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EXCEPTIONAL, POTENTIALLY FATAL COMBINATION OF EMPHYSEMATOUS PANCREATITIS AND GAS-FORMING CHOLECYSTITIS: SUCCESSFUL MULTIDISCIPLINARY CONSERVATIVE TREATMENT SUPPORTED BY REPEATED CT-STAGING

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Usually considered as a life-threatening disease, emphysematous pancreatitis requires early diagnosis and aggressive multidisciplinary treatment including the Departments of Gastroenterology, Intensive Care Medicine, Interventional Radiology and even Surgery.
The prognosis for emphysematous cholecystitis is also quite poor. It requires surgery even if a percutaneous cholecystostomy can contribute to a temporary stabilization of the patient.
Computed tomography is the imaging modality of choice to detect emphysematous pancreatitis and gas-forming cholecystitis. It enables their grading and helps identify their complications. Moreover, it proves essential in the follow-up of the lesions.

Key-words: Pancreatitis – Cholecystitis.

Emphysematous pancreatitis (EP) is a rare occurrence characterized by the presence, in the pancreatic parenchyma, of gas produced mainly by tissue necrosis and/or bacteria. It can also, just like in the exceptional case we are reporting, be complicated by gas-forming cholecystitis where gas appears in the lumen and even in the wall of the gallbladder.

Since the rate of mortality and morbidity of EP can reach 40 and 100% respectively, this condition requires early CT diagnosis together with intensive multidisciplinary management. Nowadays, interventional techniques under endoscopic or radiological guidance supersede surgery.

Emphysematous cholecystitis (EC) is also often fatal. It requires prompt diagnosis too and must be treated surgically even if the acute phase can be overcome by percutaneous cholecystostomy.

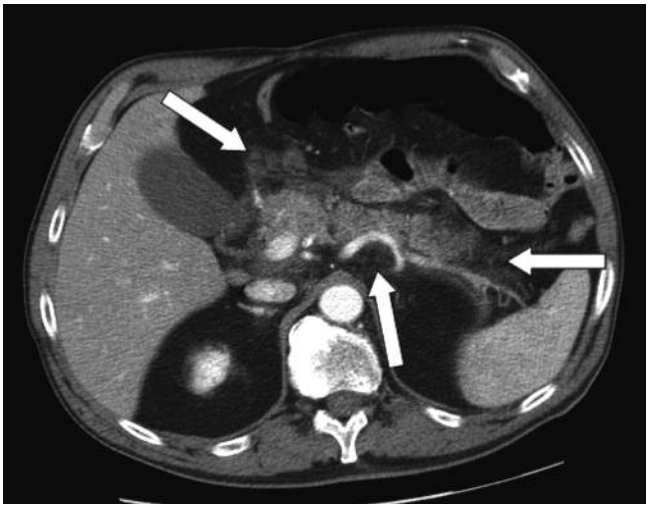

Fig. 1. — Contrast-enhanced CT image showing the peripancreatic fat stranding (arrows), without necrosis of the pancreas (Balthazar grade C, severity index 2).

Case report

A 77-year-old male patient is admitted to the Emergency Department for acute abdominal pain. His laboratory data show a normal leukocytosis but the values for pancreatic amylase reach 2471 U/L (normal values: 13-53 U/L) and the lipase level reads 11856 U/L (normal values: 13-60 U/L). The requested abdominal CT scan displays peripancreatic fat stranding without associated necrosis of the pancreas (Fig. 1). Since we cannot argue in favour of a pancreatitis of exogenic origin, we suppose that a solitary stone may have migrated. The patient is then transferred to the Gastroenterology Department where a classical treatment is started, combining strict fasting and intravenous analgesics. On the next day, the levels of amylase and lipase have dropped to respectively 828 et 1385 U/L, however the pain worsens and leukocytosis rises to 15.3 G/L (normal values: 4.8-10.8 G/L). Therefore, a second CT examination is carried out and reveals, in addition to a nearly 80% necrosis of the pancreatic parenchyma, an emphysematous pancreas as well as gas in the gallbladder lumen and wall (Fig. 2). A cholecystostomy is then performed under CT scan guidance and the patient is transferred to the Intensive Care Unit where his vital parametres are maintained. Because of the cholecystitis, antibiotics are administered. Five days later, since the case is severe and though the patient's overall state of health has improved, he will undergo another CT examination: the slices reveal the disappearance of gas in the gallbladder wall and in the pancreas and the almost complete liquefaction of the latter (Fig. 3).

