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ACUTE PANCREATITIS IN TYPE 2 DIABETES MELLITUS – IMAGING STUDY

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Abstract

The inflammatory diseases of the pancreas represent an important cause of mortality worldwide and in Romania, so that making some clinical and imaging correlations between these disorders and disturbances of the carbohydrate metabolism is needed in order to identify the groups of patients with high risk, among which we mention the group of patients with type 2 diabetes. The patients with type 2 diabetes have a triple risk of developing acute pancreatitis. The hypertriglyceridemia is frequently met in the diabetic status as well as in alcoholism, representing one of the causes of the pancreatitis. The frequent association with obesity, hypertension, and microangyopathy – wich represent characteristic features of type 2 diabetes – is also a risk for acute pancreatisis. Medical imaging – ultrasonography, computer tomography and MRI, along with clinical and laboratory methods- represents one of the main methods of diagnosing pancreatic diseases. During the recent years, the development in the field of medical technology and imaging methods of investigation, along with the use of the contrast agent, allow early diagnosis of acute pancreatisis and make a better staging by.

keywords*: diabetes mellitus, acute pancreatitis, ultrasound, CT*

Background

The diabetes has a profound effect on the metabolism of plasma lipids, especially of the triglycerides [1]. One of the complications of hypertriglyceridemia is acute pancreatitis. Diabetic hypertriglycerdemia-induced acute pancreatitis masquerading as biliary pancreatitis [2]. Institution of insulin therapy caused a resolution of the hypertriglyceridemia and a cessation of the episodes of acute pancreatitis [2].

The diabetic patients presents a deficiency in the endocrine pancreas due to the presence of the microangiopathic complications that determine the appearance of the vessels's sclerosis, which added to the diabetic neuropathy leads to the reduction and the

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delaying of the pancreatic enzymes [3, 4]. Obesity and hypertension are risk factors for acute pancreatitis. There have also been reports of acute pancreatitis in patients treated with exenatide (Byetta), but direct correlations could not be established [5].

Acute pancreatitis is the acute necrotic hemorrhagic and/or edematous inflammation of the pancreas, which clinically manifests itself through the great pancreatic drama. They are a result of the premature activation of the pancreatic pro-enzymes within the gland [6, 7, 8].

The most common classification of the acute pancreatitis is in two groups; the mild edematous form and the severe necrotic form. In 20% of the cases, a severe course can be followed, with considerable mortality that is why staging is absolutely necessary. The importance of staging acute pancreatitis is that it provides a good prediction of individual risk of complications based on factors, combined or taken individually [6]. These factors include clinical data, markers of pancreatic injury and markers of the inflammatory response.

Despite its low specificity, ultrasound is recommended as an initial examination in all patients suspected of acute pancreatitis and it can be repeated whenever the clinical conditions require it [9].

Helical computer tomography is the current method, having a well established protocol of obtaining high quality images in acute pancreatitis [10]. The tomography has two major roles in evaluating the patients with known or suspected pancreatitis [11]:

– Initial stage establishing of the inflamatory process – early detection of complications, particularly identification and quantification of parenchymatical and peripancreatical necrosis. With patients where the clinical diagnosis is clear, it is used for diagnosis purposes.
– As a method of monitoring, in the case of general deterioration or lack of response in patients confirmed as having acute pancreatitis. .

The CT severity index, developed by Balthazar and his colleagues in 1994 [11] was a significant advance because it helped clinicians to discriminate among mild, moderate, and severe forms of pancreatitis. The index focuses on the presence and degree of pancreatic inflammation and necrosis. On a 10-point severity scale, points are awarded for the presence or absence of fluid collections, in combination with an assessment of the presence and degree of pancreatic necrosis. This system has been successfully used to predict overall morbidity and mortality in patients with acute pancreatitis.

The severity of pancreatitis is categorized as mild (score, 0-3 points), moderate (4-6 points), or severe (7-10 points) [13].

