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가 가 38 . 2 , , ,

가 1 (Table 1).

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CT, MRI

5 Fr Cobra, Sidewinder Multipurpose
(Cook, Bloomington, U.S.A.) 가
가 ,
Leggiero microcatheter

(Terumo, Tokyo, Japan) U.S.A.), 250 - 710 micron polyvinyl alcohol
 Contour emboli (Interventional Therapeutics Corporation,
 Fremont, U.S.A.) (Merck, Darmstadt,
 Germany)
 Gelfoam Contour emboli
 Coil
 3 - 15 mm Steel coil (Cook, Blooming - ton,
 U.S.A.), 0.5 - 1 mm Gelfoam (Upjohn, Kala - mazoo,

Table 1. Summary of Cases

Case	Sex/Age (yr)	Location	Symptoms	Findings of Angiography	Embolic Agents	Results of Embolization	Complication	Follow up period
1	M/49	Kidney	Gross hematuria Urinary retention	Tortuous, dilated feeding artery & vein Early venous drainage	Contour emboli	Cessation of hematuria		2 months
2	F/53	Kidney	Gross hematuria Hypotension Anemia	Tortuous, dilated feeding artery & vein Early venous drainage	Gelfoam	Cessation of hematuria, Stabilized vital sign		3 months
3	F/39	Liver	Ascites Anemia	Dilated feeding artery with grape-like ppearance Early venous drainage	Coil	Correction of anemia	Transient pain	3 months
4	M/30	Lung	Exertional dyspnea Fever, hypoxia	Multiple, dilated feeding arteries & veins Early venous drainage Sacular aneurysms of the nidus	Coil	Regression of dyspnea Correction of hypoxia	Transient fever	6 months
5	M/33	Chest wall	Edema & pain of chest wall	Tortuous, dilated, numerous feeding arteries Aneurysm of the feeding artery	Coil, gelfoam Contour emboli	Regression of pain & bruit Recurrence after 3yrs	Transient fever	36 months
6	F/33	Uterus	Vaginal bleeding Low back pain	Tortuous, dilated, numerous feeding arteries & veins with honeycomb appearance Early venous drainage	Absolute ethanol Coil, Gelfoam Contour emboli Absolute ethanol	Decrease bruit Recurred vaginal bleeding	Transient pain	3 months
7	F/30	Paraspinal region	Exertional dyspnea Pleural effusion	Tortuous, dilated, multiple feeding arteries & veins Early venous drainage	Coil, Contour emboli	Normalized heart size Regression of effusion	Transient fever & pain	4 months

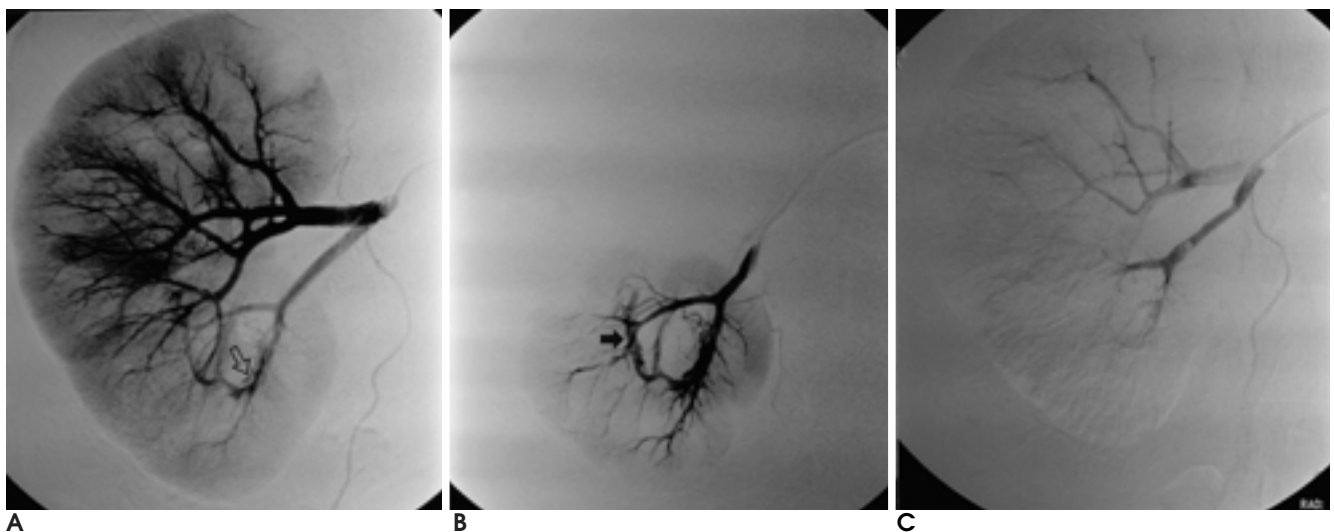


Fig. 1. A, B. Pre-embolization renal arteriogram and selective lobar arteriogram in the case 1 show tortuous, dilated feeding artery (open arrow) and vein, with early venous drainage (solid arrow) due to arteriovenous shunts.
C. Post-embolization renal arteriogram shows obliteration of the feeding artery and arteriovenous shunts.

