit (ICU) admission and length of hospital stay were revised. All operations were performed by consultants, however, the decision to undertake hysterectomy was always undertaken by two consultants. Patients' files were reviewed and analysed using Microsoft statistical package Excel 2010.

Eighty patients met the inclusion and diagnostic criteria. Figures 1 and 2 show U/S and MRI images of a patient with a high probability of placenta accreta a decision was made for delivery between 35–37 weeks gestation. Antenatal corticosteroids were routinely administered before delivery.

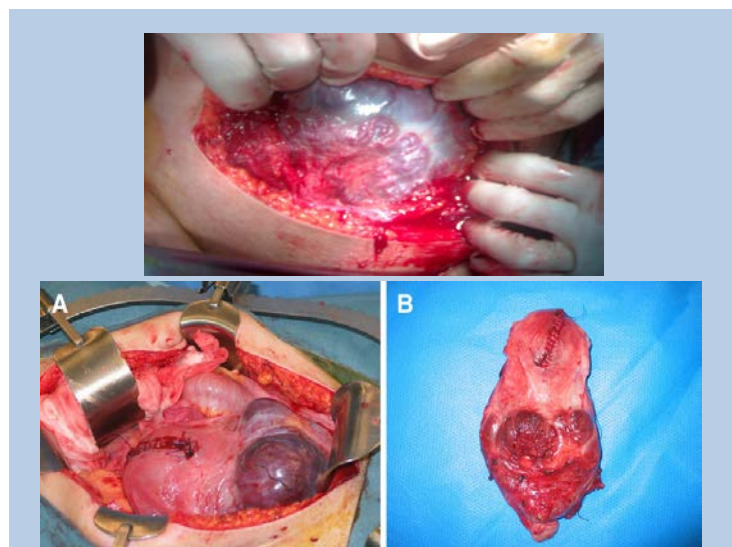


**Figure 1:** MRI image of placenta accreta from a study patient.



**Figure 2:** A colour Doppler ultrasound image of a patient demonstrating Hypervascularity, and invasion of the myometrium by the abnormal placenta.

On the day of surgery, and after rescanning the patient for placental mapping, a team including an obstetrician, an anaesthetist and a neonatologist were made available. A gynaecological oncologist, an urologist and a vascular surgeon were also on call, and ready for any eventuality. The blood bank was also notified to have blood and blood products prepared. In theatre, at least four units of blood were available. A rapid-sequence-induction anaesthesia was established, after which an indwelling Foley catheter was inserted. A laparotomy was performed either through a midline, or a wide Pfannenstiel skin incision, and a classic caesarean section delivery was performed high in the upper uterine segment, avoiding the placenta and its edges. Once the infant was delivered, the cord was tied, to facilitate an undisturbed placenta *in situ*. A primary caesarean hysterectomy was then performed, except for those cases who were managed conservatively and ended up with reopening and secondary hysterectomy due to continuous bleeding. (Figure 3) shows the intraoperative findings and specimens of a patient who underwent a classical caesarean hysterectomy.



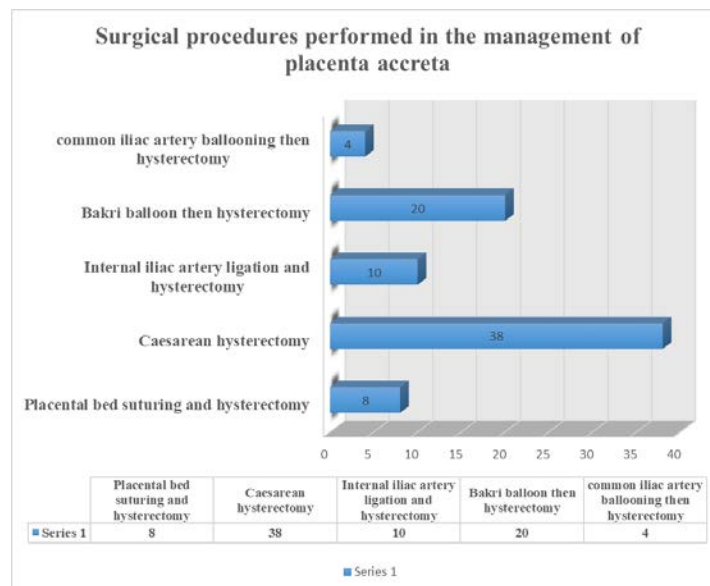
**Figure 3:** Intraoperative findings from a percreta case (A)

