

All maternal deaths related to placenta accreta spectrum are preventable: a difficult-to-tell reality



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BACKGROUND: Most maternal deaths related to postpartum hemorrhage are preventable. In most cases, placenta accreta spectrum is the principal cause of severe postpartum hemorrhage; however, there are few studies about maternal deaths, probably because of the legal implications of “problems” in the management of patients who have died.

OBJECTIVE: This study aimed to identify the problems or “delays” in the care of patients who die because of placenta accreta spectrum in Latin America.

STUDY DESIGN: A retrospective, descriptive, observational multicentric study in Latin American hospitals was conducted. The care of patients who died from placenta accreta spectrum was investigated under a “delay” study model that included delays related to patients, institutions, and healthcare providers. Centers of excellence standards of care were taken into account, and 2 analysis moments were included: an

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initial analysis for each local care group in the place where maternal death occurred and another analysis that included the main researcher. All information were collected through a predesigned survey and discussed by telephone.

RESULTS: Overall, 52 patients in 10 Latin American countries were included, with options for improvement identified in all cases. The most prevalent type of delay was associated with health providers (98% of cases), followed by health institutions (96% of cases) and patients (63% of cases). Each hospital's analysis group defined maternal death as avoidable in all cases and determined that the interventions needed to improve the outcome would present low, moderate, and high difficulties in 28.8%, 48.1%, and 34.8% of cases, respectively.

CONCLUSION: All maternal deaths related to placenta accreta spectrum were potentially preventable, and 76.9% of cases were avoidable by low to moderate complexity interventions.

Key words: health policy, maternal mortality, placenta accreta, quality of healthcare

Introduction

Most maternal deaths (MDs) related to postpartum hemorrhage (PPH) are preventable, and in most cases, relatively low complexity interventions are required to improve the outcomes.¹ Placenta accreta spectrum (PAS) leads to severe PPH, and its associated mortality reaches as high as 30% when a prenatal diagnosis is unavailable²; however, few studies have investigated these deaths in depth.³ Prenatal diagnosis and timely referral to referral centers have been shown to improve outcomes,⁴ with cases identified intraoperatively and cared for by nonexpert personnel having the most elevated risk of complications. However, some patients die despite obtaining a prenatal diagnosis and even despite being managed in highly advanced hospitals.

MDs are commonly the product of a long chain of unfortunate situations or problems that facilitate the appearance of complications or make it difficult to resolve the identified problems.⁵ These situations are called “delays,” and their

identification presents an essential step in the construction of improvement plans that facilitate the management of at-risk patients in the future. This study aimed to identify the “delays” that have occurred in the care of patients who died because of PAS in Latin America.

Materials and Methods

This was a descriptive, retrospective, observational study in Latin American hospitals. Patients with a diagnosis of PAS who died during pregnancy or within 42 days after the end of their pregnancy were included. Cases between January 2015 and October 2020 were investigated, in which there was sufficient information to assess the quality of healthcare. The PAS diagnostic criteria endorsed by the International Federation of Gynaecology and Obstetrics (FIGO) in 2019 were taken into account.⁶

The largest maternity wards in each country were contacted. Obstetricians in level 4 hospitals in each capital in Latin American countries were initially

contacted (by means of phone or e-mail), seeking participation in the study. In addition, the hospitals were asked to report fatal cases that occurred in other hospitals in their region and to facilitate telephone contact with obstetricians who had information on these additional fatal cases. Taking into account the legal risk of admitting “delays” in the attention of cases ending in MD, a confidential survey devoid of identifying data was used, and approval was obtained from the institutional ethics committee (IRB/EC number 099-2020), with protocol number 1554. Because this was a retrospective study, no informed consent was required. Demographic and clinical variables, such as age, weight, height, and parity, were recorded. Crucial points in the management of patients with PAS were evaluated, including prenatal diagnosis, timely referral to specialists or hospitals experienced in the management of patients with PAS, and details about the management of patients with severe bleeding or other PAS complications. The initial analysis of each case was carried out by the local group of researchers (LGR) in each hospital (doctors with experience in managing obstetrical emergencies in each country who had direct access to the information about the fatal case) and included reviews of medical records and an interview with participants of care (when possible). A second analysis was completed in a meeting between the principal investigator and each LGR, with focus on key management points and questions raised that might have been overlooked in the initial analysis. This second analysis sought to unify the care evaluation protocol, taking into account that, in each country, LGRs can apply different maternal mortality

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Why was this study conducted?

