Management of Abnormally Invasive Placentation: A Case Series

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ABSTRACT

Due to the growing number of Caesarean deliveries, the frequency of abnormally invasive placentation is increasing. The abnormally deep attachment of the placenta beyond the endometrial lining can cause severe maternal morbidity and mortality with massive hemorrhage and infiltration into surrounding organs in the most severe form (placenta percreta).

With improved accuracy of ultrasound and MRI techniques, we are able to diagnose more patients with this obstetric complication antenatally. This allows planning for delivery and anticipation of complications.

However, the optimal management of this condition remains unclear. Surgical removal of the uterus renders the patient sterile, with severe complications if the infiltration into surrounding organs require radical surgery at the same time. Alternatively, conservative management of keeping the placenta in-situ would only be feasible in certain cases, and require close surveillance with risk of post partum hemorrhage and infection.

This paper reviews the cases of placenta accreta and its associated variants managed at Singapore General Hospital over the 4-year period from 2003 to 2007, with the aim of distilling valuable lessons from this experience. We have shown that with advance planning and high vigilance, we can reduce the incidence of massive obstetric hemorrhage and surgical morbidity from this condition.

Keywords: abnormal placentation, obstetric, hemorrhage, caesarean section

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INTRODUCTION

Placenta accreta is defined as the abnormal attachment of the placenta chorionic plate to the myometrium due to a defect in the decidua basalis. The three forms of abnormal placentation are defined by the degree of penetration – accreta, increta and percreta. Of these, percreta is by far the most severe as there is infiltration not only of the uterine serosa, but also of neighbouring organs such as the bladder and bowel, leading to potentially serious morbidity with removal of the placenta.

If placenta accreta is unanticipated, complications can arise during attempts to deliver the placenta. Failure of the layers to spontaneously separate can lead to severe, occasionally uncontrollable, postpartum hemorrhage frequently necessitating removal of the

uterus. Further surgical morbidity and mortality may result from bowel and urological injuries, deep vein thrombosis, sepsis, bleeding and adult respiratory distress syndrome.

Placenta accreta is the most common indication for a peripartum hysterectomy as shown in many recent reviews.[1,2,3,4] As the number of Caesarean sections continues its rising trend, this previously rare occurrence is likely to become more frequently encountered by Obstetricians worldwide.[5]

The recent enrichment of medical literature in this area reflects the rising incidence of this condition. This is likely to have arisen from a combination of rising Caesarean numbers and improved detection rates from widespread use of highresolution ultrasound and imaging in antepartum diagnosis. A review of contemporary literature[6,7] showed two schools of thought regarding its management – conservative (leaving the placenta in-situ) vs surgical (hysterectomy).

Proponents for the surgical hysterectomy approach (to remove the placenta and uterus with the delivery of the fetus) cite concerns of postpartum hemorrhage and infection. Women with antenatally diagnosed morbidly-adherent placentas were treated with extirpative surgeries involving caesarean hysterectomies as well as radical surgery if there was invasion of neighbouring organs.[8] However, these major surgeries almost always led to increased transfusion requirements, prolonged hospitalization, as well as increased morbidity. Loss of future fertility is also a major problem.

Conservative options may provide a viable alternative to hysterectomy in carefully selected patients. Planned conservative management of placenta accreta cases were first reported in the late 1990s, and the outcomes of case series published in recent years support this approach.9 Management approaches to the placenta left in-situ include expectant management, manual removal of placenta at a later date10, use of methotrexate, as well as use of interventional radiology for uterine artery embolisation.[11]

