Turkish Journal of Pediatric Disease

Original Article

Beyond the threshold of viability: Mortality, morbidity, and critical prognostic cut-offs in infants born at 22–26 weeks of gestation

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Received : 02.03.2026, Accepted : 22.06.2026 DOI: 10.12956/TJPD.2026.1323

ABSTRACT

Objective: The aim of this study was to evaluate mortality, early morbidities, and critical prognostic thresholds in extremely preterm infants born at 22–26 weeks of gestation at the limit of periviability.

Materials and Methods: This retrospective single-center study included live-born infants between 22+0 and 26+6 weeks of gestation who were admitted to a tertiary 194-bed neonatal intensive care unit between June 1, 2021, and March 31, 2023. Prenatal, natal, and postnatal characteristics were analyzed. The primary outcome was mortality. Receiver operating characteristic (ROC) analysis was performed to determine optimal gestational age and birth weight cut-off values for predicting mortality.

Results: Among 11038 neonatal admissions during the study period, 263 (2.38%) were extremely preterm infants within the specified gestational age range. Overall mortality was 70.7%. Gestational age and birth weight were identified as the strongest independent predictors of survival. ROC analysis demonstrated significant cut-off values of 24.2 weeks for gestational age and 740 g for birth weight in predicting mortality. The most common early morbidities were patent ductus arteriosus (54.6%), culture-proven sepsis (38.7%), and osteopenia (28%). Survival improved markedly beyond 24 weeks of gestation, highlighting the critical prognostic importance of even small increments in maturity.

Conclusion: Biological immaturity remains the principal determinant of outcome in infants born at the threshold of viability. However, identification of clinically relevant gestational age and birth weight thresholds may guide prenatal counseling, individualized resuscitation decisions, and intensive care strategies to improve survival in this vulnerable population. Ultimately, achieving “quality survival” – survival without major disability – requires long-term neurodevelopmental follow-up beyond hospital discharge.

Keywords: Birth weight, extremely preterm infants, fetal viability, gestational age, mortality, neonatal intensive care

Introduction

Preterm birth is one of the most important causes of perinatal mortality and morbidity (1). In particular, extremely preterm birth is closely associated with high rates of disease and death. According to the World Health Organization, preterm birth refers to births occurring before 37 weeks of gestation. Prematurity is subdivided into late preterm (34–36 weeks 6 days), moderate preterm (32–33 weeks 6 days), very preterm (<32 weeks), and extremely preterm infants (<28 weeks) (1).

Approximately 15 million preterm infants are born each year worldwide. With advances in perinatal and neonatal intensive care, survival has increased, particularly among infants born before 32 weeks (1). Although extremely preterm infants constitute only 0.73% of all preterm births, they represent a significant burden in terms of complications and healthcare costs (2).

Survival rates of extremely preterm infants vary widely by country, ranging from around 10% in high-income settings to up to 90% in resourcelimited ones (2). Even in developed countries, survival without neurological sequelae is very low at <23 weeks, and no marked improvement has been reported at 22–23 weeks (3). Despite increased survival, poor longterm quality of life has raised ethical debates

(4). Decisions regarding delivery and resuscitation remain controversial due to uncertain prognosis and practice differences (3).

Over the past 50 years, advances in perinatology and neonatology have improved survival, but serious comorbidities, prolonged hospital stays, and rising costs remain major concerns (5,6). Recent studies show improved survival particularly at 25 weeks (7). Periviability (22–26 weeks) represents a gray zone: survival probability is high at ≥26 weeks, whereas births below 22 weeks usually result in death, making 22 weeks the lower limit of periviability (8).

In studies of delivery room management, "gray zone infants" are often defined as those weighing 500–600 g and/or born at 23–24 weeks (9). Parental request is a key determinant of resuscitation decisions; without such request, intervention is often initiated at 25 weeks, whereas with request it may start at 23 weeks (10).

As prognosis changes rapidly with increasing gestational age, potential benefits and risks must be discussed in detail during parental counseling (11).

In this study, we aimed to evaluate mortality, early morbidity rates, and risk factors in extremely preterm infants born at 22–26 weeks, and to identify factors associated with survival. Secondary aims included examining prematurity related complications and emphasizing the importance of prenatal and postnatal care.

