

Morbidly adherent placenta: Experience in two tertiary care centers in Sri Lanka

Ratnasiri U.D.P.^a

INTRODUCTION

Twenty years ago, morbidly adherent placenta was an obstetric rarity. However, there is an increasing trend observed over the last decade with the increasing incidence of caesarean delivery. The most common location of abnormal invasion of placenta is the anterior lower uterine wall, especially when associated with a prior caesarean scar. It is divided into three types depending on the degree of invasion. Placenta accreta which is direct attachment of the extravillous trophoblast to the myometrium, placenta increta, in which extravillous trophoblast invasion into the myometrium occurs and placenta percreta where extravillous trophoblast invasion to serosa and/or to adjacent organs eg. Urinary bladder.

The incidence of morbidly adherent placenta increases with the number of repeat Caesarean sections. (1) The records of all patients presenting to labor and delivery with the diagnosis of placenta previa between 1977 and 1983 were examined. Of a total of 97,799 patients, 292 (0.3%) Placenta previa diagnosed prior to delivery, IVF pregnancy as well as twin pregnancy and preeclampsia increases the risk of placenta accreta (OR 65, 32.1, 2.99, 3.06). (2) Other risk factors for morbidly adherent placenta include myometrial tissue damage followed by a collagen repair such as previous myomectomy, endometrial defects due to vigorous curettage resulting in Asherman syndrome, submucous leiomyomas, thermal ablation and uterine artery embolization.

In 2012, five maternal deaths out of 22 haemorrhagic maternal deaths in Sri Lanka were due to placenta accreta. There were two maternal deaths as a result of

^aMBBS MS FRCOG Consultant Obstetrician & Gynaecologist Castle Street Hospital for Women, Colombo

Correspondence: U.D.P.Ratnasiri

E mail - ratnasiri@yahoo.com

Competing interests: The authors report no conflict of interest

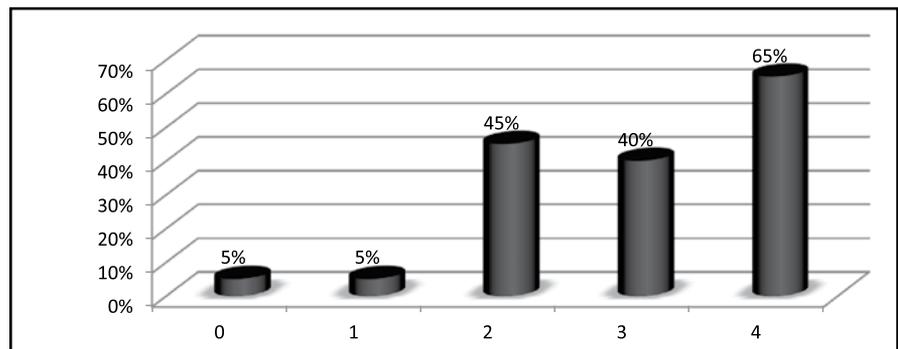


Figure 1 : Placenta accreta cases in relation to number of past Caesarean sections.

this condition out of nine haemorrhagic deaths in 2013. Fortunately in 2014 there were no deaths due to placenta accreta in Sri Lanka. (3)

The only available measure for prevention is to maintain a low caesarean section rate. Elective caesarean section carries a higher risk (OR =3.00, 95% CI – 1.1 7-6.12) than emergency Caesarean section (4). Sri Lanka has a high labour induction rate of 27%, compared with other countries in the region (Figure 2). The caesarean section rate has doubled over the last decade from 13.1% in 2001 to 27.7% in 2011 and it has increased furthermore to 31.1% in 2013.

METHODS

A retrospective descriptive study was performed on 61 cases of suspected and presumed morbidly adherent placenta during the period of 2011 to 2016. The

study setting was De Zoysa Maternity Hospital and Castle Street Hospital for Women. All cases were referred following the presumed diagnosis of placenta previa with different degrees of myometrial invasion made by the referring Obstetrician. Twenty-six cases of placenta accreta were managed from 2011 to 2014 at De Zoysa Maternity Hospital and thirty four cases were managed in Castle street hospital from 2014 to 2016. Patient data was collected from hospital records and were followed up till six weeks postpartum.