Our department had encountered our first case of placenta accreta in 2003. This patient had been antenatally diagnosed and was admitted at 32 weeks amenorrhoea with antepartum haemorrhage. An emergency transfundal caesarean section had been performed by two consultant obstetricians with a consultant urologist in attendance. After delivery of the foetus, there had been massive haemorrhage, percipitating cardiopulmonary collapse that required resuscitation. Total hysterectomy and subtotal (bladder) cystectomy had been performed but haemostasis could not be achieved as disseminated

intravascular coagulation (DIC) ensued and 22 litres of blood was lost. Large packs had to be placed in the pelvis before abdominal closure, followed by angiographic embolisation of the internal iliac vessels. She had a stormy post-operative course, requiring multiple laparotomies, including a second one for hemostasis (which involved opposing three layers of pelvic parietal peritoneum and gut to obliterate all potential spaces), bowel adhesiolysis, creation of a neobladder in the form of a sigmoid colo-cystoplasty, and repairs of a rectosigmoid junction stricture and a colo-neovesical fistula.

Since then, we have encountered an exponential increase in such cases over the next few years. We have favoured a conservative approach for placenta accreta cases diagnosed antenatally. Potential advantages include prevention of massive hemorrhage, prevention of damage to surrounding structures and preservation of fertility[12],.
This paper aims to give an account of our experience in the cases of abnormal placentation, including those undiagnosed before delivery, managed by our unit during the four year period of 2003 to 2007.

METHOD

A retrospective review of all cases of placenta accreta managed at Singapore General Hospital over a 4-year period from 2003 to 2007 was performed.

Antenatally-diagnosed cases were retrospectively identified from our ultrasound database. The operating theatre database was also interrogated using the search strings "caesarean hysterectomy" and "peripartum hysterectomy".

Specific information was collected on maternal demographics, parity, past and present pregnancy complications, previous uterine surgery, imaging investigations performed, gestation at delivery and indication for delivery.

Outcomes analyzed include measures during surgery, intra-operative blood loss, duration of hospitalisation and use of blood products, as well as complications such as visceral injuries to the bladder and ureters, and death.

RESULTS

A total of 12 cases of morbidly adherent placentas were identified. There were 9 women (median age = 38 years) with antenatally diagnosed placenta accreta (median gestational age at diagnosis = 23.3 weeks) and 3 who were not diagnosed antenatally. The common predisposing factor was previous caesarean sections (median = 2). Clinical data on these patients

are shown in Tables 1 and 2.

All 9 diagnosed patients had a multidisciplinary consult – comprising of senior obstetricians, an anaesthetist, a haematologist, a urologist and an interventional radiologist. Ultrasound diagnosis was followed by magnetic resonance imaging (MRI) for confirmation of transmyometrial invasion in all patients. Co-ordinated plans were laid for elective delivery, as well as contingency activation plans should any of the patients present on an emergency basis.

Anaemia was detected and corrected antenatally, with one patient requiring blood transfusion for Haemoglobin of 7gl/dl. The blood bank was also informed in advance of the patient's particulars and blood group and cross match was performed weekly as a precaution from 30 weeks onwards.

Four patients presented with antepartum hemorrhage (APH). Three were classified as at severe APH (estimated blood loss of more than 1.5 litres), and required urgent insertion of femoral catheters with

conserved uterus. However, she developed severe secondary post partum hemorrhage on the 3rd post operative day and required an emergency laparotomy and hysterectomy. In total, 7 pints of packed red cells were transfused. Examination of the gross surgical specimen showed that only part of the placenta had been morbidly-adherent, and that the normal portion of the placenta had separated from its decidual attachment, presumably the cause of the torrential hemorrhage.[13]

The placentas were left in situ in all but one of the patients. This patient had booked late, and the diagnosis of placenta accreta was made at 33+4 weeks. After extensive preoperative discussion, she declined conservation of the uterus as she was concerned about the long period of follow-up and the risks of postpartum hemorrhage and infection. Cystoscopy showed no bladder involvement and we proceeded with an uncomplicated caesarean hysterectomy. Blood loss was 900 ml and she recovered well.

Figure 1: Midline fundal incision well away from placenta. Note placenta percreta infiltrating bladder with prominent vessels at the lower segment

inflation of occlusion balloons to maintain blood pressure. Of these, two had placenta abruption (each had a total blood loss of 4 litres) and all three required caesarean hysterectomy after transfundal delivery.