Materials and methods

The idea of this imagistic study has started from the observation of the current every day medical work regarding the high frequence of the patients with type 2 DM in Bihor county who call the ambulance or go to the emergency room for inflammatory symptoms of the pancreas as well as for the fact that these persons have a longer period of hospitalization for these problems due to the high frequency of severe forms and of the complications. Our personal research is a transversal observational study, conducted in 2007-2009, on a group of 48 subjects with type 2 diabetes, hospitalized for symptoms of acute inflammation of the pancreas, who had an imagistic evaluation done. The structure of the lot - 48 patients with type 2 diabetes, also

known inaugural, 32 men and 16 women, aged between 41 and 75 years. All the cases studied were examined by the usual methods of imaging diagnostic (ultrasound trans-abdominal CT) in the Radiology and Imaging Laboratory of Emergency Clinical Hospital Oradea and Pelican Medical Imaging Center in Oradea. All the pathological items noted in connection with the inflammatory processes represent the result of the imaging investigations and they have served as a basis for planning the medical treatment or the operating path.

The analytical study of the pancreatic inflammatory status tracked the compared performance of the imaging techniques in terms of:

- Notification/viewing the inflammatory process
- Imaging assessment of the inflammatory process's location
- Assessment of the morphological severity staging of the inflammatory process by scores and severity indices
- The evolution of the inflammatory process
- The correlation between the imaging appearance and the intra-operative imaging

We performed ultrasound examination on Siemens Acuson Antares 4 device - digital imaging, diagnostic ultrasound, broadband and high resolution device. The system has integrated Doppler imaging, Doppler spectral auxiliary CW, Color Doppler and Power Doppler.

All examinations were performed on a SIEMENS syngo CT 2006 scanner. Contrast-enhanced CT scans (collimation, 4 x 2.5mm; reconstruction section thickness, 5 mm; reconstruction intervals 5mm, sagittal and frontal reconstruction) were obtained 40 sec after IV administration of 100 mL of iopromide 300mg I/mL (Ultravist 300, injected at a rate of 3.0mL/sec using a mechanical power injector. Opacification of the digestive tract was achieved with oral administration of 300mL Gastrografin .

Results

Distribution by sex- Most diabetic patients with acute pancreatitis (66,7%) were male, the ratio men / women was 2:1.

Distribution according to age - Over 70% of patients diagnosed with acute pancreatitis were younger than 60 years (73.0%); most of them aged 51-60 years (43.8%).

Distribution according to the time evolution of diabetes- Most patients with acute pancreatitis had a time evolution of diabetes over 5 years (77.1%), inaugural diabetes was diagnosed only in 2 patients (4.2%).

Distribution according to severity US and CT- mild form were 20,8% in US and 16,7% in CT; moderate form were 37,5% in US and 33,3% in CT; severe form were 41,7% in US and 50% in CT.

Distribution according to the morphological severity index Balthazar- Half of diabetic patients were over 3 Balthazar index (50.0%). Only 8 (16,7%) and 5 (10,4 %) were 0 and 1 Balthazar index..

Discussion

Both ultrasound and CT show that most patients had severe forms of acute pancreatitis (41.7% and 50.0%).

Patients diagnosed with a mild form of pancreatitis after ultrasound evaluation had this diagnosis confirmed by CT. From 18 patients diagnosed with moderate pancreatitis in ultrasound (figure 2), four were severe in CT.