Upon arrival at the study setting ultrasound scan was repeated to confirm the diagnosis of placenta accreta and to assess the degree of invasion and its severity by the principal investigator. A second opinion was taken in few doubtful instances from the radiologist for confirmation.

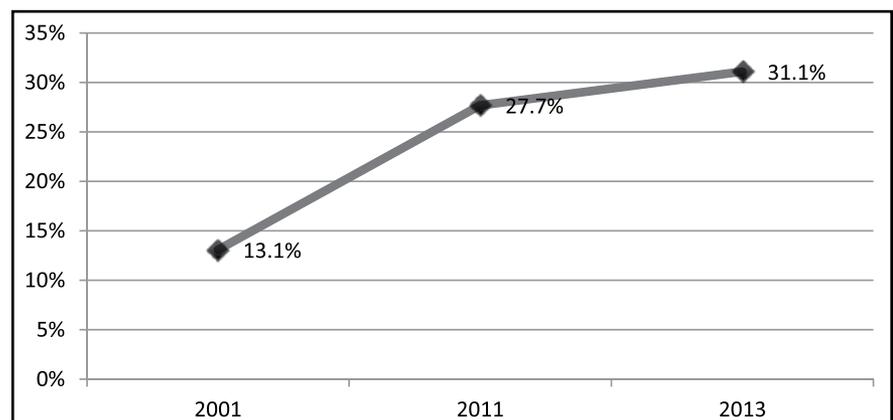


Figure 2 : Labour induction rates in Sri Lanka from 2001 to 2013



This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Following surgery histology was utilized to confirm the diagnosis of morbidly adherent placentation as placenta accreta, increta and percreta.

The plan of management in individual cases was discussed with the multidisciplinary team involving the consultant anesthetist, Interventional radiologist, transfusion specialist, and in few cases with the genito urinary surgeon. Neonatologist was informed for the premature baby care in cases of premature deliveries. The decision on the type of surgery and its extent, (Eg. Uterine conservation with uterine artery embolization, resection and repair of the uterus following delivery, hysterectomy following upper segment caesarean section) was decided based on future fertility wishes, amount of placental invasion, the intra operative assessment of the extent of placental invasion to the other organs like urinary bladder and lateral pelvic wall, and the amount of blood loss at surgery. Descriptive statistics were used to describe the study population and outcomes.

RESULTS

The association of placenta accreta with number of past sections in our study is as follows. (Figure 3)

Of a total of 61 cases referred, 5 were consequently found to have only evidence of placenta praevia while the remaining 56 had sonographic features of morbidly adherent placenta. From these cases 25 cases had features in favour of only placenta accreta while 31 had features of placenta percreta and increta.

Management of abnormal implantation of the placenta is either by conservative management or surgical management. Surgical management includes one step

