

# QRS abnormalities of the fetal electrocardiogram, and their implications for ST-interval analysis during labor.

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## Abstract

**INTRODUCTION:** The objective of this study was to describe the QRS complex of the fetal electrocardiogram (fECG) in relation to fetal presentation, and explore the effect of abnormal QRS on automated ST-interval analysis (STAN).

**MATERIAL AND METHODS:** A case-control study was carried out at a University Hospital in Norway, between the years of 2004-2008. High-risk singleton deliveries with a gestational age >35(+6) weeks, were monitored with cardiotocography and STAN. Cases included breech presentations (n = 433) and controls included cephalic presentations (n = 433). The main outcome measures were QRS-complex abnormalities and fECG abnormalities.

**RESULTS:** An abnormal QRS complex was found in 13.9% of the cases and 16.6% of the controls (p = 0.257). Split R (8.4%) and deep S (8.2%) were the most common abnormalities, and deep Q (4.4% vs. 0.7%, p ≤ 0.001) and split Q (1.8% vs. 0, p ≤ 0.005) were more common in breech than in cephalic presentations. QRS abnormalities impacted on the fECG in 114/866 (13.2%) of the total population. The most common finding was an ambiguous placement of R and S in cases of a split vector (n = 112, 12.9%). Deviance of the ECG baseline above null occurred less frequently (n = 33, 3.8%), and was more common in breech presentation (5.3 vs. 2.3%, p = 0.021). ST events due to an erroneous identification of the QRS vectors and/or a misplacement of the ECG baseline were found in 26 (3.0%) fetuses, with no significant difference in frequency between cases and controls.

**CONCLUSIONS:** The appearance of the QRS complex of fECG is dependent upon the fetal presentation. QRS abnormalities impact automated fECG tracing and subsequent ST analysis. Clinicians should be aware of this finding in clinical practice.