Diascopy parameters and image quality in interventional procedures

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In interventional procedures, the clarity and accuracy of imaging are crucial for successful outcomes. Interventional procedures, including angiography, stent placement, and minimally invasive surgeries, rely heavily on high-quality imaging. Diascopy, a technique involving the manipulation of imaging parameters such as brightness, contrast, and zoom, significantly influences image quality. Image quality in interventional imaging depends on multiple factors, including Resolution, Signal-to-noise ratio (SNR), Contrast-to-noise ratio (CNR), Brightness and contrast settings, Geometric magnification or zoom, Image filtering and processing algorithms Diascopy protocols are predefined for certain procedures and patient groups where diascopy parameters are automatically selected. In 96% of cases, no adjustment is required. In 4% of patients, it is not possible to achieve satisfactory image quality, display of fine details or implant structures. Although the percentage of such cases is small, these patients are life-threatening and the possibility of image optimization is of great importance.[1] *Hypothesis:* Manual adjustment of diascopy parameters can significantly affect image quality and treatment outcome.

Patients and Methods: The study was conducted at the Department of Invasive Cardiology, University Clinical Center of Sarajevo (KCUS), from February 1, 2022, to July 31, 2024. The study included patients of both sexes and different age groups. The study included hemodynamically stable patients, patients with myocardial infarction who underwent stenting of a lesion in the coronary blood vessels. Hemodynamically unstable patients, minors, and unconscious patients were not included in the research. The procedures were performed in the cardiac catheterization room on a TOSHIBA INFINIX diascopy device. Toshiba Infinix can manually adjust all diascopy parameters (kV, mA, matrix, pulse width, number of frames, three types of collimations), which return to system-defined values after the procedure is complete. It is this technical capability that made this type of research and proof of our hypothesis possible. The diagnostic acceptability of the image was evaluated by three examiners with grades from 1 to 5:

1 - non-diagnostic (means that the obtained structures cannot be analyzed),

2 - unclear anatomical details with worsening image quality,

3 - clearly increased clouding of the image, which is still not reflected in the diagnostic quality of the image,

4 - clearly visible anatomical details with medium blurring of the image,

5- clear delineation of small structures with clearly visible anatomical details and sharply delineated stent structures

Results and Conclusion: In the control group of 800 participants, selected based on the study inclusion criteria, the image quality was evaluated. There were 531 (66%) males and 269 (34%) females. According to the subjective assessment of image quality with implanted stents, the evaluators rated the images on a scale from 1 to 5. The quality scores of two groups of images were compared: with (90 kV and 900 mA) and (150 kV and 600 mA), where a statistically significant difference was found in the image quality score of the two groups depending on the electrical potential ($p<0.05$). The quality ratings of two groups of images with different frame rates were compared, where no statistically significant difference was found in the image quality ratings of the two groups depending on the frame rate ($p=0.767$), however, the radiation dose increased by five times.

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LITERATURE

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