(Table 1 & Fig. 1, 2).

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, CBC, UA, ABGA

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2-36 (8.1)

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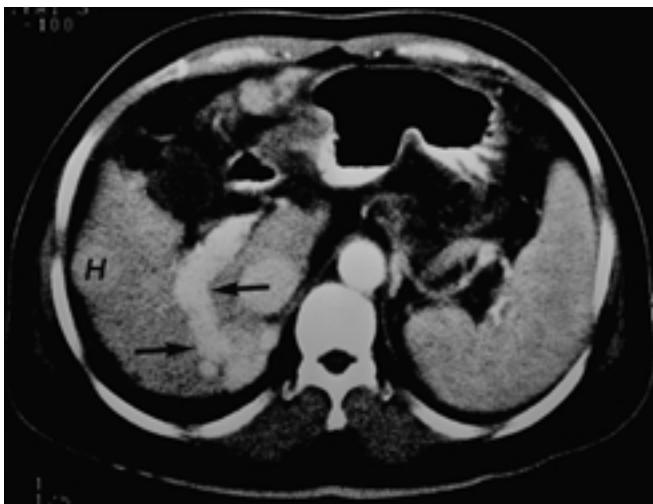
가 (11.5 g/dL 5.2 g/dL
12.7 g/dL 10.0 g/dL)
2-3 CT

6

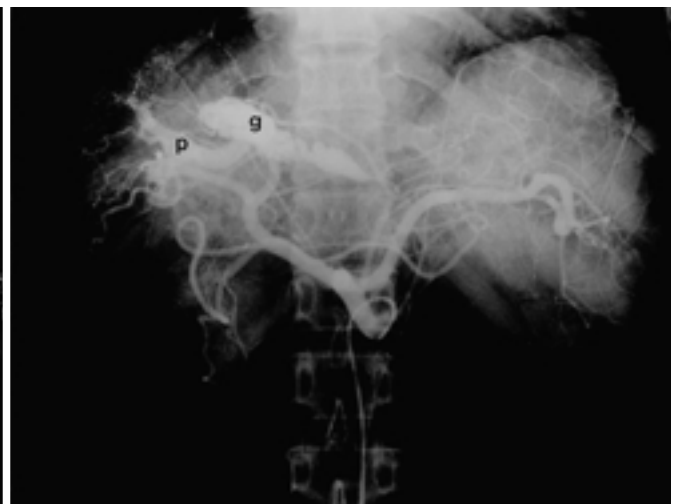
3

4 2
8.0 × 1.5 cm
가

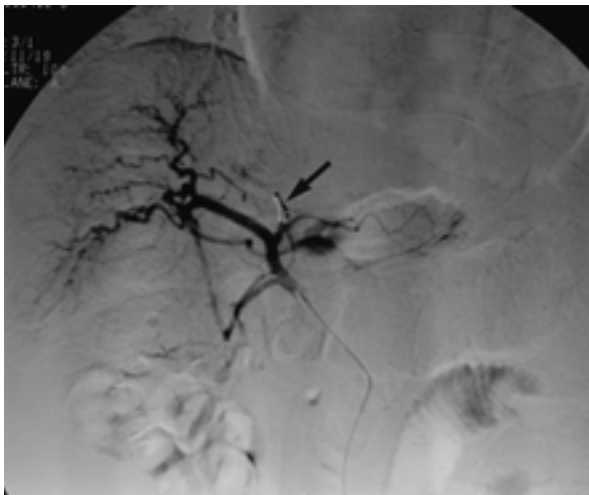
mmHg (PaO₂) 51.5 mmHg 97.1
6



A



B



C

Fig. 2. A. Contrast-enhanced CT shows tortuous and dilated abnormal vessels (arrows) in the right hepatic lobe. Small hepatoma (H) is also noted.

B. Celiac arteriogram shows grape-like, abnormal vessel (g) arising from left hepatic artery which is connected with portal vein (p).

C. Post-embolization arteriogram shows obliteration of left hepatic artery and AVM. Note the coils (arrow) occluding the left hepatic artery.

(Fig. 3). (n=3), (Table 1).

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CT 3 가 (primitive)

3 (2).

4 (n=3)