A fourth CT scan is performed a fortnight later when the patient complains again of abdominal pain. It displays an enlarging pancreatic collection (Fig. 4). This collection will be double drained endoscopically via the stomach, which will prove rather tricky because of a former surgical treatment of the Billroth II type. The efficiency of the drainage, which

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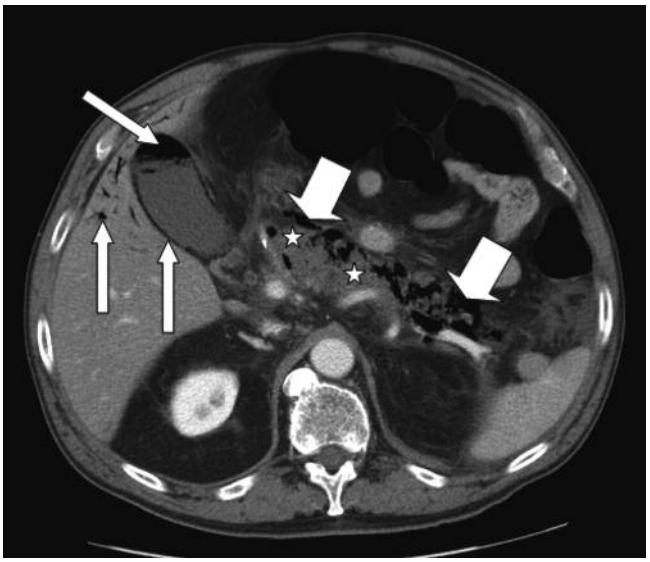

Fig. 2. — Enhanced CT, one day later: emphysematous (large arrows), necrotizing (stars) pancreatitis, together with gas (long arrows) in the vesicular lumen and wall, and in some portal veins (Balthazar grade E, severity index 10).

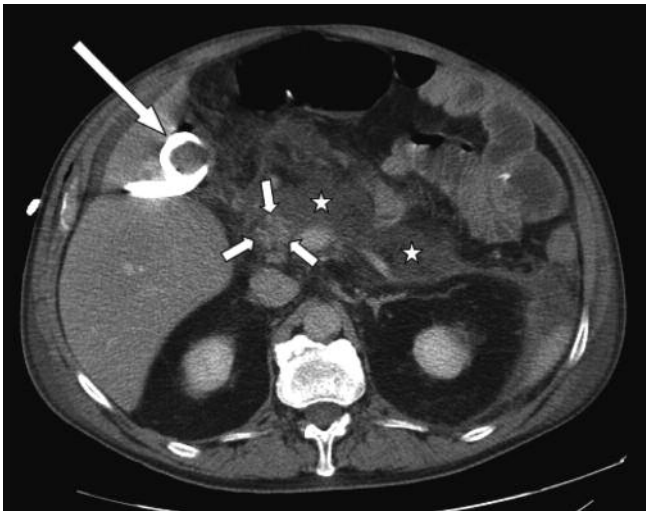

Fig. 3. — CT slice of the pancreas necrosis (stars) with the head remaining partially vascularized (short arrows).
The long arrow points to the cholecystostomy.

