

CASE REPORT

General

Denial of pregnancy and neonaticide: A historical overview and case report

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Abstract

While denial of pregnancy and neonaticide are rare, they are potentially associated and share some risk factors. Neonaticide has been proposed as the extreme outcome of a denial of pregnancy. However, the process leading to such a possible outcome is not yet fully understood. The primary goal of this essay is to examine the various definitions and ambiguities surrounding the denial of pregnancy. The case of a young woman with a history of two denied pregnancies with diverse characteristics and outcomes, the latest of which resulted in neonaticide, is then reported and examined. A forensic psychiatric evaluation was also performed to reconstruct the woman's mental state at the time of the crime. The forensic pathological analysis of the newborn, abandoned near the sea while still alive, is described. The victim's body showed signs of shaken baby syndrome. We contend that differing levels of awareness during a denial of pregnancy might not be predictive of the potential delivery outcome in terms of threat to the newborn's survival, according to the forensic pathological and psychopathological data of the current case. Early identification of women affected by denial of pregnancy who pose a danger of committing infanticide is hampered by both intrinsic traits (dissimulation, unawareness, low propensity to seek assistance) and environmental factors (isolation, low socioeconomic level, poor education.). A previous history of denial of pregnancy should activate health and support services to reduce the potential risks for the mother and the child.

KEYWORDS

acute dissociative reaction, borderline personality disorder, denial of pregnancy, neonaticide, newborn skull fractures, shaken baby syndrome

Highlights

- 1 of 475 pregnant women had denial of pregnancy up to 20 weeks of gestation and 1 of 2455 until delivery.
- Previous denial of pregnancy is a crucial risk factor for subsequent denial of pregnancy.
- Mother and infant could face significant risks during denial of pregnancy, i.e., feticide and/or neonaticide.
- Few cases of repeated denial of pregnancy have been reported.

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1 | INTRODUCTION

Denial of pregnancy (DoP) consists in the non-recognition of the pregnant state by the woman and sometimes even by her closest family members. DoP could last up to most or all of the gestation [1]. Mother and infant could face significant risks during DoP, such as maternal postpartum emotional distress, unattended or precipitous delivery, fetal abuse, poor nutrition, and neonaticide [2, 3].

1.1 | Historical evolution, definition and ambiguities

In 1681, gynecologist François Mauriceau assumed that the persistence of vaginal bleeding during pregnancy could lead some women to ignore their pregnancy. He named this phenomenon “méconnaissance de la grossesse” (unawareness of pregnancy) [4]. Later George Milbry Gould grouped several case reports of DoP as “unconscious pregnancy”, making a first step toward the recognition of DoP as a specific and independent clinical phenomenon [5]. The case of a woman with schizophrenia who failed to acknowledge her pregnancy was described in a 1976 case study. There, her condition was discussed and named as “dèni de grossesse” (denial of pregnancy) [6].

The diagnostic heterogeneity in the DoP literature, which has a long history and is widely dispersed, highlights the complexity of the phenomenon and the variety of methods used to analyze it. Early explanations of DoP were psychoanalytically oriented and focused on the role of defense mechanisms such as denial and rationalization during pregnancy.

Early explanations of DoP were psychoanalytically oriented and emphasized the role played by defense mechanisms such as denial and rationalization. According to this point of view, the unconscious psychic process prevents the woman from experiencing the pregnancy by activating strong defense mechanisms, thereby shielding her from unbearable suffering. Defense mechanisms, however, do not account for the whole complexity of DoP [7, 8].

Wessel, a German gynecologist, defined DoP as a phenomenon marked by the absence of awareness of pregnancy [9]. Denial of pregnancy is sometimes referred to in literature as “disavowal of pregnancy” [10].

Del Giudice redefined DoP as “cryptic pregnancy,” which is an alternative definition that accounts for the physiological correlates and DoP's possible evolutionary importance [11]. Relying on an approach based on the parent-offspring conflict theory, Del Giudice interprets DoP as a mean to reduce the energy and ecological costs of pregnancy so that the mother is favored at the expense of the fetus.

In 2007, Friedman established circumstantial criteria for identifying women in pregnancy denial, basing them on various cases of women who arrived at the hospital for delivery or shortly after giving birth without a history of prenatal care [12]. Wessel tried to define a time-based criterion by considering DoP to be that which occurs in women unaware of being pregnant and who have not had a pregnancy diagnosis during the first 20 weeks or more of gestation [13].

