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REVIEW

Scoping Review on En Caul Births

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ABSTRACT

Objective: To identify and analyze the available literature on en caul birth.

Data Sources: PubMed, Embase, and Scopus databases.

Study Selection: We included all full-text, peer-reviewed reports on en caul birth (i.e., vaginal or cesarean), including research studies, case reports, case series, surveys, surgical technique descriptions, narrative reviews, and commentaries, published in English or Italian. We did not place any restrictions on the year of publication. We excluded conference abstracts and reports about nonviable fetuses.

Data Extraction: We extracted the following data from each included source: author(s), year of publication, country, study design and duration, type of birth (i.e., vaginal or cesarean), en caul (*n*), en caul characteristics (i.e., spontaneous or intentional), control (*n,* if applicable), previous cesarean birth, fetal presentation, number of fetuses/newborns, gestational age, and study key findings.

Data Synthesis: We identified 32 full-text articles that met the inclusion criteria. We organized and summarized the literature according to birth type and narratively highlighted findings from the included reports related to gestational age, fetal presentation, and the use of en caul as a technique during cesarean birth in relationship to specific pregnancy complications.

Conclusion: Our results provide a map of the available, albeit limited, evidence on en caul births. The authors of the reports in our review suggested that en caul vaginal birth may offer some benefits to preterm newborns regardless of fetal presentation and that en caul cesarean birth may be beneficial with some uncommon pregnancy complications such as vasa previa.

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(Continued)

En caul (EC) birth is a rare event in which the fetus is born in the intact amniotic sac. This type of birth is also called a "veiled" or "mermaid" birth (Moran, 2022, p. 1). In a report from West Yorkshire, United Kingdom, Abouzeid and Thornton (1999) stated that if clinicians refrained from artificial amniotomy, 1% to 2% of spontaneous vaginal births would occur EC. In contrast, reflecting the routine use of artificial rupture of membranes, EC births are widely reported to occur in fewer than 1 in 80,000 deliveries (Greenstein et al., 2016; Malik et al., 2018; Moran, 2022; Pabin et al., 2024). However, this figure should be interpreted cautiously given that EC births are not systematically tracked in birth registries. Historically, EC births were surrounded by many cultural beliefs and myths. For example, Heggarty (1975) explained that in Scottish folklore people believed that being born EC was protection against drowning later in life and signified a fortunate and protected existence. Likewise, Prabakar and Nimaroff (2012) reported that in medieval folklore, EC births were regarded as indications of great luck and fortune. Although science has arguably refuted these myths, the rarity and uniqueness of EC births continue to fascinate. In a letter to the editor, Zacharis et al. (2021) reflected on their team's profound experience when they witnessed a twin EC birth and emphasized that through this experience "nature offers a glimpse into a fetus's sheltered world within the uterus" (p. 110). These cultural and historical perspectives add a rich context to the clinical observations and outcomes associated with EC birth. Nurses, midwives, and physicians should be aware of this history, assess and respect patients' beliefs, and provide evidence-based information about EC birth.

Whereas EC birth can occur spontaneously during vaginal birth (VB), in modern maternity care EC birth has also been intentionally employed as a planned technique during VB (Richmond et al., 2002) and cesarean birth (CB; Lin et al., 2010) to

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Midwives, nurses, and physicians may be unfamiliar with the rare phenomenon of en caul births.

reduce direct fetal manipulation and mechanical trauma during extraction, particularly for extremely preterm or malpresenting fetuses. The intact amniotic sac may function as a protective hydrostatic cushion, helping to reduce head entrapment during vaginal breech birth and compressive injury during cesarean extraction (Lin et al., 2010; Murakoshi, 2020; Richmond et al., 2002). The transition from a spontaneous occurrence to an intended procedure raises clinical and practical concerns, and the dual nature of EC birth calls for a thorough investigation of its biological and medical implications as well as potential benefits and risks (Lin et al., 2010; Malik et al., 2018; Murakoshi, 2020). Therefore, the primary purpose of this scoping review was to collect and analyze existing literature on EC birth during VB or CB. The secondary goals were to identify the specific gestational ages and fetal presentations for which EC birth might be beneficial.

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Methods

We conducted the review according to JBI scoping review methodology (Peters et al., 2020) and used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Review extension checklist (Tricco et al., 2018) to ensure a complete report. In scoping reviews, research is organized on broad topics to identify key concepts, gaps, and evidence types. This methodology enables iterative refinement and the inclusion of diverse studies, making scoping reviews ideal for investigating new or complex topics (Peters et al., 2021). Before beginning the review, we designed an a priori protocol to outline the objectives and actions for identifying and selecting evidence, extracting data, and displaying results. We registered the protocol in the Open Science Framework platform (Fiasella & Londero, 2022).

Review Questions

We used the population, concept, and context framework (Peters et al., 2020) to construct the review questions. Our primary review question was "What evidence is available regarding EC births?" We also asked secondary questions: "What were the gestational ages at which EC birth occurred or was employed?" and "What were the fetal presentations in which EC birth occurred or was employed?"