Excised specimen (uterus and adherent placenta (B)

A bar chart (Figure 4) was used to demonstrate the number of patients and surgical interventions performed in this study. Twenty patients (25%) were initially managed with Bakri balloon insertion to create an intrauterine tamponade, to stop bleeding from the placental bed, and to salvage the uterus. The balloon was inserted intraoperatively, and inflated with 500 ml normal saline, after closure of the uterine incision.

All the conservatively managed group continued to bleed and ended up with reopening and secondary hysterectomy with 0% success rate in keeping the uterus. Sixty patients (75%) had a primary caesarean hysterectomy with 4 cases managed by an interventional radiologist, where balloons were inserted in the common iliac artery, bilaterally before surgery, and inflated after delivery, during hysterectomy to minimise blood loss. A prophylactic internal iliac artery ligation was performed for another 10 patients by the vascular surgeon and gynaecologist in charge after delivery, and before hysterectomy to decrease the risk of intraoperative bleeding.

Simple descriptive statistics (frequencies and percentages) were used to describe variables. One way ANOVA analysis was used to describe blood loss variation among the groups who underwent surgical vascular ligation or interventional radiological ballooning. A specially designed abstract record form was used to collect relevant data. Institutional review board (IRB) approval was obtained prior to data collection from the patients’ files.



**Figure 4:** Summary of surgical procedures performed for the management of placenta accreta.

Results

During the study period, 80 women underwent primary or secondary caesarean hysterectomy after unsuccessful conservative surgical management for suspected placenta accreta. All patients were booked into our department, except for 18 cases who were referred from district general hospitals.

The most common age range was 36–40 (32.5%), with a mean age of 35.9 years. The most frequent parity ranged between 4 and 6 (45%) (Table II). All patients had U/S which was strongly suggestive of placenta previa, with potential accreta. Twenty patients required further imaging (MRI). All patients had at least one previous caesarean section. Approximately 75% of the study group (60

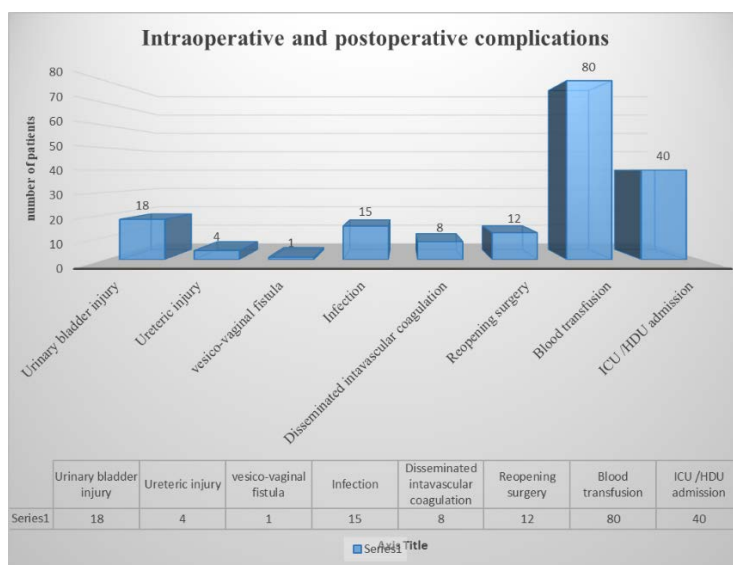
patients) had 3–5 previous uterine scars. Sixteen patients had two previous caesarean sections. Four patients had only one previous caesarean section. All were hospitalised for periods ranging from 2–6 weeks before surgery.