Materials and Methods

In this retrospective study, the medical records of preterm infants born alive between 22 and 26 weeks of gestation and hospitalized in the Neonatal Intensive Care Unit (NICU) of Ankara Bilkent Şehir Hastanesi between June 1, 2021, and March 31, 2023, were reviewed. Mortality and early neonatal morbidities were evaluated.

Selection of cases

Inclusion Criteria: Infants born alive at ≥22 and <26 weeks of gestation, followed in the NICU, with complete data available. Gestational age was determined based on the mother's last menstrual period, first trimester ultrasonography, and, when necessary, by neonatal examination using the Ballard scoring system (12).

Exclusion Criteria: Patients with insufficient or inaccessible medical records and those diagnosed with syndromic diseases prenatally were excluded.

Recording of case data

Prenatal, natal, and postnatal data were recorded retrospectively from NICU files, discharge summaries, physician notes, and maternal follow up records.

Prenatal Characteristics: Maternal age, parity, birth order, multiple pregnancy, chronic diseases, risk factors for preterm birth, presence of infection, history of previous preterm birth, gestational weight gain, preterm labor, premature rupture of membranes (PROM), and antenatal steroid and magnesium administration.

Natal Characteristics: Mode of delivery, gestational age, gender, birth weight, 1st and 5thminute APGAR scores, and need for postnatal resuscitation.

Postnatal Characteristics: Surfactant administration, respiratory support, intubation timing, mechanical ventilation duration, oxygen therapy, inotropic support; body weights and fluid intake on days 1 and 7; time to enteral feeding; hypothyroidism; patent ductus arteriosus (PDA) – diagnosed by echocardiography and considered hemodynamically significant (hsPDA) if it required medical or surgical treatment; osteopenia; intraventricular hemorrhage (IVH); hydrocephalus; periventricular leukomalacia; seizures; necrotizing enterocolitis (NEC); retinopathy of prematurity (ROP); bronchopulmonary dysplasia (BPD); sepsis; duration of intensive care and hospital stay; and day of death.

Morbidities were evaluated according to internationally accepted criteria

NEC diagnosis and staging were based on Bell criteria (13). IVH classification was assessed according to Papile staging (14). BPD diagnosis was made according to National Institutes of Health (NIH) consensus criteria (15). Diagnoses of ROP, PDA, and sepsis were made according to relevant international guidelines. Osteopenia of prematurity: diagnosed when at least two of the following were present – serum phosphorus <1.8 mmol/L, serum alkaline phosphatase >500 IU/L, or radiographic evidence of osteopenia/rickets (e.g., fraying, cupping, or fractures) (16).

Statistical analysis

Statistical analyses were performed using IBM Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Armonk, NY, IBM Corp., USA). Normality was assessed with the Kolmogorov–Smirnov test. For continuous variables with normal distribution, comparisons between two independent groups used Student's t test, and comparisons among more than two groups used oneway ANOVA. For nonnormally distributed variables, the Mann–Whitney U test was used for two groups and the Kruskal–Wallis test for more than two groups. Categorical variables were compared using the chi square test. When ANOVA or Kruskal–Wallis tests were significant, post hoc comparisons were performed using Tukey's HSD (for ANOVA) or Dunn's test with Bonferroni correction (for Kruskal–Wallis). Continuous variables are presented as mean and SD or median (IQR), categorical variables as number and percentages. Logistic regression analysis was performed to identify independent risk factors using a forward stepwise (likelihood ratio) variable selection method. Multicollinearity was assessed using variance inflation factors (VIF <2.5). Model fit was evaluated with the Hosmer–Lemeshow goodness of fit test (p>0.050). ROC curve analysis was used to evaluate diagnostic performance. A p value <0.050 was considered statistically significant.

Power analysis was conducted to determine the sample size. The total study population consisted of 263 infants distributed across five gestational age groups (22 weeks, n=46; 23 weeks, n=51; 24 weeks, n=65; 25 weeks, n=53; 26 weeks, n=48). Based on the observed overall mortality rate of 70.7% and an assumed effect size corresponding to an absolute mortality difference of 15% between gestational age subgroups (approximately n≈45

per group), the estimated statistical power was 82% at a two sided alpha level of 0.05. Power calculations were performed using G*Power version 3.1.9.7. Accordingly, the sample size was considered adequate for the primary outcome analysis and certain subgroup analyses.