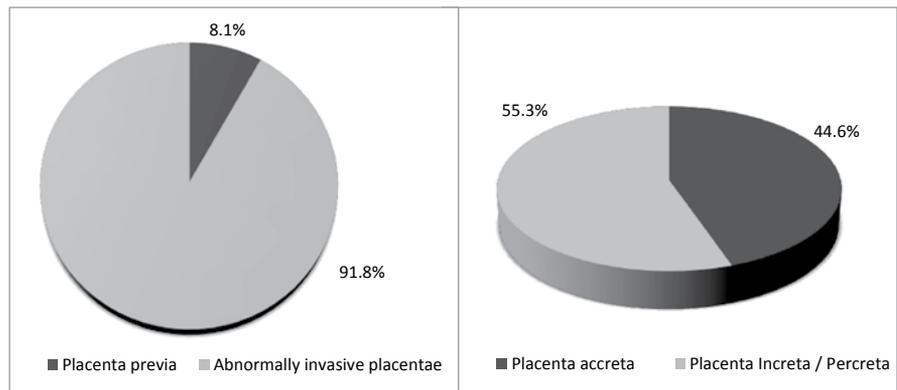


Figure 4 : Sonographic evidence of morbidly adherent placenta in study group

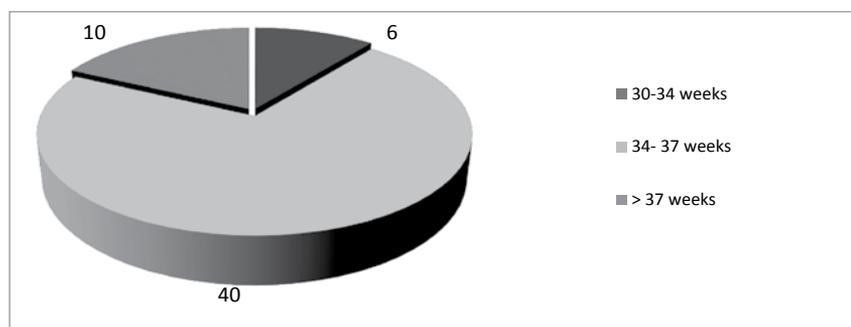


Figure 5 : Placenta accreta cases according to period of gestation at delivery

conservative surgery or hysterectomy. Table 1 shows the distribution of our cases in view of management offered:

Table 1 : Distribution of placenta accreta cases according to management offered

Conservative management	10
Conservative surgical management	03
Total Hysterectomy	43

Ten cases were managed conservatively. All of them have undergone upper segment caesarean section for the delivery of the fetus under general anesthesia. Placenta was left behind and upper segment was closed in two layers. The average gestational age was 36 weeks gestation and average blood loss was 600ml in these cases.

We have managed 46 cases with definitive surgery. Mean gestational age was 35 weeks. There was minimal maternal morbidity with zero maternal mortality. 95.6% of the cases were elective and 4.3% were emergency cases.

Blood loss was assessed using the pictorial loss assessment method and it varies between one to 4.5 litres depending on the severity of invasion and ability to control the loss. Figure 8 shows the average estimated blood loss during surgery. Manual aortic compression during the dissection of the invaded area of the placenta minimized the loss.

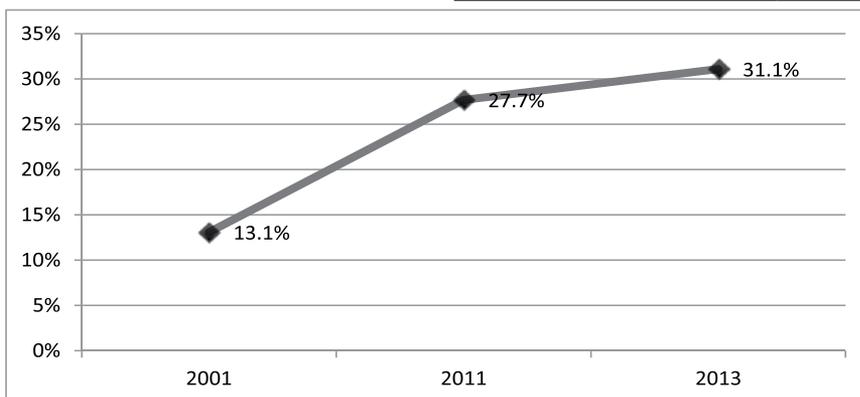
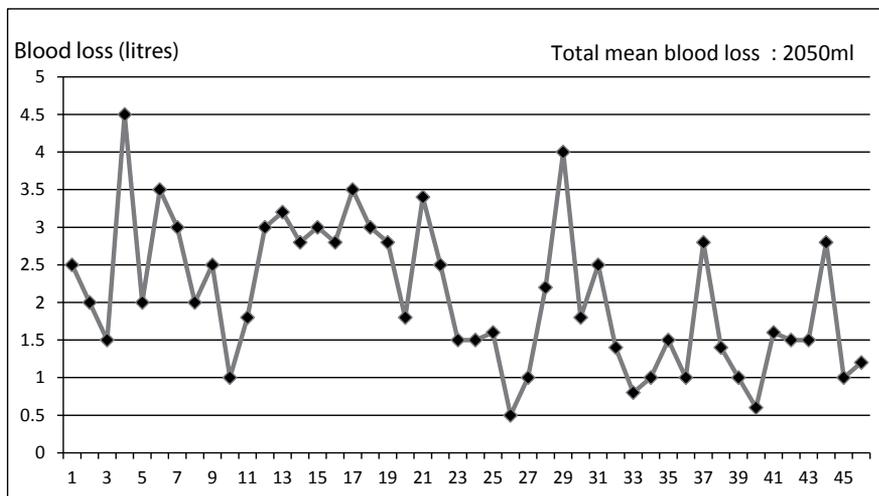
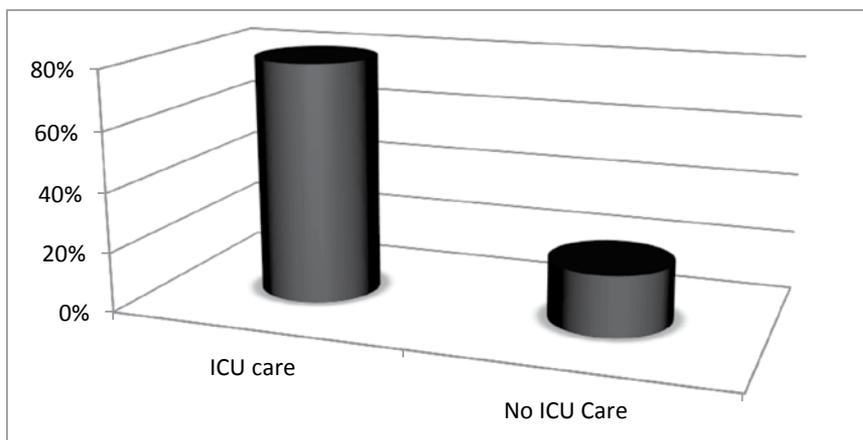