**Table II:** Maternal age and parity in women who underwent caesarean hysterectomy

Age	Number	%	Parity	Number	%
≤ 30	20	25	Primipar	0	0.0
31–35	16	20	Para 1–3	12	15
36–40	26	32.5	Para 4–6	36	45
41–45	18	22.5	> para 6	32	40
<b>TOTAL</b>	<b>80</b>	<b>100</b>	<b>TOTAL</b>	<b>80</b>	<b>100</b>

In the twelve patients who were treated conservatively with the Bakri balloon, hysterectomies were performed because of continuous bleeding. The eight patients whose placentae were separated also had hysterectomies performed, after unsuccessful haemostatic suturing of the placental bed measuring 0% success rate in preserving the uterus and their future fertility.

Patient complications are shown in (Figure 5). Incidental cystostomies (bladder injuries) and ureteral transections were recognised, repaired intraoperatively (by an urologist), and healed uneventfully, except for one case who developed a vesico-vaginal fistula two weeks after surgery. The patient was readmitted, the injury repaired and the patient discharged in good health. No patients developed any major infectious morbidities, and wound infection cases were treated appropriately. Those who developed DIC were a subgroup of reopened patients due to internal bleeding after hysterectomy. They were managed successfully with blood products replacements.



**Figure 5:** Bar chart showing complications encountered in our patient cohort

Most patients received 4–8 units of blood, with appropriate ratios of fresh frozen plasma and platelets, with an approximate 1:1:1 ratio. Six patients received 10–15 units of blood, and one case received 20 units. It was worth noting that this 20 unit patient had a histopathology that indicated placenta percreta. Most of the histopathology reports i.e. 58 (72.5%) revealed accreta. Eighteen (22.5%) reports showed increta, and only four (5%) confirmed percreta.

The blood products replaced were used to denote the estimated amount of blood loss intraoperatively. In order to assess the efficacy of the additional prophylactic vascular occlusive procedures which were employed to decrease bleeding during hysterectomy the operative notes for the 60 patients who underwent primary hysterectomy were reviewed and divided into three subgroups. The first group was those who had common iliac artery balloon stenting (4), the second one involved those whose anterior division of internal iliac arteries were prophylactically ligated before hysterectomy (10), and the last group consisted of (46) patients who underwent the standard hysterectomy procedure. Average blood transfusion was 6.9 units for all groups where the mean amount of blood required was 5 units for the first group, 6 and 7.3 units for the artery ligation and standard hysterectomy group respectively. Though the calculated P value (0.0779) of these interventions did not reach a statistical significance, it had positive impact on decreasing the number of blood units needed.

Those admitted to the high dependency unit (HDU) or ICU, stayed a minimum 24 hours, but the majority did not require ICU management. The mean length of patient stay after surgery was 9.8 days (range; 3–31 days). We observed no maternal deaths.

## Discussion

The incidence of placenta accreta has increased steadily over recent decades, and is most likely secondary to rising rates of caesarean deliveries. The condition has a current rate of 1 in 500 deliveries<sup>12</sup> reaching to 1 in 272 in a study conducted in the united states.<sup>13</sup> In comparison, placenta accreta was a rare occurrence in the 1950's, occurring in 1 in 30,000 deliveries<sup>14</sup>, however in our sample the rate was approximately 1 in 1000 after excluding the emergency cases (during the stated time frame of this study, almost 89000 patients delivered in King Hussein Medical Centre).

Placenta previa, especially with a history of caesarean delivery, is a major risk factor for placenta accreta.<sup>5,6,14</sup> Other risk factors include: advanced maternal age, previous uterine surgery, dilatation and curettage, history of myomectomy, adenomyosis and endometritis.<sup>15,16</sup> Our patients had risks for placenta accreta, including placenta Previa, previous caesarean sections and advanced maternal age. 85% of our study group were para 4 or above, and more than half were older than 36 years. These factors facilitated the surgical recommendation for hysterectomy.