Results

Between June 1, 2021, and March 31, 2023, 263 extremely preterm infants born at 22+0–26+6 weeks were included. During the study period, 11038 neonates were admitted to our 194 bed tertiary NICU; infants born at 22–26 weeks accounted for 2.38% of total admissions. Distribution by gestational age: 22 weeks (n=46, 17.5%), 23 weeks (n=51, 19.4%), 24 weeks (n=65, 24.7%), 25 weeks (n=53, 20.2%), and 26 weeks (n=48, 18.3%). Overall mortality was 70.7% (186/263); 29.3% (77/263) survived to discharge.

Baseline neonatal characteristics are summarized in Table I. Gender distribution did not differ significantly (p=0.689). Birth weight increased with gestational age (p<0.001). Apgar scores improved significantly (p<0.001). Resuscitation need decreased from 39.1% at 22 weeks to 4.2% at 26 weeks (p=0.006). Mortality showed a strong inverse relationship with gestational age (p<0.001).

Maternal characteristics are presented in Table II. Maternal age, smoking, chronic disease, and multiple pregnancy rates were similar across groups (p>0.050). Prenatal infection rates differed significantly (p=0.012). PPROM (p=0.032) and antepartum bleeding (p=0.0430) also differed. Antenatal steroid exposure increased with gestational age (p=0.002).

Postnatal outcomes are summarized in Table III. Mechanical ventilation duration differed significantly (p<0.001). Sepsis occurred in 39.6 to 52.2% (p=0.015). The incidence of PDA increased with gestational age, from 28.3% at 22 weeks to 70.8% at 26 weeks (p<0.001). hsPDA showed a similar trend (p<0.001). NEC rates ranged from 4.3% to 13.2% (p<0.001). Osteopenia also increased with gestational age (p<0.001). Among infants who died, hospital stay increased with gestational age (p=0.029); among survivors, NICU stay decreased (p<0.001).

Prenatal risk factors associated with survival are shown in Table IV. Nonsurvivors had significantly higher rates of antenatal steroid exposure, magnesium therapy, preeclampsia, gestational diabetes, maternal infection, smoking, chronic disease, antepartum bleeding, PPROM, oligohydramnios, and polyhydramnios (all p<0.050).

ROC Analysis were performed for the mortality predictors ROC analysis results are presented in Table V and Figures 1 and 2. Gestational age predicted survival with an AUC of 0.733 (95% CI 0.675–0.785, p<0.001). A cut off of >24.2 weeks yielded 76.6% sensitivity and 62.4% specificity. Birth

Table I: Comparison of basic clinical characteristics and mortality according to gestational age

Variables	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	p
Total number of patients	46	51	65	53	48	-
Male gender*	27 (58.7)	28 (54.9)	34 (52.3)	31 (58.5)	25 (52.1)	0.689
Birth weight (g)†	537.5±145.4	634.8±138.4	660.3±145.8	737.5±148.4	883.5±210.6	<0.001 / <0.001$_{cdgij}$
APGAR 1 min‡	1 (2)	2 (3)	2 (2.5)	3 (3)	4 (3)	<0.001 / <0.01$_{dgi}$
APGAR 5 min‡	3 (3)	5 (3)	5 (3)	5 (2)	6 (2)	<0.001 / <0.05$_{dgi}$
Resuscitation performed*	18 (39.1)	13 (25.5)	15 (23.1)	13 (24.5)	2 (4.2)	0.006 / <0.01$_{dgij}$
Death*	44 (95.6)	42 (82.4)	46 (70.8)	34 (64.1)	20 (41.7)	<0.001 / 0.003$_{b}$ 0.001$_{c}$/ <0.001$_{d}$ 0.002$_{g}$

**: n(%) (Pearson Chi-Square, post-hoc pairwise z-test with Bonferroni correction), †: mean±SD (ANOVA, Post-hoc Tukey HSD), ‡: median(IQR) (Kruskal-Wallis, Post-hoc Dunn's test with Bonferroni correction), $_{a}$: 22 vs. 23 week, $_{b}$: 22 vs. 24 week, $_{c}$: 22 vs. 25 week, $_{d}$: 22 vs. 26 week, $_{e}$: 23 vs. 24 week, $_{f}$: 23 vs. 25 week, $_{g}$: 23 vs. 26 week, $_{h}$: 24 vs. 25 week, $_{i}$: 24 vs. 26 week, $_{j}$: 25 vs. 26 week*

