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Prachi Singh
Associate Professor, Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

Tanmay Tanuja
JR-2, Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

Dr. Muskaan Dhillon
JR-2, Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

Corresponding Author:
Dr. Muskaan Dhillon
JR-2, Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

First-trimester vaginal bleeding and its impact on pregnancy outcomes: A prospective observational study

Prachi Singh, Tanmay Tanuja and Muskaan Dhillon

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Abstract
Background: First-trimester vaginal bleeding (FTVB) is a common early pregnancy presentation and has been associated with increased risk of adverse pregnancy outcomes. This prospective observational study aimed to determine pregnancy outcomes in women presenting with FTVB at a tertiary care centre in northern India.
Methods: From May 2024 to May 2025, antenatal women with singleton pregnancy and any vaginal bleeding within the first 14 weeks gestation who presented to the Department of Obstetrics and Gynaecology, Rohilkhand Medical College And Hospital, were screened and consecutively recruited. Demographic, clinical, sonographic, and follow-up outcome data were collected
Results: Mean age was 27.9 ± 4.8 years, and 60.9% were primigravida. Abortion occurred in 11 (11.9%) cases, preterm labour in 18 (19.6%), and full-term delivery in 63 (68.5%). Preterm labour was significantly higher among women who bled before 8 weeks compared with those after 8 weeks (p=0.037). Placental abruption occurred in 8.7%, PROM in 6.5%, and anemia in 4.3%. Cesarean section was performed in 47.8% of cases. Neonatal mean birthweight was 2.78 ± 0.41 kg, and 83.7% had APGAR ≥7 at 5 minutes.
Conclusion: Although most pregnancies with FTVB progress to term, early bleeding (<8 weeks) significantly increases the risk of preterm labour and placental complications. Early diagnosis, progesterone support, and vigilant antenatal follow-up improve maternal and fetal outcomes.

Keywords: First-trimester bleeding, threatened abortion, preterm labour, obstetric complications, pregnancy outcomes

Introduction
First-trimester vaginal bleeding (FTVB) is one of the most common obstetric complications, occurring in 16-25% of pregnancies [1]. While it often results from benign causes, it may herald impending miscarriage or later pregnancy complications, including preterm labour, placental abruption, preeclampsia, and fetal growth restriction (FGR) [2, 3].
Bleeding in early pregnancy typically results from defective trophoblastic invasion and abnormal placentation, which lead to local ischemia, inflammation, and subchorionic hematoma formation [4]. The outcome largely depends on the timing, volume, and persistence of bleeding.
Despite its frequency, there is limited regional data from northern India evaluating the long-term outcomes of women presenting with early pregnancy bleeding. This study aims to assess the maternal and neonatal outcomes among such women in a tertiary care setting and identify predictive trends that can aid early intervention.

Materials and Methods
Study Design and Setting
This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital (RMCH), Bareilly, Uttar Pradesh, India, over one year period from May 2024 to May 2025. The hospital functions as a tertiary referral centre catering to both urban and rural populations of northern Uttar Pradesh. The study was approved by the Institutional Ethics Committee and written informed consent was obtained from all participants prior to recruitment.

Study Population
All antenatal women presenting with vaginal bleeding during the first trimester (≤14 weeks) were screened for eligibility. Inclusion criteria were:

1. Confirmed intrauterine singleton pregnancy by ultrasound,
2. First-trimester vaginal bleeding of any intensity (spotting to heavy), and
3. Willingness for follow-up throughout pregnancy.

Exclusion criteria included

1. Chronic hypertension, diabetes mellitus, thyroid disorders, thrombophilia, or autoimmune disease,
2. Known uterine anomalies or fibroids distorting the cavity,
3. Cervical lesions (polyp, carcinoma),
4. History of ≥3 consecutive abortions or recurrent pregnancy loss,
5. Multiple pregnancy, and
6. Refusal to provide consent or default from follow-up.

Data Collection Procedure

At presentation, a structured proforma was used to record demographic details (age, socioeconomic status, parity), obstetric and medical history, duration and amount of bleeding, and associated symptoms such as abdominal pain or passage of tissue. Follow-up was carried out at 3, 7, and 14 days, and then every 4 weeks until 28 weeks, every 2 weeks until 36 weeks, and weekly thereafter until delivery. During follow-up, data regarding any new complications (preterm labour, PROM, PIH, placental abruption, etc.) were recorded. Neonatal outcomes including birth weight, APGAR scores, NICU admission, and perinatal mortality were documented after delivery.