Inclusion Criteria

We included all full-text articles (e. g., research studies, case reports, case series, surveys, surgical technique descriptions, narrative reviews, commentaries) in which authors described the care of pregnant women, their fetuses, and newborns during vaginal or cesarean EC births that were published in peer-reviewed journals and were written in English or Italian. To provide a comprehensive review, we did not impose any restrictions on publication date. We excluded conference abstracts, non-peer-reviewed records, and reports of nonviable fetuses.

Search Strategy

Following the JBI methodology, we used a three-phase search strategy (Tricco et al. 2018). First, we conducted an exploratory search for the terms "en caul delivery" and "en caul birth" in the PubMed and Scopus databases. Then, we carefully evaluated keywords in titles, abstracts, and indexes to design an effective search strategy. Subsequently, we used the newly constructed search strategy in the following databases: PubMed (U.S. National Library of Medicine), Scopus (Elsevier), and EMBASE (Elsevier). Supplementary Table S1 shows the detailed search queries. Lastly, we searched the reference lists of each included publication to identify additional sources relevant to our objectives. This comprehensive search process enabled us to review the literature and refine review questions thoroughly. Our initial search was conducted in September 2022 and updated in January 2026.

Selection of Sources

We retrieved 982 records through searches across the three databases. We used Zotero software to manage citations. After removing 389 duplicates, 593 records remained. To screen the remaining records, we first randomly selected 25 records and had the entire team individually and manually examine them to validate the inclusion criteria. We began screening the remaining records only after achieving more than 75% agreement in the preliminary validation phase. Then, two reviewers (E.F. [second author] and A.P.L. [first author]) independently assessed the remaining titles and abstracts. We resolved disagreements through discussion and comparison until we reached consensus. We excluded 555 records because they did not meet the inclusion criteria. Next, we retrieved and assessed 45 full-text reports for eligibility, including 7 from citation searching. We excluded 13 reports; in 3 the reports were written in languages other than

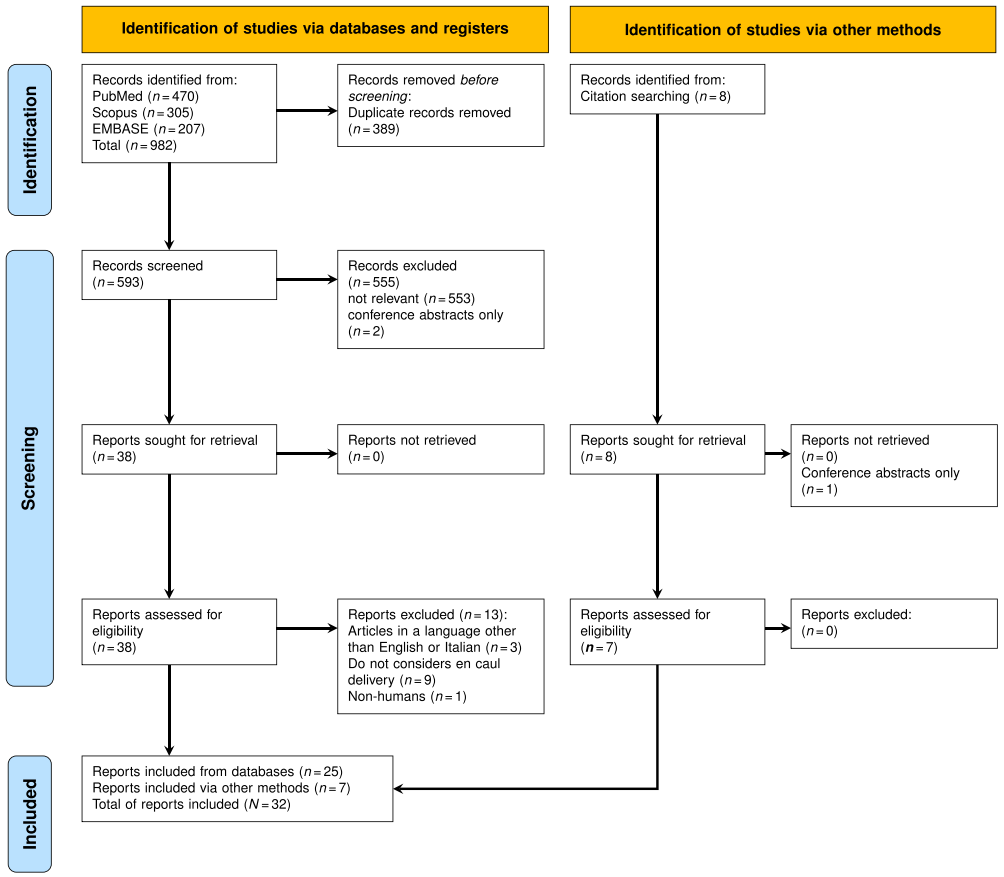

Figure 1. Flowchart indicating study selection.

English or Italian (German, $n = 2$; Japanese, $n = 1$), in 9 the authors did not consider EC birth, and 1 was an animal study. Our final sample consisted of 32 reports (Supplementary Table S2). We used a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram (Page et al., 2021) to visually describe the selection process (Figure 1).