The fourth patient had presented with minimal spotting prior to delivery and was initially delivered via caesarean section with the placenta left in-situ of the

For the other four patients, there was minimal manipulation of the uterus and placenta and intraoperative blood loss was less than 500ml. They subsequently expelled the placenta after period of 3 to 6 months.

Three cases were not detected antenatally. The first two cases were known to have placenta previa type 4

(reaching os), while ultrasound imaging had shown the placenta to be non-previa about 5 weeks prior to delivery in the last case. Intraoperative blood loss was between 1500ml and 2500ml, and all the women required blood transfusion, one of which was massive (11 pints of packed red cells and 4 units fresh frozen plasma). Of note, the third case did not have any previous uterine surgery except for an evacuation of uterus a few years prior to conception. She was, however, on high doses of steroids and cyclosporine due to an autoimmune medical condition.

There were no maternal deaths in our series. For the conservatively managed patients without antepartum hemorrhage, none developed endometritis or postpartum hemorrhage during the follow-up period.

The collection of this series over such a short time period following our first case in 2003 reflects the increasing incidence. This is in tandem with our department's rising Caesarean rate, which is currently about 30%.

Primary prevention of this condition calls for a reduction in Caesarean section rates and non-essential instrumentation of the uterus.

Secondary prevention involves increased vigilance for this condition, with increased suspicion in patient with risk factors such as previous Caesarean sections, uterine instrumention and placenta previa. Our department practice is for radiographers performing antenatal scans of high risk patients to have a high index of suspicion for accreta, especially in cases of placenta previa.

In view of the recent evidence for the conservative approach with leaving the placenta in situ, our department has adopted the conservative approach[14] for patients in whom we cannot exclude percreta preoperatively, and they were scheduled for elective deliveries (4 out of 5 in our series).

With cases of suspected percreta, the conservative approach with retention of the placenta can reduce rates of morbidity seen with conventional surgical therapy, such as ureter injuries, bladder resection, fistula formation and massive hemorrhage. Our series shows that conservative treatment reduces blood transfusions (only 2 out of 5 needed a transfusion) and hysterectomy rates (1 out of 5 cases), in agreement with the case series by Kayem et al.[7]

For the conservative approach to be successful, the following points are important:
    High index of clinical suspicion in patients with prior uterine surgery. Undiagnosed cases may present as an emergency with severe or uncontrolled haemorrhage, with its attendant mortality and morbidity. As seen in our series, all the undiagnosed cases needed hysterectomies for unanticipated bleeding and had significant use of blood products with prolonged stays in hospital.

2) Advance planning involving a multidisciplinary team. Members should be identified and informed in advance. Preoperative planning and counseling should also be done to ensure that adequate expertise and haematological support with facilities to support massive hemorrhage are available. Also, the classical transfundal incision can be used rather than the standard lower segment incision, which risks cutting through the placenta. The use of a protocol and identification of key personnel to contact in such cases had greatly facilitated our efficiency and experience in management of cases.

3) Patient compliance. There is a need for prolonged follow-up, and the patient needs to be instructed to seek immediate medical attention if secondary haemorrhage and infection occur.

High-resolution ultrasound with Doppler studies is the first line for diagnosis of placenta invasion. The diagnostic criteria has been defined in several papers[15, 16,] and include obliteration of retroplacental clear space, a myometrial thickness of <1 mm, presence of vessels bridging the placental-uterine margin, disruption of the placental-uterine wall interface, and vessels crossing the sites of interface disruption (Fig 2). The use of Doppler studies can aid diagnosis in suspicion cases where there is evidence of turbulent blood flow between placenta and bladder, pulsatile flow in bladder wall or pulsatile flow though the thickness of the placenta in places. A study reviewing these criteria has recently been published and suggests that the use of a composite score can improve the diagnostic value.[17]

Magnetic Resonance Imaging (MRI) may allow better definition of the extent of invasion than ultrasound, especially for a posteriorly-sited placenta, as the fetal head can interfere with the passage of the ultrasound waves.[18] This should be done for all patients in whom a morbidly-adherent placenta is suspected. However, the jury is still out as to whether MRI can replace ultrasound for diagnosis of placenta accreta, as the specificities of both modalities are comparable.[19] Our local study[20] suggests that three previously-described MRI features were consistently present in patients with adherent placentas: lower uterine bulging, heterogeneous placenta and dark intra-placental linear bands on T2-weighted images (Fig 3).