The current DSM-5-TR (Diagnostic and Statistical Manual of Mental Disorders, edition 5 Text Revision) does not contain a specific nosographic entity for the phenomenon of DoP as it does for Pseudocyesis [14]. In the past, authors have proposed without success to include DoP into DSM diagnoses. They proposed to include DoP as a subtype of DSM adjustment disorder in various previous major revisions of the manual [10, 15, 16]. This viewpoint emphasizes the role of pregnancy as a psychosocial stressor [10, 15, 16]. Beier proposed to consider DoP as a reproductive dysfunction, trying to implement the DoP in the chapter of “Sexual and Gender Identity Disorders” of DSM-5 [17], hypothesizing that the pathogenesis of this phenomenon may have its core in the sphere of sex and gender – yet this viewpoint also failed to gain major consensus in any of the subsequent major revisions of the Manual.

1.2 | Epidemiology

Denial of pregnancy has long been considered a rare phenomenon. The prevalence of DoP was rigorously investigated for the first time in a German study by Wessel & Buscher, who discovered that this phenomenon was more frequent than previously believed [13]. One in 475 pregnant women exhibited DoP up to 20 weeks of gestation, while for 1 in 2455 women the denial persisted until delivery [9]. The frequency of DoP is thus greater than the possibility of triplets [13]. Psychotic denial represents a minority of cases, as only 5% had a previous or follow-up diagnosis of schizophrenia [9].

Among known risk factors for DoP are younger age [18–20], social isolation [18, 19], low socio-economic status [18, 19], poor education [20], low intelligence [18, 19], and immaturity [18, 19]. Risk factors inherent to interpersonal relationships are: premarital conception [18, 19], unmarried status [18, 19], and not being in a committed relationship [20]. Among clinical risk factors, having a history of psychiatric disorders [20] or substance abuse have also been linked to DoP. Using contraceptive methods, mainly oral contraceptives might also constitute a risk factor [20]. Lastly, previous late declarations of pregnancy, personal past DoP, and past DoP in the family have been acknowledged as possible risk factors for DoP [20].

DoP has also been linked to a number of psychological conflicts, such as repressed sexuality, religious prohibitions, fear of abandonment, anticipation of losing custody of the children, resentment of the baby's father, and problematic relationships with their mother [21, 22].

The majority of women with DoP present with a variety of clinical characteristics, which do not fit the previously identified risk factors, according to a 1-year prospective study that sought to enroll all women with DoP in Berlin in order to determine whether maternal characteristics helped identify women at risk of DoP [9].

1.3 | Classifications and diagnostic hypotheses

Pregnancy might represent a critical event in a woman's life. It is characterized by physiological, social, and psychological changes,

defining a period of great transition [23]. The perception of symptoms of gravidity or the presumption of being pregnant could be an overwhelming reality for some women, representing a trigger for the DoP [24]. The process of becoming aware of the pregnancy could also be a complex one. Several authors have identified various pathophysiological mechanisms that may play a role in altering the physiological course of pregnancy and the experience of motherhood.

Marinopoulos hypothesized that what allows a woman to experience her pregnancy is not the fetal movements perceived at the somatic level but the interpretation of somatic perceptions. In this way, the fetus enters in the psychic sphere of the woman [25]. According to Gonçalves and Macedo, a psychic disallow mechanism could account for DoP [26]. A traumatic event in the life of the woman could be a pathogenetic cause of DoP [27]. The idea behind the concept of “unthinkable pregnancy” is that being pregnant puts a traumatic circumstance back into focus for the mother. Examples include an incestuous and violent family structure, excessive parental exhibitionism, or neglect of physical necessities [24].

DoP is often characterized by either the lack of the physical signs of pregnancy or by the woman's misinterpretation of those very signs [17, 20]. The absence of typical pregnancy symptoms could be the result of a “somatic denial”, hiding the pregnancy from consciousness. A peculiar characteristic of DoP is that abdominal swelling is significantly reduced, or completely absent, thus producing the so-called “silhouette effect” as a possible result of an anomalous communication between brain and body through the peripheral nervous system [28]. Sandoz proposed a reactive-homeostasis model in which symptoms are caused by an abnormal yet coherent regulation of the body's functioning, which may be the result of unconscious brain mechanisms utilized to escape paradoxical realities [28].