Data Extraction

Two authors (A.P.L. and E.F.) extracted relevant data aligned with the review questions. We used Google Sheets to generate a digital data extraction table. We extracted pertinent data, including author(s), year of publication, country, study design and duration, type of birth (i.e., VB or CB), EC (*n*), control (*n,* if applicable), gestational age, fetal presentation, previous CB, number of fetuses/newborns, study outcomes, key findings, and conclusions. Consistent with scoping review methodology (Peters et al., 2020), we sought to map the literature, regardless of quality, to determine the scope of available evidence; therefore, we did not conduct a quality appraisal of the included studies.

Data Analysis and Presentation

We categorized reports by type of birth (VB vs. CB). Within reports on VB, we further distinguished spontaneous EC births from intentionally facilitated EC births when reported. We used visual and illustrative tables and a narrative synthesis to convey that conclusions aligned with the study questions and to identify developing domains. In the narrative summary, we highlighted key findings related to gestational age and fetal presentation at birth and other relevant outcomes. We focused on descriptive statistics and qualitative insights to provide a comprehensive overview of the evidence. This approach adhered to updated methodological guidance for conducting scoping reviews (Peters et al., 2021; Tricco et al., 2018) and ensured a thorough and accurate representation of the findings.

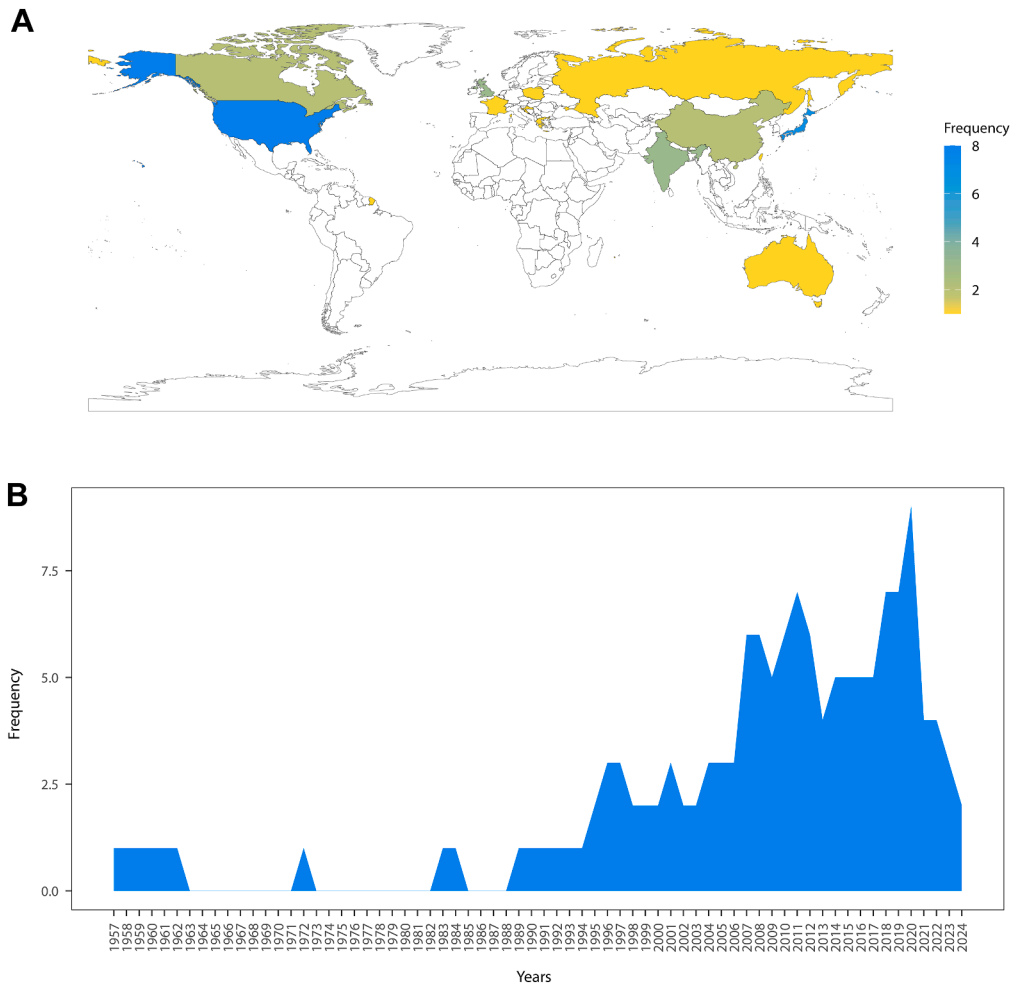

Figure 2. Plot A shows the world map with the spatial distribution of the included studies. Plot B shows the frequencies of the studied periods in the analyzed articles. When the materials and methods sections lacked the study period, we used the article's submission or publication date to determine the reference period.