Table II: Maternal prenatal and obstetric characteristics

Variables	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	p
Total number of patients	46	51	65	53	48	-
Maternal age (years)*	28.6±4.9	28.9±5.7	29.4±5.6	28.2±6.6	28.9±5.1	0.624
Parity†	2 (1-3)	2 (1-3)	2 (1-4)	2 (1-3)	2 (1-3)	0.781
Magnesium use‡	20 (43.5)	24 (47.1)	35 (53.8)	28 (52.8)	26 (54.2)	0.742
Infection during pregnancy‡	13 (28.3)	15 (29.4)	24 (36.9)	11 (20.8)	16 (33.3)	0.012 / 0.008$_{h}$
Smoking during pregnancy‡	3 (6.5)	3 (5.9)	5 (7.7)	0 (0)	2 (4.2)	0.394
Chronic disease‡	19 (41.3)	14 (27.5)	20 (30.8)	17 (32.1)	20 (41.7)	0.429
PPROM‡	12 (26.1)	15 (29.4)	20 (30.8)	12 (22.6)	12 (25.0)	0.032 / 0.020$_{h}$/ 0.040$_{i}$
Bleeding during pregnancy‡	16 (34.8)	13 (25.5)	17 (26.2)	10 (18.9)	11 (22.9)	0.043 /0.030$_{c}$
Multiple pregnancy‡	12 (26.1)	11 (21.6)	20 (30.8)	10 (18.9)	13 (27.1)	0.563
Antenatal steroids‡	27 (58.7)	39 (76.5)	52 (80.0)	39 (73.6)	37 (77.1)	0.002 / 0.001$_{b}$/ 0.003$_{c}$ / 0.002$_{d}$

: mean±SD (ANOVA, Post-hoc Tukey HSD), †: median(IQR) (Kruskal-Wallis, Post-hoc Dunn's test with Bonferroni correction), ‡: n(%) (Pearson Chi-Square, post-hoc pairwise z-test with Bonferroni correction), $_{a}$: 22 vs. 23 week, $_{b}$: 22 vs. 24 week, $_{c}$: 22 vs. 25 week, $_{d}$: 22 vs. 26 week, $_{e}$: 23 vs. 24 week, $_{f}$: 23 vs. 25 week, $_{g}$: 23 vs. 26 week, $_{h}$: 24 vs. 25 week, $_{i}$: 24 vs. 26 week, $_{j}$: 25 vs. 26 week, **PPROM : preterm premature rupture of membranes.*

Table III: Postnatal morbidities and hospital course (n=263)

Variables	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	p
Total number of patients	46	51	65	53	48	-
Duration of mechanical ventilation (days)*	2 (4.25)	2 (7)	5 (17.5)	13 (45.5)	5 (14.75)	<0.001/ <0.001$_c$/0.002$_f$
Sepsis†	24 (52.2)	25 (49.0)	33 (50.8)	21 (39.6)	21 (43.8)	0.015/0.010$_c$
PDA†	13 (28.3)	22 (43.1)	39 (60.0)	34 (64.2)	34 (70.8)	<0.001/0.001$_b$/<0.001$_{cd}$
hsPDA†	8 (17.4)	18 (35.3)	23 (35.4)	18 (34.0)	24 (50.0)	<0.001/0.001$_d$/0.040$_b$
NEC†	2 (4.3)	3 (5.9)	5 (7.7)	7 (13.2)	5 (10.4)	<0.001/0.020$_c$/0.040$_f$
Osteopenia†	5 (10.9)	11 (21.6)	19 (29.2)	21 (39.6)	17 (35.4)	<0.001/0.004$_c$/0.010$_d$/0.020$_b$/0.040$_f$
Hypothyroidism†	2 (4.3)	5 (9.8)	7 (10.8)	6 (11.3)	8 (16.7)	0.012/0.040$_d$
Length of hospital stay in deceased infants (days)‡	5.2±7.6	13.4±35.4	14.1±32.2	27.7±34.8	11.3±29.4	0.029/0.020$_c$
NICU stay in discharged infants (days)‡	153±131.5	126.9±100.8	96.3±48.0	101.1±56.8	88.1±42.4	<0.001/0.010$_b$/0.020$_c$/0.008$_d$/0.040$_g$

