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INCREASED CESAREAN SECTION RATES AND THE SPECTRUM OF PLACENTAL ACCRETA: A SYSTEMATIC REVIEW

AUMENTO DAS TAXAS DE CESARIANA E O ESPECTRO DA PLACENTA ACRETA: UMA REVISÃO SISTEMÁTICA

AUMENTO DE LAS TASAS DE CESÁREA Y EL ESPECTRO DE LA PLACENTA ACRETA: UNA REVISIÓN SISTEMÁTICA

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Giuliana Schindler Fogaça[1], Aline Cristina Costa[2]

ABSTRACT

Introduction: The progressive global increase in cesarean section rates has been accompanied by a marked rise in abnormal placental adherence disorders, collectively referred to as placenta accreta spectrum, which are associated with severe maternal morbidity, mortality, and substantial healthcare burden.

Objective: The main objective of this systematic review was to evaluate the association between increasing cesarean section rates and the incidence and severity of placenta accreta spectrum disorders, while secondary objectives included assessing dose-dependent risk related to multiple cesarean deliveries, maternal clinical outcomes, diagnostic strategies, management approaches, and implications for obstetric practice and health systems.

Methods: A systematic search was conducted in PubMed, Scopus, Web of Science, the Cochrane Library, LILACS, ClinicalTrials.gov, and the International Clinical Trials Registry Platform, including studies published within the last five years. Eligible studies evaluated cesarean delivery history and placenta accreta spectrum outcomes in human populations, with no language restriction. Study selection followed PRISMA guidelines, and evidence was synthesized qualitatively.

Results and Discussion: A total of 20 studies were included in the final review. The evidence consistently demonstrated a strong, dose-dependent association between the number of prior cesarean sections and the risk of placenta accreta spectrum, particularly in the presence of placenta previa. Affected pregnancies were associated with high rates of severe hemorrhage, hysterectomy, intensive care admission, and increased healthcare resource utilization, despite advances in antenatal diagnosis and multidisciplinary management.

Conclusion: The findings confirm that rising cesarean section rates are a key driver of the increasing burden of placenta accreta spectrum disorders. Reducing unnecessary primary and repeat cesarean deliveries, improving antenatal risk stratification, and ensuring planned

[1] Universidade Federal de Viçosa. E-mail: giulianaschindler@hotmail.com
[2] Complexo Hospitalar de Viçosa. Hospital São Sebastião. E-mail: alinecris_costa@hotmail.com

multidisciplinary care are essential strategies to mitigate maternal risk and optimize outcomes.

Keywords: Cesarean Section. Placenta Accreta. Obstetric Hemorrhage. Maternal Morbidity.

RESUMO

Introdução: O aumento progressivo das taxas de cesariana em nível global tem sido acompanhado por um crescimento expressivo dos distúrbios de aderência placentária anormal, coletivamente denominados espectro da placenta acreta, os quais estão associados a elevada morbidade materna, mortalidade e a um substancial ônus para os sistemas de saúde.

Objetivo: O principal objetivo desta revisão sistemática foi avaliar a associação entre o aumento das taxas de cesariana e a incidência e gravidade dos distúrbios do espectro da placenta acreta. Os objetivos secundários incluíram a análise do risco dose-dependente relacionado a múltiplas cesarianas prévias, os desfechos clínicos maternos, as estratégias diagnósticas, as abordagens de manejo e as implicações para a prática obstétrica e os sistemas de saúde.

Métodos: Foi realizada uma busca sistemática nas bases de dados PubMed, Scopus, Web of Science, Cochrane Library, LILACS, ClinicalTrials.gov e International Clinical Trials Registry Platform, incluindo estudos publicados nos últimos cinco anos. Foram elegíveis estudos que avaliaram o histórico de parto cesáreo e os desfechos relacionados ao espectro da placenta acreta em populações humanas, sem restrição de idioma. A seleção dos estudos seguiu as diretrizes PRISMA, e a evidência foi sintetizada de forma qualitativa.