Results

Characteristics of Included Sources

We included 32 full-text reports in our review (Supplementary Table S3). Of these reports, 8 were from the United States (Campbell et al., 1984; Goldenberg & Davis, 1983; Groen et al., 2014; Kimball & Oliver, 1964; Malik et al., 2018; Oyelese et al., 2022; Prabakar & Nimaroff, 2012; Sherer et al., 1989), 7 from Japan (Isayama et al., 2024; Murakoshi, 2020; Oku et al., 2025; Shibata et al., 2020; Shitara et al., 2021; Taga et al., 2014; Takagi & Muraoka, 2019), 3 from India (Ghosh & Choudhury, 2020; Pal, 2021; Sattiraju & Katakdhond, 2024), 3 from the United Kingdom (Abouzeid & Thornton, 1999; Heggarty, 1975; Vincent, 2005), 2 from Canada (Richmond et al., 2002; Sugati et al., 2025), 2 from China (Jin et al., 2013; Shan et al., 2024), 1 from Australia (McGurgan et al., 2004), 1 from Croatia (Blagaić et al., 2014), 1 from France (Girault et al., 2022), 1 from Greece (Zacharis et al., 2021), 1 from Poland (Pabin et al., 2024), 1 from Russia (Radzinsky et al., 2015), and 1 from Taiwan (Lin et al., 2010) (Figure 2A). We found that most of the included studies focused on births from 2006 to 2012 (Figure 2B).

Seven articles were reports of retrospective cohort studies (Blagaić et al., 2014; Girault et al., 2022; Jin et al., 2013; Kimball & Oliver, 1964; Oku et al., 2025; Richmond et al., 2002; Shan et al., 2024), 1 article was a report of a case-control study (Radzinsky et al., 2015), 1 article was a report of a single-arm interventional study (Lin

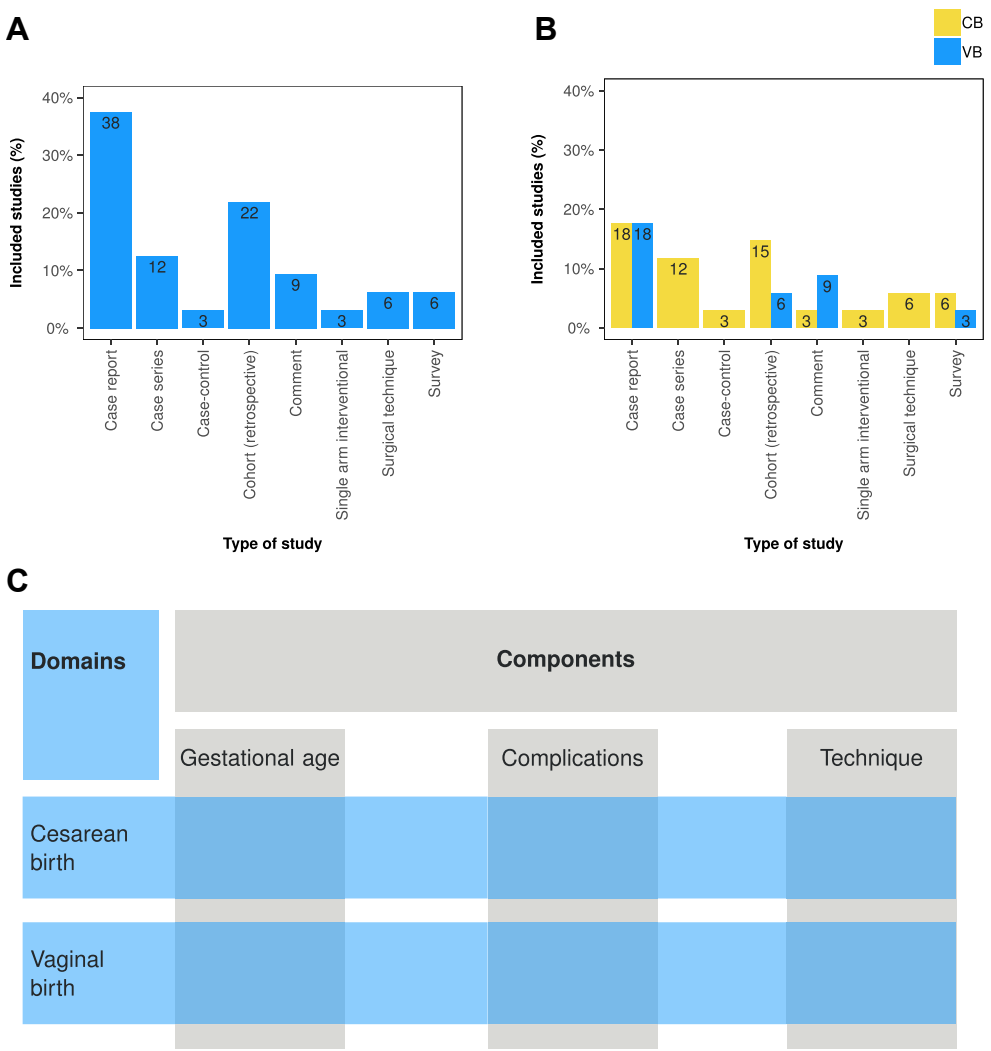

Figure 3. Panel A depicts the prevalence of the study types considered. Panel B shows the prevalence of the included study types stratified by main domains (vaginal birth [VB] and cesarean birth [CB]). Panel C shows the domains and components found in the included articles.