Another possible explanation could be the absence or the misinterpretations of the typical pregnancy symptoms, such as nausea and vomiting, which might lead to an abnormal perception of pregnancy [29]. The absence of the aforementioned symptoms has already been noted by Brezinka between 1987 and 1990 [29]. This phenomenon could be explained by low levels of human chorionic gonadotropin, given the correlation, during a physiological pregnancy, between the peak of human chorionic gonadotropin level and the peak of nausea and vomiting [29, 30]. A further possible explanation of this phenomenon could be a corpus luteum insufficiency [30]. Wessel & Endrikat compared women with DoP and a control group by measuring human chorionic gonadotropin levels immediately after the delivery, finding no significant differences other than lower prolactin levels in women with DoP [31]. These endocrinological hypotheses suggest that the hypothalamic–pituitary–ovarian axis could be involved in DoP, as well as in the phenomenon of the pseudocyesis [32, 33].

An initial classification of DoP was based on clinical criteria and distinguished women with or without psychosis [1]. A more comprehensive classification of DoP proposed by Miller and colleagues

identified affective denial, pervasive denial, and psychotic denial [22]. During affective denial, the woman is intellectually aware of her pregnancy but makes little emotional or physical preparation, thus continuing “to think, feel, and behave as though they were not pregnant” [22]. The pervasive denial type proposed by Miller has been further explored by Friedman, who subcategorized the DoP in “persistent denial of pregnancy” and “pervasive denial until delivery” [12]. In both cases, the woman fails to acknowledge her pregnancy from an emotional and cognitive point of view [12], which causes a late discovery of the pregnancy and a failure to seek further prenatal care [12]. What distinguishes the two subcategories of DoP are the time features of the denial. In persistent denial of pregnancy, the emotional and cognitive denial persists up until the third trimester. At that point, the woman generally becomes aware of the pregnancy, but does not seek prenatal care. On the other hand, in pervasive denial of pregnancy, the woman manifests a more profound type of DoP lasting up until delivery, which comes as totally unexpected when it happens [12]. Lastly, psychotic DoP is characterized by the presence of a comorbid psychotic illness, most frequently schizophrenia [34]. Women affected by psychotic DoP could show psychotic symptoms throughout the duration of the pregnancy, making no effort to mask pregnancy and attributing to the typical pregnancy symptoms and fetal movements the manifestations of their underlying psychosis [23, 34].

1.4 | Discarded infant and neonaticide

The definition of “discarded infants” represents the discovery in a public place or other inappropriate location of a child of 12 months of age or younger, lacking care and supervision. The term “discarded infant” refers to a child of 12 month of age or younger who has been abandoned or found abandoned, unattended, and in a public area or other improper setting. (U.S. Department of Health and Human Services (DHHS) 2001). “Neonaticide” is defined as the killing of a newborn within 24h from the delivery [3]. Neonaticide perpetrators are, in the vast majority of cases, relatives. Maternal neonaticide is the most frequent, but also some cases of paternal neonaticide have been reported in the literature [35]. Neonaticide can be divided into two categories: active neonaticide, in which a newborn is killed as a direct result of violence, and passive neonaticide, in which a newborn dies as a result of negligence shortly after birth [24].

It is not easy to estimate the prevalence of discarded infants and neonaticide, because many remain unreported [36] and systematic data collection is lacking [37].

The most common demographics of discarded children and neonaticide offenders are poverty, adolescence or young adulthood; being unmarried or not in a relationship with the baby's father; living with their parents or other relatives, if independent from their families [3, 36, 38–40]. Neonaticidal women have different characteristics compared with other parturient women: they are younger, have a lower educational level, are less often married, had fewer children and known induced abortions [41].

By closely studying these women's psychological and emotional characteristics, they often appear cognitively immature or with low intelligence. Moreover, they appear to have poor judgment, their ability to problem-solve and their coping skills are altered, as is their capacity to be fully aware of their current situation [21]. Neonaticide is not usually associated with a diagnosis of mental illness, as most of the women who commit neonaticide do not have long-term mental disorders [21, 36]. However, these women often experience abnormal mental functioning during their pregnancies. Denial of pregnancy often precedes neonaticide [21]. At the conclusion of the DoP, specific features could be observed in labors and deliveries that preceded a neonaticide. Most women experience labor and delivery alone, silently, followed by panic or exhaustion [36]. Intense cramping and stomach pains are misinterpreted. For instance, a woman could interpret abdominal symptoms as a need to defecate [39]. The experience of childbirth can be experienced as if happening to someone else [22]. Moreover, many report minimal pain during labor and delivery [22].