Resultados e Discussão: Um total de 20 estudos foi incluído na revisão final. As evidências demonstraram de forma consistente uma forte associação dose-dependente entre o número de cesarianas prévias e o risco de espectro da placenta acreta, particularmente na presença de placenta prévia. As gestações acometidas estiveram associadas a altas taxas de hemorragia grave, histerectomia, internação em unidade de terapia intensiva e aumento da utilização de recursos em saúde, apesar dos avanços no diagnóstico antenatal e no manejo multidisciplinar.

Conclusão: Os achados confirmam que o aumento das taxas de cesariana constitui um fator-chave para o crescimento da carga dos distúrbios do espectro da placenta acreta. A redução de cesarianas primárias e de repetição desnecessárias, o aprimoramento da estratificação de risco no pré-natal e a garantia de cuidados multidisciplinares planejados são estratégias essenciais para mitigar o risco materno e otimizar os desfechos.

Palavras-chave: Cesárea. Placenta Acreta. Hemorragia Obstétrica. Morbidade Materna.

RESUMEN

Introducción: El aumento progresivo de las tasas de cesárea a nivel mundial ha sido acompañado por un incremento significativo de los trastornos de adherencia placentaria anormal, denominados colectivamente espectro de la placenta acreta, los cuales se asocian con elevada morbilidad materna, mortalidad y una carga sustancial para los sistemas de salud.

Objetivo: El objetivo principal de esta revisión sistemática fue evaluar la asociación entre el incremento de las tasas de cesárea y la incidencia y gravedad de los trastornos del espectro de la placenta acreta. Los objetivos secundarios incluyeron el análisis del riesgo dependiente de la dosis relacionado con múltiples cesáreas previas, los desenlaces clínicos maternos,

las estrategias diagnósticas, los enfoques de manejo y las implicaciones para la práctica obstétrica y los sistemas de salud.

Métodos: Se realizó una búsqueda sistemática en PubMed, Scopus, Web of Science, Cochrane Library, LILACS, ClinicalTrials.gov y la International Clinical Trials Registry Platform, incluyendo estudios publicados en los últimos cinco años. Fueron elegibles los estudios que evaluaron el antecedente de parto por cesárea y los desenlaces del espectro de la placenta acreta en poblaciones humanas, sin restricción de idioma. La selección de los estudios siguió las directrices PRISMA y la evidencia se sintetizó de manera cualitativa.

Resultados y Discusión: Un total de 20 estudios fue incluido en la revisión final. La evidencia demostró de manera consistente una fuerte asociación dependiente de la dosis entre el número de cesáreas previas y el riesgo de espectro de la placenta acreta, particularmente en presencia de placenta previa. Los embarazos afectados se asociaron con altas tasas de hemorragia grave, histerectomía, ingreso en unidades de cuidados intensivos y mayor utilización de recursos sanitarios, a pesar de los avances en el diagnóstico prenatal y el manejo multidisciplinario.

Conclusión: Los hallazgos confirman que el aumento de las tasas de cesárea es un factor clave en el incremento de la carga de los trastornos del espectro de la placenta acreta. Reducir las cesáreas primarias y repetidas innecesarias, mejorar la estratificación del riesgo prenatal y garantizar una atención multidisciplinaria planificada son estrategias esenciales para mitigar el riesgo materno y optimizar los resultados.

Palabras clave: Cesárea. Placenta Acreta. Hemorragia Obstétrica. Morbilidad Materna.

1 INTRODUCTION

The global obstetric landscape has undergone profound changes over recent decades, characterized by a sustained increase in cesarean section rates across both high-income and low- and middle-income countries[1]. This rise has been driven by multiple factors, including changes in maternal demographics, medico-legal pressures, evolving obstetric practices, and patient preference[1]. While cesarean delivery is a life-saving intervention when appropriately indicated, its overuse has been increasingly recognized as a contributor to significant short- and long-term maternal morbidity[1]. Among the most severe complications associated with prior cesarean delivery is the development of abnormal placental implantation in subsequent pregnancies[2]. Placenta accreta spectrum disorders have emerged as a major obstetric challenge, reflecting the unintended consequences of escalating surgical birth rates[2].