et al., 2010), and 2 articles were reports of survey studies (Isayama et al., 2024; Takagi & Muraoka, 2019). Moreover, 4 articles were reports of case series (Abouzeid & Thornton, 1999; Oyelese et al., 2022; Shitara et al., 2021; Taga et al., 2014), 12 articles were case reports (Ghosh & Choudhury, 2020; Groen et al., 2014; Heggarty, 1975; Malik et al., 2018; McGurgan et al., 2004; Pal, 2021; Prabakar & Nimaroff, 2012; Sattiraju & Katakdhond, 2024; Shibata et al., 2020; Sugati et al., 2025; Vincent, 2005; Zacharis et al., 2021), 2 articles were reports of surgical techniques (Murakoshi, 2020; Sherer et al., 1989), and 3 articles were commentaries (Campbell et al., 1984; Goldenberg & Davis, 1983; Pabin et al., 2024) (Figure 3A and 3B). In these reports, authors evaluated 792 EC CBs or VBs (741 from studies and 51 from case series or reports). We organized the reports by birth type (VB vs. CB). Thus, CB and VB were the main domains (Figure 3C). Transversal components such as gestational age, complications, and technique were examined in both primary domains. In 22 (68.8%) of the reports, researchers focused on EC CB, and in 12 reports (37.5%), they focused on VB. In 2 reports (6.2%), we noted an overlap between the two domains. The overall average gestation period for all studies in both domains was 28 weeks. The

average gestational age in reports of VBs was 25 weeks, whereas CBs had a wider average gestational range and a mean of 30 weeks.

EC Vaginal Births

Twelve studies within the VB domain were reviewed, as presented in Supplementary Table S3 (Campbell et al., 1984; Ghosh & Choudhury, 2020; Girault et al., 2022; Goldenberg & Davis, 1983; Groen et al., 2014; Heggarty, 1975; Isayama et al., 2024; Malik et al., 2018; Pabin et al., 2024; Richmond et al., 2002; Sugati et al., 2025; Vincent, 2005). Evidence concerning vaginal EC births included both spontaneous events during rapid labors and deliberate membrane preservation to safeguard vulnerable fetuses. Spontaneous EC births were infrequent occurrences, typically associated with multiparity and prematurity (Ghosh & Choudhury, 2020; Malik et al., 2018; Pabin et al., 2024). Case reports documented instances of spontaneous EC birth in diverse environments such as home births (Heggarty, 1975) and emergency departments (Pabin et al., 2024) involving preterm infants. Heggarty (1975) described a case of a 34-week infant born at home within an intact sac who survived 25 minutes of extrauterine life prior to membrane rupture, suggesting that the placenta may sustain oxygen supply for a brief period following birth. Malik et al. (2018) explained that spontaneous EC birth in extremely preterm infants, such as those born at 23 weeks, may lead to significant complications, including intraventricular hemorrhage and respiratory distress, attributable to extreme prematurity regardless of the birth method.

In most VB cases, EC birth was conducted intentionally (Girault et al., 2022; Richmond et al., 2002; Vincent, 2005). Protocols for intentional VB of extremely preterm breech fetuses have been outlined, specifically for gestational ages from 24 to 27 weeks (Girault et al., 2022; Richmond et al., 2002). This technique aimed to use the intact amniotic sac for passive cervical dilation while safeguarding the fetus from direct trauma and head entrapment (Campbell et al., 1984; Goldenberg & Davis, 1983; Richmond et al., 2002). A retrospective review of singleton breech births before 26 weeks of gestation demonstrated successful vaginal EC birth without membrane rupture during labor (Richmond et al., 2002). In a comparison of outcomes between vaginal EC birth and VB with ruptured membranes for breech fetuses at 24 to 27 + 6 weeks, Girault et al. (2022) reported that the EC technique demonstrated significantly higher arterial cord pH values. In the study by Girault et al. (2022), the technique did not yield a statistically significant reduction in perinatal mortality rates compared with ruptured membrane births (19.2% vs 28.2%), but it appeared to confer a protective advantage against fetal heart rate abnormalities and extraction difficulties.

Vaginal EC birth was employed as a rescue intervention in instances of intrapartum diagnosis of vasa previa. A case at 27 weeks of gestation demonstrated that refraining from artificial rupture of membranes and facilitating a rapid EC birth averted fetal exsanguination due to exposed vessels (Groen et al., 2014). Moreover, Sugati et al. (2025) described the infrequent occurrence of spontaneous vaginal EC birth of twins to a multiparous woman at 24 weeks and 1 day of gestation after possible rupture of membranes 17 days prior.