***:** median (IQR) (Kruskal-Wallis, Post-hoc Dunn's test with Bonferroni correction),†**:** n(%) (Pearson Chi-Square, post-hoc pairwise z-test with Bonferroni correctio), ‡**:** mean±SD (ANOVA, Post-hoc Tukey HSD), $_a$**:** 22 vs. 23 week, $_b$**:** 22 vs. 24 week, $_c$**:** 22 vs. 25 week, $_d$**:** 22 vs. 26 week, $_e$**:** 23 vs. 24 week, $_f$**:** 23 vs. 25 week, $_g$**:** 23 vs. 26 week, $_h$**:** 24 vs. 25 week, $_i$**:** 24 vs. 26 week, $_j$**:** 25 vs. 26 week **PDA:** patent ductus arteriosus, **hsPDA:** hemodynamically significant PDA, **NEC:** necrotizing enterocolitis, **NICU:** neonatal intensive care unit*

Table IV. Comparison of prenatal characteristics between deceased and surviving infants (n=263)

Variables*	Deceased	Surviving	p
Total number of patients	186	77	
Antenatal steroid use	139 (71.6)	55 (28.4)	<0.001
Magnesium use	97 (67.8)	46 (32.2)	<0.001
Preeclampsia	21 (61.8)	13 (38.2)	0.039
GDM	12 (75.0)	4 (25.0)	0.026
Infection during pregnancy	51 (64.6)	28 (35.4)	0.012
Smoking during pregnancy	10 (76.9)	3 (23.1)	0.028
Presence of chronic disease	68 (75.4)	22 (24.6)	0.033
Bleeding during pregnancy	52 (77.6)	15 (22.4)	0.008
PPROM	49 (69.0)	22 (31.0)	0.025
Oligohydramnios	35 (77.8)	10 (22.2)	0.036
Polyhydramnios	7 (70.0)	3 (30.0)	0.034

***:** n(%), **GDM:** Gestational diabetes mellitus, **PPROM**: Preterm premature rupture of membranes. Percentages are row percentages (within each variable).*

weight predicted survival with an AUC of 0.786 (95% CI 0.731–0.835, p<0.001). A cut off of >740 g yielded 66.2% sensitivity and 80.1% specificity. Logistic regression confirmed that gestational age >24.2 weeks increased survival odds 1.45 fold (95% CI 1.10–1.90, p<0.001) and birth weight >740 g increased survival odds 1.20 fold (p=0.007).

Discussion

In this study, the mortality rate among extremely preterm infants born at 22–26 weeks was 70.7%, consistent with high mortality ranges reported for periviable infants. Gestational age and birth weight were the strongest determinants of mortality; cut off values of 24.2 weeks and 740 g demonstrated that prognosis is markedly influenced by small weekly or gram level increases. These thresholds are largely consistent with large international cohorts (e.g., NICHD, EPICure) (17,21). They may provide clinically useful guidance for prenatal counseling, delivery room resuscitation, and intensive care planning. The high frequency of PDA, sepsis, and osteopenia indicates that cardiovascular, immunological, and metabolic immaturity plays a decisive role. The observed increase in

Table V: ROC analysis for predictors of mortality

Variable	Cutoff	AUC (95% CI)	Sensitivity % (95% CI)	Specificity % (95% CI)	p
Gestational age	>24.2 weeks	0.733 (0.675–0.785)	76.62 (65.6–85.5)	62.37 (55.0–69.3)	<0.001
Birth weight (grams)	>740 g	0.786 (0.731–0.835)	66.23 (54.6–76.6)	80.11 (73.6–85.6)	<0.001

***AUC:** Area under the curve, **CI:** Confidence interval. Cut off values were selected based on the Youden index*

PDA incidence with advancing gestational age (from 28.3% at 22 weeks to 70.8% at 26 weeks) is likely influenced by survival bias: mortality is extremely high (95.6%) at 22 weeks, so many infants in that group do not survive long enough for PDA to become clinically diagnosed or hemodynamically significant. In contrast, more mature infants survive longer, providing a wider clinical window for PDA and other morbidities to manifest. The observed increase in osteopenia with advancing gestational age may be explained, at least in part, by longer survival and prolonged hospitalization. Taken together, biological immaturity is the principal determinant of prognosis; however, appropriate prenatal care, experienced tertiary level intensive care, and early targeted therapies may improve outcomes.