Figure 3 : Number of past sections in cases of placenta accreta

Table 2: Complications of Surgical management versus conservative management in placenta accreta.

Complication	Hysterectomy n(%)	Conservative n(%)
Hysterectomy	46(100%)	3 (30%)
ICU care (Stay 2-5 days)	40 (86%)	8 (80%)
Massive transfusion	15 (32.6%)	4 (40%)
Bladder injury / Cystostomy	10 (21.7%)	1 (10%)
Ureter injury	1 (2.1%)	0 (0%)
Vesico vaginal fistula	2 (4.3%)	0 (0%)
Bowel injury	0 (0%)	0 (0%)
Paralytic ileus	4 (8.6%)	1 (10%)
Wound infection	8 (17.3%)	1 (10%)
Reopening	2 (4.3%)	3 (30%)
Secondary PPH	3 (6.5%)	3 (30%)
Maternal mortality	0 (0%)	0 (0%)
Perinatal mortality	1 (2.1%)	0 (0%)

**Figure 6 : Blood loss during placenta accreta surgery****Figure 7 : ICU admissions in placenta accreta cases managed conservatively**

DISCUSSION

Morbidly adherent placenta is increasing in incidence and poses a challenge to the obstetrician involved in its management. Accurate prenatal diagnosis is the key important factor in planning management. Prenatal diagnosis is based on history of Caesarean section, trauma to the endometrium from other causes and other risk factors for morbidly adherent placenta. Ultrasonography is the main tool used in diagnosis. Lower lying placenta with previous cesarean scar should be carefully screened for placental invasion. Grey scale scan, colour doppler, 3D and 4D scans will add to the accuracy of the diagnosis. Any sonographer who finds lacuna pattern in low lying placenta with previous Caesarean scar should look for features of placenta accreta.

Placental vascular Lacunae are placental anfractuous or tortuous liquid areas that may appear as early as 15weeks gestation. There is turbulent high velocity flow (> 15cm/sec) with communication with retro placental flow. They have sensitivity 79%, PPV : 92% in diagnosing placenta accreta.

The sonographic features of morbidly adherent placenta include loss or irregularity of the hypoechoic area between uterus and placenta (retro placental clear zone), thinning / interruption of the uterine serosa- bladder wall interface, myometrial thickness <1mm, presence of turbulent placental lacunae with high velocity flow (>15cm/s) (PV 90%), presence of increased vascularity of the uterine serosa bladder wall interface (PV >95%), loss of vascular arch parallel to the basal plate and irregular intraplacental vascularization. According to the "Two criteria system", presence of at least two of the above mentioned characteristics were considered diagnostic for placenta accreta, increta and Percreta. The degree of invasion of morbidly adherent placenta can be predicted by the number of sonographic features identified. (5)

Mistakes in diagnosis are made by using a wide field which includes maternal abdomen, when the bladder is empty or over distended, taking very fine slices (less than 5mm) or axial slices according to pelvic axis. Lack of experience and lack of background on surgical findings are operator related problems that can lead to wrong diagnosis.