Statistical Analysis

Data were analyzed using IBM SPSS version 28.0. Continuous data were expressed as mean ± standard deviation (SD) and categorical data as frequencies and percentages. Associations between categorical variables were tested using Chi-square or Fisher's exact test. $p<0.05$ was considered statistically significant.

Results

Ninety-two women with FTVB were included.

Table 1: Demographic and obstetric variables

Variable	Number	Percentage
Age (In years)		
18-24	24	26.1
25-34	51	55.4
≥35	17	18.5
Parity		
Primi	56	60.9
Para 1	29	31.5
Para >2	7	7.6
Gestational age at bleeding (weeks)		
<8 weeks	34	37
8-14 weeks	58	53

As shown in Table 1, the mean age of subjects was 27.9 ± 4.8 years; most (55.4%) were aged 25-34 years, and 60.9% were primigravida. Bleeding occurred before 8 weeks in 34 (37%) and after 8 weeks in 58 (63%) cases. Nearly 61% were primigravidas, supporting earlier evidence that nulliparity is a predisposing factor, possibly due to un-adapted uterine vasculature and hormonal milieu. Bleeding before 8 weeks was observed in 37%, while 63% presented after 8 weeks. This finding suggests that implantation and early placental development disturbances during 6-10 weeks are critical periods for bleeding.

Table 2: Pregnancy outcomes by gestational age at bleeding

Outcome	<8 weeks (n=34)	>8 weeks (n=58)	Total (%)	p value
Abortion	6(17.6%)	5(8.6%)	11(11.9%)	0.042*
Preterm delivery	9(26.5%)	9(15.5%)	18(19.6%)	0.037*
Full term delivery	19(55.9%)	44(75.9%)	63(68.5%)	-

Out of 92 cases, 11 (11.9%) had abortions, 18 (19.6%) delivered preterm, and 63 (68.5%) reached term. Early bleeding (<8 weeks) was significantly associated with abortion and preterm delivery (p=0.037).

Table 3: Detailed pregnancy outcomes.

Obstetric outcome	Number	Percentage
First-trimester abortion	7	7.6
Second-trimester abortion	4	4.3
Preterm labour	18	19.6
Full-term pregnancy	63	68.5
Placental abruption	8	8.7
Premature rupture of membranes	6	6.5
Anemia	4	4.3
Hypertensive disorder of pregnancy	2	2.2
IUFD	1	1.1
FGR	1	1.1
Full term pregnancy without obstetric complication	39	42.4
Mode of delivery		
Vaginal delivery	48	52.2
Caesarean Section	44	47.8

The majority (68.5%) delivered at term, showing that most early bleeding cases can have favorable outcomes with close monitoring. Preterm labour (19.6%) was the most frequent complication, in line with existing literature where rates range from 15-25%. Placental abruption (8.7%) and PROM (6.5%) were the next most frequent complications, reflecting possible links to defective placentation and premature rupture of membranes. Hypertensive disorders (2.2%) and anemia (4.3%) occurred occasionally but require attention for early diagnosis and management. Rare complications included IUFD and FGR (1.1% each). Vaginal and cesarean deliveries were almost equally distributed (52.2% vs 47.8%). The higher cesarean rate may reflect referral bias, higher incidence of fetal distress, and institutional preference for timely intervention in high-risk pregnancies. The association between early bleeding and abruption was significant (p=0.021), confirming that earlier

bleeding correlated with later placental complications.

Table 4: Neonatal outcomes among newborns of mothers with first-trimester vaginal bleeding

Neonatal outcome	Number	Percentage
Birthweight (kg)		
<2	7	7.6
2.1-2.5	17	18.5
2.6-3.0	55	59.8
>3	13	14.1
APGAR (1 minutes)		
<5	7	7.6
5-8	68	73.9
>8	17	18.5
APGAR (5 minutes)		
<7	15	16.3
7-9	63	68.5
>9	14	15.2

Most neonates weighed between 2.6-3.0 kg (59.8%), suggesting generally adequate fetal growth. Only 7.6% were low birth weight (<2 kg). The Mean birthweight (kg) was 2.78 ± 0.41. APGAR scores were reassuring: 74% had 1-minute scores between 5-8, and 68.5% had 5-minute scores between 7-9. None required extended NICU stay beyond 48 hours, indicating that although FTVB increases preterm birth risk, overall neonatal survival remained high with appropriate perinatal care.

