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302

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Impact of abdominal fat distribution in pancreatic pseudocyst formation: a retrospective analysis

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BACKGROUND

Obesity plays an important role as a risk factor in acute pancreatitis. Assume that the volume of visceral adipose tissue (VAT) directly influences the severity of acute pancreatitis, by increasing the pro-inflammatory environment. We investigated the relationship between abdominal fat distribution parameters measured with computed tomography (CT) and pancreatic pseudocyst formation.

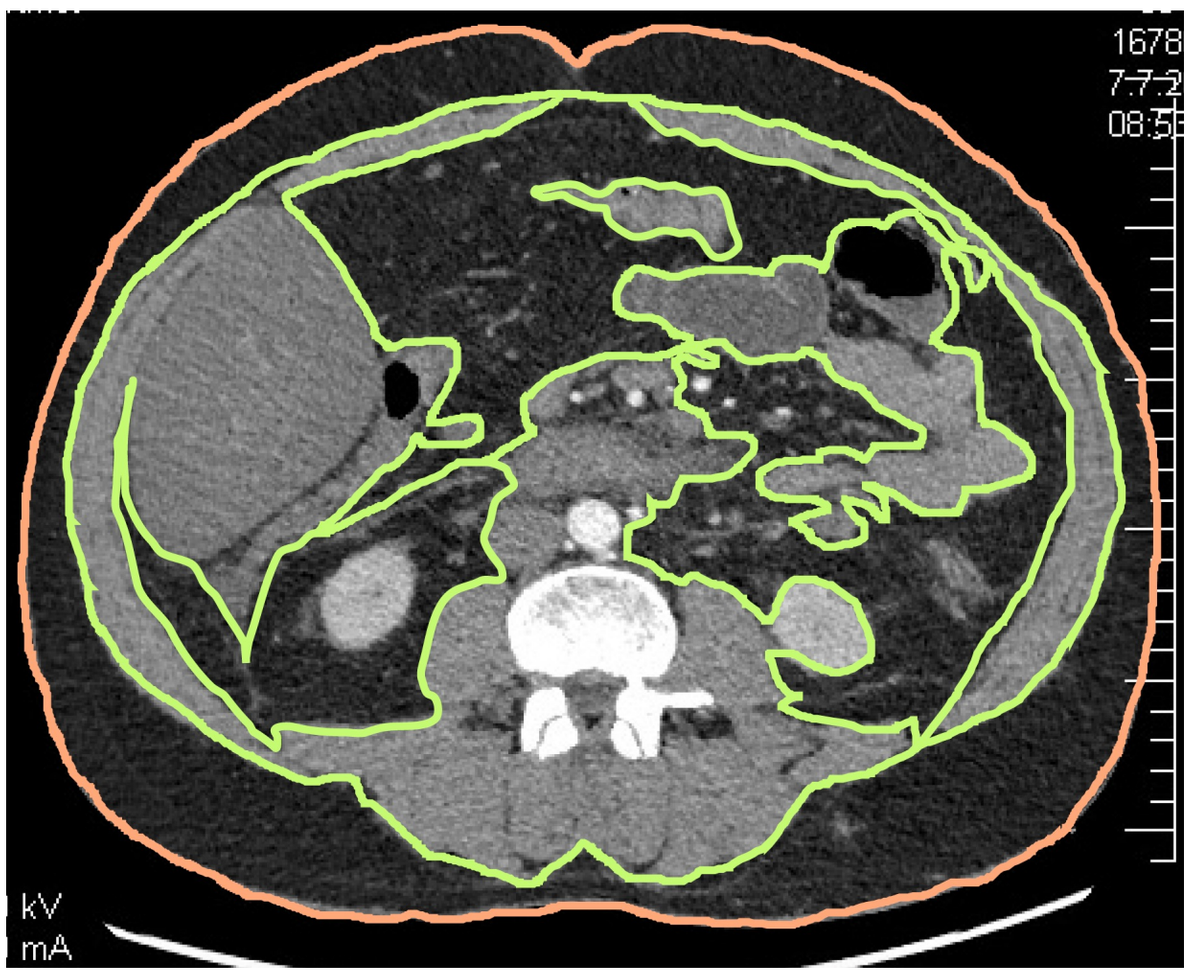

Figure 1 - A representative case of measurements of SAT, subcutaneous adipose tissue; SMA, skeletal muscle area; VAT, visceral adipose tissue using HDCT images.