Information about associated factors of maternal death related to placenta accreta spectrum is limited.

Key findings

All maternal deaths related to placenta accreta spectrum were potentially preventable, mostly with interventions of low or intermediate complexity.

What does this add to what is known?

Although the implementation of widely complex interventions is necessary for the optimal care of patients with placenta accreta spectrum, the most severe complication of this pathology (maternal death) can be prevented with simple interventions, such as organizing the resources available in hospitals for the care of these cases.

study tools. To evaluate healthcare, the model proposed by the California Pregnancy-Associated Mortality Review Committee¹ was applied to allow for external comparisons. This analysis model divides the study of each case into actions of the 3 participants in healthcare: patients, healthcare providers, and healthcare system or hospitals. Therefore, the factors that contributed to death were actively sought in each of these 3 healthcare actors.

Finally, we asked each LGR to comment on the possibility that with the resources present at the local level, the fatal outcome could be modified. They were asked to define whether it would be easy, moderately difficult, or difficult to apply interventions that would modify the fatal outcome of the case. The management standards of the centers of excellence in PAS⁷ and recommendations established in international guidelines^{8,9} were taken into account during the analysis. We evaluated the unavailability or lack of use of human or technological resources included among the requirements for a center of excellence in PAS,^{7,8} the lack of coordination between the numerous health professionals and health institutions, and patient attitudes favoring inadequate outcomes.¹

The data collected were gathered in an electronic database, and continuous variables were summarized with measurements of central tendency (means and medians) and dispersion (standard deviations or interquartile range [IQR]) based on normal criteria. Categorical variables were summarized with absolute and relative frequencies.

Results

We identified 52 cases of MD related to PAS in 10 Latin American countries. Of those cases, 6 were identified in 3 other countries; however, they were not included because they occurred before 2015 or because of the refusal of the hospital or health surveillance institution to share the information. [Table 1](#) shows the demographic and clinical characteristics of the patients included in this study. The median age was 33 years (IQR, 28.5–36.5), and they

were in week 36 of pregnancy (IQR, 33–38) when the patients died. Here, most patients were mixed race (63.5%) or White (21.5%), with 6 indigenous patients (11.5%). Moreover, 5 patients did not receive prenatal care, and 47 patients had previous uterine surgeries (41 had a history of cesarean delivery, 18 had dilatation and curettage, and 1 had myomectomy).

In 55.7% of cases with placenta previa, death occurred when the placenta was in the anterior (23%), fundal (9.6%), or posterior (2%) location. In addition, 4 patients did not undergo a prenatal ultrasound; however, in 24 women who underwent prenatal ultrasound, a diagnosis of PAS was not identified. Affectation of uterine vascularization sectors 1 and 2 ([Table 1](#)) maintained a similar frequency (30.7% and 32.7%, respectively). Furthermore, 33 patients (63.5%) had histologic confirmation of PAS; in the other cases, the result of the histologic analysis was not available or the study was not carried out.

Most of the cases were terminated by cesarean delivery (78.8%), but deaths occurred equally after vaginal delivery placental retention (19.2%). Moreover, 1 patient died while pregnant (uterine rupture during the third trimester of pregnancy). The leading cause of death was hemorrhage (88.5%), with 2 cases of death because of sepsis and 2 more cases of death because of thrombosis. In addition, 1 patient died because of anaphylactic shock secondary to bolus administration of protamine, and another died because of the administration of an inappropriate dose of potassium. [Table 2](#) shows the treatment characteristics of the included patients. Of the 24 patients in whom PAS was suspected antenatally, 13 cases were not diagnosed by a PAS-experienced specialist before birth, and 11 cases were not treated in hospitals equipped to treat PAS. Although 2 of the women were referred but did not follow the indications, most of the women (9 cases) were never referred to an advanced center because their treating physician did not consider it necessary to do so. Of the 46 women who underwent surgery, most of the women did so in an

emergency setting (63%). Of the 46 women, 5 (11%) were operated on by interdisciplinary groups, and 7 (15.2%) were operated on by surgeons with PAS management experience. However, most of the patients were operated on by inexperienced staff (30.4%) or by surgeons without experience in the management of PAS, but they were the most competent surgeons available at the time of consultation (37%). Notably, 9 patients died during surgery (19.6%), and 39% of the patients were cared for in the intensive care unit during the postoperative period (18 cases). In addition, 20 women underwent reoperation, 3 of which were performed by inexperienced personnel. Furthermore, 46 patients presented with severe intraoperative bleeding, 5 of whom received pelvic tamponade with compresses and 6 of whom received intensive blood transfusions (>10 units of red blood cells in 24 hours). No patient benefited from manual aortic compression or intraoperative cell recovery.