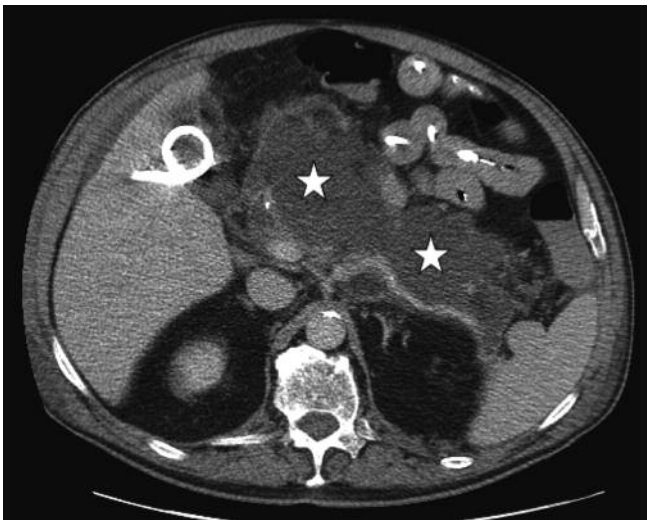

Fig. 4. — CT demonstration of the enlarging pancreatic collection (stars).

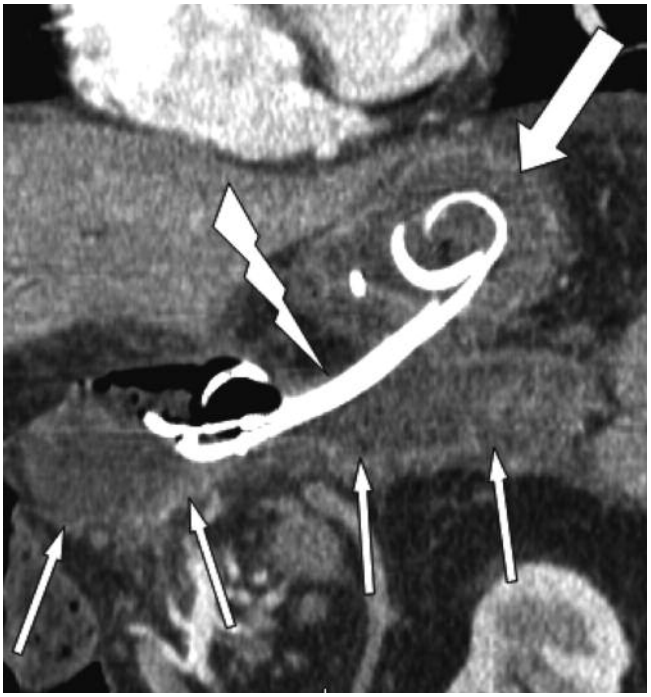

Fig. 5. — CT control of the drainage: oblique coronal reconstruction showing the double drain (lightning) between the remaining stomach (Billroth II, thick arrow) and the pancreatic collection (thin arrows) which begins to decrease in size.

will yield half a litre of necrotic material, will be monitored by a fifth CT scan (Fig. 5). Since the patient's overall state of health is improving and since his biological values have returned to normal, the cholecystostomy drainage tube is removed and he is transferred back to the Gastroenterology Department.

A sixth, low-dose, CT examination, is performed two weeks later: the peripancreatic collection is receding (Fig. 6), the patient can thus be discharged. The latest CT scan, on outpatient basis three months later, will reveal the disappearance of the pancreatic collection (Fig. 7). The removal of the gastro-pancreatic drains is planned.

Discussion

In Europe and in North America, 80% of cases of pancreatitis are caused by cholelithiasis or alcohol abuse (1-3). The literature does not reveal any figure concerning the frequency of emphysematous transformation of pancreatic necrosis but the occurrence is considered to be rare (1, 4). The combination of EP and gas-forming cholecystitis, like the one we report here, is even more exceptional.