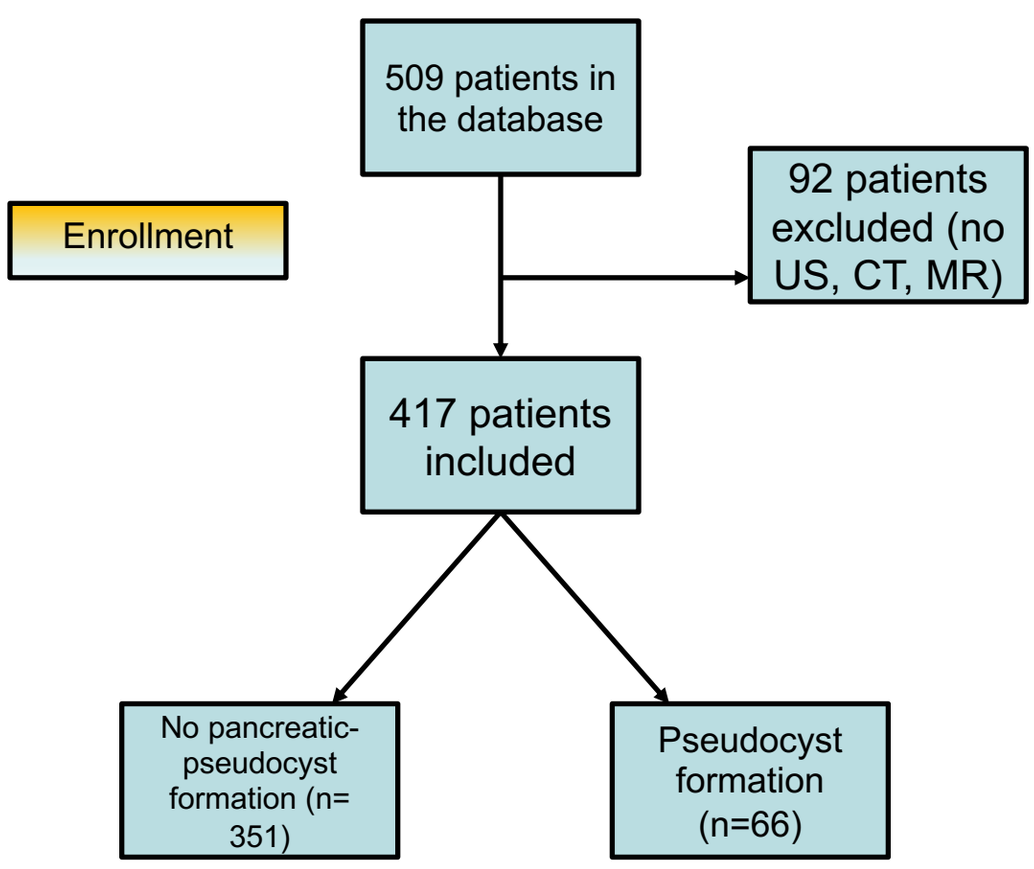

Figure 2 – Study flowchart

METHODS

The study included patients monitored due to AP in the 4th Department of Surgery of University Hospital Bratislava from January 2019 to December 2023. Body mass index (BMI) was calculated from the database. Computed tomography was performed in all patients. An open source image processing analysis software (Slice, v 3.9) was used to calculate individual abdominal fat distribution parameters from CT scans by segmentation of abdominal tissues. VAT, subcutaneous adipose tissue (SAT), waist circumference (WC) and visceral to total fat tissue area ratio (VTR) were measured (from –50 to –250 Hounsfield units) at the level of the intervertebral disk between L2 and L3. Atlanta criteria were adopted to define severe acute pancreatitis. Clinical courses were investigated and Ranson and acute physiology and chronic health evaluation II (APACHE II) scores were calculated for all patients.