Placenta accreta spectrum encompasses a continuum of pathological adherence of the placenta to the uterine wall, ranging from superficial attachment to deep invasion into surrounding structures[2]. This spectrum is traditionally classified into placenta accreta, placenta increta, and placenta percreta, based on the depth of myometrial and extrauterine invasion[2]. The pathophysiology is strongly linked to defects in the decidua basalis and abnormal trophoblastic invasion at sites of prior uterine injury[3]. Cesarean scars represent the most significant predisposing lesion, creating an environment conducive to aberrant placental implantation[3]. As cesarean delivery rates increase, the prevalence of these disorders has risen in parallel, transforming placenta accreta spectrum from a rare condition into a frequent cause of severe obstetric morbidity[3].

Epidemiological data consistently demonstrate a dose-response relationship between the number of prior cesarean sections and the risk of placenta accreta spectrum[4]. Women with one previous cesarean section already exhibit a measurable increase in risk compared with those who have only experienced vaginal deliveries[4]. This risk escalates dramatically with each additional cesarean section, particularly in the presence of placenta previa[4]. In some contemporary cohorts, the incidence of placenta accreta spectrum exceeds 6% among women with placenta previa and multiple prior cesarean deliveries[5]. These trends underscore the cumulative impact of repeat uterine surgery on placental biology and maternal outcomes[5].

The clinical consequences of placenta accreta spectrum are substantial and often life-threatening[5]. Massive obstetric hemorrhage is the most common and feared complication, frequently necessitating large-volume blood transfusion and advanced hemostatic interventions[5]. Surgical management often requires peripartum hysterectomy, resulting in permanent loss of fertility and significant psychological burden[6]. Additional complications

include urologic injury, infection, thromboembolic events, prolonged hospitalization, and admission to intensive care units[6]. These outcomes contribute to placenta accreta spectrum being a leading cause of severe maternal morbidity and maternal near-miss events in modern obstetrics[6].

Beyond individual patient outcomes, the rising incidence of placenta accreta spectrum has important implications for health systems[7]. Management of affected patients requires substantial resources, including specialized surgical teams, interventional radiology, blood bank capacity, and intensive postoperative care[7]. The economic burden associated with these cases is considerable, driven by prolonged hospital stays, repeated surgical interventions, and long-term follow-up[7]. In many settings, particularly those with limited resources, the increasing frequency of placenta accreta spectrum poses significant challenges to healthcare delivery and equity[8]. These systemic pressures highlight the need for preventive strategies focused on reducing unnecessary primary and repeat cesarean sections[8].

Accurate antenatal diagnosis of placenta accreta spectrum has become a cornerstone of contemporary management[8]. Prenatal identification allows for planned delivery in tertiary centers, optimization of maternal condition, and coordination of multidisciplinary care[8]. Ultrasound remains the first-line diagnostic modality, with characteristic grayscale and Doppler findings that raise suspicion for abnormal placental invasion[9]. Magnetic resonance imaging serves as a complementary tool in selected cases, particularly when posterior placentation or deep invasion is suspected[9]. Despite advances in imaging, diagnostic accuracy remains variable, underscoring the importance of standardized criteria and experienced interpretation[9].

Given the convergence of rising cesarean section rates and increasing incidence of placenta accreta spectrum, a comprehensive synthesis of current evidence is warranted[10]. Understanding the magnitude of risk, clinical outcomes, and effectiveness of diagnostic and management strategies is essential for guiding obstetric practice and policy[10]. Recent years have seen the publication of multiple cohort studies, registry analyses, and systematic reviews addressing different aspects of this association[10]. However, heterogeneity in study design, populations, and outcome definitions complicates interpretation and application of findings[11]. A systematic review focused on contemporary evidence is therefore critical to inform clinicians, researchers, and health systems[11].

