Medical Xpress

Special probes improve ultrasound imaging in obese patients

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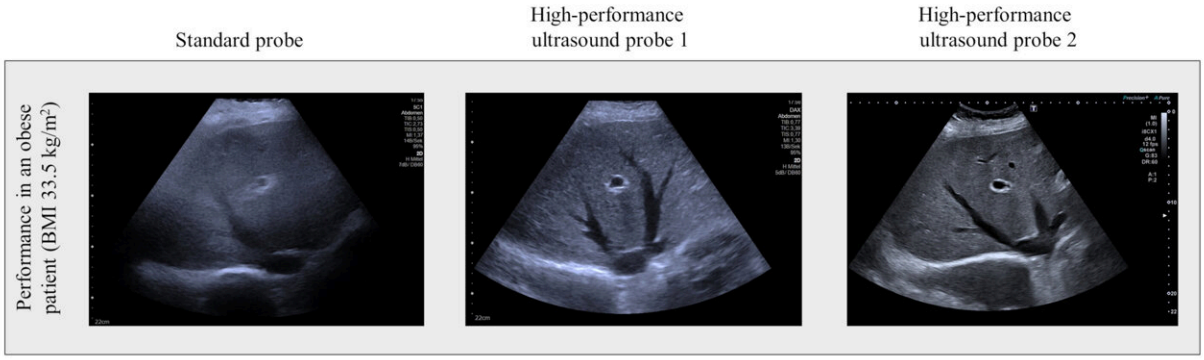

Edited image from the publication: scan of the liver of an obese patient. The image quality of the standard ultrasound probe (left) is significantly poorer than that of the high-performance probes (centre and left). Credit: *Scientific Reports* (2023). DOI: 10.1038/s41598-023-43509-9

Ultrasound is used to diagnose many diseases in the abdominal cavity. A new study conducted at the University of Leipzig Medical Center and supported by the Helmholtz Institute for Metabolism, Obesity and Vascular Research (HI-MAG) shows that obesity affects the quality of ultrasound scans of the liver and kidneys. It also shows that the use of high-performance ultrasound probes can improve the anatomical depiction in these patients. The findings have been published in the journal *Scientific Reports*.

Ultrasound of the abdominal organs is a central diagnostic tool and is recommended as the first-line approach for many medical conditions. Compared with other imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI), ultrasound is readily available, avoids unnecessary radiation exposure and can be used in almost every case. However, the accuracy of this method is usually limited in obese individuals because the imaging quality of anatomical structures is impaired. To date, the degree of obesity at which ultrasound diagnostics are no longer sufficiently precise has not been sufficiently researched.

In a recent clinical study at the University of Leipzig Medical Center, researchers found that the quality of ultrasound scans of the liver and kidneys was significantly lower in obese patients. "The results showed that as the body mass index of the patients increased, the image quality of the ultrasound decreased. It also became clear that modern probes with matrix technology improve the quality of ultrasound imaging," says Professor Thomas Karlas, head of the study and corresponding author of the current publication.

The matrix probes have an improved transmitting and receiving performance and therefore achieve greater penetration depth into the tissue. This allows for better diagnostic accuracy in high-risk patients. The performance of matrix probes in obese individuals has not yet been scientifically validated.

The current data show that these relatively expensive special probes for ultrasound equipment can provide significant added value. The 40 participants in the study underwent a highly standardized ultrasound examination of the abdomen with three different probes: a standard probe and two high-performance probes. The liver and right kidney were examined in people with varying degrees of obesity, and the quality of the ultrasound imaging was scored.

"Particularly in centers that specialize in the care of obese patients, for example, in diabetology, nutritional medicine or bariatric surgery, ultrasound equipment with matrix probes should be available for abdominal examinations," says Professor Karlas.

As the senior physician and head of the Interdisciplinary Central Ultrasound Unit in the Department of Oncology, Gastroenterology, Hepatology and Pneumology at the University of Leipzig Medical Center, he also points out the following problem, "Even if matrix probes improve the quality of ultrasound imaging in obese patients, the quality is often not as good as in lean patients. Obesity therefore remains a challenge—both as a cause of secondary diseases such as metabolic liver disease—and as a limitation for widely used diagnostic methods."

A follow-up project will investigate whether specialized ultrasound applications (e.g., determination of liver fat content and liver stiffness) work better with the high-performance probes than with conventional methods.

More information: Sascha Heinitz et al, The application of high-performance ultrasound probes increases anatomic depiction in obese patients, *Scientific Reports* (2023). DOI: 10.1038/s41598-023-43509-9

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