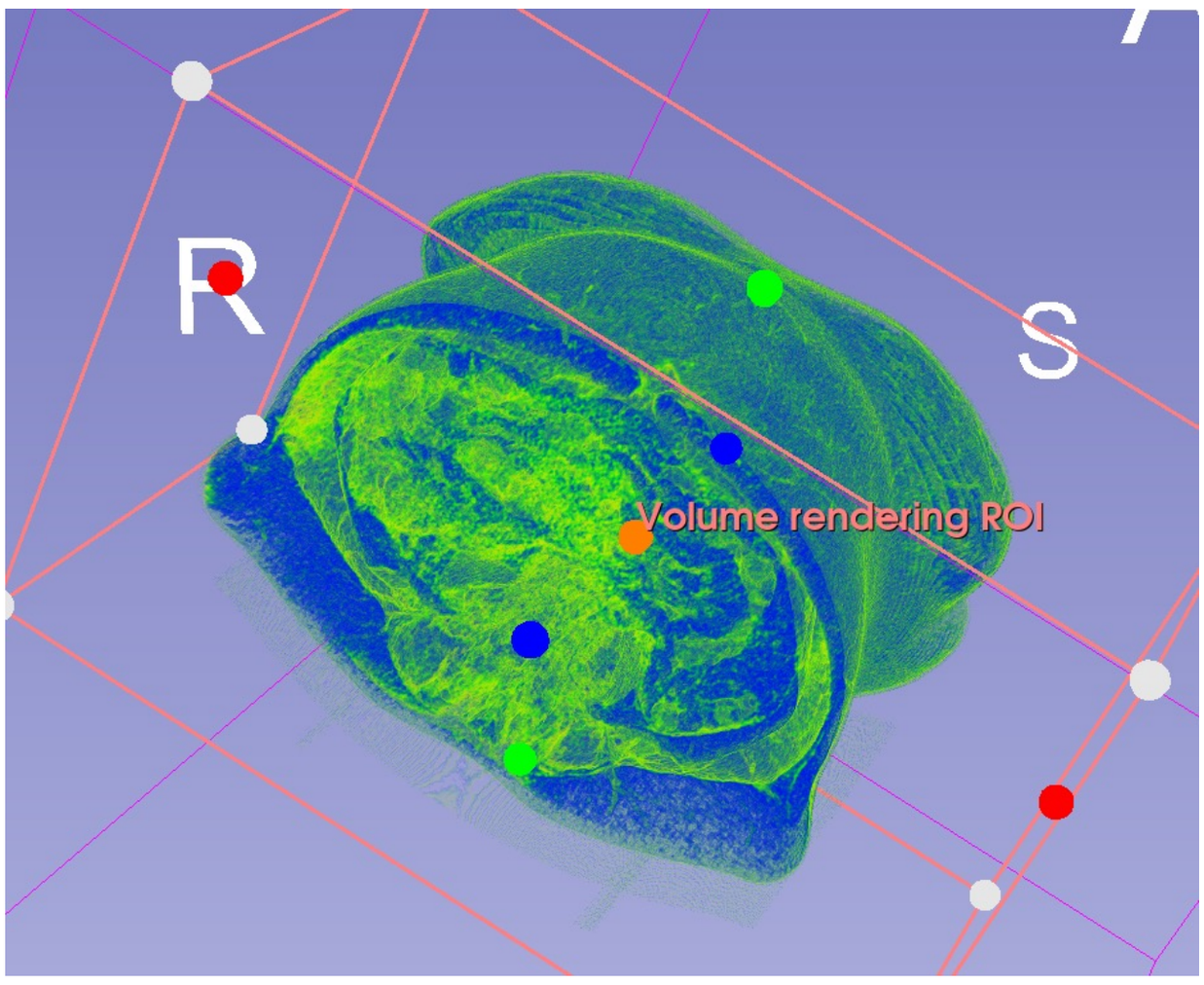

Figure 3 - Radiologic analysis of body fat distribution.
The total fat area (TFA) was obtained by using the threshold (− 250 Hounsfield units [HU] to − 50 HU) segmentation function of the software to automatically segment regions of interest (ROI) of total fat. The subcutaneous fat area (SFA) was obtained based on the region of interest of the subcutaneous fat; the boundary of the abdominal wall muscles and the paraspinal muscles were selected manually as the area of interest. The visceral fat area (VFA) was obtained by subtracting the SFA from the TFA.

RESULTS

BMI, VAT, SAT, WC and VFA were correlated with the severity of acute pancreatitis in a univariate analysis, but VAT and VFA had a strong correlation with severe acute pancreatitis and also the presence of pseudocysts in the multivariate analysis. Particularly, the presence of pancreatic pseudocyst was significantly related to VAT volume. ($p < 0.001$).

CONCLUSION

In patients with AP diagnosis and abdominal CT scans, VAT volume and VFA are strongly correlated with the formation of a pseudocyst and high VAT volume may lead to persistent pseudocyst formation. Our study shows that these parameters should be included in AP predictive scoring systems.