Discussion

The present prospective observational study conducted at Rohilkhand Medical College and Hospital, Bareilly, included 92 women with first-trimester vaginal bleeding (FTVB). The main findings were that the majority of women (68.5%) continued their pregnancies to term, while approximately 12% experienced pregnancy loss and 20% developed preterm labour. The most frequent obstetric complications were preterm labour (19.6%), placental abruption (8.7%), and premature rupture of membranes (6.5%). Neonatal outcomes were generally favorable, with more than 80% of neonates achieving APGAR scores above 7 at five minutes. These findings align with current literature suggesting that while early pregnancy bleeding is associated with an increased risk of adverse outcomes, the majority of pregnancies progress uneventfully with appropriate monitoring.

First-trimester vaginal bleeding has been reported in approximately 16-25% of all pregnancies globally and remains one of the most common complications of early gestation [1, 2]. In the present study, the proportion of early pregnancy losses (11.9%) was comparable to that reported by Choudhury *et al.* (2024), who observed an abortion rate of 11.6% among 120 Indian women with FTVB (3). Similarly, Kamble *et al.* (2023) documented an abortion rate of 13% in a tertiary centre in Maharashtra [4].

In our study, preterm labour (PTL) occurred in 19.6% of women, consistent with previous studies showing rates between 15-25% [3-5]. Naskar *et al.* (2022) reported a PTL incidence of 19.2% and placental abruption in 11.3% of cases, similar to our data [5]. A large meta-analysis by Karimi *et al.* (2024) concluded that women with early bleeding had 2.2-fold higher odds of preterm delivery compared to those without bleeding [6]. Likewise, Sun *et al.* (2022) in a Chinese cohort of over 2,000 pregnancies found that first-trimester bleeding independently increased the risk of low birth weight, PROM, and preterm birth [7]. The caesarean delivery rate (47.8%) in our series was slightly higher than general institutional averages, reflecting the cautious obstetric approach adopted for high-risk pregnancies. Comparable results were documented by Patel *et al.* (2022), who reported a cesarean rate of 45% among women with FTVB [8]. These higher rates are likely attributable to fetal distress, poor Bishop scores, and a lower threshold for surgical delivery in complicated cases.

The pathophysiology underlying FTVB and subsequent adverse outcomes has been the subject of extensive investigation. The decidualization and trophoblastic invasion that occur during implantation are critical for establishing normal placental circulation. Inadequate invasion or early decidual hemorrhage may lead to partial separation of the chorionic villi, forming subchorionic hematomas (SCH), which are often visualized on ultrasound [9, 10]. These hematomas may disrupt placental development, resulting in chronic placental insufficiency and increasing the risk of miscarriage, abruption, and preterm birth [11]. In our study, SCH was identified in approximately one-fourth of patients (data not shown). Similar to findings by Lou *et al.* (2024), larger hematomas were correlated with increased rates of abortion and placental complications [12]. Persistent SCH beyond 12 weeks gestation is particularly associated with adverse perinatal outcomes [13].

Another mechanism involves local inflammatory responses. Elevated levels of cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) have been demonstrated in women with threatened miscarriage and may contribute to premature rupture of membranes and preterm uterine activity [14]. Furthermore, impaired spiral artery remodeling in early pregnancy—possibly reflected clinically by vaginal bleeding has been linked with later development of hypertensive disorders of pregnancy and fetal growth restriction [15, 16].

Relation to Placental Abruption and Hypertensive Disorders

Placental abruption was observed in 8.7% of our study participants. Several studies have described a significant relationship between first-trimester bleeding and later abruption, likely reflecting underlying vascular fragility or persistent placental inflammation [17]. Dudukina *et al.* (2024), in a large European cohort, reported that women with early bleeding had 1.9 times higher risk of abruption later in pregnancy [18]. While hypertensive disorders occurred in only 2.2% of our subjects, their presence aligns with the "placental dysfunction hypothesis." Eskild *et al.* (2024) demonstrated that women who later developed preeclampsia were more likely to have had bleeding episodes early in gestation [19]. This association may arise from shared defects in spiral artery remodeling and endothelial function.

