

DIFFERENTIAL HEMODYNAMIC RESPONSE USING CONTINUOUS WAVE DOPPLER DEPENDING ON N-TERMINAL-PRO BRAIN NATRIURETIC PEPTIDE (nt-pro-BNP) DURING IMMUNOTHERAPY WITH TRASTUZUMAB VS. PACLITAXEL FOR METASTATIC BREAST CANCER

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Background:

Chemotherapy for metastatic breast cancer involves possible cardiotoxic agents. A thorough cardiac evaluation and monitoring during chemotherapy therefore is mandatory to increase patients' safety. Immunotherapy with trastuzumab (Herceptin), a selective HER-2(ErbB2)-antibody, is approved in women with metastatic breast cancer and is associated with a certain degree of cardiotoxicity. This study sought to evaluate the immediate hemodynamic response to trastuzumab vs. paclitaxel with real time CW-Doppler depending on the level of nt-pro-BNP (brain natriuretic peptide) as a possible marker of cardiotoxicity.

Methods:

75 patients with HER-2-positive metastatic breast cancer were continuously measured with CW-Doppler ultrasound for stroke volume (SV), cardiac output (CO), cardiac index (CI), and systemic vascular resistance (SVR) before, during and after drug infusion in combination with nt-pro-BNP before and 10 minutes after drug infusion. Depending on the nt-pro-BNP-levels <125pg/ml (group A, treated with trastuzumab n=34, 51±11years vs. group B n=15, 54,8±9,5 years in paclitaxel-group, p=0.305) and NTproBNP > 125pg/ml (group C, n=14, 63±8 years in trastuzumab-group vs. group D, treated with paclitaxel n=12 61±8.7 years p=0.512) four groups have been defined.

Results:

Stroke volume at baseline was 49±14ml in group A vs. in group B 66±15ml (p=0.001) with a significant increase by 20% 5 minutes after the infusion 59±19ml in group A vs. in group B 66±15ml (p<0.05). In the high level nt-pro-BNP groups the stroke volume at baseline was in group C 42±15ml vs. in group D 54±18ml (p=0.062) with a significant increase of stroke volume 5 minutes after stop of the infusion to 58±25ml vs. 55±18ml (p<0.05). In line, cardiac output was 3.4±1.1l/min in group A vs. 5±1.2ml/min in group B (p=0.0001), which increased 5 minutes after the trastuzumab infusion to 3.9±1.6l/min vs. 5.1±1.2ml/min in the paclitaxel group (p=0.018), which was the same in the high-level nt-pro-BNP group C cardiac output 3.0±1.1ml/min to 4.0±1.5l/min for trastuzumab. While systemic vascular resistance (SVR) remained the same in the paclitaxel group, trastuzumab infusion decreased SVR significantly in low and high nt-pro-BNP women.

Conclusion:

Using the CW-Doppler USCOM a different hemodynamic response to trastuzumab vs. paclitaxel infusion is evident in women with metastatic breast cancer. Trastuzumab-infusion leads to significant upregulation of stroke volume and cardiac output immediately after the end of the infusion associated with a decreased afterload, while paclitaxel did not change hemodynamic parameters of pumping as well as afterload during and early after infusion. This different hemodynamic response is evident in women with low and high nt-pro-BNP levels prior to infusion.