

REFERENCES

1. PEARSON HA, SPENCER RP, CORNELIUS EA: Functional asplenia in sickle cell anemia. *New Engl J Med* 281: 923-926, 1969
2. SPENCER RP, PEARSON HA, BINDER HJ: Identification of cases of "acquired" functional asplenia. *J Nucl Med* 11: 763-766, 1970
3. SPENCER RP, DHAWAN V, SURESH K, et al: Causes and temporal sequence of onset of functional asplenia in adults. *Clin Nucl Med* 3: 17-18, 1978
4. PEARSON HA, CORNELIUS EA, SCHWARTZ AD, et al: Transfusion-reversible functional asplenia in young children with sickle-cell anemia. *New Engl J Med* 283: 334-337, 1970
5. PEARSON HA, SCHIEBLER GL, SPENCER RP: Functional hyposplenia in cyanotic congenital heart disease. *Pediatrics* 48: 277-280, 1971
6. JOSPHE G, ROTHENBERG SP, BAUM S: Transient functional asplenia in sickle cell-C disease. *Am J Med* 55: 720-722, 1973
7. SPENCER RP, SURESH K, PEARSON HA, et al: "Reversible" functional asplenia in combined immunodeficiency. *Internat J Nucl Med Biol*: in press
8. DHAWAN V, SPENCER RP, PEARSON HA, et al: Functional asplenia in the absence of circulating Howell-Jolly bodies. *Clin Nucl Med* 2: 395-396, 1977
9. SPENCER RP, PEARSON HA: Splenic radiocolloid uptake in the presence of circulating Howell-Jolly bodies. *J Nucl Med* 15: 294-295, 1974
10. ASHKENAZI A, IDAR D, HUNDZEL ZT: An in vitro immunological assay for diagnosis of coeliac disease. *Lancet* 1: 627-629, 1978

Detection of a Large Arteriovenous Fistula between the Internal Iliac Vessels by Radionuclide Angiography

Tatsuya Miyamae, Mutsumi Fujioka, Yoshitaka Tsubogo, Yoshito Tonariya,
Yutaka Dohi, Yoshihisa Akashi, and Hiroshi Watanabe

Saitama Medical School, Saitama, Japan

A patient evaluated for heart failure was found by routine radionuclide angiography to have a large internal iliac arteriovenous fistula of presumed postoperative origin. The value of radionuclide angiography is described with a review of the literature on such unusual cases.

J Nucl Med 20: 36-38, 1979

Radionuclide angiography is an excellent procedure as an initial screening test for detection of aneurysm or other vascular diseases. We recently observed an internal iliac arteriovenous fistula (AVF) in a 60-year-old woman in which radionuclide angiography demonstrated an unusual pattern. This unusual case is presented here.

CASE REPORT

A 60-year-old woman was admitted to Saitama Medical School Hospital because of recurrent exertional dyspnea for the past 3 years. The patient had had a supracerivical hysterectomy 34 years previously for a chorionic epithelioma and right upper abdominal surgery 15 years previously, the nature of which was obscure.

Examination revealed a blood pressure of 130/80 mmHg, pulse rate 90 per minute and irregular, respiratory rate 21 per minute, and bilateral distention of the jugular veins. A grade 3/6 systolic murmur was heard in the left third and fourth intercostal space. The abdomen was flat, soft, and without palpable masses. By auscultation, a continuous murmur with systolic intensification was heard in the lower abdomen. No adnexal mass was detected on vaginal examination, but an expansile pulsation was noted in the right uterine fornix. The electrocardiogram revealed an atrial fibrillation with left-sided axis deviation, the chest radiograph showed cardiomegaly with deviation to the left, and an abdomen radiograph revealed a circular-shaped calcification in the right pelvis.

Routine anterior radionuclide angiocardiograms and whole body scintigram were obtained with a scintillation camera and low-energy all-purpose collimator, following bolus injection of 15 mCi of in vivo labeled Tc-99m red blood cells. The angiocardiograms demonstrated early filling of the inferior vena cava and indicated laminar blood flow from the

Received March 29, 1978; revision accepted Aug. 2, 1978.

For reprints contact: Tatsuya Miyamae, M.D., Dept. of Radiology, Div. of Nuclear Medicine, Saitama Medical School, Moroyama, Iruma, Saitama, 350-04, Japan.