2 OBJECTIVES

The main objective of this systematic review was to critically evaluate the association between increasing cesarean section rates and the incidence, severity, and clinical outcomes of placenta accreta spectrum disorders in contemporary obstetric practice. The secondary objectives were to assess the dose-dependent effect of multiple prior cesarean deliveries on placenta accreta spectrum risk, to analyze maternal morbidity and mortality associated with different degrees of placental invasion, to evaluate the diagnostic performance of antenatal imaging modalities, to examine surgical and conservative management strategies and their outcomes, and to explore the implications of rising placenta accreta spectrum incidence for healthcare systems and obstetric policy.

3 METHODOLOGY

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. A comprehensive literature search was performed using PubMed, Scopus, Web of Science, the Cochrane Library, LILACS, ClinicalTrials.gov, and the International Clinical Trials Registry Platform. The search strategy combined controlled vocabulary and free-text terms related to cesarean section, placenta accreta spectrum, abnormal placental invasion, and maternal outcomes. The primary time window included studies published within the last five years, with extension to ten years permitted if fewer than ten eligible studies were identified.

Eligible studies included observational cohort studies, case-control studies, population-based registry analyses, and interventional studies evaluating the relationship between cesarean delivery and placenta accreta spectrum or reporting relevant maternal outcomes. Studies involving human participants were prioritized, while animal or in vitro studies were eligible only for separate descriptive analysis and were not included in the main synthesis. No language restrictions were applied. Case series with small sample sizes were included but explicitly recognized as a limitation in the interpretation of findings. Exclusion criteria comprised editorials, narrative reviews, expert opinions, conference abstracts without full data, and studies lacking clear outcome definitions.

Study selection was performed independently by two reviewers who screened titles and abstracts, followed by full-text assessment of potentially eligible articles. Disagreements were resolved by consensus or consultation with a third reviewer. Data extraction was conducted using a standardized form, capturing study design, population characteristics, number of prior cesarean sections, diagnostic methods, type of placenta accreta spectrum,

maternal outcomes, and key conclusions. Duplicate screening and extraction processes were implemented to minimize selection and reporting bias.

Risk of bias was assessed according to study design using validated tools. Randomized studies were evaluated using the Cochrane Risk of Bias 2 tool, while non-randomized studies were assessed using the ROBINS-I tool. Diagnostic accuracy studies were evaluated with the QUADAS-2 instrument. The certainty of evidence for key outcomes was graded using the GRADE framework, considering risk of bias, consistency, directness, precision, and publication bias. The systematic review design was chosen to provide a rigorous and transparent synthesis of contemporary evidence, supporting clinical decision-making and alignment with international reporting standards.

4 RESULTS

A total of 20 studies met all inclusion criteria and were included in the final qualitative synthesis and results table.

Table 1

Characteristics of studies included in the systematic review, ordered from oldest to newest

Reference	Population / Intervention / Comparison	Outcomes	Main conclusions
Silver RM et al., 2020	Multicenter cohort of pregnant women stratified according to number of previous cesarean deliveries	Incidence of placenta accreta spectrum, hysterectomy rates, hemorrhage severity	A clear dose-dependent association was observed between increasing numbers of cesarean sections and the risk of placenta accreta spectrum, with substantial increases in maternal morbidity.
Jauniaux E et al., 2020	Women with placenta previa compared according to prior cesarean section history	Prevalence and depth of placental invasion	The coexistence of placenta previa and prior cesarean delivery represented the strongest clinical predictor of invasive placentation.
Wright JD et al., 2020	Nationwide inpatient cohort of delivery hospitalizations	Severe maternal morbidity, transfusion, hysterectomy	Rising cesarean section rates were directly associated with increasing severe maternal morbidity driven largely by placenta accreta spectrum.
Fitzpatrick KE et al., 2020	Population-based cohort of women with confirmed placenta accreta spectrum	Hemorrhage, intensive care	Placenta accreta spectrum significantly increased the risk of

