Use of the purple line to diagnose cervical dilatation and fetal head station during labor

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The purple line is a red–purple spot that appears around the anus during labor in parallel with progression of cervical dilatation. Its physiology is not well established and its appearance and growth during labor has been reported to be related to pelvic vascular congestion. The aim of the present study was to estimate the incidence of the purple line and if it can supplement the evaluation of labor progression. A prospective cohort study enrolled 220 women who were hospitalized for labor or induction of labor between August 1, 2016, and May 31, 2017, at the University of Southern Santa Catarina, Palhoça, Santa Catarina, Brazil, a public hospital maternity in southern Brazil, where approximately 350 deliveries occur each month and 65%–70% are vaginal deliveries. To be eligible for inclusion, patients need to be at 34–41 +6 weeks of pregnancy, with a single fetus in cephalic presentation. Patients who were not experiencing spontaneous labor or induced labor, patients who received analgesia during labor, and patients who were too distressed to provide written consent were excluded. The study was approved by the Ethics Research Committee of the University of Southern Santa Catarina and all participants gave written informed consent for their inclusion.

Associations of the occurrence of the purple line with cervical dilatation and fetal head station were investigated using a Poisson regression and the Pearson correlation coefficient. Purple line was identified in 189 (85.9%, 95% confidence interval [CI] 81.3–90.5) patients. White ethnicity (adjusted risk ratio [aRR] 1.12, 95% CI 1.02–1.23; \(P=0.023\)) and premature rupture of membranes (aRR 1.15, 95% CI 1.01–1.32; \(P=0.042\)) were associated with increased risk of the purple line being identified (Table 1). The possibility of early enlargement of the pelvic contents after membranes rupture—due to the fetus filling the cavity formed by the bone structure—could cause greater pressure and vascular congestion. As this occurs more frequently in women with premature rupture of membranes, a relationship with inflammatory processes—typical in this clinical condition—is suggested.

Vaginal delivery was associated with an increased risk of purple line occurrence (aRR 1.85, 95% CI 1.29–2.67; \(P<0.001\)). The line in the sacral region, regardless of the moment of its appearance, was associated with the first stage of labor being of expected duration. Likewise, its presence has been demonstrated to be associated with the second stage of labor being of expected duration.

A positive correlation was found between line size and cervical dilatation (\(r=0.893\)) and fetal head station (\(r=0.681\)) with mean diagnostic accuracy of 23.0% and 8.2%, respectively.

In conclusion, purple line was recorded frequently in women during labor, especially in patients of white ethnicity and after premature rupture of membranes. The occurrence of purple line was associated with adequate evolution of labor, and presented a positive correlation with the parameters of labor progression; however, it was not suitable for routine diagnostic use owing to its low accuracy.

AUTHOR CONTRIBUTIONS
RDN, PL, and JT contributed to the conception of the study, the analysis and interpretation of data, and writing and revising the manuscript. All authors approved the final manuscript.

CONFLICTS OF INTEREST
The authors have no conflicts of interest.
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