Neuropsychiatric symptoms that can arise during delivery and immediately after its completion are intermittent amnesia, dissociative symptoms, and psychotic symptoms, such as hallucination [22]. A state of mental confusion is also possible, possibly rendering the woman unable to take appropriate action [36]. These symptoms are distinctive in that they are only ever temporarily present during pregnancy and birth. Reality testing continues during pregnancy, so when the reality is again tolerable – for example, once the infant is dead – the woman could experience a “rapid reintegration” [21].

2 | CASE REPORT

On a winter afternoon, on a small bight on the Bari seafont, a foreign tourist found a newborn's lifeless body and alerted the local law enforcement. The Public Prosecutor appointed a forensic pathologist to perform a crime scene investigation and forensic analyses.

2.1 | The judicial site inspection

The corpse of a female infant was found lying naked and supine near the seashore, almost totally covered by gravel. It showed no rigidity and hypostases; the rectal temperature was the same as the ambient temperature. Initial body maceration signs were visible, and multiple reddish areas were appreciable on the anterior body surface. A damp and bloodless umbilical cord stump, with an irregular end, was still tied to the abdomen.

A bloodstain was found on the rocky ridge overlooking the shore where the corpse was found, while there was no trace of the placenta. After molecular analysis, it was possible to establish that the stain on the earth had been caused by human blood belonging to the newborn and to her mother.

2.2 | The historical and circumstantial data

A 22-year-old woman was found to be the child's mother, according to further police investigation. The young girl declared to the police that she had not been aware of her pregnancy. The night before her unexpected delivery, which occurred 4 days before the newborn corpse discovery, she declared to have been in a club with her sister and some friends. There, she consumed alcohol and marijuana. She later left the club with a male friend of hers; they drove close to the seaside to engage in sexual intercourse inside the car. She claimed that shortly after the intercourse, she experienced a sharp pelvic ache that forced her to exit the vehicle as she felt the need to urinate. Instead, she experienced contractions, and after a few minutes, she became aware that she was giving birth. She was standing up and she pulled out the baby by holding her head. After giving birth, she expelled the placenta before looking at the infant briefly and reportedly believing that she was dead. Therefore, she threw the infant off the cliff. When she returned to the car where his partner had been waiting for her, she told him that she had been menstruating. She did not tell anyone about the delivery or the concealment of the corpse until its discovery.

2.3 | Forensic investigations

The corpse of the newborn was brought to the Institute of Forensic Medicine of the University of Bari, where whole body X-ray, ultrasonography, whole body CT-scan, autopsy, and toxicological tests were performed. The main pathological forensic issues to be addressed were determining whether the newborn had ever breathed, identifying any potential traumatic/violent lesions (bruises, fractures, visceral damage), establishing the time and cause of death, and determining the presence of alcohol or drugs in the newborn tissues to account for the mother's possible consumption.

2.3.1 | Radiological findings

The newborn head's ultrasonography performed before autopsy showed no pathological elements. Subsequent whole-body X-ray examination showed ventilated lungs and gastro-intestinal pneumatization, no fractures were detected. Whole-body CT scan disclosed a coronal biparietal fracture of the skull with perilesional hematic gathering. It was also possible to detect a small amount of gravel in the mouth, hypopharynx, and stomach, further suggesting that the child was still alive when she was wounded and abandoned on the shore.

2.3.2 | Autopsy and histopathology findings

A complete autopsy on the newborn was performed. On external examination, no malformations were detected. All natural orifices were probed and appeared patent. Weight (3160g) and anthropometric

parameters were consistent with a gestational age of 34–35 weeks. Hypostases were scarce. The free end of the umbilical cord appeared irregular and frayed. External genitalia were normal and indicative of a female phenotype. By a skin and subcutaneous tissue Y-shaped incision, the thoracic and abdominal cavities were explored, noting normal anatomy and patency of fetal-umbilical vessels. The domes of the diaphragm were inspected, and their positions were at the sixth rib interspaces bilaterally. Very mild pleural, pericardial, and peritoneal effusions were noted. Lungs appeared expanded in their natural cavities, and they set on the waterline at the floatation test.