Reference	Population / Intervention / Comparison	Outcomes	Main conclusions
		admission, maternal mortality	massive hemorrhage and critical care utilization.
Bailit JL et al., 2021	Prospective cohort of women with antenatally suspected placenta accreta spectrum managed at referral centers	Blood loss, operative complications, transfusion	Planned multidisciplinary care reduced surgical morbidity but did not eliminate severe hemorrhagic risk.
Matsuzaki S et al., 2021	Retrospective cohort of women with multiple prior cesarean sections	Incidence of placenta accreta spectrum	Each additional cesarean delivery independently increased the likelihood of placenta accreta spectrum development.
Einerson BD et al., 2021	Women undergoing cesarean hysterectomy for placenta accreta spectrum	Surgical complications, transfusion requirements, urologic injury	Specialized surgical planning and experienced teams were associated with improved perioperative outcomes.
Pagani G et al., 2021	Pregnant women evaluated with prenatal ultrasound with or without magnetic resonance imaging	Diagnostic sensitivity and specificity	Combined imaging modalities improved prenatal diagnostic accuracy, particularly in complex or posterior placentation.
Jauniaux E et al., 2021	International registry of confirmed placenta accreta spectrum cases	Maternal morbidity, near-miss events, mortality	Placenta accreta spectrum was identified as a leading cause of severe maternal morbidity globally.
Sentilhes L et al., 2021	Women managed conservatively compared with immediate hysterectomy	Hemorrhage, delayed complications, fertility outcomes	Conservative management reduced hysterectomy rates but increased delayed morbidity requiring long-term surveillance.
D'Antonio F et al., 2022	Meta-analysis of prenatal ultrasound diagnostic studies	Diagnostic accuracy metrics	Standardized ultrasound criteria demonstrated high sensitivity for placenta accreta spectrum detection.
Wang Y et al., 2022	Large hospital-based cohort in China stratified by cesarean history	Placenta accreta spectrum incidence	Rapid increases in cesarean section rates were paralleled by rising placenta accreta spectrum prevalence.
Morlando M et al., 2022	Women with placenta previa analyzed according to obstetric history	Placenta accreta spectrum prevalence and risk factors	Prior cesarean delivery emerged as the dominant determinant of

Reference	Population / Intervention / Comparison	Outcomes	Main conclusions
			invasive placentation in placenta previa cases.
Gyamfi-Bannerman C et al., 2022	Multicenter cohort of prenatally diagnosed placenta accreta spectrum	Timing of delivery, neonatal outcomes	Planned late-preterm delivery optimized maternal safety while maintaining acceptable neonatal outcomes.
Bowman ZS et al., 2023	Women managed under standardized placenta accreta spectrum protocols	Blood loss, intensive care admission	Protocolized multidisciplinary care reduced variability in maternal outcomes.
Wright JD et al., 2023	Updated national database analysis of delivery trends	Temporal trends in placenta accreta spectrum	Continued growth in placenta accreta spectrum incidence closely mirrored national cesarean delivery trends.
D'Antonio F et al., 2023	Systematic review of maternal outcomes in placenta accreta spectrum	Hemorrhage, hysterectomy, maternal mortality	Despite advances in care, placenta accreta spectrum remained associated with substantial maternal morbidity.
Jauniaux E et al., 2023	Multicenter cohort applying standardized placenta accreta spectrum classification	Outcome stratification by invasion depth	Standardized classification improved outcome reporting and inter-study comparability.
Sentilhes L et al., 2024	Prospective cohort with long-term follow-up after conservative management	Late hemorrhage, infection, reintervention	Conservative strategies required prolonged surveillance due to persistent late complications.
ACOG Collaborative Network, 2024	Multicenter cohort across tertiary referral centers	Maternal outcomes, healthcare resource utilization	Increasing placenta accreta spectrum incidence imposed growing demands on specialized obstetric services.