Accreta, increta and percreta percentages as determined by histology, confirmed abnormally implanted placentae in hysterectomy specimens, and were consistent with observations by Wu *et al.*<sup>2</sup>

With a prenatally confirmed or suspected diagnosis of placenta accreta, a multidisciplinary team approach is appropriate,<sup>8</sup> and is associated with a decrease in maternal morbidity.<sup>15</sup> When risk factors are present, early diagnosis is most often performed with U/S which carries a very high sensitivity and specificity in the diagnosis of placenta accrete spectrum. In a systematic review, involving 23 studies and 3,707 pregnant women, a sensitivity of 90.7% and specificity of 96.9% were noted.<sup>17</sup> When antenatal sonographic findings are not definitive, the diagnosis can be complemented by MRI,<sup>10,18</sup> which localises the placenta and assesses its extent into surrounding viscera.<sup>19,20,21</sup> This

was the case for 20 of our patients, whose placentae were either located posteriorly, or the depth of invasion was difficult to diagnose by U/S.

All our patients were preoperatively suspected of having placenta accrete which facilitated planning delivery at 35 to 37 week of gestation and prescribing glucocorticoid therapy to promote fetal lung maturity. As it is not recommended to delay delivery beyond this gestational age because more than half of these cases would require urgent surgical intervention due to antepartum haemorrhage<sup>22</sup>. It is likely that antenatal diagnoses have significantly contributed to the overall drop in maternal morbidity and deaths associated with this condition if it is compared to the outcome in accidentally encountered cases in labour room or during caesarean section in the same department.

Preventive internal iliac artery ligation is useful in some cases, but is time consuming, and is reported to be ineffective in controlling pelvic haemorrhage in approximately 50% of cases.<sup>23</sup> It also precludes the use of selective pelvic angiography and embolization, if subsequently required.<sup>23</sup> In our centre, internal iliac artery ligation was performed in 10 cases before hysterectomy, and was beneficial in reducing the risk of excessive bleeding by 1.3 units. Nevertheless, it was difficult to withdraw conclusions on this approach, because the number of our patients were very small.

The use of interventional radiological procedures during the surgical management of placenta accreta is a controversial approach, but it has been reported in the literature.<sup>24</sup> <sup>25</sup> most studies have shown that this procedure should be decided on a case by case basis, and that it carries no benefits. Moreover, it has a small risk of arterial thrombosis and iliac artery trauma.<sup>26</sup><sup>27</sup><sup>28</sup> In our four cases managed by pelvic artery balloon occlusion, Although the procedure was time consuming necessitating lengthy preoperative preparations, reduced blood loss was recorded but it was not statistically significant (P value 0.0779).