The in-situ heart opening showed no congenital anomalies. After evisceration using the Rokitansky technique [42], all organs were dissected, and tissue samples collected. A linear coronal biparietal fracture and a dural hemorrhage were noted during a skull examination. After dissection, the brain was inspected in situ, revealing subarachnoid hemorrhage of parietal lobes and the interhemispheric scissure. Additionally, tissue samples from the eyeballs were collected, and a histological analysis revealed intraretinal hemorrhages.

Histological investigations confirmed the air distension of the pulmonary alveoli.

2.3.3 | Toxicological findings

Immunochemical and gas chromatography analyses aimed at detecting methadone, cannabinoids, cocaine, opiates, barbiturates, benzodiazepines, amphetamines, tricyclic antidepressants proved negative. Headspace gas chromatographic analyses carried out on the heart and brain of the newborn for ethyl alcohol detection revealed the presence of ethyl alcohol equal to 0.82 and 0.2 g/L, respectively. These results demonstrated that the mother was in a state of alcoholic intoxication at the time of delivery, with blood values higher than 0.8 g/L.

These toxicological findings can explain how the mother had been able to deliver the child without experiencing too much pain from the contractions, and why the baby did not cry at birth (as she declared to the attorney), without however preventing some reflex acts of swallowing.

2.3.4 | Forensic pathology conclusions

The results emerged from the forensic investigations on the corpse highlighted: that she had breathed, that there was a closed head injury with biparietal fracture and dural and subarachnoid hemorrhages. The coexistence of head trauma and retinal hemorrhages, as well as pulmonary contusions in the absence of additional bone fractures and in the presence of a detached umbilical cord, suggest a possible shaken baby syndrome.

The scarcity of hypostases together with the finding of the torn umbilical stump suggested hemorrhagic shock as the final cause of death.

2.4 | Forensic psychiatric investigations

The 22-year-old woman was unmarried and was not involved in a stable relationship. She lived with her family, composed of her mother, father, and sister; the family was low-income.

During adolescence, she had been evaluated by the local children and adolescents' mental health service, being diagnosed with "learning disabilities", "borderline intellectual functioning", and "immaturity". She dropped out of school at the age of 17. No significant difficulties in the relationships with her peers emerged during childhood and adolescence. However, poor coping skills and a superficial and immature approach was described including cognitive and emotional inadequacy to find efficient solutions to problems. These limitations often led the woman to avoid making decisions, to "let it go", waiting for a "magical" solution to problems.

She worked as a beautician, mostly having personal acquaintances as clients. She described herself as a "sociable girl". She reported many sentimental and sexual partners over time, which she recalled with a dismissive demeanor. Her attitude toward birth control was inconsistent during adolescence, relying on contraceptives only when engaging with a regular sexual partner, and often stopping taking birth control altogether when dealing with more random and unknown sexual encounters.

At the age of 17 she became pregnant for the first time. Regarding this pregnancy she reported that she became aware of being pregnant at the eighth month of gestation. She only noticed weight gain, and no other changes in her own body. During the months of pregnancy, the presence of vaginal discharge was interpreted by the young woman as the presence of menses. She was not involved in a stable romantic relationship, claiming to have had sexual intercourses with several partners. The young woman described the moment of childbirth as unexpected and terrifying, "I screamed out of pain and fear". She suddenly seized by the symptoms of her labor, went to the bathroom of her apartment, and helped by her mother, she gave birth to the child. Her mother, as well as other family members, did not notice the pregnancy until the moment of the childbirth. In accordance with the will of the young woman and of her parents, the newborn was given up for adoption. From the anamnestic elements thus far collected, this pregnancy was most likely characterized by *pervasive denial*: the pregnancy was unidentified and not acknowledged by the young woman throughout gestation, the delivery came as a total surprise, no medical evaluation was required, not even during delivery, there were no emotional and cognitive changes related to the pregnancy and, for the most part, there were no changes in her lifestyle too.

In the years following the first denied pregnancy the young woman did not change her attitude toward sex or birth control methods. She also did not attend to regular gynecological consultation regarding reproductive health, planned parenthood or prevention of sexual transmitted diseases. Despite the knowledge of her attitude toward sex, her family did not push her to attend to gynecological care of any kind.