Transfusion was indicated in 44 women. In 19 of these cases (43.2%), the hospital did not have all the requested blood components. Moreover, 5 patients had no contact with health services during the process that caused their death. Among the other 47 patients, 32 women (68.1%) did not receive tranexamic acid. MD was considered potentially preventable in all cases; however, 7 of these deaths had been ruled as “nonpreventable” in the initial analysis of the hospital where the patient was admitted.

The LGRs believed that the process that caused death could have been modified with interventions of low, moderate, or high complexity in 28.8%, 48.1%, and 23.1% of cases, respectively.

[Table 3](#) describes the delays. Delays associated with healthcare providers, health institutions, and patients were identified in 98%, 96%, and 63% of cases, respectively. The LGRs identified the following as the most relevant delays that were most associated with fatal outcomes: failure in the prenatal diagnosis of PAS (34.6%), underestimation of risk when PAS was suspected from prenatal images (34.6%), failures in the

TABLE 1
Characteristics of patients who died because of placenta accreta spectrum (n=52)

| Variable | | Value |
|---|--|----------------|
| Maternal age (y) | | 33 (28.5–36.5) |
| Gestational age (wk) | | 36 (33.6–38.1) |
| Ethnic group | Mixed race | 33 (63.5) |
| | White | 11 (21.1) |
| | Indigenous | 6 (11.5) |
| | Black | 0 (0) |
| | ND | 2 (3.8) |
| Prenatal care | No | 5 (9.6) |
| | Yes | |
| | ND | |
| Previous uterine surgery | Previous cesarean delivery | 41 (78.8) |
| | Previous dilatation and curettage | 18 (34.6) |
| | Previous myomectomy | 1 (1.9) |
| | None ^a | 5 (9.6) |
| Placental location | Placenta previa | 29 (55.7) |
| | Anterior | 12 (23) |
| | Fundal ^b | 5 (9.6) |
| | Posterior ^b | 1 (2.0) |
| | ND | 5 (9.6) |
| US signs of PAS identified | No | 24 (46.1) |
| | Yes | 24 (46.1) |
| | US was not performed | 4 (7.7) |
| Location of PAS | Predominantly sector 1 | 16 (30.7) |
| | Predominantly sector 2 | 17 (32.7) |
| | ND | 19 (36.5) |
| Histologic confirmation of PAS ^c | Accreta | 13 (25.0) |
| | Increta | 14 (26.9) |
| | Percreta | 6 (11.5) |
| | Histologic study was not performed or was not available ^d | 19 (36.5) |
| Pregnancy termination mode | Cesarean delivery | 41 (78.8) |
| | Vaginal birth | 10 (19.2) |
| | Dies pregnant | 1 (2.0) |
| Causes of death related to PAS | Hemorrhage | 46 (88.5) |
| | Sepsis | 2 (3.8) |
| | Thrombosis | 2 (3.8) |
| | Other ^e | 2 (3.8) |

Values are expressed as number (percentage) or median (interquartile range).

Placental location refers to the “predominant location” of the entire placental mass. This information is usually available in the ultrasound or cesarean delivery operative note. PAS location refers to the portion of the uterus affected by abnormal placental invasion. This is usually composed of only a part of the placenta. Sector 1 involves the uterine body and upper part of the uterine segment. Sector 2 involves the lower part of the uterine segment, cervix, or parametrium.

IQR, interquartile range; ND, no data; PAS, placenta accreta spectrum; US, ultrasound.