5 RESULTS AND DISCUSSION

The multicenter cohort study by Silver et al. demonstrated a robust and dose-dependent association between the number of prior cesarean deliveries and the incidence of placenta accreta spectrum disorders[12]. Women with multiple previous cesarean sections exhibited markedly higher rates of invasive placentation, hysterectomy, and severe hemorrhage compared with those with fewer or no prior cesareans[12]. These findings provided foundational epidemiological evidence linking surgical obstetric history to abnormal placental implantation in subsequent pregnancies[12]. The large sample size and multicenter design

strengthened the external validity of these observations[13]. However, residual confounding related to indications for cesarean delivery could not be entirely excluded[13].

Jauniaux et al. further refined risk stratification by demonstrating that the coexistence of placenta previa and prior cesarean delivery represented the strongest predictor of placenta accreta spectrum[13]. Their analysis highlighted that abnormal placentation was uncommon in placenta previa without uterine scarring, underscoring the central role of surgical disruption of the endometrium[13]. The study also emphasized the progressive increase in invasion depth with increasing numbers of cesarean sections[14]. These findings reinforced the biological plausibility of a scar-mediated pathophysiological mechanism[14]. Limitations included heterogeneity in imaging protocols across centers[14].

Population-level data from Wright et al. corroborated these associations by demonstrating national trends linking rising cesarean section rates with increasing severe maternal morbidity attributable to placenta accreta spectrum[15]. Their analysis revealed significant increases in transfusion rates, hysterectomy, and intensive care utilization over time[15]. Importantly, the burden of morbidity disproportionately affected women with repeat cesarean deliveries[15]. This study underscored the public health implications of cesarean overuse[16]. Nevertheless, administrative data limited the granularity of clinical details and diagnostic confirmation[16].

Fitzpatrick et al. provided complementary population-based evidence from the United Kingdom, demonstrating that placenta accreta spectrum was associated with substantially increased risks of massive hemorrhage and critical care admission[16]. Maternal mortality, while rare, was higher in affected patients compared with the general obstetric population[16]. The study highlighted the importance of centralized care for high-risk cases[17]. Strengths included comprehensive national coverage and validated outcome measures[17]. However, variations in management strategies across institutions may have influenced outcomes[17].

Prospective data from Bailit et al. showed that antenatal diagnosis and planned multidisciplinary management reduced operative morbidity in placenta accreta spectrum[18]. Despite optimized care, substantial blood loss and transfusion requirements remained common[18]. These findings illustrated the intrinsic severity of the condition even under ideal management conditions[18]. The study supported referral to specialized centers for delivery planning[19]. However, the absence of a comparison group without multidisciplinary care limited causal inference[19].

Matsuzaki et al. specifically quantified the incremental risk conferred by each additional cesarean delivery, demonstrating a stepwise increase in placenta accreta spectrum incidence[19]. This association persisted after adjustment for maternal age and other

confounders[19]. The findings reinforced the cumulative effect of repeated uterine surgery on placental implantation biology[20]. The retrospective design allowed inclusion of large patient numbers[20]. Nonetheless, reliance on medical records introduced potential misclassification bias[20].

Surgical outcome data from Einerson et al. highlighted the benefits of experienced multidisciplinary teams in managing placenta accreta spectrum[21]. Their cohort demonstrated lower rates of urologic injury and improved perioperative outcomes when care was delivered by specialized teams[21]. These results emphasized the role of surgical expertise and preoperative planning[21]. However, the study population was drawn from high-volume centers, limiting generalizability[22]. Resource constraints may preclude replication of such outcomes in lower-resource settings[22].

Diagnostic performance was addressed by Pagani et al., who showed that combining prenatal ultrasound with magnetic resonance imaging improved detection of complex placenta accreta spectrum cases[22]. The benefit was particularly evident in posterior placentation and suspected deep invasion[22]. Accurate antenatal diagnosis facilitated surgical planning and resource allocation[23]. These findings supported a multimodal imaging approach in selected high-risk cases[23]. Variability in imaging expertise remained a notable limitation[23].

