titative relationship between various published calculation methods for STV and LTV using actual CTG data and to establish a standard method of STV and LTV for clinical use.

Methods

The actual normal fetal ECG data were divided in fragments of every 48 seconds. As for STV, 6 parameters, i.e. sum of $|\Delta FHR|$, sum of $|\Delta Interval|$, SD of ΔFHR, Differential Index by Yeh etc. were compared. Concerning LTV, 5 parameters, i.e. SD of FHR, SD of Interval, Bandbreite with computer (peak to peak method), Interval index by Yeh etc. were examined. For every two parameters, the correlation coefficients of 150 fragments of CTG were calculated with computer (HP1000).

Results

In relation to STV, all correlation coefficients were greater than 0.835. As for LTV, coefficients were also greater than 0.813. These results suggests that all parameters for STV and LTV are almost equivalent.

It means also that for clinical use, simple calculation methods are most useful, namely sum of $|\Delta FHR|$ for STV, SD of FHR for LTV.

Authors wish express thanks to Professor F. Kubli in UFK Heidelberg.

(This study was sapported by Alexander von Humboldt Stiftung in F.R. of Germany)

243. On the Accuracy of Variability Measurement

T. KUBO, J. INABA, S. SHIGEMITSU, N. MESAKI, M. KORESAWA, H. IWASAKI and T. AKATSUKA

Dept. Obst. & Gynec., Univ. of Tsukuba, Ibaraki

The accuracy of heart rate measurement for STV (=short term variability) indeces was investigated. From the analysis of simulated heart beat by a signal generator; it was found that the value of the standard deviation of beat to beat difference (one of the STV index) less than five millisecond through the cardiotocomoniter is unreliable in accuracy of measurement, and if the STV (the standard deviation of beat to beat difference) is to be measured with an accuracy of one millisecond, an accuracy of measurement of 0.16 millisecond is necessary even if the fetal heart beat data are sampled with a sampling interval of one millisecond.

244. Application of Precise FHR Meter to Estimate Variability Indices

K. YATSUKI, T. OHKAWA, M. HOGAKI K. ARAI and S. OKINAGA

Dept. Obst. & Gynec., Teikyo Univ. Sch. Med., Tokyo

Fetal heart rate (FHR) variability is assumed to be an important index of fetal condition, and many obstetricians believe that the presence of normal variability reflects the well-being of fetus. But the quantitative estimation of short-term variability (STV) and long-term variability (LTV) has not been established to the clinical application, not withstanding the vigorous work and report. We have utilized software system to analyze the fundamental characteristics of various variability indices, including de-Haan, Yeh, Heilbron and Geijn. For clinically applied FHR meter, the most optimal recording should be assumed as fixed FHR (144-146 bpm) with improved S/N ratio (more than 12 db). In this condition, the direct analysis method for FHR variability changes has been established by the flexible software system characterized by high resolution (less than 1 msec) of QRS peak detection of FECG, as well as instantaneous response of FHR change, and compared with the conventional FHR meter (YHP 8030). Between these two systems, the difference of QRS peak detection was found 2-4 msec. Even in this minimum scattering due to the accuracy of FHR, 8 variability indices differed from 100 to 40% except for Heilbron's "A" and "LH". In conventional FHR meter, "A" was computed as fixed value of 1., showing apparent contrast of software system's value of .46-.98 fluctuating in accordance with another indices. "LH" was also estimated 10 to 20 times larger in 8030. The effect of the accuracy of QRS peak detection to variability indices was also estimated using software system by changing the sampling rate of A/D conversion from .5 to 5 msec. Comparing at the sampling of 2 msec, 4 STV indices was already different 100% at 5 msec sampling. While in .5 and 1 msec, it was 16-43%. in LTV indices, the difference was 19%, reflecting the small dependance of sampling rate.

Ultimately, the crinical estimation of these variability indices awaits the quantitative testing of fundamental parameters which affect the indices such as accuracy of QRS peak detection, baseline shift of FHR change, and processing of FHR pattern itself including miscount rate.