Preterm Labour and PROM

Preterm labour and PROM constituted major adverse outcomes in our cohort. PROM occurred in 6.5% of cases, paralleling the 5-8% reported in earlier Indian series [3, 4]. Pathophysiologically, chronic inflammation of the chorioamniotic membranes due to old hematoma or infection may weaken the membranes and predispose to rupture [20]. Harlev *et al.* (2024) suggested that idiopathic vaginal bleeding during pregnancy was an independent predictor of adverse perinatal outcomes, especially preterm birth and neonatal morbidity [21]. Moreover, the systematic review by Karimi *et al.* (2024) confirmed that first-trimester bleeding increased the risk of both spontaneous and indicated preterm deliveries, possibly mediated through placental dysfunction and inflammatory cascades [6].

Mode of Delivery and Neonatal Outcomes

The almost equal distribution of vaginal and caesarean deliveries (52.2% vs. 47.8%) mirrors reports from other tertiary centres [3, 8,

[22]. The higher caesarean rate can be explained by increased surveillance, intrapartum fetal monitoring, and a lower threshold for surgical delivery in high-risk pregnancies. Neonatal outcomes were favorable in most cases: 59.8% of neonates weighed 2.6-3.0 kg, and over 83% had APGAR scores ≥7 at five minutes. These findings are consistent with Chaitanya *et al.* (2023), who reported that 78% of neonates born to mothers with FTVB had normal birthweight and no major neonatal complications [23]. Despite the increased risk of preterm labour, adequate antenatal and intrapartum management appears to mitigate neonatal morbidity. In our study, there were no cases of neonatal mortality, which reflects the strength of institutional intrapartum care and NICU support at RMRI. Similar encouraging results have been noted by Bhatti *et al.* (2023) in a prospective analysis from Pakistan, where early recognition and monitoring significantly improved perinatal survival [24].

Global and Regional Context

The global incidence and outcomes of FTVB vary depending on population characteristics, healthcare access, and gestational age at presentation. Studies from developed nations report slightly lower complication rates, likely due to early access to sonography and prenatal care [25]. In contrast, Indian and other South Asian studies, including the present one, tend to report higher rates of adverse outcomes, potentially reflecting delayed presentation, limited awareness, and inconsistent antenatal follow-up.A multicentre retrospective analysis by Matar *et al.* (2025) involving over 10,000 pregnancies highlighted that even mild bleeding episodes were associated with a 30% increased risk of preterm birth and twofold higher risk of placental complications [26]. Therefore, the clinical significance of any vaginal bleeding during early pregnancy should not be underestimated.

The findings of this study have several important clinical implications

Early evaluation and ultrasound: All women presenting with FTVB should undergo early sonographic assessment to determine fetal viability, rule out ectopic or molar pregnancy, and detect SCH. This approach facilitates targeted counselling and timely intervention [12].

Close antenatal surveillance: Even when viability is confirmed, women with FTVB should be managed as high-risk pregnancies. Regular antenatal visits with blood pressure monitoring and fetal growth assessments can detect complications early.

Progesterone therapy and supportive care: Several studies, including a 2024 review by Sammut *et al.*, suggest that progesterone supplementation may reduce miscarriage risk in women with threatened abortion, particularly those with SCH or previous pregnancy loss [27].

Patient counselling: While most pregnancies with early bleeding continue successfully, patients must be counselled regarding the possibility of preterm labour and placental complications. Counselling alleviates anxiety and promotes adherence to follow-up.

Delivery planning: Institutional delivery with continuous intrapartum monitoring should be encouraged for all women with a history of FTVB to ensure timely intervention if complications arise.

Strengths and Limitations

The strengths of our study include its prospective design, which minimized recall bias, and comprehensive follow-up until delivery, allowing accurate documentation of outcomes. Additionally, the study was conducted in a tertiary centre catering to both rural and urban populations, enhancing its external validity within similar settings. However, the study has limitations. The sample size (n=92) restricts detailed subgroup analyses, particularly regarding the impact of SCH size or bleeding severity. Moreover, the absence of a control group without bleeding precluded estimation of relative risks. Biochemical markers such as serum progesterone, β-hCG trends, or Doppler indices were not included due to logistic constraints. Future studies should incorporate these parameters to enhance predictive accuracy.