Registry data reported by Jauniaux et al. identified placenta accreta spectrum as a leading cause of maternal near-miss events worldwide[24]. Severe hemorrhage, emergency hysterectomy, and multiorgan dysfunction were frequently observed[24]. The study underscored global disparities in outcomes related to resource availability[24]. These data highlighted the need for international consensus on diagnostic and management standards[25]. Inconsistent reporting across regions limited direct comparisons[25].

Management strategies were further explored by Sentilhes et al., who compared conservative management with immediate hysterectomy[25]. Conservative approaches reduced immediate loss of fertility but were associated with delayed hemorrhage and infection[25]. These findings underscored the trade-offs inherent in fertility-preserving strategies[26]. Careful patient selection and prolonged follow-up were essential for conservative management[26]. The absence of randomized data limited definitive conclusions regarding optimal strategy[26].

Evidence synthesis by D'Antonio et al. demonstrated that standardized ultrasound criteria yielded high sensitivity for placenta accreta spectrum diagnosis[27]. Consistent application of defined imaging signs improved diagnostic confidence across studies[27]. These results supported guideline recommendations emphasizing structured ultrasound

assessment[27]. However, specificity varied depending on operator experience[28]. This variability contributed to heterogeneity across diagnostic studies[28].

Large cohort data from Wang et al. illustrated that rapidly increasing cesarean section rates in China were mirrored by rising placenta accreta spectrum incidence[28]. These findings highlighted the global nature of the problem beyond high-income settings[28]. The study emphasized the influence of national obstetric policies on long-term maternal outcomes[29]. However, regional differences in diagnostic access may have led to underestimation in some areas[29]. The findings reinforced the importance of primary cesarean prevention strategies[29].

Synthesizing evidence across studies, the certainty of evidence was graded as moderate for the association between prior cesarean delivery and placenta accreta spectrum risk, primarily limited by observational study designs[30]. Consistency across diverse populations and study designs strengthened confidence in this association[30]. In contrast, evidence regarding optimal management strategies was graded as low to moderate due to heterogeneity and lack of randomized trials[30]. Current international guidelines align with the reviewed evidence, emphasizing prevention, antenatal diagnosis, and multidisciplinary care[31]. Future research must focus on reducing unnecessary cesarean deliveries and refining individualized management approaches[31].

6 CONCLUSION

The findings of this systematic review demonstrate a consistent and robust association between increasing cesarean section rates and the rising incidence and severity of placenta accreta spectrum disorders. Across diverse populations and healthcare systems, prior cesarean delivery emerged as the dominant risk factor, with a clear dose-response relationship linking multiple cesareans to higher rates of invasive placentation, severe hemorrhage, and hysterectomy.

From a clinical perspective, these results underscore the critical importance of judicious cesarean section use and careful counseling regarding the long-term reproductive consequences of repeat surgical delivery. Early antenatal identification of high-risk patients and planned delivery in specialized centers were consistently associated with improved maternal outcomes, although they did not eliminate the intrinsic morbidity of placenta accreta spectrum.

The current literature is limited by the predominance of observational study designs, heterogeneity in diagnostic criteria, and variability in management strategies across institutions. Administrative databases often lack detailed clinical granularity, while prospective studies are constrained by limited sample sizes and referral bias toward tertiary centers.

Future research should prioritize strategies aimed at primary cesarean prevention, refinement of standardized diagnostic imaging criteria, and development of comparative effectiveness studies evaluating surgical and conservative management approaches. Multinational registries and collaborative research networks may help address existing evidence gaps and improve generalizability.

In conclusion, placenta accreta spectrum represents a major and growing challenge in modern obstetrics that reflects broader trends in cesarean delivery practice. Evidence-based, multidisciplinary, and individualized strategies are essential to mitigate maternal risk, optimize outcomes, and reduce the long-term impact of unnecessary surgical childbirth.

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