MRI is not essential, but complementary in

Figure 8 : Sonographic appearance of in placenta accreta. a) Visible lacunae pattern, b) loss of retroplacental hypoechoic area, c) increased colour flow, d) MRI appearance

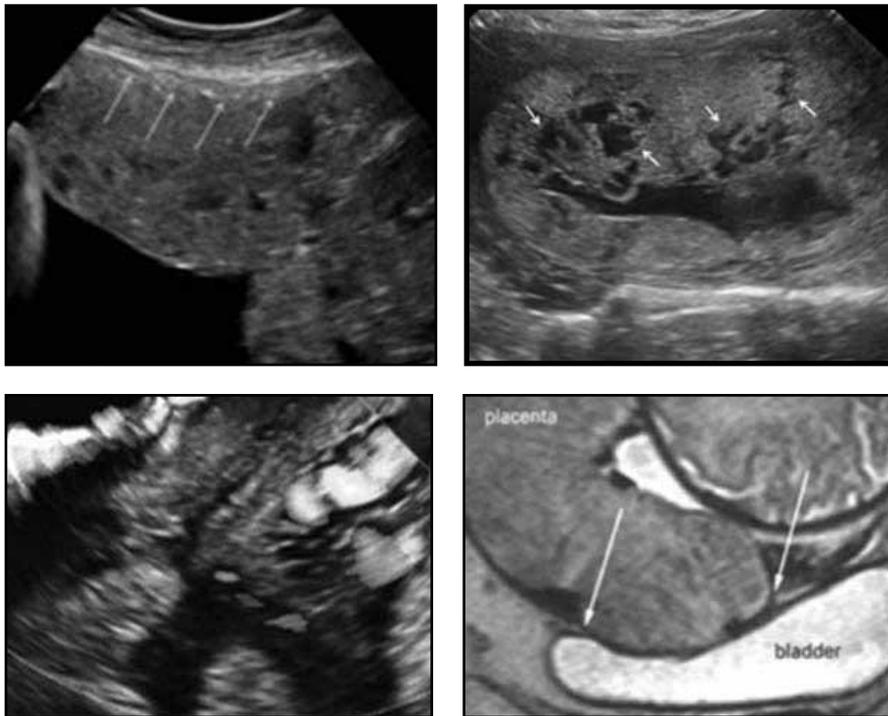


Table 3: Prediction of degree of invasion in placenta accreta by sonographic features

Number of features	No AIP	Placenta accreta	Placenta Increta / Percreta
0	207	3	0
1 or 2	5	8	2
>2	0	6	17

Table 4 : Review of accuracy of screening for placenta accreta with sonography

Author	Screened (no with accreta)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Warshak et al 2006	453 (9)	77	91	65	98
Esakoff et al 2011	108 (23)	89.5	96.1	65	98
Cali et al 2013	187 (22)	89.5	96.1	68	97.6
Chalubinski et al 2013	232 (14)	87	100	100	100
NewCastle	94 (16)	94.5	90.6	85.2	94.5

the diagnosis. MRI has similar sensitivity and specificity to ultrasound for diagnosis of placenta accreta. T2 weighted images with contrast (toxicity not so with newer contrast material) are being used in some centers as well. MRI is helpful in planning surgical intervention especially in uterine conserving surgery. We have not required MRI in our experience.

Once a primary diagnosis has been arrived at, the next priority is to know **how and where the placenta invades** the adjacent tissues. This helps in predicting the surgical difficulty, specific invaded areas and which vascular pedicles are involved. A combination of vascular control, fascial dissection and identification of specific pelvic elements (ureter or specific vessels) makes it possible to prevent injuries and to avoid complications.

From a surgical morphological point of view, knowledge on vascular supply to the uterus is important (table 5), while three main types of anterior placental adhesions may be distinguished

Type 1 in which the anterior segment is noticeably thinner and the placenta reaches the serosal surface. No newly formed placental-vesical or vesicouterine vessels are seen. There is a lax dividing plane between the posterior bladder wall and the anterior surface of the uterine segment.