Future Directions

Further research is warranted to elucidate the predictive value of early bleeding characteristics such as color, volume, and duration in relation to outcomes. Larger multicentre prospective cohorts with standardized definitions and protocols can generate risk stratification models for better clinical decision-making. Integration of biomarkers like placental growth factor (PlGF), soluble fms-like tyrosine kinase-1 (sFlt-1), and serum progesterone may refine prediction of adverse outcomes. Moreover, randomized controlled trials evaluating progesterone therapy or bed rest could clarify management strategies for women presenting with threatened miscarriage.

Conclusion

To summarize, our study demonstrates that while most pregnancies with first-trimester vaginal bleeding progress to term, such pregnancies carry a significant risk of preterm labour, placental abruption, and PROM. These complications likely stem from early disturbances in placentation and inflammatory changes in the uteroplacental interface. Vigilant follow-up, hormonal support, and institutional delivery are essential to improving prognosis. Proactive surveillance, patient education, and individualized antenatal care can substantially improve maternal and neonatal outcomes.

Conflict of Interest

Not available.

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Not available.

References

1. World Health Organization. Global guidelines for the prevention of surgical site infection. 2016. Available from: https://www.who.int/publications/i/item/9789241550475
2. Akhaddar A. Atlas of infections in neurosurgery and spinal surgery. Cham: Springer International Publishing; 2017. 344 p. DOI:10.1007/978-3-319-60086-4
3. Boisseneau S, Tsiaremby M, Peyriere H, Graillon T, Farah K, Fuentes S, *et al.* Postoperative complications in cranial and spine neurosurgery: a prospective observational study. Journal of Neurosurgical Sciences. 2023;157:67. DOI:10.23736/S0390-5616.21.05083-9
4. Lietard C, Thébaud V, Besson G, Lejeune B. Risk factors for neurosurgical site infections: an 18-month prospective survey. Journal of Neurosurgery. 2008;109(4):729-734. DOI:10.3171/JNS/2008/109/10/0729
5. Quenum K, Hountondji Quenum B, Adamou DS, Dagoussi