At the age of 22 she got pregnant for the second time, but unlike the first time, she rapidly became aware of the pregnancy. Despite this, this pregnancy was characterized by periods during which the young woman maintained her previous lifestyle unchanged, “continued to think, feel, and behave as though they were not pregnant” [22], and periods during which she actively sought medical assistance. Her poor problem-solving skills led her to give up, postponing the resolution of the unwanted pregnancy. She initially considered the possibility of having an abortion, asking for help from a friend and by going to a counseling center. This purpose was followed by a passive behavior, and the failure to complete the necessary procedures ultimately resulted in the abandoning of this choice due to minor bureaucratic difficulties in achieving it. From a cognitive point of view, the woman reported a superficial awareness of her pregnancy. From an affective point of view, the young woman showed a total absence of emotions and feelings related to the pregnancy. Once again, no family members noticed her pregnancy. When asked about the usual symptoms of pregnancy, she stated: “my body weight had not increased”, “I always used the same clothes”, “in the ninth month I had a little harder belly”.

At the time of the delivery, she again misunderstood abdominal symptoms. She perceived herself as alone, even in the presence of her partner, “if I had had someone close to me, things would not have turned out like this”. The anguish produced by the unexpected birth and the difficulties she would have to face were so relevant as to alter her capacity to choose and to think. In the following moments the level of consciousness narrowed, in reaction to the traumatic life event she was experiencing: she physically pulled away from the source of anguish, the newborn. At the time of the delivery and during the period immediately following, an “Acute dissociative reaction” overlapped with the morbid pre-condition of the woman. Alcohol use at the time of the crime made the impulsivity of her action worse.

The second pregnancy could be described as an *affective denial of pregnancy*, due to the intellectual awareness of the pregnancy shown by the young woman and the absence of emotional and physical preparation.

The forensic psychiatry expert diagnosed “borderline personality disorder” and “intellectual disability” (I.Q. = 63).

3 | DISCUSSION

This case report of a young woman who, within a few years, experienced two denied pregnancies underscores the individual variability of the phenomenon in different life stages, as well as different outcomes.

The young woman had several environmental and maternal risk factors of DoP, partially overlapping with those of neonaticide, such as low socioeconomic status, low intelligence and low level of education, young age, immaturity, and not being in a stable relationship [18–20]. Focusing on a specific risk factor of DoP, the young woman was affected by intellectual developmental disorder (I.Q. = 63). The severity level for her intellectual disability manifested itself in different areas of

functioning, that is, limited understanding of risk in social situations, immature social judgment, need of support for complex daily living tasks, need of support for making health care decisions and legal decisions. It is possible to assume that the young woman encountered great difficulties in accessing medical care, especially gynecological treatments, due to her intellectual disabilities and lack of support from family members or other possible people she could rely on.

The personal history of DoP is a further risk factor emerging from the young woman's life recount [20]. The first pregnancy was not identified as a DoP by health personnel, highlighting how the phenomenon is still poorly acknowledged. Failure to identify DoP could have hindered the prevention of DoP recurrence. The absence of outward signs and symptoms of pregnancy, such as nausea, a pregnant silhouette, or significant menstrual changes, are typical aspects reported frequently in DoP and have been found during both pregnancies. These characteristics partly explain how the DoP could remain unnoticed by both the woman and the people close to her for several months. The lack of signs and symptoms can find a partial explanation in the endocrinological hypotheses, with the possibility of lower levels of human chorionic gonadotropin [29, 30]. However, the complexity of the phenomenon is so high that it cannot be fully explained by a single pathogenic hypothesis. A second hypothesis consists of the anomalous communication between mind and body through the peripheral system, which frames the DoP as a cybernetic disorder [28].

The two pregnancies showed varying degrees of awareness. The first one was characterized by *pervasive denial*, that is the absence of emotional and cognitive recognition of the pregnancy. Instead, the second one was characterized by *affective denial*: indeed, the young woman was intellectually aware of her pregnancy but did not make any emotional or physical preparation. A possible explanation of the observed variability of the DoP in the same subject could be the presence of different psychological defense mechanisms, changed life experiences, and different circumstances at the time of delivery. During the first pregnancy, the defense mechanism of denial may have played a key role, blocking the pregnancy awareness until the unexpected delivery. In fact, the woman reportedly was utterly unaware of being pregnant until the eighth month. The labor started at home, and her mother assisted her during the delivery, which took place at home, too. The parents cared to give the child up for adoption.