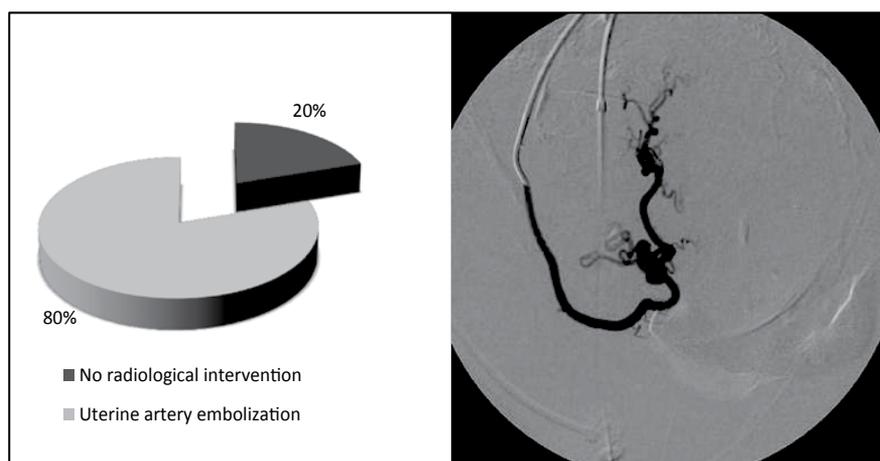
Type 2 where both the lower uterine segment and the posterior wall of the bladder are noticeably thinner. No newly formed placental-vesical or vesico uterine vessels are observed. There is no lax plane between both organs and a fibrous scar connects them.

Type 3 in which there is a thinner uterine segment and vesical wall of variable thickness There is placental-vesical and vesicouterine neovascular circulation. Vesicouterine plane is with or without fibrous adherence.

Complete reverse of the normal placentation occurs due to lack of muscularity and increase collagen tissue. Spiral arteries are not formed and new vessels arise from arcuate and proximal arteries. Complex vascular anastomotic system with three vascular systems, vesico uterine system (VUS), placental-vesical system (PVS) and colpo uterine system (CUS) persists. These three vessels join each other and both sides are connected at the center. Formation

Table 5 : Lower uterine vascular supply (S2)

Upper pedicle	Uterine artery	100% from IIA
Middle pedicle	Cervical artery	67% from UA
		23% from Vas
		10% from LVeA
Lower pedicle	UVA	18% from UA
	MVA	11% from IIA
	LVA	71% from PIA
		75% as descending branch
		25% as ascending branch
Sectional diameters	UA: 1.81 mm	MaVA: 1.88 mm

**Figure 9 : Practice of Uterine artery embolization (UAE) amongst conservatively managed cases of placenta accreta**

of new vessels from the placental vasculature (neovascularization) causes this anastomotic network mediated by placental VEGF.

This association implies difficulties from a technical surgical point of view including adherence to bladder, development of neovascularization, destruction of myometrial tissue and access to the pelvic sub peritoneal spaces. (6)

One step conservative surgery is challenging and not always feasible. Fertility wishes of patient should be considered. Three cases in our series were managed conservatively with the excision of lower uterine segment with adhered placenta and end-to-end repair. Methotrexate was given to reduce vascularity prior to surgery in one case with an abnormal fetus with IUD (7). One case required condom catheter ballooning of the uterine cavity following surgery due to persistent haemorrhage.

Uterine artery embolization (UAE) is utilized in conservative management, which involves an interventional radiologist. It was performed in 8 patients undergoing conservative management within 1 week of delivery and broad spectrum antibiotics were given for 5 days with ICU care. These patients were followed up over a period of 4 months duration. Secondary hysterectomy was required in only one patient due to persistent haemorrhage.

However conservative management can give rise to increased anxiety of the patient and a variety of complications such as sepsis, secondary haemorrhage necessitating delayed hysterectomy. (8)

When placenta is left in situ it requires long term monitoring for several months. Woman and her partner should be properly counseled and motivated. Follow up requires usually first weekly and then monthly visits till complete resorption of

the placenta. Follow up involves clinical examination, blood and vaginal samples, ultrasound +/- RM imaging. Monitoring beta HCG level seems not relevant and useful. The benefit-harm balance is against the use of methotrexate. Routine embolization may hasten placental resolution. Hysteroscopic resection may be a useful tool to shorten recovery time, particularly in symptomatic cases.

Surgical management of placenta accreta depends on severity of invasion, extension and fertility wishes. Each case is individualized with tailor made management with standard policy of management. Surgical management involves a multi disciplinary approach including senior Obstetrician, Obstetric anesthetist, Neonatologist, Interventional Radiologist and Genito urinary surgeon.