EC Cesarean Births

A total of 22 studies in the CB domain were reviewed, as detailed in Supplementary Table S3 (Abouzeid & Thornton, 1999; Blagaić et al., 2014; Isayama et al., 2024; Jin et al., 2013; Kimball & Oliver, 1964; Lin et al., 2010; McGurgan et al., 2004; Murakoshi, 2020; Oku et al., 2025; Oyelese et al., 2022; Pabin et al., 2024; Pal, 2021; Prabakar & Nimaroff, 2012; Radzinsky et al., 2015; Sattiraju & Katakdhond, 2024; Shan et al., 2024; Sherer et al., 1989; Shibata et al., 2020; Shitara et al., 2021; Taga et al., 2014; Takagi & Muraoka, 2019; Zacharis et al., 2021). Only one prospective trial included a single intervention arm (Lin et al., 2010). The predominant body of literature examines EC birth through CB, commonly termed "amnion protective cesarean birth" (Blagaić et al., 2014; Oku et al., 2025; Sherer et al., 1989). Reports indicated that this technique was prevalent in contemporary obstetrics, especially in Japan, where a survey of perinatal centers indicated that 81.6% of Level 3 centers used it (Takagi & Muraoka, 2019). The widespread adoption of this practice in Japan was evident in a recent report of national-level data, which indicated that EC CB was a frequently used method for managing extremely preterm births at 22 to 23 weeks of gestation (Isayama et al., 2024). Amnion protective cesarean birth or EC CB was most commonly performed for preterm and extremely low-birth-weight (ELBW, $<$1000 g) infants to minimize birth-related trauma (Lin et al., 2010; Murakoshi, 2020). Reports showed that the procedure was often recommended for fetuses under 32 weeks of gestation or very low birth weight (VLBW, $<$1500 g) (Abouzeid & Thornton, 1999; Lin et al., 2010; Murakoshi, 2020).

Successful applications were also documented in ELBW infants at specialized centers (Shitara et al., 2021). The authors of a certain protocol advocated total EC for ELBW fetuses and partial EC for VLBW fetuses (Murakoshi, 2020). In two studies, EC CB was used for multiple presentations, such as breech and transverse lie, to enable atraumatic extraction (Blagaić et al., 2014; Shan et al., 2024). Researchers indicated that elective EC birth for preterm twins was both feasible and beneficial in minimizing birth injuries (Pal, 2021; Prabakar & Nimaroff, 2012; Radzinsky et al., 2015; Shan et al., 2024; Zacharis et al., 2021). Oyelese et al., (2022) recommended EC CB for vasa previa to visualize fetal vessels and prevent laceration during uterine access. This technique was also employed in instances of placenta accreta and anterior placenta previa to prevent incision of the placenta (Lin et al., 2010; Taga et al., 2014) and to reduce maternal blood contamination of amniotic fluid, facilitating the reinfusion of autologous blood in the absence of suitable filtering devices (McGurgan et al., 2004). Kimball and Oliver (1964) reported that the procedure entailed making a considerable uterine incision while ensuring that the membranes remain intact. Researchers reported that tocolytic agents, such as nitroglycerin, were frequently administered to promote uterine relaxation and prevent the "hug-me-tight" uterus phenomenon, characterized by rapid uterine contractions around the fetus following membrane rupture (Murakoshi, 2020; Takagi & Muraoka, 2019). Different types of incisions were identified such as lower transverse, J-shaped, U-shaped, and in some cases vertical or transverse fundal incisions, which are determined by the development of the lower uterine segment and the location of the placenta (Murakoshi, 2020; Taga et al., 2014).

En caul CB was associated with higher Apgar scores and higher arterial cord pH than conventional CB (Blagaić et al., 2014; Shan et al., 2024). In a single-center retrospective study, Oku et al. (2025) reported that in ELBW infants, successful EC birth notably decreased the occurrence of severe intraventricular hemorrhage (grade ≥ 3) compared with alternative birth methods. In preterm twins, EC CB was associated with a lower incidence of respiratory distress syndrome and a lower need for mechanical ventilation, especially in the second twin (Radzinsky et al., 2015; Shan et al., 2024). In several studies, authors mentioned that the intact hydrostatic cushion safeguarded the delicate fetus from bruising and pressure-induced trauma during extraction (Lin et al., 2010; Malik et al., 2018; Sattiraju & Katakdhond, 2024). The technique was generally considered safe, yet it presented particular risks, such as the potential for neonatal anemia, especially if the placenta separated during birth or if velamentous cord insertion resulted in vessel rupture during membrane peeling (Abouzeid & Thornton, 1999; Shibata et al., 2020). Conversely, Girault et al. (2022) reported no significant differences in hemoglobin levels when compared with conventional CB. The procedure presented technical challenges, with failure rates, specifically inadvertent membrane rupture, rising alongside gestational age (beyond 34 weeks), increased birth weight, and elevated amniotic fluid volume (Jin et al., 2013). Several studies indicated that EC cesarean procedures tended to have longer operation times; however, this was generally not associated with increased maternal blood loss or postoperative complications (Jin et al., 2013; Shan et al., 2024). Nonetheless, authors cautioned that the necessity for vertical uterine incisions in certain extremely preterm instances may affect subsequent pregnancies (Girault et al., 2022; Richmond et al., 2002).

