

Predictive performance of cervical length and mechanical shortening by fundal pressure: For identifying women at increased risk of preterm birth

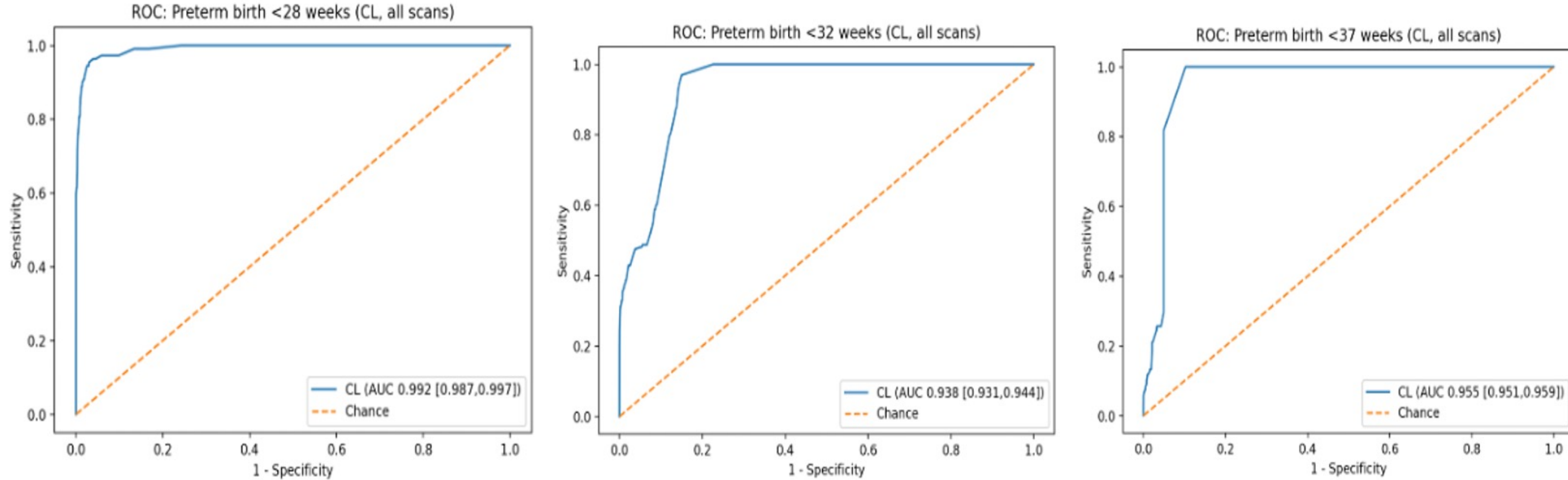
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Objectives: To evaluate the relationship between cervical length (CL) and preterm birth, inclu delivery before 37, 32, and 28 weeks of gestation along with the predictive performance of mechanical shortening by fundal pressure of CL, both as an absolute measurement and as a gestational age-adjusted Z-score.

Methods: Retrospective study on 16,522 patients to establish Indian normative CL data across gestati and to evaluate the association between cervical length and preterm birth outcomes. Pregnancy outcomes were used to assess the predictive performance of cervical length for preterm birth at <37, <32, and <28 weeks. mechanical shortening by fundal pressure was defined as opening of internal os with minimum 4 mm shortening of cervical length after applying fundal pressure at the time of cervical assessment.

Results: Receiver operating characteristic analysis demonstrated excellent discrimination of cervical length for preterm birth. The area under the curve (AUC) for prediction of delivery before 37 weeks was 0.825 (95% CI 0.719–0.891) using cervical length in millimeters and improved to 0.910 (95% CI 0.834–0.912) when gestational age- adjusted Z-scores were applied. Discrimination was strongest for early preterm birth, with AUCs exceeding 0.87 for prediction of delivery before 28 weeks. These findings indicate a strong and clinically meaningful association between cervical shortening and preterm birth risk in the Indian population. Calculate positive likelihood ratio is 1.86 and negative likelihood ratio is 4.1.

Conclusion: Absolute length of cervix of < 25 mm and mechanical shortening by fundal pressure has excellent correlation of preterm birth prediction. Both along with cervical shortening by progressive shortening has good predictive value and can be used in clinical practice.



16522 total patients	mean (Range)	mean (Range)	mean (Range)	mean (Range)
Parameter	<28 weeks (n=96)	28-32 weeks (n=154)	33-36 weeks (n=1560)	>37 weeks (n=14712)
Age (years)	mean 22 (range 18-39)	22.5 (18-41)	230 (18-40)	21 (18-36)
BMI (kg/m²)	26.3 (18.3-34.2)	27.2 (19.2-36.1)	252 (19.5-29.7)	24.5 (22.5-32.7)
Smoker/ Tobacco	12 (1.25)	12(7.78)	120 (7.6)	324 (1.99)
Past Obstetric History	42 (43.75)	30 (19.48)	100(6.4)	656(4.03)
Nulliparous	42 (43.75)	60 (38.96)	620(39.74)	7475 (45.95)
Delivery > 37 weeks	12 (12.5)	(20.77) 32	(39.74) 620	(73.55) 11964
Delivery 16-23 weeks	54 (56.25)	20 (12.98)	(3.84)60	(2.42) 395
Delivery 24-33 weeks	15(15.62)	84 (54.54)	(8.97) 140	(6.88) 1120
Delivery 34-36 weeks	15 (15.62)	18 (11.68)	(47.43) 740	(17.12) 2786
Cervical length (mm)	18.8 (2-24)	25.2 (22-34)	28.9 (26-33)	35.2 (31-50)

Curve	Degree	Equation form	Coefficients (highest power → constant)				
5th centile (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	-7.308683823e-05, 0.005899046552, -0.1874072387, 2.694144106, 15.67763317				
10th centile (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	2.610979903e-05, -0.002396707688, 0.06628199072, -0.6219004424, 32.97971514				
25th centile (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	7.082196307e-05, -0.007447574411, 0.2754152951, -4.319322647, 57.98607003				
50th centile (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	-3.275452057e-05, 0.0009542683079, 0.02791828638, -1.198544229, 45.55828659				
95th centile (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	-0.0003402554282, 0.02648301655, -0.7481684213, 9.178589515, -1.323284629				
Mean (mm)	4.00	a4*GA^4 + ... + a1*GA + a0	-4.149492613e-05, 0.002481902236, -0.04984354025, 0.3629463355, 34.52518699				
log(SD) (ln mm)	3.00	a3*GA^3 + ... + a1*GA + a0	-0.0002069032237, 0.01292181108, -0.2426773254, 2.681636601				