The conservative management of placenta accreta is reported in the literature, in selected patients who desire fertility.<sup>29</sup><sup>30</sup><sup>31</sup> In a recent retrospective comparative study on 36 patients with suspected placenta accreta<sup>30</sup>, 19 patients underwent intraoperative placental separation, followed by Bakri balloon insertion to preserve fertility, while 17 other patients had a primary caesarean hysterectomy. A success rate of 84.2% (16/19) was reported in the conservatively treated group, with the advantage of a shorter surgery time, shorter hospital stay, lower blood loss, and reduced blood transfusions, when compared to the hysterectomy group. Additionally, two patients in the Bakri balloon group had conceived and delivered later.<sup>30</sup> In another systematic review by Stein Bisschop and colleagues about the use of uterus-preserving treatment modalities, the reported success rate in uterus-preserving surgery was 69% (53/77), maternal mortality was 4% and reported future pregnancy was 73%.<sup>32</sup> Findings that support Pala et al results. Moreover, Sentilhes et al, in a retrospective large multicenter study conducted in France on 167 patients, reported successful treatment in avoiding hysterectomy after leaving the placenta in situ combined with prophylactic devascularisation measures or methotrexate. They reported conservative treatment success in 131(78.4%). However severe maternal mortality was seen in 10 cases (6%) and of the remaining 36 patients (21.6%), 18 cases underwent primary hysterectomy and 18 had delayed hysterectomy. Our results for the 20 conservatively managed patients were inconsistent with the Pala *et al.* study whose design was similar to our conservative approach where the only modality used was intrauterine tamponade by insertion of Bakri Balloon.<sup>30</sup> The two major drawbacks of this study were the small number of treated patients (19), and the lack of strong diagnostic evidence suggesting the conservatively managed patients were indeed true placenta accrete cases. Furthermore, Stein Bisschop systematic review<sup>32</sup> has its limitations being descriptive and it collected the published case reports and series which are subject to publication bias. In addition, the employed uterus-preserving surgery combined more than one modality to decrease failure rate which could have improved our results if it had been adopted in our management. Regarding Sentilhes et al multicentre study<sup>29</sup>, the mainstay of placenta accrete approach was not to remove the placenta, a modality which was not performed in our study.



Successful treatment with methotrexate has been reported as a fertility preserving option.<sup>33'34'35</sup> However, serious infection, delayed vaginal haemorrhage, and DIC can occur, with further surgery often required. Uterine artery accretion using this approach can be considered, allowing for vascularity of the pelvis to regress. Subsequent pregnancy with normal delivery has been reported. Nevertheless, there is not enough evidence to recommend this method.<sup>36'37</sup> none of our patients were managed by leaving the placenta *in situ*, or with methotrexate, as this was not an acceptable management approach, with unacceptable potentially fatal complications.

During the management of our patients, we implemented a multidisciplinary approach based on the strong evidence that delivery at a tertiary centre with such a team reduces placenta accrete morbidity.<sup>38</sup> The reported postoperative complications after surgery for placenta accrete, include massive haemorrhage, disseminated intravascular coagulopathy, adult respiratory distress syndrome, renal failure, unplanned surgery, ICU admissions and perinatal mortality and maternal death.<sup>38</sup> Other reported complications include: bowel injury, depression and vaginal cuff bleeding.<sup>39</sup> Our complications were consistent with the literature.<sup>40</sup>

No maternal deaths were reported in our study. It is clear from our data that surgery for an abnormally implanted placenta is associated with a high complication rate, even in tertiary centres.

## Conclusions

Placenta accrete remains a high-risk obstetric condition for which adequate preoperative planning, with a multidisciplinary team is recommended to reduce disease complications. While our experience in the management of abnormally adherent placentae is improving, a caesarean hysterectomy still remains the only employed procedure. Conservative management should be adopted only for selected cases after detailed counselling about the potential maternal morbidity, mortality, questionable success in uterine preservation.