Similar complication rates were observed in other placenta accreta management case series as well. In a study conducted in Salt Lake City USA in 2009 involving 57 cases of suspected placenta accreta average blood loss was 2.4 L, with blood transfusion >4 units 39%, wound infection 14%, ureteral injury 7%, cystostomy required in 33%, reopening in 4% and early and late morbidity of 44% and 19% respectively. (9). In a study conducted in India on morbidly adherent placenta involving 20 patients during a period of five years operative morbidity included an average blood loss of 2.7 litres, bladder injury and partial cystectomy 20%, mortality 30% with an average ICU stay for 2.6 days. (10) high risk factors, fetomaternal outcome and management options in morbidly adherent placenta (MAP)

During pre operative preparation it is important to refine and confirm diagnosis/perform placental mapping. A care plan is made to decide on gestational age for delivery. Correction of anaemia (target Hb 11g/dl) is achieved. Corticosteroids and MgSO₄ is administered if needed in case of premature deliveries. Informed written consent is taken for the surgical procedure including hysterectomy. Six units of cross matched blood are saved. ICU bed preserved. Theatre is informed for equipment preparation. Preparation made for ureteric stenting or UAE. Eller described that scheduled procedures for placenta accreta are associated with lesser morbidity compared to unscheduled surgery though results were not statistically

significant in his series (9).

Anesthetist preparation is also required. Blood warmers are arranged. Central line is instilled for Central venous pressure monitoring. Rapid infusion sets are kept ready for massive transfusions if required. Abdomen is opened with a midline incision. Prior to incision methylene blue dye is injected into the bladder through the urinary catheter and clamped to demarcate the urinary bladder clearly.

Upper segment Caesarean section performed with a transverse incision to avoid the placental transection. Baby delivered & handed over. Administration of oxytocin is withheld. Cord is tied to prevent bleeding and placental separation, which could give rise to massive haemorrhage. Careful handling of tissues to prevent damaging the fragile thin lower uterine segment with tightly adherent placenta is of paramount importance.

Neovessels along the bladder and uterine systems are thereafter carefully dissected to separate the bladder from the lower uterine segment. In the event of sudden separation and massive blood loss, quick resort to hysterectomy is necessary. In such instances of anticipated massive blood loss, manual aortic compression was used until hysterectomy is completed.

Manual aortic compression was utilized in 75% of cases for effective control of blood loss during surgery. Bilateral internal iliac artery ligation may not be feasible with enlarged uterus. Aortic compression can be done with aortic clamps, manual aortic compression or endovascular aortic occlusion. Manual aortic compression is feasible but need a separate assistant. It is effective in low cost settings. Intermittent aortic occlusion between 30 to 60minutes can be safely applied without ischaemic damage to the lower limbs. Occlusion is done just above bifurcation.

Routine cystoscopy prior to surgery has no evidence based value (8). However according to the series published by Eller bilateral ureteric stenting decreased early morbidity significantly ($p=0.02$)(9). Lack of clear tissue plane and neovascularization makes bladder dissection difficult. When dissection is done traction and counter traction should be applied. Always sharp dissection is done from round ligament inwards. Diathermy cauterisation or double ligation of neovessels is done prior to dissection. Methylene blue is

injected to bladder prior to surgery for clear demarcation. Cystostomy and bladder repair was carried out in few cases with dense bladder adhesions with extremely difficult dissections. Retro vesical approach is needed in certain cases. Majority of these surgeries were performed under general anaesthesia.

ICU care is given in the post-operative period. Transfusion of blood products is guided by Rotational thromboelastometry (RoTEM). Patient needs adequate post-operative analgesia. If cystostomy is done or bladder injury is sustained the catheter is kept for 14 days post operatively. Early mobilization and DVT prophylaxis is needed. The average hospital stay is 7 days.

Overall conservative surgery for placenta accreta was associated with less morbidity and mortality. In our series need for massive transfusion, bladder injury, paralytic ileus and wound infection rates were low compared to hysterectomy. A study done in Pakistan involving 14 cases of myometrial resection against 10 cases of Caesarean hysterectomy for placenta accreta showed less blood transfusion ($p<0.01$), no bladder injuries, less post operative ICU stay with conservative surgery (11).