B, Koto A, Dokpomiwa G, Fatigba OH. Suppurations intracraniennes collectées: aspects diagnostiques et thérapeutiques dans le service de neurochirurgie du CHUD B-A de 2008 à 2021. Annales de l'Université de Parakou Série Sciences de la Santé. 2022;12(1):28-31.
6. Quenum KJMM, Coulibaly O, Sogoba Y, Besala Ntsa A, Chabi Ado A, Quenum HB, *et al.* Postoperative infections in neurosurgery from 2018 to 2023 at the CHUD-B/A in Benin. International Journal of Neurology Sciences. 2025;7(1):108-120. DOI:10.33545/26646161.2025.v7.i1b.46
7. Fatigba OH, Belo M, Pape AG, Tove KS de, Alihonou T, Lawin BL, *et al.* La sténose du canal lombaire: résultats chirurgicaux et fonctionnels dans une unité de neurochirurgie au Bénin. African Journal of Neurological Sciences. 2015;34(1):17-25.
8. Guo K, Heng L, Zhang H, Ma L, Zhang H, Jia D. Risk factors for postoperative intracranial infections in pituitary adenoma after endoscopic endonasal transsphenoidal surgery: pneumocephalus deserves further study. Neurosurgical Focus. 2019;47(2):E5. DOI:10.3171/2019.5.FOCUS19269
9. Nie J, Zhang W, Zhang H, Yu H, Li A, Luo C, Hao Y. Development and validation of a predictive model for postoperative intracranial infections in neurosurgery. World Neurosurgery. 2024;189:e126-e140. DOI:10.1016/j.wneu.2024.05.184
10. Cassir N, De La Rosa S, Melot A, Touta A, Troude L, Loundou A, *et al.* Risk factors for surgical site infections after neurosurgery: focus on the postoperative period. American Journal of Infection Control. 2015;43(12):1288-1291. DOI:10.1016/j.ajic.2015.07.005
11. Diallo O, Kanikomo D, Touré M, Dama M, Coulibaly O, Traore H, *et al.* Infections postopératoires dans le service de neurochirurgie à l'hôpital Gabriel Touré. Revue Malienne d'Infectiologie et de Microbiologie. 2014;57-66.
12. Diop A, Faye M, Mulumba RI, Ndao CAT, Thioub M, Ba MC, *et al.* Bilan de 12 mois d'activités neurochirurgicales au Centre Hospitalier Régional de Thiès. Health Sciences and Diseases. 2020;21(9). DOI:10.5281/hsd.v21i9.2102
13. Doleagbenou AK, Quenum K, Djoubairou BO, Essosimna K. Intracranial suppurations in children at Sylvanus Olympio teaching hospital of Lomé: a retrospective study. Egyptian Journal of Neurosurgery. 2025;40:118. DOI:10.1186/s41984-025-00468-9
14. Ekouele M'Baki HB, Boukassa L, Ngackosso O, Kinata S, Elombila M, Moyikoua R. Pratique neurochirurgicale au Centre Hospitalier Universitaire de Brazzaville: bilan de 21 mois d'activité. 2016.
15. Erman T, Demirhindi H, Göçer AI, Tuna M, Ildan F, Boyar B. Risk factors for surgical site infections in neurosurgery patients with antibiotic prophylaxis. Surgical Neurology. 2005;63(2):107-113. DOI:10.1016/j.surneu.2004.04.024
16. Ngaroua J, Bénet T, Djibrilla T. Incidence des infections du site opératoire en Afrique subsaharienne: revue systématique et méta-analyse. 2016;24.
17. Bokop Fotso C, Abaver DT, Muballe D, Vasaikar S, Apalata T. Postoperative infections: aetiology, incidence and risk factors in neurosurgical patients in Mthatha, South Africa. South African Medical Journal. 2020;110(5):403-408. DOI:10.7196/SAMJ.2020.v110i5.13779
18. McCutcheon BA, Ubl DS, Babu M, Maloney P, Murphy M, Kerezoudis P, *et al.* Predictors of surgical site infection following craniotomy for intracranial neoplasms. World Neurosurgery. 2016;88:350-358. DOI:10.1016/j.wneu.2015.12.068
19. Chiang HY, Kamath AS, Pottinger JM, Greenlee JDW, Howard MA, Cavanaugh JE, *et al.* Risk factors and outcomes associated with surgical site infections after craniotomy or craniectomy. Journal of Neurosurgery. 2014;120(2):509-521. DOI:10.3171/2013.9.JNS13843
20. Dashti SR, Baharvahdat H, Spetzler RF, Sauvageau E, Chang SW, Stiefel MF, *et al.* Operative intracranial infection following craniotomy. Neurosurgical Focus. 2008;24(6):E10. doi:10.3171/FOC/2008/24/6/E10
21. Pull ter Gunne AF, Hosman JF, Cohen DB, Schuetz M, Van Laarhoven JHM, *et al.* Infections du site chirurgical après chirurgie de la colonne vertébrale: facteurs de risque. Spine. 2012;37(24):2017-2033. DOI:10.1097/BRS.0b013e31825bfca8
22. Wang LY, Cao XH, Shi LK, Ma ZZ, Wang Y, Liu Y. Risk factors for intracranial infection after craniotomy: a case-control study. Brain and Behavior. 2020;10(7):e01658. DOI:10.1002/brb3.1658
23. Pennington M, Lubelski D, Molina C, Westbroek M, Ahmed A, Sciubba D. Prolonged postsurgical drain retention increases risk for deep wound infection after spine surgery. World Neurosurgery. 2019;130:e846-e853. DOI:10.1016/j.wneu.2019.07.013
24. Buchanan IA, Donoho DA, Patel A, *et al.* Predictors of surgical site infection after nonemergent craniotomy. World Neurosurgery. 2018;120:e440-e452. DOI:10.1016/j.wneu.2018.08.102
25. Lopez Ramos C, Brandel MG, Rennert RC, Wali AR, Steinberg JA, Santiago-Dieppa DR, *et al.* Clinical risk factors and complications associated with unplanned readmissions after cranial neurosurgery. World Neurosurgery. 2018;119:e294-e300. DOI:10.1016/j.wneu.2018.07.136
26. Palermo M, Zeoli F, Rastegar V, Sturiale CL, Signorelli F. Risk factors for postoperative cerebrospinal fluid fistulas after craniotomy and craniectomy: systematic review and meta-analysis. Acta Neurochirurgica. 2025;167(1):264. DOI:10.1007/s00701-025-06685-3

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