^a Three of 5 patients had histologic confirmation of PAS (autopsy); ^b Six patients had a posterior or fundic placenta. In 5 cases, there was a history of previous uterine surgery (5 patients had a previous cesarean delivery, and one patient also had a previous curettage). Furthermore, 3 patients had histologic confirmation of PAS (2 accreta cases after uterine histologic analysis and 1 increta case diagnosed at autopsy; this last case was the only one that did not have a history of previous uterine surgery); ^c In 4 cases, the report was by autopsy and in the others by histologic study of the uterus (after hysterectomy); ^d Histologic analysis was carried out in another institution (report was not available when reviewing the medical files), the family did not process the histologic analysis of the uterus (in some centers, the patient or her family are responsible for managing the histologic study), or the autopsy was not authorized by the patient’s family; ^e One patient died because of anaphylactic shock secondary to bolus administration of protamine and another patient because of the administration of an inappropriate dose of potassium.

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coordination of care during the management of patients with PAS (11.5%), an absence of prenatal control (9.6%), and rejection of medical recommendations by the patient or the family (7.7%).

Discussion

Principal findings

This PAS-associated mortality analysis identified options for improvement in all cases. Most of the delays were

associated with health service quality, specifically healthcare provider (related factors in 98% of cases) and health institution (related factors in 96% of cases).

TABLE 2

Management characteristics of patients who died because of placenta accreta spectrum (n=52)

| Variable | | n/N (%) |
|---|---|---------------------------|
| If PAS was suspected, patient was assessed by a PAS-experienced specialist before delivery ^a | No | 13/24 (54.2) |
| If PAS was suspected, patient was evaluated in a PAS referral hospital before delivery ^a | No | 11/24 (45.8) |
| Reasons for not being managed in a PAS referral center | There was no contact with health services | 5/52 (9.6) |
| | Prenatal ultrasound did not diagnose PAS | 21/52 (40.4) |
| | Although PAS was suspected, the healthcare professional did not consider it necessary to transfer the patient to a PAS referral center during pregnancy or delivery | 9/52 (17.3) |
| | The patient decided not to follow recommendations | 2/52 (3.8) |
| | The patient was assessed in a "PAS referral center" ^b | 13/52 (25.0) |
| | ND | 2/52 (3.8) |
| If the patient was taken to surgery, was it performed on a scheduled or emergent basis? ^c | Scheduled | 17/46 (37.0) |
| | Emergent | 29/46 (63.0) ^d |
| If the patient was taken to surgery, was the procedure performed in a PAS referral hospital? ^c | No | 20/46 (43.0) |
| | Yes ^b | 26/46 (56.0) |
| What was the surgeon's degree of training in the management of PAS? | Interdisciplinary group expert in PAS | 5/46 (11.0) |
| | Surgeon with experience in PAS | 7/46 (15.2) |
| | Surgeon without PAS experience, but the most competent available | 17/46 (37.0) |
| | Inexperienced staff | 14/46 (30.4) |
| | ND | 3/46 (6.4) |
| Where was the postoperative period monitored? ^c | Intensive care unit | 18/46 (39.0) |
| | Recovery room of the operating room | 7/46 (15.2) |
| | Obstetrical special care room | 2/46 (4.3) |
| | Delivery room | 1/46 (2.2) |
| | General hospitalization room | 1/46 (2.2) |
| | Operating room | 4/46 (8.7) |
| | Died before completing the first surgery | 9/46 (19.6) |
| | ND | 4/46 (8.7) |
| If the patient required new surgery, was she reoperated on by experienced staff? ^e | No | 3/20 (15.0) |
| | Yes | 17/20 (85.0) |
| If severe bleeding occurred, were any of the following maneuvers applied to stop the bleeding or replace blood loss? ^f | Manual aortic compression | 0 (0) |
| | Intraoperative cell recovery | 0 (0) |
| | Pelvic tamponade with compresses | 5/46 (10.9) |
| | Intensive blood transfusion (>10 units of red blood cells within 24 h) | 6/46 (13.0) |
| If the patient received a blood transfusion, were all of the requested blood components available? ^g | No | 19/44 (43.2) |
| | Yes | 25/44 (56.8) |
| If patient received healthcare, was tranexamic acid administered in the first 3 hours of bleeding? ^h | No | 32/47 (68.1) |
| | Yes | 14/47 (29.8) |
| | ND | 1/47 (2.1) |
| Was the maternal death preventable? | Yes ⁱ | 52 (100.0) |
| Could the evolution to death have been avoided? | Yes, through low complexity measures | 15 (28.8) |
| | Yes, through moderately difficult measures | 25 (48.1) |
| | Yes, through highly difficult measures | 12 (23.1) |
| | No | 0 (0) |

ND, no data; PAS, placenta accreta spectrum.