Contraindications for conservative management includes S2 segment involvement in Ultra sound scan, S1 with $>50\%$ axial circumference, no future fertility wishes, multiple prior Caesarean section and age >40 years. (5)

Perclot which is a haemophealic starch extract is useful in uterine conservative procedures. (12) Cell salvage techniques may improve outcome as well although not freely available.

If accreta is identified during surgery, perform upper segment Caesarean section and deliver the baby. Oxytocin should not be given. Ligate the cord and achieve vascular control. Close and transfer the patient to a center with expertise and equipment to manage massive transfusion and definitive surgery. Most importantly avoidance of placental transection is important to prevent massive haemorrhage.

In conclusion, placenta accreta is rare but life threatening condition. Be vigilant. All pregnant mothers with previous caesarean sections should have a ultrasound scan to locate the placenta in mid trimester of pregnancy. Always suspect accreta

when placenta is low lying and anterior in a patients with previous caesarean section. Presence of placental lacunae, loss of retroplacental hypoechoic area with turbulent flow in sonography are features in favour of accreta. Individualize the management with multi-disciplinary approach. If the facilities are not available refer to tertiary care center where facilities are available. Conservative management is possible in carefully selected cases. Conservative management requires long term follow up for resorption due to high risk of haemorrhage, infection and may need secondary hysterectomy. Careful selection is needed for one step conservative surgery. Surgical management should include measures to minimize blood loss, avoiding damage to other organs and structures. Skilled assistance is invaluable in performing these surgeries. Sri Lanka requires regional centres for the management of this life threatening condition to reduce the maternal morbidity and mortality.

REFERENCES

1. Clark SL, Koonings PP, Phelan JP. Placenta previa/accreta and prior cesarean section. *Obs Gynecol* [Internet]. 1985;66(1):89–92. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/4011075>
2. Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. Incidence and Risk Factors for Placenta Accreta/Increta/Percreta in the UK: A National Case-Control Study. *PLoS One*. 2012;7(12).
3. Jayaratne K, Physician H. Maternal Death Surveillance and Response (MDSR) – outcomes of 2014. 2014.
4. Kamara M, Henderson JJ, Doherty DA, Dickinson JE, Pennell CE. The risk of placenta accreta following primary elective caesarean delivery: A case-control study. *BJOG An Int J Obstet Gynaecol*. 2013;120(7):879–86.
5. Robbs S. No Title. In: Professor. Birmingham, United Kingdom: Royal College of Obstetricians and Gynaecologists World Congress 2016; 2016.
6. J. M. Palacios-Jaraquemada. A comprehensive text book of postpartum haemorrhage, Chapter 31 : One-Step Conservative Surgery

- for Abnormal Invasive Placenta (Placenta. 2nd Editio. Sabaratnam AS, Karoshi M, Keith LG, Lalonde AB, B Lynch C, editors. Global Library of Women's Health, Sapiens Publishing; 263-271 p.
7. Dissanayake AD, Ratnasiri UDP, De Silva G, Abeykoon TP. Intramuscular Methotrexate followed by successful Uterine preserving surgery for placenta accreta with second trimester miscarriage: A Case study. 2016.
 8. Amsalem H, Kingdom JCP, Farine D, Allen L, Yinon Y, D'Souza DL, et al. Planned Caesarean Hysterectomy Versus "Conserving" Caesarean Section in Patients With Placenta Accreta. *J Obstet Gynaecol Canada* [Internet]. Elsevier Masson SAS; 2011;33(10):1005–10. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S1701216316350496>
 9. Eller AG, Porter TT, Soisson P, Silver RM. Optimal management strategies for placenta accreta. *BJOG An Int J Obstet Gynaecol*. 2009;116(5):648–54.
 10. Aggarwal R, Suneja A, Vaid NB, Yadav P, Sharma A, Mishra K. Morbidly adherent placenta: A critical review. *J Obstet Gynecol India*. 2012;62(1):57–61.
 11. Srichand P. Conservative surgical management of patient with morbidly adherent placenta. Professor. Hyderabad Sidh, Pakistan; 2016.
 12. Edwin C, Moore J, Hartopp R, Pinas A. Does the size of the myometrial excision during the Triple P Procedure for the management of Placenta Percreta matter? Analysis of the first 25 cases. London, United Kingdom; 2016.