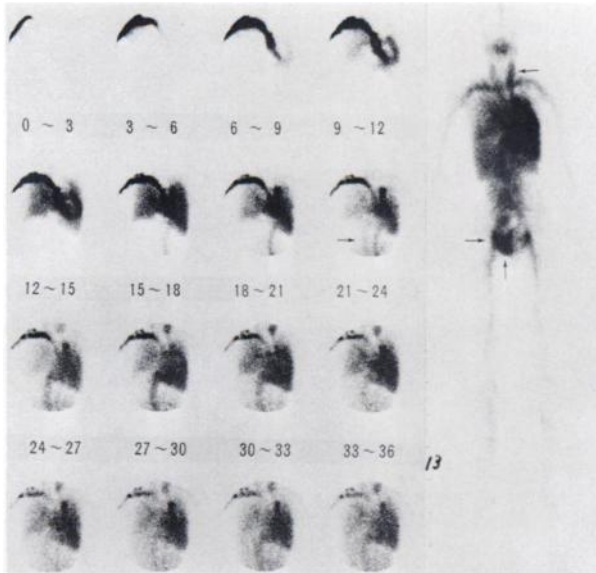


FIG. 1. Anterior radionuclide angiograms and whole body scintigram in vivo labeled Tc-99m red blood cells. There is left-sided deviation of cardiac pool and early filling of the inferior vena cava (arrow). Filling defect at the inferior portion in the right atrium (arrow) is filled by blood from the inferior vena cava, considered to be laminar blood flow. An area of increased activity (venous phase) of unknown cause is seen in left neck (arrow). Whole-body scintigram shows abnormal blood pool in left neck and right pelvis (arrow).

superior and inferior vena cavae. In the venous phase, an area of increased activity was observed in the left neck. The whole body scintigram showed an abnormal blood pool in the right pelvis and in the left neck, and indicated the possibility of asymmetric pulmonary perfusion (Fig. 1). Two days after the first radionuclide examination, anterior abdominal angiograms were obtained following bolus injection of 15 mCi of Tc-99m DTPA, which showed a tortuous aorta and both iliac arteries, and then the region noted in the previous study (Fig. 2). Subsequent posterior

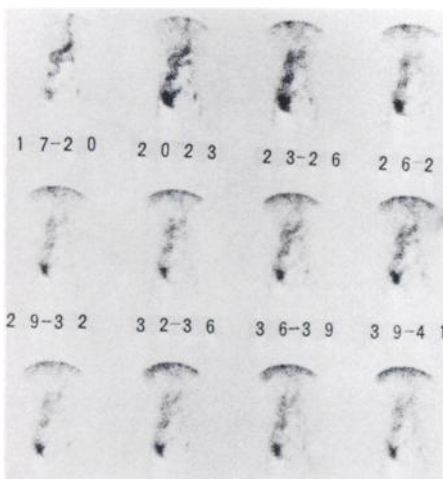


FIG. 2. Anterior abdominal angiograms (Tc-99m DTPA) demonstrates abnormal blood pool in arterial phase following visualization of tortuous iliac arteries.

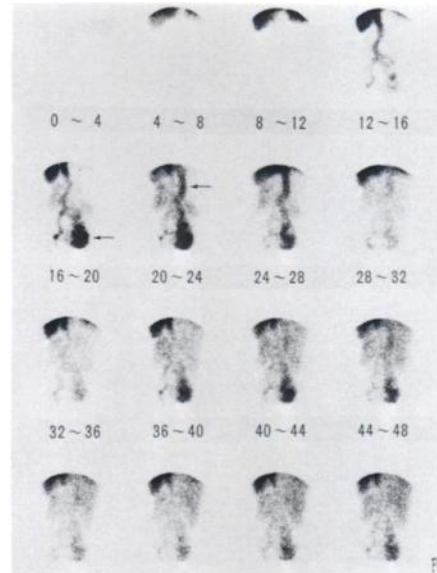


FIG. 3. Posterior abdominal angiograms (Tc-99m phytate) shows rapid filling of inferior vena cava (arrow) following appearance of abnormal blood pool (arrow), repeatedly visible at intervals of about 20 sec.

abdominal angiograms with Tc-99m phytate disclosed an abnormal pattern with rapid filling of the inferior vena cava following the repeat appearance of the abnormal blood pool (Fig. 3). These examinations suggested a large AVF between the internal iliac vessels. Subsequent contrast angiograms confirmed the abnormality observed on the radionuclide studies (Fig. 4). On cardiac catheterization, PO₂ values were extremely high in the inferior vena cava and moderately high in the right ventricle, but there was no evidence of septal defects.