245. Quantitative Evaluation of FHR Variability Indices

T. OHKAWA, K. SATOH, K. YATSUKI,

M. HOGAKI, K. ARAI and
S. OKINAGA

Dept. Obst. & Gynec.,
Teikyo Univ. Sch. Med., Tokyo

Quantitative evaluation of 8 numerical indices of fetal heart rate variability indices including de-Haan, Yeh, Heilbron and Geijn was performed by the introduction of the precise measurement of actual R-R interval of scalp lead FECG. QRS peak detection without any time lag was performed by desktop computer (HP9826), and variability indices were calculated from R-R peak intervals obtained from 20 patients blocking in every 100 intervals which revaeled the adequate sample size to get statistically stable parameters. The patterns of variability indices during labor were compared with those from conventional FHR meter (HP 8030); low correlations were observed in all STV indices (STI, DI, SH and ID), while LTV indices of LTI and II showed good correlation coefficients of 0.8-0.9. Another LTV index LH and A which represents STV/LTV balance from 8030 showed the quite different values and patterns corresponding to the logical processing in this conventional device. Dependences between indices from our measurement system were assessed with correlation coefficients, showing 0.9-0.95 in DI and LH but STV indices of STI and ID showed relatively decreased coefficients 0.6-0.7. Among three LTV indices, high correlation coefficients more than 0.9 were obtained. These variability indices were also evaluated by various parameters such as standard deviation of FHR, FHR mean, uterine contraction and time trends, demonstrating positive correlations with SD FHR and uterine contraction, and negative correlations with FHR mean and time trends. Further careful evaluation should be enhanced not only by the analysis of the characteristics of indices, but also by the careful estimation on actual R-R intervals, accuracy of measurement system, and noise component of the original data.

246. Evaluation of the Inhibitory Effect of Placental LAP on ADP-induced Platelet Aggregation

M. KIHIRA

Dept. Obst. & Gynec.,
Mie Prefectural General Shiohama Hosp., Mie

T. MATSUMOTO and Y. SAWAKI

Dept. Obst. & Gynec.,
National Tsu Hosp., Mie

M. ITO, F. MORIKAWA and Y. SUGIYAMA

Dept. Obst. & Gynec.,
Mie Univ. Sch. Med., Mie

K. OKANO

Research Laboratory of the Green Cross Corporation, Osaka

Purpose: It has been reported that platelet aggregation rate is decreased in cord blood and placental extract. In the present study, a specific inhibition of ADP-induced platelet aggregation by human placental leucine aminopeptidase (P-LAP) was detected as reported below.

Methods: Placental extracts were treated with 8% revanol, Sephadex G-150 gel filtration and DEAE-Sephadex A-50 chromatography. In addition to placental extracts, purified P-LAP (Green Cross Corporation) was tested. P-LAP was dialyzed against PBS (pH. 7.4), subjected to affinity chromatography with ConA-Sepharose and eluted with methyl-α-D-glucoside to obtain more purified P-LAP rich fraction. Inhibitory effects of these samples on platelet aggregation were measured by using NKK HEMA TRACER-1 with inducers such as ADP (f.c. 2×10^{-6} M) and collagen (f.c. 1 μg/ml).

Results: 1) Purified P-LAP rich fraction prepared by using crude P-LAP and ConA-Sepharose inhibited platelet aggregation induced by ADP, but did not influence collagen-induced aggregation at all. 2) P-LAP activity demonstrated by 7% polyacrylamide gel electrophoresis and inhibitory effect on ADP-induced aggregation showed a good agreement. 3) Treatment with a condition which inactivates P-LAP (pH. 10, 60°C., 30 min.) resulted in a loss of ADP-aggregating effect. 4) After preincubation with P-LAP and ADP, the effect of the mixture on platelet aggregation disappeared. 5) Paper chromatographic analysis revealed the hydrolysis of ATP and ADP to AMP by P-LAP.

In conclusion, the potent inhibitory effect of P-LAP on ADP-induced platelet aggregation appears to be due to the ADPase-like action of this enzyme. Attention has been focussed on this action as one of the controlling factors of hemostasis in fetoplacental circulation.

247. Red Blood Cell Antibodies in Maternal and Cord Blood