En caul birth may benefit preterm neonates and aid in maternity care complications such as vasa previa.

Discussion

In our scoping review, we identified 32 heterogeneous reports describing 792 EC births, most of which involved CB in preterm or low-birth-weight infants. In the reviewed reports, EC birth was frequently characterized as a potentially protective technique aimed at minimizing birth trauma, enhancing immediate neonatal condition, and aiding in specific high-risk scenarios, including breech presentation, twin pregnancy, and vasa previa. However, the evidence was limited and primarily consisted of reports of retrospective and descriptive studies. Despite these limitations, evidence suggested that EC CB and VB may benefit preterm and low-birth-weight newborns given that the technique can reduce traumatic complications. By preventing the phenomenon of the hug-me-tight uterus after membrane rupture, the intact sac cushions against contractions that can cause trauma, including cerebral hemorrhage. Extracting the fetus within the intact amniotic sac can be easily applied in the event of CB and has also been successfully applied in the case of VB. This technique may also prevent some rare obstetric complications, including vascular rupture in vasa previa, which otherwise should require rapid cord clamping to avoid neonatal hemorrhage. It is also known as atraumatic or amnion-protective CB

Findings may be used to inform nurses, midwives, and other health care professionals about the unique event of en caul birth.

(Sherer et al., 1989; Taga et al., 2014) and offers a "gentle entrance into life" (Sherer et al., 1989, p. 23).

According to the evidence, in some instances EC CB and VB improved neonatal outcomes, but EC birth cannot prevent the adverse consequences of prematurity. Prematurity remains the leading cause of neonatal morbidity and mortality at birth. Common complications include respiratory distress, intraventricular hemorrhage, sepsis, and long-term neurodevelopmental impairment (Blencowe et al., 2012). Although advances in neonatal care have improved survival, the risk of adverse outcomes persists, particularly in infants born before 32 weeks (Markestad et al., 2005). However, data presented in the primary studies showed that EC birth can improve the Apgar score (Blagaić et al., 2014; Radzinsky et al., 2015; Shan et al., 2024) and cord pH (Blagaić et al., 2014; Girault et al., 2022) at birth for high-risk newborns, such as those born very prematurely, with low birth weight, or in twin pregnancies, reducing the risk of perinatal asphyxia (Blagaić et al., 2014; Girault et al., 2022; Jin et al., 2013; Pabin et al., 2024; Radzinsky et al., 2015; Shan et al., 2024). Furthermore, it was found that EC infants spend less time in the neonatal intensive care unit (Blagaić et al., 2014; Radzinsky et al., 2015), have a lower morbidity rate in the first year of life, and have better neurobehavioral development than routine, non-EC CB infants (Pabin et al., 2024; Radzinsky et al., 2015).

The safety of VB for very preterm infants (generally defined as <32 weeks of gestation, and especially <28 weeks) remains a topic of ongoing debate in perinatal medicine (Wang et al., 2025). Indeed, survival rates for very preterm infants do not consistently differ between VB and CB, especially in cephalic presentations. A recent meta-analysis of infants born before 32 weeks of gestation found that CB appeared to protect against neonatal death, independent of fetal presentation (Demertzidou et al., 2023). However, fetal breech presentations seemed to play a negative role in neonatal outcomes. Demol et al. (2000) found that fetal breech presentation was a major risk factor for the occurrence of neonatal complications during birth, independent of the type of birth, and for adverse outcomes in very preterm births. This risk persisted even after adjusting for other confounding factors such as gestational age and birth weight, potentially due to fetal head entrapment (Demol et al., 2000).

According to studies in this review, EC VB and CB may be attempted in any case of preterm birth, particularly in very preterm cases, given that they may gain greater benefit from this technique and have a higher chance of success (Jin et al., 2013; Pabin et al., 2024). Common indications for preterm EC CB can include any of the usual indications for a preterm CB, including severe hypertension, placental abruption, placenta previa hemorrhage, fetal distress, growth restriction, and twin pregnancies with breech presentation (Abouzeid & Thornton, 1999; Blagaić et al., 2014; Lin et al., 2010; Pabin et al., 2024; Radzinsky et al., 2015). Each of these situations comes with its own set of complications (Mitrogiannis et al., 2023).

En caul VB seems to be as feasible as CB, even though EC VB appears to be reported less frequently than EC CB. Interestingly, in extremely preterm breech fetuses, similar results have been shown with respect to the neonatal outcome in the cases of EC VB and CB, independent of the fetal presentation. These results may be related to the protective effect of EC birth against mechanical trauma from CB or during passage through the birth canal. The evidence supporting the use of the EC birth technique in advanced gestational age was limited given that increased fetal weight and amniotic fluid volume can increase the rate of EC birth failure. In addition, advanced gestational fetuses will benefit less from atraumatic birth.

