The Clinical Evaluation of Pancreas Scintigraphy in Diagnosis of Pancreatic Diseases

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The cases studied were 538 cases of non-pancreatic diseases, and 276 cases of pancreatic diseases.

The imaging rate of normal pancreas was about 90.0%. Twenty-five cases of 64 chronic pancreatitis cases were normally imaged the entire pancreas, but 25 cases were not imaged entirely. Most cases with calcification in the pancreas were not imaged entirely. Thirteen cases of pancreatic cyst showed the defect in the corresponding region. Thirty seven cases of 45 pancreas head cancer cases showed defect in the corresponding region and 8 cases failed to show the image of the pancreas. Twenty seven cases of 32 pancreas body and tail cancer cases showed the defect in the corresponding region and 6 cases failed to demonstrate the image of pancreas. Five cases of 7 papilla Vateri cancer cases showed the normal pancreas. The rate of correct diagnosis were 82.2% in the head, 84.4% in the body and tail, and 71.4% in the papilla Vateri.

There has been various literatures2),3) reported clinical experiences of pancreas scanning since 75Se-selenomethionine was applied to pancreas scanning by Blau in 19615). This examination has been taken an important role in diagnosing the pancreatic lesions6),7). In my experience, pancreas scanning has been performed in 810 cases, in which pancreas diseases were suspected in a period of 1966 to 1975. In this paper there are reported the rate of imaging the pancreas on scintigram in normal cases, the shape of normal pancreas imaged on scintigram, and the findings of pancreas scintigram in various pancreatic lesions and the diagnostic reliability.

1. Method and Materials

Pancreas scintigraphy is principally performed in the morning with patient's fasting and with on other special preparations. The patients are given 200 μCi of 75Se-selenomethionine intravenously and scintiphotograms are taken at 15, 30, 45 and 60 minutes after injection with a preset count of 150,000-200,000 per exposure in patient's supine position. One of these exposures is taken with the camera angled 10 degree towards the patient's head. The camera used was pho/gamma III scinticamera of Nuclear Chicago, USA.

The cases subjected to study were 538 cases of non-pancreatic diseases including gastro-duodenal diseases 360 cases, hepatic diseases 27 cases, cholecystopathy 87 cases, and other diseases 64. Two hundred and seventy six cases of the pancreatic diseases were consisted of chronic pancreatitis 171, pancreatic cyst 13, pancreatic cancer 85, islet cell tumor 4, haemangioma of pancreas 1 and sarcoidosis of pancreas 1.

2. Result

1) The rate of imaging the pancreas on scintigram

The imaging rate of pancreas in non-pancreatic lesion was studied. In 329 cases of chronic gastritis the pancreas clearly imaged in 318 cases. Twenty one out of 25 cases of gastric cancer, the pancreas imaged. In 6 cases of gastric polyp, the pancreas imaged in all. Seventy six out of 87 cholecystopathy, the pancreas imaged. In 22 out of 27 cases of liver disease, the pancreas is imaged. Therefore, over all rate of imaging the pancreas were approximately 90.0%.
2) Shape of pancreas

According to Centi Colella’s classification⁴, the normally imaged pancreas (276 cases) are divided into 4 types which are classic type, club-shaped type, reversed sigmoid type and horse-shoe type. About a quarter of cases is compared with the finding of pancreatic ductography and the shape of pancreas imaged on scintigrams and the patterns of the pancreatic duct were well coincided.

There are 33.5% in classic type, 40.9% in club-shape type, 13.9% in reversed sigmoid type and 11.9% in horse-shoe type.

3) Findings in pancreatic diseases

a. Chronic pancreatitis

Sixty four cases of chronic pancreatitis are observed by pancreas scintigraphy. Twenty five cases out of 64 cases are normally imaged the entire pancreas, but 25 cases are not imaged entirely. Nine cases show defect in head region, 1 case defect in body region and 4 cases defect in tail region. Most of the cases with calcifications of the pancreas are not imaged entirely (Fig. 1 a, b).

b. Pancreas cyst

Thirteen cases of pancreas cyst show the defect in corresponding region in which the cyst lesion is located. Three cases show the defect in the head region, 8 cases the defect in the body and tail regions and 1 case the defect in the tail region respectively (Fig. 2).

36) Exceptionally a case of the cyst developed in the tail region extending outward shows no apparent defect in the pancreas image.

c. Cancer of pancreas

There are 45 cases of pancreas cancer in the head portion, 33 cases of pancreas cancer in the body and tail portions and 7 cases in the papilla region observed. Thirty seven cases out of 45 cases of pancreas head cancer show partial defects in the head region and 8 cases show total defect in the entire pancreas on the scintigram. It, therefore, can be correctly found a lesion in 82.2% by scintigraphy of the pancreas.

Twenty seven cases out of 32 cases of pan-
Fig. 3 Cancer of the pancreas in the head portion.
The scintiphotogram demonstrates a partial defect in the head region (arrow). The body and tail portions are imaged normally. The cancer body and tail cancer show partial defect in the body and tail regions and 6 cases show total defect in the entire pancreas on the scintigram. It, therefore, can be found a lesion correctly in 84.4% by scintigraphy (Fig. 4). Five cases out of 7 cases of papilla cancer show normal pancreas on the scintigram. It, therefore, can be diagnosed to be ruled out a lesion of pancreas in 71.4% of papilla cancer by scintigraphy.