## References

1. Eller A, Porter T, Soisson P, Silver R. Optimal management strategies for placenta 75ccrete. *International Journal of Obstetrics and Gynaecology* 2009;116:648–654.
2. Wu S, Kocherginsky M, Hibbard J. Abnormal placentation: twenty year analysis. *American Journal of Obstetrics and Gynaecology*. 2005;192:1458–1461.
3. Jauniaux E, Collins S, Burton GJ. Placenta accrete spectrum:pathophysiology and evidence-based anatomy for prenatal ultrasound imaging. *Am J Obstet Gynecol* 2018;218:75-87
4. Clark SL, Koonings PP, Phelan JP. Placenta previa and prior caesarean section. *Obstetrics & Gynaecology*. 1985;66:89–92.
5. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et al. Maternal morbidity associated with multiple repeat caesarean deliveries. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Net-work. *Obstet Gynecol*.2006;1226-32
6. Usta IM, Hobeika EM, Musa AA, Gabriel GE, Nassar AH. Placenta previa-accreta: risk factors and complications. *American Journal of Obstetrics and Gynaecology*. 2005; 193:1045-9.
7. Marshall NE, FuR, Guise JM. Impact of multiple caesarean deliveries on maternal morbidity: *Am J Obstet Gynecol* 2011;205:262.e1-8.
8. Russo M, Krenz EI, Hart SR, Kirsch D. Multidisciplinary approach to the management of placenta 75ccrete. *The Ochsner Journal*. 2011;11:84–88.
9. Chou MM, Ho ES, Lee YH. Prenatal diagnosis of placenta previa 75ccrete by transabdominal colour Doppler ultrasound. *Ultrasound Obstetrics & Gynaecology* 2000;15:28–35.
10. Lax A, Prince MR, Mennitt KW, Schwebach JR, Budorick NE. The value of specific MRI features in the evaluation of suspected placental invasion. *Magnetic Resonance Imaging*. 2007;25:87–93.
11. Dwyer BK, Belogolovkin V, Tran L, Rao A, Carroll I, Barth R, et al. Prenatal diagnosis of placenta 75ccrete: sonography or magnetic resonance imaging. *Journal of Ultrasound in Medicine*. 2008;27:1275–1281.