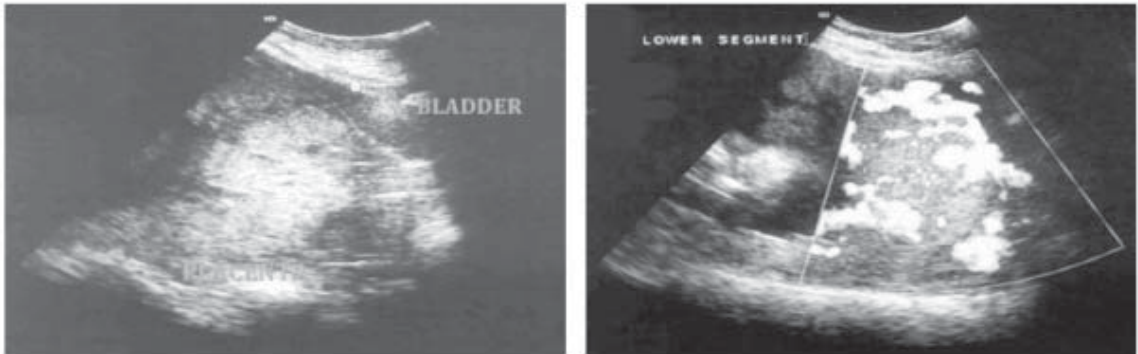Advances in interventional radiology have contributed

Figure 2: Ultrasound features suspicious for placenta accreta include a) obliteration of retroplacental clear space , b) turbulent blood flow between placenta and bladder
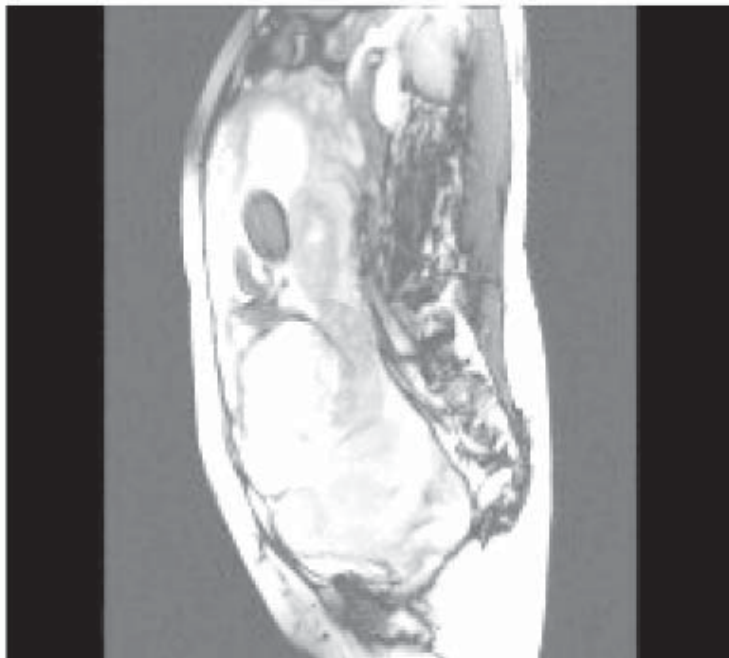

Figure 3: MRI-Sagittal view showing loss of hypointensity between placenta and bladder

greatly to our therapeutic armamentarium against severe hemorrhage. Mitty et al. were the first to report the use of uterine artery embolisation as the primary treatment of placenta accreta in 1993.[21]