The patient was diagnosed as having high-output cardiac failure with atrial fibrillation due to an AVF between the internal iliac vessels, probably the uterine vessels.

DISCUSSION

Arteriovenous fistulae between the internal iliac vessels in women are rare lesions, although there are several cases of uterine AVF reported in the literature. Bottomley and Whitehouse reported two cases of congenital uterine AVF and collected 17 cases from the literature (1). Fulmer et al. reported a case of acquired uterine AVF, found 19 years following supracervical hysterectomy, and reviewed six similar cases (2). A surgically induced AVF is considered to result from transfixion sutures that penetrate a contiguous artery and vein (2,3).

In our case the manifestation of this lesion so late in life and the history of a supracervical hysterectomy 34 years earlier would strongly suggest an acquired etiology. In none of the seven previously reported cases that developed following surgery were there typical symptoms of high-output cardiac failure. Only in a case of right ovarian AVF following a supracervical hysterectomy 17 years previously (3) were such symptoms observed.

In the posterior view of the radionuclide angiogram, early filling of the inferior vena cava following that of the renal veins is more clearly defined than in the anterior view.

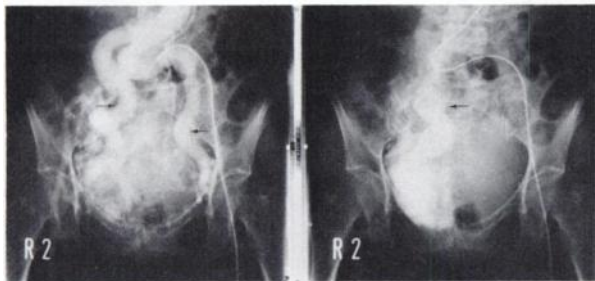


FIG. 4. Contrast angiograms show AVF between bilateral internal iliac arteries and pelvic venous plexuses. Note remarkable dilatation of bilateral internal iliac arteries (arrow) and right internal iliac vein (arrow).

Radionuclide angiogram of the chest demonstrated distinct early filling of the right heart from the inferior vena cava that suggested an arteriovenous shunt in the abdomen. Subsequently, abdominal angiograms showed a bolus effect due to early recirculation between the heart and the pelvic lesion that suggested that existence of a large AVF.

Figure 1 discloses a very interesting finding—"laminar blood flow." El-Zayat and Razzak verified the existence of laminar blood flow in the pulmonary artery from the superior and inferior vena cavae in man, with an I-131 macro-

aggregate external counting method of the lungs (4). In Fig. 1 it appears that in the right heart there is limited mixing of blood flows from the superior and inferior vena cavae. Based on these observations, the existence of laminar blood flow at the level of the right heart is reinforced. The possibility of the existence of laminar blood flow at the level of the pulmonary artery could be verified by pulmonary perfusion studies with Tc-99m macroaggregate.

This rare case demonstrates the value of radionuclide angiography for detection of AVF in the pelvis.

ACKNOWLEDGMENTS

The authors are indebted to Mr. K. Suzuki and Mrs. N. Miyamae for their assistance in the preparation of this manuscript.

REFERENCES

1. BOTTOMLEY JP, WHITEHOUSE GH: Congenital arteriovenous malformations of the uterus demonstrated by angiography. *Acta Radiol Diagnosis* 16: 43-48, 1975
2. FULMER GT, MAYBERGER HW, SHEEHY TJ, et al: Arteriovenous fistula of the uterine artery: A rare complication of hysterectomy. *Angiology* 21: 647-653, 1970
3. CAMP OB: Arteriovenous fistula following hysterectomy. *Am J Surg* 86: 240-243, 1953
4. EL-ZAYAT A, RAZZAK MA: Selective distribution of caval blood within the lungs. *J Nucl Med* 13: 616-620, 1972

**PRAIRIE PROVINCE CHAPTER
ANNUAL MEETING**

April 27-28, 1979

Regina, Saskatchewan, Canada

CALL FOR ABSTRACTS

Abstracts are now being accepted for the Annual Meeting of the Prairie Province Chapter of the Society of Nuclear Medicine, to be held in Regina, Saskatchewan, Canada, April 27-28, 1979.

Abstracts should be typed in a single-space format, with line length not exceeding 4½ inches, and limited to less than 250 words, including title. Send the Abstract to:

Dr. Z. Catz
Nuclear Medicine Department
Plains Health Center
4500 Wascana Parkway
Regina, Saskatchewan, Canada

Abstract deadline: February 28, 1979

For further information write to the above address or telephone Dr. Ian Tyson at (303) 527-9641.