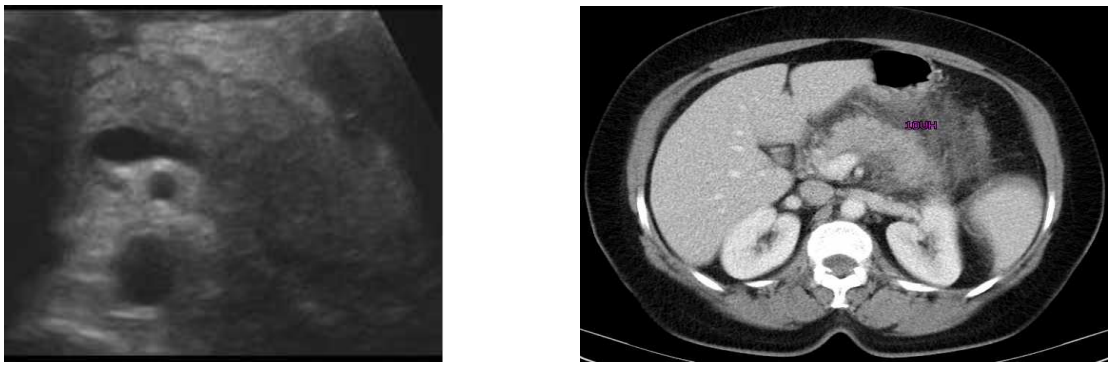

Figure 1. Early edematous pancreatitis shows enlargement of the gland diffusely and subtle amounts of edema fluid around the body of the gland(collection B.D.)

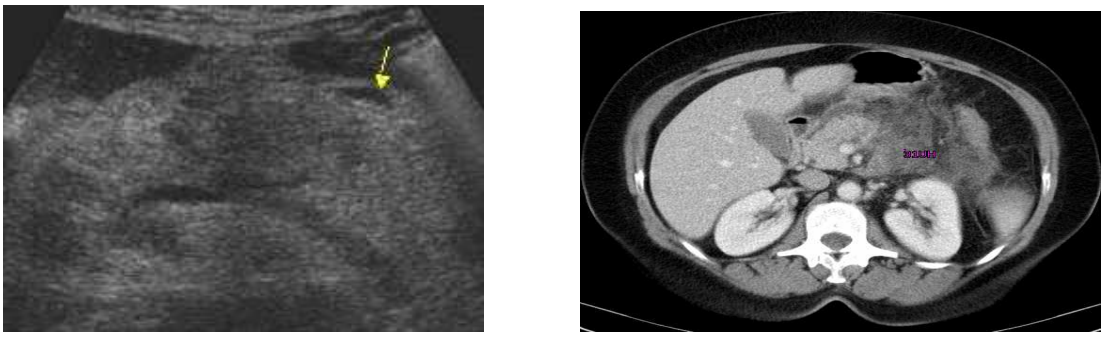

Figure 2. US and CT scan Pancreatic edema, fluid around the body of the gland(collection B.D.)

Both methods show early pancreatic necrosis and fluid collection around the gland, into the retroperitoneum or in the omenthal bursa (figure 3, 4, 5)

Evolution was generally favorable, after medical (31,3%) and surgical (68,7%) treatment.

Complications occurred in 12 cases representing 25.0% of the lot with acute pancreatitis, 3 cases with pseudocyst (6.3%) (figure 6) and 9 cases of phlegmon or abscess (18.8%)

11 patients died, representing 22.92% of all cases of acute pancreatitis and 55.0% of cases with severe pancreatitis.

Conclusion

In the studied group of patients with type 2 diabetes mellitus, acute pancreatitis was:

– More common in men than in women aged between 51 and 60 years, these patients having a duration of diabetes of over 5 years.
– Most of them presented medium or severe clinical forms of pancreatitis (Balthazar score 3-4)
– Complications occurred in patients with early and severe forms of acute pancreatitis, these patients representing a quarter of the total lot.

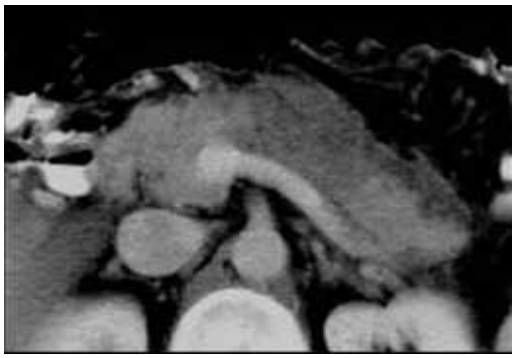

Figure 3. CT scan Large fluid mass in the central portion of the pancreas coresponding to an area of necrosis (collection B.D.)