Up to quite recently the prognosis for EP was considered to be extremely poor (1, 2, 5). At present and for some authors this gloomy prognosis should be revised as gas-forming pancreatitis no longer looks more serious but even less than non emphysematous necrosing pancreatitis (4, 6). One can wonder to which extent this change in the prognosis does not result from the improvement of the aggressive treatments applied for such gas-forming pancreatitis.

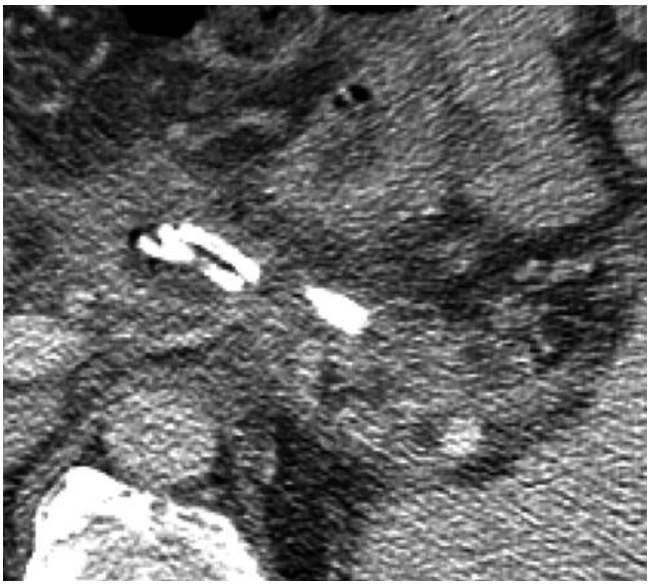

Fig. 6. — Low-dose CT control, a fortnight later: the collection still recedes.

Fig. 7. — The latest low-dose CT control, three months later on outpatient status, showing the disappearance of the collection (arrows).

EC remains very precarious too, with a mortality rate of 15% to be compared with the 4% lethality rate in uncomplicated cholecystitis (5).

Resulting from phenomena of tissue necrosis, gas can also be produced by the fermentation of bacteria carried by the blood stream, the lymphatic channels or a biliary reflux (2, 5, 7). Escherichia coli, Klebsiella, Staphylococcus Aureus and Clostridium are the main pathogenic agents involved (3-5, 8) but tuberculous bacteria are sometimes mentioned too (9). Arteriosclerosis, diabetes, renal failure and immunocompromised condition contribute, quite logically, to the increased production of gas (2, 5). Let us remember that gas pockets can also appear in case of enteric fistula or incompetent sphincter of Oddi, even as a result of endoscopic or surgical instrumentation (2, 5).

The symptomatology of pancreatitis and cholecystitis remains vague and usually associates abdominal pain, occasionally localized, nausea and vomiting (1-3). Emphysematous lesions are known to be serious and are accompanied by general signs such as agitation, tachypnea, even shock (1). In the mid seventies, in order to evaluate the prognosis of pancreatic lesions and thus to provide guidelines for their treatment, Ranson defined a series of clinical and biological criteria measured on admission and 24 hours later (10, 11). They are shown in table I. Since the advent of CT scanners, radiologists have also been able to identify severity criteria for pancreatitis. We will go back over them soon.

Table I (from Balthazar and Ranson, Radiology, 1985, 156: 768). — Early prognosis signs of acute pancreatitis.

At admission or diagnosis	During initial 48 hours
Age over 55 years	Hematocrit fall greater than 10 percentage points
White blood cell count over 16 x 10^9/l	Blood urea nitrogen level rise more than 5 mg/dl
Blood glucose level over 200 mg/dl	Serum calcium level below 8 mg/dl
Serum lactic acid dehydrogenase level over 300 IU/l	Arterial PO_2 below 60 mm HG Base deficit greater than 4 mEq/l
Serum glutamic-oxaloacetic transaminase level over 250 IU/dl	Estimated fluid sequestration more than 6 l

Standard radiological abdominal examinations remain nonspecific. They can identify the presence of calcifications, endo- or extra-luminal air, pleural effusion or associated ileus (1-3). Ultrasonography permits visualisation of gas within the gallbladder but evaluates pancreatic lesions with difficulty because of frequent air-filled digestive interpositions (1, 3, 5).