Periviability (22–26 weeks) remains a period where survival strongly depends on gestational age and birth weight. Recent national cohort studies show progressive survival increases with each week: approximately 50–60% at 23 weeks and 60–70% at 24 weeks, while survival at 22 weeks, though still limited, has improved with proactive management (17,21). Our 24.2 week cutoff supports 24 weeks as a critical prognostic threshold. Center experience, antenatal steroids, and active resuscitation significantly influence survival (22). Our 70.7% mortality is consistent with the 60–80% range in NICHD and EPICure cohorts (17,20,21,22). The marked survival improvement after 24 weeks matches literature reports (17,23,24). Frequent PDA, sepsis, and osteopenia

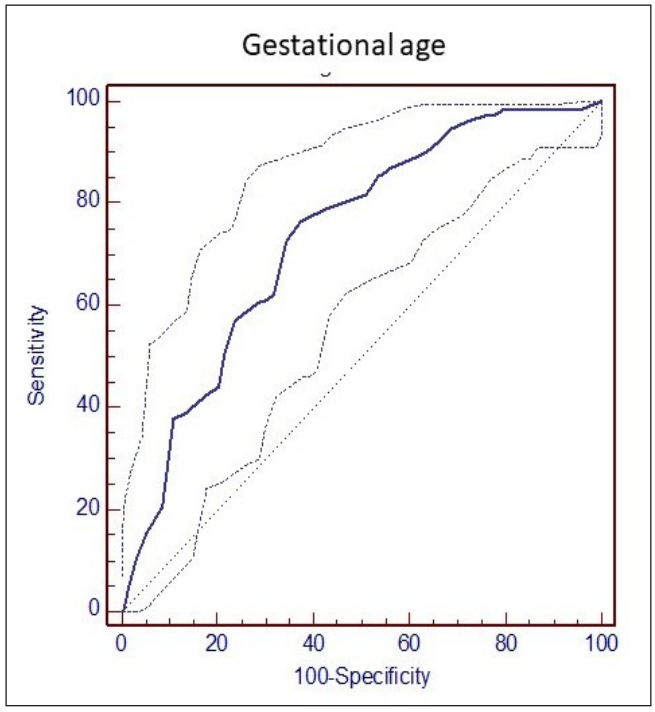

Figure 1: Receiver operating characteristic (ROC) curve showing the predictive performance of gestational age for survival in infants born at 22–26 weeks of gestation. A gestational age cut off value of >24.2 weeks predicted survival with 76.6% sensitivity and 62.4% specificity (AUC=0.733, 95% CI 0.675–0.785; p<0.001).

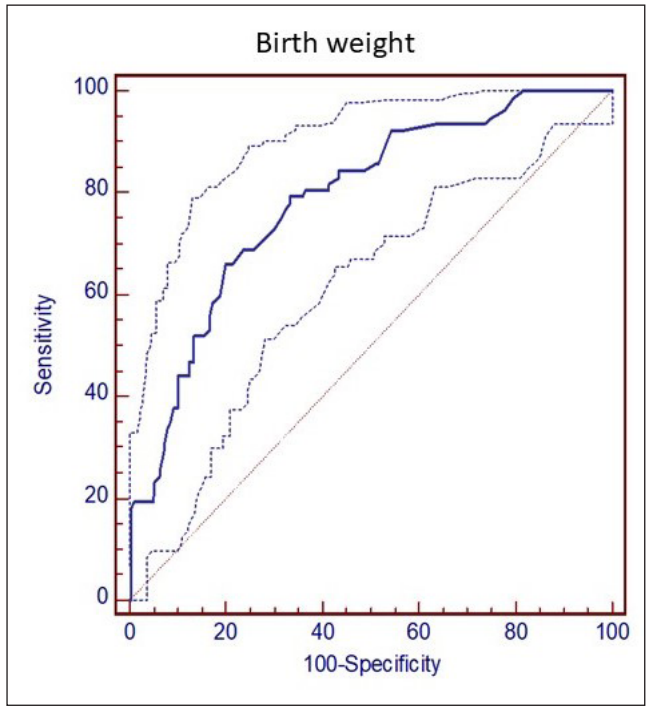

Figure 2: Receiver operating characteristic (ROC) curve demonstrating the predictive value of birth weight for survival among infants born at 22–26 weeks of gestation. A birth weight cut off value of >740 g predicted survival with 66.2% sensitivity and 80.1% specificity (AUC=0.786, 95% CI 0.731–0.835; p<0.001).

underscore the key role of cardiovascular and immune immaturity (19,25).