Fig. 4 Cancer of the pancreas in the body and tail portions.
The scintiphotogram demonstrates the head portions imaged normally. The portions of body and tail are not imaged indicating the lesion located in this portion (arrow).

4) Comparison of scintigraphy with other diagnostic methods for pancreatic lesions

Generally speaking the patient suffering from pancreatic malignant lesions complains not so much in the early stage, but when the patient begins to notice something wrong in the epigastrium, the diseases are mostly advanced in its stage.

Therefore when the patients examine by the upper gastrointestinal fluoroscopic study, the findings obtained on the stomach study are very significant. But usually the findings suggestive of the pancreatic lesions are so small or very faint. These findings would be hardly recognized to be significant to pancreatic lesions, if the examiner is not always kept in his mind on the pancreas locating behind the stomach. The hypotonic duodenography is very useful in the diagnosis of the papilla lesion, that of the head of pancreas and duodenum itself. From these findings and patient’s complaints suggestive of pancreatic lesions, pancreas scintigraphy should be proceeded. The result of this study gives a clue of proceed further examinations such as pancreatic angiography, axial transverse tomography following retroperitoneal air insufflation, pancreatic ductography through duodenal fiberscope and percutaneous transhepatic cholangiography in case of obstructive jaundice.

The diagnostic reliability of the pancreas scintigraphy is compared to that of pancreas angiography. In the pancreas head cancer, the diagnostic reliability of the angiography is 70.0% (14/20) and that of scintigraphy 80.0% (16/20). In the pancreas body and tail cancer, the diagnostic reliability of the angiography is 86.7% (13/15) and is same to that of scintigraphy.

Therefore, the reliability of scintigraphy is rather superior to that of angiography for detection of a lesion in the pancreas. There is, however, adequate and timely cooperation of both diagnostic tools necessary.

On the other hand, the percutaneous transhepatic cholangiography is well demonstrated the status of the common bile duct with a special reference to the lesion of head of the pancreas and distal end of the
common bile duct. The lesion in the above mentioned area can be diagnosed in 66% of these cases.

The axial transverse tomography following the retroperitoneal air insufflation is one of a method demonstrating the contour of pancreas. This method can be demonstrated the pancreatic lesion in 53%.

3. Discussion

The various radioisotopic pharmaceuticals, such as \(^{65}\)Zn-chloride, \(^{54}\)Mn-chloride and others have been tried as the scanning agents of the pancreas. At present \(^{75}\)Se-selenomethionine is recognized as a most suitable scanning agent for pancreas.

In the beginning of pancreas scanning the various preparation methods were reported to be useful. But since Sodee\(^3\), and Kakehi\(^4\) reported it to be no value, the preparation has not been used.

The pancreas is well visualized over 90% of non-pancreatic cases in our series of pancreas scanning. This result is not inferior to that of other reports and is considered to be reliable among the various methods examining the state of pancreas.

On the other hand, the coincidence of visualization of pancreas lesions on the scintigram is reported to be only 51% by Rodriguez-Antunez, but is agreed in 92% by Hatchettes and 84% by Uchiyama. Our overall results show almost the same. This fact can be considered the pancreas scanning to be highly reliable.

In the cases of pancreas cancer, the advanced one shows non-visualization of pancreas entirely, but the relatively early cases shows a localized partial defect.

In the cases of chronic pancreatitis with calcification the pancreas is not visualized entirely and/or shows moderate decrease in uptake entirely.

Therefore the differentiation of chronic pancreatitis and pancreas cancer is sometimes rather difficult by the scintigraphy. Further study by other roentgenologic examinations is necessary for a detail observation.

4. Conclusion

As concluded, the pancreas scintigraphy is slightly superior to the various roentgenologic methods, such as hypotonic duodenography, percutaneous transhepatic cholangiography, pancreas angiography, pancreatic ductography only for detecting the lesions in the pancreas. This examination is quite easy to performed and less burdensome to the patient when compared to the other roentgenologic examinations. Therefore, the pancreas scintigraphy should be performed to the patient which is suspicious to the lesion in the pancreas as a screening method combined with the upper gastrointestinal examination (hypotonic duodenography). The percentage for imaging the normal pancreas in pancreas scintigraphy is very high and about 90%.

It can be, therefore, considered at present the pancreas scintigraphy to be most reliable for ruling out the suspective lesions.

References

要旨

膵シンチグラフィの膵疾患診断に対する臨床的評価

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$^{75}\text{Se}$ーセレノメチオニンによる膵シンチグラフィを膵疾患276例、非膵疾患538例の計814例に実施した。正常膵の検出率は約90％であった。膵がんの診断率は膵がんの45例では37例に欠損を膵部に認め一致率は82.2％、体尾部がんの32例では27例に欠損を認め一致率は84.4％であった。慢性膵炎では64例において、正常膵を検出するものと、まったく膵を検出しないものと同程度に認められ、膵石灰化を示すものの多くは膵は検出されなかった。膵囊腫の13例では全例に病巣に一致する欠損像が認められた。すなわち、膵シンチグラフィの病巣局在診断能は高く、スクリーニング法として信頼度の高い検査法ということができる。