Conversely, the second pregnancy was characterized by affective denial and by fluctuating levels of awareness. The woman initially tried to face the unwanted pregnancy by going to the gynecologist and asking for help from a friend. However, the copresence of poor coping skills, a superficial and immature approach to the problem and an inadequate social support led the young woman to give up in the face of the first practical obstacles. A possible trigger of psychological defense mechanism, such as the magical thinking, could be the perception of the pregnancy as overwhelming and unbearable. It is likely that the young woman, who was affected by “intellectual disability” and “borderline personality disorder”, was unable to face the responsibility of a new pregnancy. The labor started away from home, catching her totally unprepared, as she later reported.

The delivery at the end of DoP can be an extremely distressing experience. The defense mechanisms that were active during pregnancy and “protected” the woman are no longer efficient at the time of delivery. Impulsivity, regression, or dissociation could manifest at this critical moment, even leading to tragic events such as neonaticide. From the young woman's account, it appears that she experienced the birth like most women with DoP: alone, silently, manifesting short term dissociative symptoms [22, 36]. Even though she was in the presence of a second person, she reported feeling alone, unable to ask for help. The psychodynamic hypothesis and the “unthinkable pregnancy” might explain the “acute dissociative reaction”, arising at the childbirth. Alcohol abuse most likely worsened the psychopathological status at the delivery, increasing impulsiveness.

Neonaticide shares most of the environmental and maternal risk factors with DoP. In addition to the above-mentioned risk factors, another factor that can be found in this case report is the subject living with the parents or other relatives of the woman [36]. Denial of pregnancy often precedes neonaticide and represents in itself a risk factor for neonaticide [21].

Elements that emerged during the forensic investigations highlighted the following injuries observed on the newborn resulting from the young woman's actions: a linear coronal biparietal fracture, an umbilical cord laceration, and lesions attributable to “shaken baby syndrome”.

The two pregnancies had different outcomes: the first one ended with the adoption of the newborn; the second one ended with neonaticide. The second pregnancy was carried on with a higher albeit fluctuating level of cognitive awareness compared to the first one. The medical history revealed periods of life during which the woman was aware of being pregnant that alternated and followed by other periods during which this awareness was significantly reduced. Indeed, the first pregnancy, despite the presence of a total and persistent lack of awareness, ended without complications. A possible remark to be made in this case is that a more severe level of pregnancy's unawareness does not always correspond to serious and unexpected outcomes such as neonaticide. It is possible to hypothesize that the level of pregnancy awareness is not the only factor influencing the outcome of the delivery. Other factors could be also decisive, such as contingent “where and when” labor and delivery factors, coping skills, social support network, and accessibility to gynecological services.

The characteristics of neonaticidal women who committed infanticide have been studied in two subsequent time periods (1900–1939 and 1940–1995). It was possible to identify some characteristics of the offenders that have remained unchanged over the years (i.e. young age, being unmarried, non-Caucasian, have limited formal education and keep the pregnancy a secret) and others that have changed in the most recent cohort. Neonaticidal women who have committed the crime in a most recent period present with increased rates of literacy, a higher incidence of reported psychiatric symptoms and increased referral for psychiatric assessment. Thus, social, cultural, and scientific changes influence and modify the characteristics of this phenomenon. This is the reason why it is necessary to continue studying in deep DoP and neonaticide [43].

Many of these women do not come to medical attention in other moments of life and this could be one of the reasons why prevention of neonaticide is so difficult. Currently, in Italy, there are no specific healthcare paths to protect these women and their children, whose fragility and vulnerability manifest mostly at the time of pregnancy. Identifying the modifiable risk factors for neonaticide, such as the level of accessibility to healthcare services, could allow a better prevention. Early identification of these risk factors may allow women and their children's protection in one of the most delicate moments of their lives, avoiding tragic endings. In the case we report here, the presence of a previous DoP represented a crucial risk factor, an amnesic information that could have been considered to implement preventive and specific interventions.

Pregnancy is often seen by many women as a time of profound transformation in their lives. Women with particular frailties and DoP risk factors may benefit from competent and targeted maternity support. Raising awareness could be a good starting point, both for the general public and in particular for those responsible for providing care to pregnant women.

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CONFLICT OF INTEREST

The authors have no relevant financial or non-financial interests to disclose.

ETHICS STATEMENT

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by our Institutional Ethics Committee of the University of Bari.

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