Our department uses pre-operative internal iliac artery catheterisation[22] as an adjunct to prophylactically address intraoperative and post-operative bleeding. The internal iliac artery balloon is inflated after the birth of the baby and haemostasis is secured before closure. For cases followed immediately by hysterectomy, the balloons were deflated before skin closure. When the placenta is retained, embolisation is performed post-operatively. The advantage of this approach is to minimise exposure of the fetus to fluoroscopy (majority of time

taken for embolisation) as well as to avoid embolisation in cases where it is not needed – i.e. the uterus is removed by hysterectomy. As there is a theoretical risk of inducing ischemia of the surrounding tissue, such the ovaries, with embolisation, we use absorbable gelatin sponge particles, which provide a transient vascular blockade lasting 2 to 4 weeks.

We did not use methotrexate for the conservatively managed cases immediately post operation as the current literature is equivocal regarding its usefulness.[4,23] There had been a steady downward trend of BHCG in all our cases, but use as adjuvant therapy remained an option had there been a delay in the fall of the BHCG levels.

Conservative managed patients are monitored in high dependency following the delivery for at least one day, with at least one week post operative hospitalization as there is potential for secondary postpartum hemorrhage. They are given prophylactic antibiotics for 14 days. Outpatient follow ups are at close (weekly or two-weekly) intervals until the placenta is passed out, which can take up to 6 months in our series.

In the case of partial accreta in our series, a repeat laparotomy on the 3rd post-operative day showed that the vascularity of the uterus had been greatly reduced and the operation was technically easier. Two learning points from this case are that postpartum hemorrhage can be severe and precautions (close surveillance and haematological support) should be taken post operatively after leaving the placenta in, and that a delayed hysterectomy is technically easier and less vascular with the involution of the uterus, and may be considered an option in selected patients.

In the cases which were not preoperatively diagnosed, the lesson learnt is that there is still a margin of error with the antenatal diagnosis of placenta percreta, even when supported by imaging studies and cystoscopy. For one of the cases, the ultrasound scan at 31.2 weeks did not pick up the placenta previa, although the patient did have 3 previously caesarean sections and is considered at a very high risk of having a morbidly-adherent placenta. Hence, in cases with placenta previa or risk factors for morbidly-adherent placenta (i.e. multiple uterine surgeries), we must be vigilant to the possibility of massive haemorrhage regardless of the management plan adopted.

CONCLUSION

With rising caesarean section rates and presence of high resolution ultrasound, the diagnosis of morbidly adherent placenta is expected to increase. There is need for high index of suspicion in the antenatal period and currently, colour doppler ultrasound is the mainstay for diagnosis. Preparedness is the key with multidisciplinary team alerted once a case is identified. This allows advanced planning and delivery under controlled circumstances.

There is need for individualized management of each case. For cases of placenta percreata diagnosed antenatally, our experience with conservative approach has been encouraging. From this series, we hope to have shared our rationale for management as well as valuable lessons learnt.

REFERENCES

1. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et al. Maternal morbidity associated with multiple repeated cesarean deliveries. Obstet Gynecol 2006;107:1226–32.

2. Flood KM, Said S, Geary M, Robson M, Fitzpatrick C, Malone FD. Changing trends in peripartum hysterectomy over the last 4 decades. Am J Obstet Gynecol. 2009 Jun; 200(6):632.e1-6.

3. Habek D, Becareviç R. Emergency peripartum hysterectomy in a tertiary obstetric center: 8-year evaluation. Fetal Diagn Ther. 2007;22(2):139-42.

4. Kwee A, Bots ML, Visser GH, Bruinse HW. Emergency peripartum hysterectomy: A prospective study in The Netherlands. Eur J Obstet Gynecol Reprod Biol. 2006 Feb 1;124(2):187-92

5. Wu S; Kocherginsky M; Hibbard JU. Abnormal placentation: Twenty-year analysis. Am J Obstet Gynecol 2005 May;192(5):1458-61.