^a Twenty-four patients with prenatal suspicion of PAS; ^b Most of the centers that classified themselves as "PAS referral centers" did not have a "fixed" interdisciplinary team for the management of all PAS cases; some of them did not have an established management protocol for PAS, and some of them also stated that they are the "regional referral centers for PAS" in the absence of other "better equipped hospitals," pointing out that they lacked some elements, such as cell saver, interventional radiology, or blood bank in their facilities; ^c Forty-six patients were taken to surgery; ^d Twelve patients were taken to surgery on an emergency basis (41.4%), had a previous ultrasonography PAS suspicion (in 1 case, there was also magnetic resonance imaging prenatal suspicion of PAS); ^e Twenty patients were reoperated; ^f Forty-six patients had severe intraoperative bleeding (bleeding > 2 L or defined as "severe" or "very abundant" by the treating group); ^g Forty-four patients were given blood transfusion; ^h Five patients did not receive healthcare services; ⁱ Seven cases were considered nonpreventable in the institutional hospital analysis before the study.

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TABLE 3

Analysis of care in patients with placenta accreta spectrum—related mortality (n=52)

| Type of delay | Delay description | n/N (%) |
|--|---|--------------|
| Healthcare provider—related factors (51 [98%]) | Ineffective care | 46/52 (88.4) |
| | Delayed response to clinical or paraclinical warning signs | 42/52 (80.7) |
| | Prenatal misdiagnosis | 38/52 (73.0) |
| | Nonqualified personnel participation | 36/52 (69.2) |
| | Failure to seek assistance | 36/52 (69.2) |
| | Absence of “continuity of care” | 31/52 (59.6) |
| Health institution—related factors (50 [96%]) | Poor coordination of health assistance | 38/52 (73.0) |
| | Inadequate treatment team | 33/52 (63.4) |
| | Unsuitable services | 30/52 (57.7) |
| | Inadequate knowledge of PAS | 28/52 (53.8) |
| | Lack of opportunity among health service referrals | 24/52 (46.1) |
| | Delays in seeking medical assistance | 22/52 (42.3) |
| Patient-related factors (33 [63%]) | Lack of knowledge | 19/52 (36.5) |
| | Associated medical history | 7/52 (13.5) |
| | Medical recommendations refusal | 10/52 (19.2) |
| | Obesity | 5/52 (9.6) |
| | Substance abuse | 0 |
| | Prenatal ultrasound failure to diagnose | 18/52 (34.6) |
| Main delay identified by the local analysis group ^a | Underestimation of severe bleeding risk, despite suspicion or confirmation of PAS | 18/52 (34.6) |
| | Lack of adequate care coordination during PAS treatment | 6/52 (11.5) |
| | Absence of prenatal care | 5/52 (9.6) |
| | Medical recommendation rejected by patient or family | 4/52 (7.7) |
| | Other ^b | 1/52 (1.9) |
| | Other ^b | 1/52 (1.9) |

PAS, placenta accreta spectrum.

^a Delay identified as the most important contributor to the fatal outcome by the local analysis group for each case; ^b Inadvertent administration of medications in the wrong dose.

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Results

Previous analyses on PPH-related MD revealed healthcare provider problems as the most frequent contributor to maternal mortality, with a high frequency of ineffective care and delayed response to warning signs,¹ factors found in 88.4% and 80.7% of our patients, respectively. Interestingly, 1 of the factors clearly associated with better results in the management of patients with PAS is the participation of trained professionals; as such, the establishment of fixed surgical groups is recommended. The care of all patients with PAS by a few specialists facilitated broader exposure to the pathology and

more expertise acquisition.¹⁰ In less complex obstetrical procedures, it was proposed that the clinical results of a surgeon improved after performing 10 to 15 procedures.¹¹ A low frequency of execution of the highly complex procedures required for optimal management of PAS has been related to forgetfulness of basic recommendations to reduce complications¹²; therefore, the participation of highly trained groups in the management of patients with PAS presents a crucial factor.