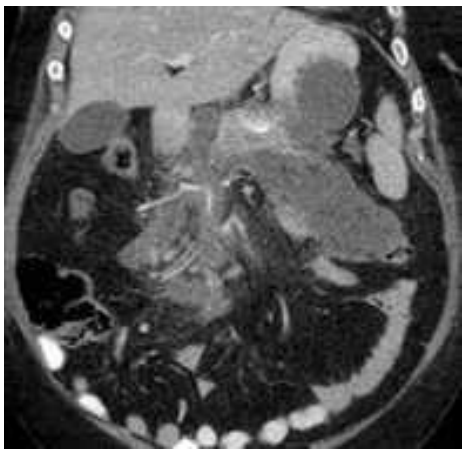

Figure 4. CT scan shows extensiv fluid collection extending caudally into retroperitoneal fascia (collection B.D.)

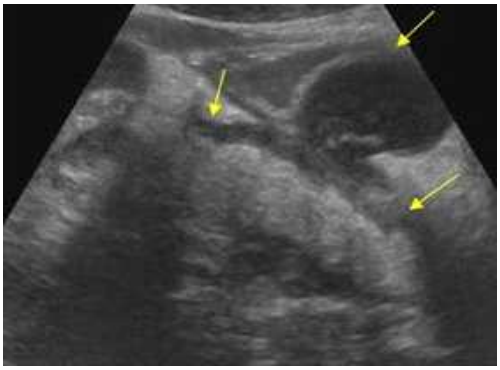

Figure 5. US show diffusely enlarged pancreas, decreased echogenicity, fluid collection around the gland and into omenthal bursa(collection B.D.)

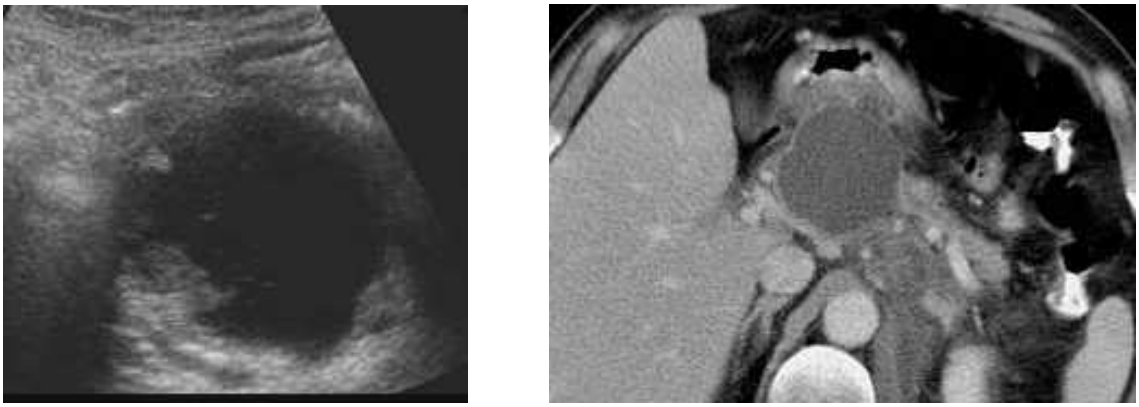

Figure 6. US and CT scan show typical apperance of a pseudocyst in the head of the pancreas(collection B.D.)

- Medium and long-term prognosis of patients with diabetes and mild acute pancreatitis was relatively good, unlike that of patients who had severe acute pancreatitis, which was unfavorable
- The mortality in our study was high especially in severe cases of pancreatitis
- Ultrasound has sensitivity and medium accuracy in detecting the pancreatic inflammatory changes and fluid collection
- The computer-tomography has maximum accuracy in determining the areas of necrosis, of bleeding and of fluid collection quantified severity scores.

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