6. Timmermans S, van Hof AC, Duvekot JJ. Conservative management of abnormally invasive placentation. Obstet Gynecol Surv. 2007 Aug;62(8):529-39.

7. Kayem G, Davy C, Goffinet F, Thomas C, Clement D, Cabrol D. Conservative versus extirpative management in cases of placenta accreta. Obstet Gynecol 2004;104:531-6.

8. O'Brien JM, Barton JR, Donaldson ES. The management of placenta percreta: conservative and operative strategies. Am J Obstet Gynecol 1996; 175: 1632 -1638

9. Kayem G; Davy C; Goffinet F; Thomas C; Clement D; Cabrol D Conservative versus extirpative management in cases of placenta accreta. Obstet Gynecol 2004 Sep;104(3):531-6.

10. Descargues G, Clavier E, Lemercier E, Sibert L. Placenta percreta with bladder invasion managed by arterial embolization and manual removal after cesarean. Obstet Gynecol 2000;96:840.

11. Weinstein A; Chandra P; Schiavello H; Fleischer A Conservative Management of Placenta Previa Percreta in a Jehovah's Witness. Obstet Gynecol 2005 May;105(5):1247-50

12. Alanis M, Hurst BS, Marshburn PB, Matthews ML. Conservative management of placenta increta with selective arterial embolization preserves future fertility and results in a favorable outcome in subsequent pregnancies.Fertil Steril. 2006 Nov;86(5):1514.e3-7.

13. *Teo SB, Kanagalingam D, Tan HK, Tan LK. Massive postpartum haemorrhage after uterus-conserving surgery in placenta percreta: the danger of the partial placenta percreta. BJOG 2008;115: 789–92.*

14. *Thia EW, Tan LK, Devendra K, Yong TT, Tan HK, Ho TH. Lessons learnt from two women with morbidly adherent placentas and a review of literature. Ann Acad Med Singapore. 2007 Apr;36(4):298-303.*

15. *Comstock CH. Antenatal diagnosis of placenta accreta: a review. Ultrasound Obstet Gynecol 2005;26:89-96.*

16. *Finberg HJ, Williams JW. Placenta accreta: prospective sonographic diagnosis in patients with placenta previa and prior caesarean section. J Ultrasound Med 1992;11:333- 43.*

17. *Wong HS, Cheung YK, Zuccollo J, Tait J, Pringle KC. Evaluation of sonographic diagnostic criteria for placenta accreta.J Clin Ultrasound. 2008 Nov-Dec;36(9):551-9*

18. *Lax A, Prince MR, Mennitt KW, Schwebach JR, Budorick NE. The value of specific MRI features in the evaluation of suspected placental invasion. Magn Reson Imaging 2007;25:87-93.*

19. *Dwyer BK, Belogolovkin V, Tran L, Rao A, Carroll I, Barth R, Chitkara U. Prenatal diagnosis of placenta accreta: sonography or magnetic resonance imaging? J Ultrasound Med. 2008 Sep;27(9):1275-81.*

20. *Teo TH, Law YM, Tay KH, Tan BS, Cheah FK. Use of magnetic resonance imaging in evaluation of placental invasion. Clin Radiol. 2009 May;64(5):511-6.*

21. *H.A. Mitty, K.M. Sterling, M. Alvarez and R. Gendler, Obstetric hemorrhage: prophylactic and emergency arterial catheterization and embolotherapy, Radiology 188 (1993), pp. 183–187*

22. *Tan CH, Tay KH, Sheah K, Kwek K, Wong K, Tan HK, Tan BS. Perioperative endovascular internal iliac artery occlusion balloon placement in management of placenta accreta.AJR Am J Roentgenol. 2007 Nov;189(5): 1158-63.*

23. *Raziel A, Golan A, Ariely S, Herman A, Caspi E. Repeated ultrasonography and intramuscular methotrexate in the conservative management of residual adherent placenta. J Clin Ultrasound 1992;20:288 –90.*