At 22–23 weeks, survival and neurodevelopmental outcomes remain controversial. NICHD and other multicenter studies show wide center to center variation in survival at 22 weeks, but significant increases at 23 weeks (22–24). Antenatal steroids and active resuscitation may improve survival even at 22–23 weeks (25). Centers with active care policies report substantially higher survival at 22 weeks (21,23). Our 24.2 week cut off is consistent with the literature and supports individualized care, particularly at 23–24 weeks.

In our cohort, the most common early morbidities were PDA (54.6%), culture positive sepsis (38.7%), and osteopenia (28%). Previous studies similarly report PDA, sepsis, BPD, ROP, and NEC as frequent complications (21,25). The paradoxical increase in PDA incidence with gestational age is best explained by survival bias, as noted above. As survival increases, persistent severe comorbidities underscore the need for care strategies targeting not only survival but also neurodevelopmental and functional quality of life (27).

Maternal infection, preeclampsia, PPROM, and multiple pregnancy are known contributors to prematurity (28). Antenatal steroids improve survival and reduce IVH risk (25). The limited observed effect of antenatal steroids on mortality in our study may relate to the dominant influence of gestational age and sample size; Larger international cohorts (e.g., NICHD, EPICure) have demonstrated more pronounced survival benefits with antenatal steroids, particularly at 23–24 weeks' gestation; the lack of a strong signal in our data may reflect the play of chance in a smaller sample or differences in the timing or completeness of steroid administration (29). This again supports the concept that biological immaturity is the principal determinant of prognosis in the periviability group.

Over the past 50 years, advances in neonatal care have substantially improved survival among extremely preterm infants (21). Nevertheless, neurodevelopmentally intact survival remains low, especially at 22–23 weeks (27). Periviability management is thus not only a medical but also an ethical and sociocultural process. Realistic prognostic counseling, individualized active care decisions, and improved center experience are paramount.

Clinically, individualized intensive care, strict infection control, and early cardiovascular stabilization are critical in reducing mortality, particularly for infants born before 24 weeks or weighing <750 g. Antenatal steroids and magnesium sulfate, and delivery in experienced tertiary centers, may improve prognosis. Strengths of our study include detailed prenatal ,natal and postnatal data focused on the periviability group and the determination of clinically relevant thresholds using ROC analysis.

Limitations

Limitations include its retrospective, single center design, the relatively small number of infants in the 22–23 week subgroup, and the absence of long term neurodevelopmental

outcome assessment.

Three key clinical messages emerge. First, active care decisions for infants born at 23–24 weeks should be made jointly by a multidisciplinary team and the family. Second, in infants weighing <750 g, individualized ventilation, infection control, and cardiovascular stabilization may be critical for reducing mortality. Third, broader implementation of antenatal steroids and magnesium, and delivery in experienced tertiary centers, may improve survival (26,30). However, increasing survival must be evaluated alongside neurodevelopmental outcomes, with the goal of achieving "quality survival" (23,27).

Conclusion

In conclusion, although biological immaturity remains the principal determinant of prognosis in extremely preterm infants at the periviability threshold, appropriate prenatal care, experienced center management, and targeted intensive care strategies may achieve meaningful improvements in survival and morbidity. Given that survival without major disability – "quality survival" – is the ultimate goal, future studies should incorporate longterm neurodevelopmental follow up beyond hospital discharge. Multicenter studies including longterm outcomes will make an important contribution to clinical decisionmaking.

Ethics committee approval

This study was conducted in accordance with the Helsinki Declaration Principles. The study was approved by Ankara Bilkent City Hospital (March 15, 2023, reference number: E2 23 3612).

Contribution of the authors

Study conception and design: CT; data collection: MHEM; analysis and interpretation of results: CT, MHEM; draft manuscript preparation: MHEM. All authors reviewed the results and approved the final version of the article.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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