McMahon et al. (2025) reported that caution should be taken in the case of insertio velamentosa and vasa previa given that acute fetal hemorrhage due to rupture of the fetal artery and bleeding secondary to vessel rupture occurred in the cases they reviewed (Groen et al., 2014; McMahon et al., 2025; Shibata et al., 2020). They noted that this fairly uncommon complication could occur during a partial EC birth if the prenatal diagnoses were missed (McMahon et al., 2025; Shibata et al., 2020). If, on the other hand, vasa previa was diagnosed during pregnancy, the Society of Obstetricians and Gynecologists of Canada recommended performing an elective EC CB at 35 to 36 weeks (McMahon et al., 2025). Several authors indicated that by making an incision away from the vessels, this procedure prevented fetal hemorrhage, hypovolemia, and anemia (McMahon et al., 2025; Oyelese et al., 2022). In circumstances of vasa previa and

imminent birth, McMahon et al. (2025) suggested that women in advanced expulsive periods who could not execute a protective CB might attempt EC VB with membrane preservation for as long as possible (Groen et al., 2014; McMahon et al., 2025).

From a technical standpoint, EC CB is typically conducted via a lower-segment transverse uterine incision given that vertical uterine incisions are generally avoided due to their potential to elevate the risk of maternal hemorrhage (Pabin et al., 2024). Although a wider incision and the administration of uterine-relaxing agents may raise concerns regarding increased bleeding, the existing literature on emergency CB does not consistently indicate higher blood loss (Blagaić et al., 2014; Jin et al., 2013; Shan et al., 2024). This inconsistency may be attributed to the smoother fetal extraction achieved when the membranes remain intact (Blagaić et al., 2014; Pabin et al., 2024). Evidence from preterm CB indicated that tocolysis was linked to an increased risk of postoperative hemorrhage, which varied by drug class (Lee et al., 2020). Nitrates exhibited the highest relative risk; thus, these agents should be used with caution and tailored to the specific clinical scenario (Lee et al., 2020). By contrast, oxytocin receptor antagonists like atosiban demonstrated a maternal safety profile comparable to placebo, as evidenced by a large randomized trial showing no significant differences in maternal adverse events or postpartum hemorrhage (van der Windt et al., 2025).

Limitations

We found a lack of scientific studies about EC births. The existing literature was diverse in terms of study type and demographic targets. Most reports were retrospective cohort studies or case reports and case series, and only one prospective interventional study with a single arm was reported (Lin et al., 2010). In contrast, prospective cohort studies or even randomized controlled trials, which provide stronger scientific evidence, were lacking. In addition, most reports were from East Asian countries, particularly Japan (Jin et al., 2013; Lin et al., 2010; Murakoshi, 2020; Shibata et al., 2020; Takagi & Muraoka, 2019), potentially limiting the generalizability of the results. For practical reasons, we limited the search to reports in English and Italian, which means that we may have missed some critical information. In accordance with scoping review methodology, we did not conduct a quality appraisal on the included studies.

Nursing Implications

Midwives and nurses play an essential role in both spontaneous and cesarean EC births. They must recognize potential EC birth scenarios to prepare effectively and ensure that all necessary resources are available. Training in managing EC births, focusing on handling the intact amniotic sac and providing immediate neonatal care, is crucial. Our review identified specific scenarios where EC birth may be beneficial, such as preterm breech deliveries, emphasizing the importance of midwives and nurses being knowledgeable about these situations to advocate for and support appropriate interventions. By integrating this knowledge into their daily clinical practice, midwives and nurses may improve EC birth outcomes and enhance patients' overall birthing experiences.

This unique type of birth has cultural significance and is often associated with various cultural beliefs and practices (Heggarty, 1975; Prabakar & Nimaroff, 2012; Zacharis et al., 2021). Understanding these cultural contexts is essential for providing culturally sensitive care and effectively preparing women and families for EC births (Adatara et al., 2019; Behruzi et al., 2010). By acknowledging and incorporating cultural beliefs into their practice, midwives and nurses can foster trust and cooperation, ultimately improving the overall birthing experience for women and infants.

Conclusion

We aimed to summarize the scarce literature on EC births. Researchers investigating EC births suggested that some premature newborns may benefit from EC births regardless of prenatal presentation. In addition, the literature indicates that EC CB may be advantageous in exceptional cases such as vasa previa. However, risks were also identified, such as fetal bleeding, and the current literature lacked sufficient data, highlighting the necessity for further research to gather strong clinical evidence on maternal and neonatal outcomes during EC births. Future research, including systematic reviews with meta-analyses, is essential to address these knowledge gaps and develop tailored procedures for specific patient populations. Nurses and midwives play a crucial role in educating patients and families and assisting in EC births and

associated techniques. Thus, it is important for nurses, midwives, and other health care personnel to become more familiar with this rare phenomenon.

SUPPLEMENTARY MATERIALS

Note: To access the supplementary materials that accompany this article, visit the online version of the *Journal of Obstetric, Gynecologic, & Neonatal Nursing* at http://jognn.org and at https://doi.org/10.1016/j.jogn.2026.06.002.

CONFLICT OF INTEREST

The authors report no conflicts of interest or relevant financial relationships.

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