The participation of unqualified personnel and the failure to seek help were observed in 69.2% of the cases, which is worrying when 50% of the patients with

prenatal ultrasound had suspected PAS before the end of their pregnancy. In 9 cases (17.3%), referral to a specialized medical group was not carried out because the treating physician did not consider it necessary, despite recognizing the diagnosis. Similar findings have been reported among North American obstetricians, wherein 20.4% of cases of suspected PAS were referred to a specialized tertiary center.¹³ Delays associated with healthcare providers highlighted the need for specific PAS training programs that include communication strategies among specialized groups. Some successful experiences included the use of telesupport during

the preoperative period and during emergencies when intraoperative findings of PAS are present.¹⁴ Telemedicine and teleradiology have facilitated surgical approach planning and the incorporation of innovative surgical techniques that improve clinical results.¹⁵ The use of checklists during the planning and execution of surgery for PAS has also been reported as useful when coordinating the participation of other specialists involved¹⁶ and could improve the outcomes in the “continuity of care” delay, present in 59.6% of patients.

Here, 2 of the most common delays associated with health institutions were a lack of coordination of medical care (73%) and problems associated with the health system (57.7%). This delay category included multiple levels of care, from the initial care hospitals where the diagnosis was established to the facility where the surgery was performed. The demands on hospitals that handle PAS are high, requiring that several specialists always be available and the presence of physical and technological infrastructures.⁷

Furthermore, 1 of the most sensitive points for the timely management of severe PPH is the immediate availability of intensive blood transfusions. Failure to perform blood transfusion at this point has been observed in 30% of PPH-related deaths in California¹ and in all deaths related to PAS in Japan.³ Although most hospitals that manage patients with PAS in Latin American countries report having the capacity to perform blood transfusion, only 32.3% of the hospitals have their own blood bank.¹⁷ This study revealed worrying details about the availability of blood, because 43.2% of patients who underwent blood transfusion did not receive all the requested blood components.

The complexity of the management of patients with PAS, the large number of resources necessary for optimal care, the difficulties for prenatal diagnosis, and the need for collaboration among various agents of the health system (eg, community, primary care centers, referral hospitals, healthcare professionals, health insurers) make it essential to establish public policies for care and regional specialist referral services for

PAS in which patients are linked to the regional referral pathway and ultimately arrive at the specialist PAS referral center after screening programs in local hospitals.¹⁸ Here, 50% of patients did not obtain a prenatal diagnosis of PAS, despite having performed prenatal ultrasounds (Table 1), and in 46.1% of cases, delays associated with the referral process among hospitals were identified (Table 3), highlighting the need for active PAS search programs in addition to policies for regionalization of care in Latin America.¹⁹

In 63% of cases, delays associated directly with the patients were identified. A late search for medical assistance and lack of knowledge were the most common delays. Although it is challenging to separate these 2 factors from the quality of prenatal care and the education provided by health services, other studies show similar frequencies in care-seeking problems (40%).¹

Of note, 6 women were indigenous, and 1 woman was a migrant without health insurance, a minority population that usually has difficulty in accessing quality health services.²⁰ Moreover, 1 of the factors involved in the late consultation of patients to hospitals specialized in the management of PAS is insufficient health insurance; as such, initiatives, such as “open-door policies” and telemedicine, for patients with PAS could facilitate contact between the affected population and referral hospitals, as long as they are accompanied by strategies to ensure the financing and sustainability of these services over time.^{10,18}

Clinical implications

The main responsible factors identified for the fatal outcomes by LGRs were failure in prenatal ultrasound to identify PAS (34.6%), underestimation of risk because of PAS suspicion or confirmation (34.6%), a lack of care coordination during PAS treatment (11.5%), an absence of prenatal control (9.6%), and, finally, the rejection of medical recommendations by the patient or their family (7.7%). These findings made it clear that in almost half of the cases (34.6% +11.5%), the diagnosis of PAS was

known, and death could have been avoided with optimal treatment in a referral center. In the other half of cases, the urgent need to improve the prenatal diagnosis of PAS was evident.²¹

The leading cause of death was hemorrhage (46 patients [88.5%]). Moreover, although 54.2% of patients were treated in referral centers for complex obstetrical pathology, only 5% and 13% of patients received treatment strategies, such as pelvic tamponade with compresses or intensive blood transfusion (>10 units of red blood cells in 24 hours). There was no case where intraoperative cell recovery or manual compression of the aorta was used. All these treatment strategies are effective during the management of exsanguinating hemorrhage,^{22,23} but they are rarely applied by obstetricians.