12. Warshak CR, Ramos GA, Eskander R, Benirschke K, Saenz CC, Kelly TF, et al. Effect of predelivery diagnosis in 99 consecutive cases of placenta 76ccrete. *Obstetrics & Gynaecology*. 2010;115:65–69.
13. Mogos MF, Salemi JL, Ashly M, Whiteman VE, Salihu HM. Recent trends in placenta accrete in the united states and its impact on maternal-fetal morbidity and healthcare-associated costs, 1998-2011. *J Matern Fetal Neonatal Med* 2016;29:1077-82
14. Baysinger CL. Imaging during pregnancy. *Anaesthesia & Analgesia*. 2010;110:863–867.
15. Mitchel S. Morbidity associated with nonemergency hysterectomy for placenta 76ccrete. *American Journal of Obstetrics and Gynaecology*. 2010;202:628:1–5.
16. Ana Pinas Carrillo, Edwin Chandraharan. Placenta accrete spectrum: Risk factors, diagnosis and management with special reference to the Triple P procedure. *Women’s health* 2019 Sep;15:1-8
17. D’Antonio F, Iacovella C, Bhide A. Prenatal identification of invasive placentation using ultrasound: systematic review and meta-analysis. *Ultrasound Obstet Gynecol* 2013;42:509-17.
18. Miller DA, Chollet JA, Goodwin TM. Clinical risk factors for placenta previa-placenta 76ccrete. *American Journal of Obstetrics and Gynaecology*. 1997;177:210–2 14
19. D’Antonio F, Iacovella C, Bhide A. Prenatal identification of invasive placentation using ultrasound: systematic review and meta-analysis. *Ultrasound Obstetrics & Gynaecology*. 2013;42:509–17
20. Gielchinsky Y, Mankuta D, Rojansky N, Laufer N, Gielchinsky I, Ezra Y. Perinatal outcome of pregnancies complicated by placenta 76ccrete. *Obstetrics & Gynaecology*. 2004;104:527–530.
21. Esakoff TF, Sparks TN, Kaimal AJ, Kim LH, Feldstein VA, Goldstein RB, et al. Diagnosis and morbidity of placenta 76ccrete. *Ultrasound Obstetrics & Gynaecology*. 2011;37:324–327.
22. Antenatal corticosteroid therapy for fetal maturation. Committee Opinion No. American College of Obstetricians and Gynecologists. *Obstet Gynecol*. 713.e102-9:130;2017
23. Clark SL, Phelan JP, Yeh SY, Bruce SR, Paul RH. Hypogastric artery ligation for obstetric haemorrhage. *Obstetrics & Gynaecology*. 1985; 66:353–356.
24. Tan CH, Tay KH, Sheah K, Kwek K, Wong K, Tan HK, et al. Perioperative endovascular internal iliac artery occlusion balloon placement in management of placenta 76ccrete. *American Journal of Roentgenology*. 2007;189:1158–1163.
25. Salim R, Chulski A, Romano S, Garmi G, Rudin M, Shaleve E. Precesarean prophylactic balloon catheters for suspected placenta accrete: a randomized controlled trial. *Obstet Gynecol* 2015;126:1022-8
26. Matsueda S, Hidaka N, Kondo Y, Fujiwara A, Fukushima K, Kato K. External iliac artery thrombosis after common iliac artery balloon occlusion during caesarean hysterectomy for placenta 76ccrete in cervico-isthmic pregnancy. *Journal of Obstetrics & Gynaecology Research*. 2015;41:1826–1830.
27. Gagnon J, Boucher L, Kaufman I, Brown R, Moore A. Iliac artery rupture related to balloon insertion for placenta 76ccrete causing maternal haemorrhage and neonatal compromise. *Canadian Journal of Anaesthesiology*. 2013;60:1212–1217.
28. Bishop S, Butler K, Monaghan S, Chan K, Murphy G, Edozien L. Multiple complications following the use of prophylactic internal iliac artery balloon catheterization in a patient with placenta percreta. *Int J Obstet Anesth* 2011;20:70-3.
29. Sentilhes L, Ambroselli C, Kayem G, Provansal M, Fernandez H, Perrotin T, et al. Maternal outcome after conservative treatment of placenta 76ccrete. *Obstetrics & Gynaecology*. 2010; 115:526–534.
30. Pala S, Atilgan R, Baspinar M, Kavak EC, Yavuzkir S, Akyol A, et al. Comparison of results of Bakri balloon tamponade and caesarean hysterectomy in management of placenta 76ccrete and increta: a retrospective study. *Journal of Obstetrics & Gynaecology*. 2018;38:194–199.
31. M. Patabendige, JMP. Sanjeeva, AMAKG. Amarasekava, RP. Herath. Conservative management of placenta percreta: three cases and a review of the literature regarding conservative management of placenta accrete spectrum(PAS) disorders. *Hindawi, case reports in obstetrics and gynecology*. 2020 March, Available from: <https://doi.org/10.1155/2020/9065342>
32. Stein Bisschop CN, Schaap TP, Vogelvang TE, Schotten PC. Invasive placentation and uterus preserving treatment modalities: a systematic review. *Arch Obstet*. 2011 Aug;284(2):491-502..
33. Raziell A, Golan A, Ariely S, Herman A, Caspi E. Repeated ultrasonography and intramuscular methotrexate in the conservative management of residual adherent placenta. *Journal of Clinical Ultrasound*. 1992; 20:288–290.
34. Ramoni A, Strobl EM, Tiechl J, Ritter M, Marth C. Conservative management of abnormally invasive placenta: four case reports. *Acta Obstetrica et Gynaecologica Scandinavica*. 2013;92:468–471.
35. Lin K, Qin J, Xu K, Hu W, Lin J. Methotrexate management for placenta accreta: A prospective study. *Archives Gynaecology Obstetrics*. 2015;291:1259–1264.
36. Armstrong CA Harding S, Dickinson JE. Clinical aspects and conservative management of placenta accreta. *The Obstetrician & Gynaecologist* 2004;6:132–137
37. Das SS, LS Devi, LR Singh, R Singh. Conservative management of placenta accreta with injection methotrexate to preserve fertility. *Journal of Medical Society* 2014;28:125–127
38. RCOG Green-top Guideline No. 27 RCOG, January 2011
39. Garmi G, Salim R. Epidemiology, aetiology, diagnosis, and management of placenta accreta. *Obstetrics and Gynaecology International*. 2012; Article ID 873929.

40. Aggarwal R, Suneja A, Vaid NB, Yadav P, Sharma A, Mishra K. Morbidly adherent placenta: a critical review. *The Journal of Obstetrics and Gynaecology of India* 2012;62:57–61.