CT is the imaging modality of choice in case of EP and/or gas-forming cholecystitis (3, 5, 10, 12-14). The presence of extradigestive air, even in tiny quantities, as well as of radiopaque or radiolucent stones, is readily identified. Most important, CT identifies severity signs of the pancreatic pathology which, when summed, allow for an evaluation of the prognosis. This list of criteria, whose setting-up is the result of research works carried out by M. Hill and then E. Balthazar, is shown in Table II, A and B (10, 11, 13).

As far as EC is concerned, its staging is modelled on the basis of standard radiology but its CT reading is much easier. Stage 1 is characterized by the presence of gas within the gallbladder, stage 2 by wall emphysema and stage 3 by gas within the pericholecystic spaces (5).

Besides being an excellent implement for diagnosis and prognostic evaluation, CT also allows for secure aspiration and drainage whenever a percutaneous procedure is advisable. It finally facilitates the follow-up of the lesions. In order to reduce the irradiation level of the patients, we have chosen to carry out the follow-up examinations with low-dose CT scans unless the patient's condition worsens or his clinical

Table II (from Balthazar and Robinson, Radiology, 1990, 174: 331-336).

A. *Balthazar grade and severity index* (0 to 10)

CT signs (simplified)	*Balthazar grade*	*Balthazar severity index*
Normal pancreas	A	0
Enlarged pancreas	B	1
Peripancreatic fat inflammation	C	2
1 fluid effusion (even in the pleural space)	D	3
2 fluid effusions (or gas in 1 or 2)	E	4
< 30% pancreatic necrosis		+ 2
30-50% pancreatic necrosis		+ 4
> 50% pancreatic necrosis		+ 6

B. *Correlation of CT severity index with mortality and morbidity*

CT severity index	*mortality*	*morbidity*
0-3	3%	8%
4-6	6%	35%
7-10	17%	92%

parametres deteriorate. In the latter case the benefit of a low dose might result in a loss of capital information.

MRI, mainly since the advent of high-performance 3T machines, is slowly carving out its place in the primary evaluation as well as in the follow-up of pancreatitis (3). In the case of emphysematous lesions however, we think that its weak capability to detect gas collections remains a strong handicap.

The medical treatment of pancreatitis still consists of strict fasting and intravenous analgesics since the advantage of administering somatostatin or preventive antibiotherapy has not yet been proved. Serious, largely necrotized, even emphysematous lesions must be closely monitored in the Intensive Care Unit, with hydro-electrolytic and blood-pressure control. Artificial respiration may be required but antibiotics will only be administered in case of infection. Cholecystitis is treated in a similar way but antibiotics must be administered from the very start. When necessary, percutaneous CT or US guided aspiration or drainage will be performed (3, 8, 14-16).

If the definitive cure of EC does really require surgical treatment, the consensus is less broad in the case of gas-forming pancreatitis (8, 10). The present tendency is to limit necrosectomy and closed lesser sac lavage, not only because of their cost but also because of their potentially deleterious nature (6).

Conclusion

Basing ourselves on this exceptional combination of EP and gas-forming cholecystitis, we confirm that CT remains the examination of choice for their diagnosis and follow-up. It allows for their precise staging and helps evaluate their prognosis. Finally, by monitoring the procedure it contributes to secure percutaneous therapeutic treatments.

If the severity of EP is presently being reevaluated, it remains sure that such cases of gas formation in the pancreas or the gallbladder remain particularly serious and require aggressive multidisciplinary management. Up to now, only surgery is able to cure EC definitively but surgical treatment of gas-forming pancreatitis is less and less plebiscited.

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