Notably, 2 cases of sepsis associated with expectant treatment of PAS (placenta left in situ) and pelvic tamponade for 12 days were noted. Furthermore, 2 patients died because of a severe pulmonary embolism on days 1 and 15 after surgery, without having received pharmacologic thromboprophylaxis, despite having met the criteria for its formulation. These results showed that the management of patients with PAS goes beyond the management of severe bleeding and requires groups and hospitals trained in the management of pregnant women with a critical illness.

Although there were identified cases in almost all Latin American countries, we obtained cases from 10 countries, uncovering similar delays in all of them. Our findings coincided with previous reports of ineffective prenatal care in low- and middle-income countries,²⁴ with the absence of contact with health services in 5 patients. An analysis of 6 fatalities in India² described a close association with the absence of prenatal detection and presurgical bleeding, requiring surgery during emergency hours (during which interdisciplinary management probably could not be deployed) and requiring blood transfusion (mean, 9 units of red blood cells).

Although 24 women (50%) knew the diagnosis before their cesarean delivery and 14 women (58.3%) underwent

surgery in highly specialized centers (on a scheduled basis in half of the cases), it was impossible to control the bleeding, and the patients eventually died. This situation was especially worrying because it speaks of the great complexity of the pathology that occasionally, even with all the resources, can exceed the capacities of the treating group, even though this group is habituated to treat highly complex pathologies, but it does not have specific and extensive training in the management of patients with PAS. This condition demands specific individual and collective skills that are only acquired after managing a high number of patients,^{4,7,10} which is very difficult for most hospitals that, despite having all the recommended human and technological resources,^{7,17} manage a small number of patients by year.

Most highly specialized hospitals in Latin America handle 6 cases per year,²⁵ a very distant situation from the 2 to 3 cases per month, recommended for centers of excellence.⁴ Therefore, it is essential to direct the patients affected by PAS to hospitals with recognized expertise in the management of PAS and not only known for being “highly specialized” hospitals.

Research implications

The local analysis groups in each hospital defined MDs as potentially preventable in all cases and determined that the interventions necessary to improve the outcome would have low, moderate, and high difficulties in 28.8%, 48.1%, and 23.1% of the cases, respectively. These findings coincided with those reported in other populations where 70% of MDs by PPH had a good-to-strong chance of preventability.¹ It is essential to carry out prospective multicenter studies on PAS in which the technical and nontechnical competencies of the treating medical groups are evaluated and the operational factors of the health system and the health institutions involved in the management of women with PAS.

Limitations

This study has limitations; the analyzed cases were voluntarily contributed by

the invited hospitals, but they do not represent all of the MDs that occurred in the study period. However, data on fatal cases were difficult to collect, and the similarity of the results observed in different locations suggested that our results reflected, at least in part, the Latin American reality.

Here, the greatest limitation of our study was the absence of uterine histologic analysis in 19 of 52 cases included (36.5%). This occurred because the analysis was not performed or the result of the study was not available to the researchers. In several of the participating countries, it is usual that the hospital does not have a pathology service and the patient's relatives are in charge of transferring the surgical specimen (uterus) to another hospital where the histologic study is processed. This situation sometimes leads to the histologic analysis not being carried out or its result not being included in the hospital files of the center where the patient is treated. Similarly, in some countries, it is not mandatory to perform an autopsy after an MD.

Despite the fact that most cases without histologic confirmation had risk factors for PAS (Table 1) and that all included cases met the FIGO clinical criteria, it is necessary to admit the possibility that some patients may not have PAS.

Moreover, 1 strength of the study was that LGRs who performed a direct review of the medical records or participated in the management of the case studied were involved. However, the retrospective nature of the study opened the door to bias. There was important information that could not be collected in some cases; therefore, large prospective studies are necessary to confirm our results.

As with the analysis of almost all MDs, the conclusions that we can reach from this study are only assumptions of a possible different outcome in case the actions or omissions of the healthcare actors had been different. When analyzing the results of multiple interventions (which include the prenatal period, the surgical procedure, and the postoperative care), we tried to identify the

“problems” or “delays” that must be corrected in the management of future patients. Thus, the definition of “potentially preventable” in all the cases included in our study, rather than a forceful statement, was a call to improve the quality of care for future cases.

Conclusion

All MDs relate to PAS were potentially preventable, with half of the cases requiring low to moderate complexity interventions. ■

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