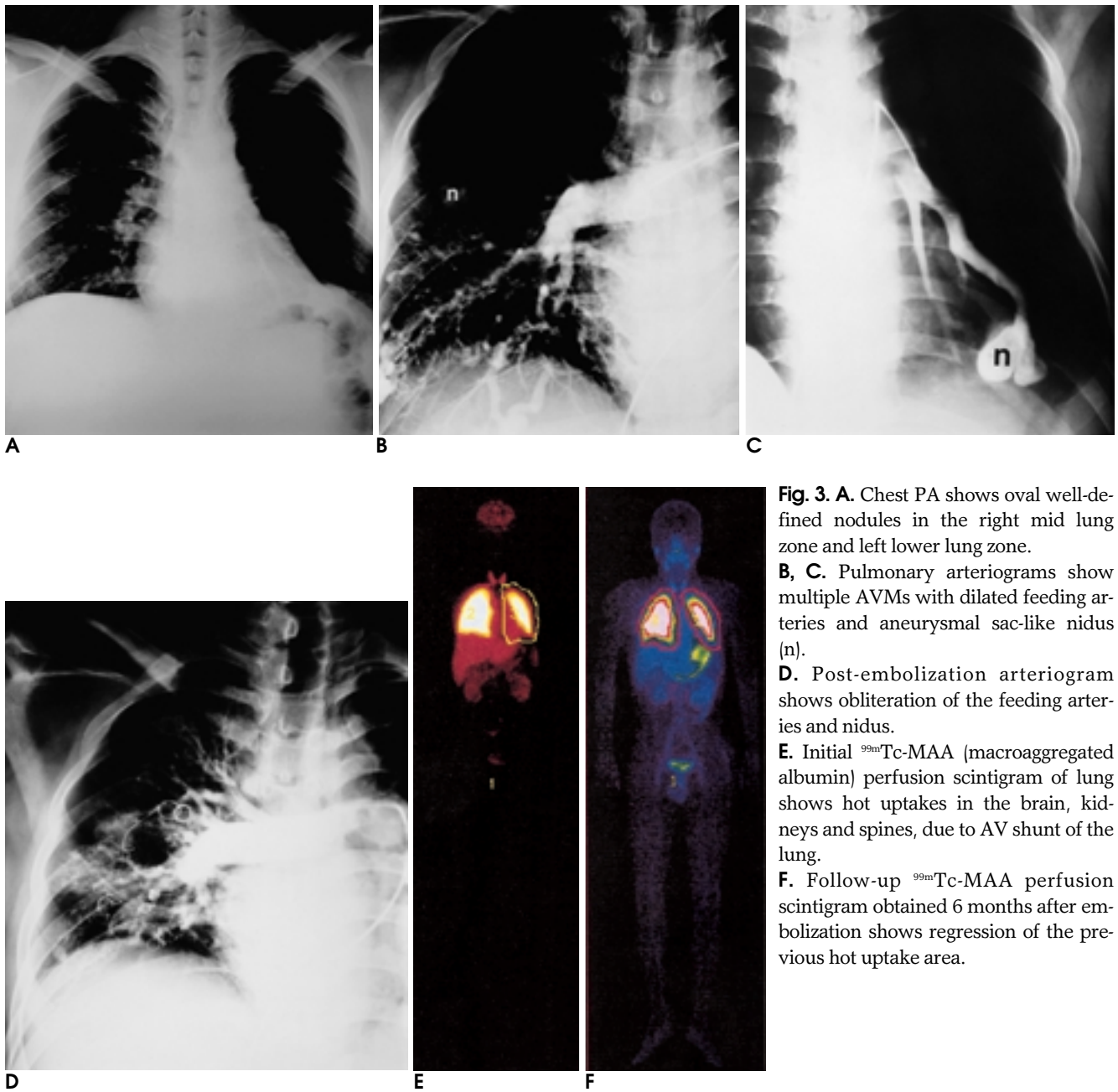


Fig. 3. A. Chest PA shows oval well-defined nodules in the right mid lung zone and left lower lung zone.
B, C. Pulmonary arteriograms show multiple AVMs with dilated feeding arteries and aneurysmal sac-like nidus (n).
D. Post-embolization arteriogram shows obliteration of the feeding arteries and nidus.
E. Initial ^{99m}Tc-MAA (macroaggregated albumin) perfusion scintigram of lung shows hot uptakes in the brain, kidneys and spines, due to AV shunt of the lung.
F. Follow-up ^{99m}Tc-MAA perfusion scintigram obtained 6 months after embolization shows regression of the previous hot uptake area.

(3). 가 , (simple) (5).
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(4). (4).
(parasitization) , detachable balloon Coil 가
(nidus) . (4).
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(aneurysmal sac) ,
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(4).
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Gelfoam

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The Effectiveness of Percutaneous Transarterial Embolization for Arteriovenous Malformation¹

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Purpose: To determine the effectiveness of percutaneous transarterial embolization for the treatment of arteriovenous malformation (AVM).

Materials and Methods: Seven patients with AVMs located in the kidney, liver, lung, chest wall, uterus and paraspinal region underwent angiography and percutaneous transarterial embolization. The embolic materials used were steel coil, gelfoam, contour emboli, and absolute alcohol; in some cases, more than one of these were employed. The analysed the angiographic findings and clinical status following embolization were assessed and analysed.

Results: The AVMs had tortuous, dilated feeding arteries ($n=7$) and veins with early venous drainage ($n=6$). In the hepatic AVM, a grape-like dilated vessel arose from the hepatic artery and was connected to the portal vein. In the uterine AVM, numerous dilated feeding arteries formed a honeycomb. In the feeding arteries of the chest wall AVM and in the nidus of the pulmonary AVM, aneurysms were present. In simple AVMs, the patient's symptoms were relieved by first embolization. Complex AVMs, however, required repeated embolizations for symptomatic relief. Although extensive, complex AVMs of the chest wall and uterus recurred after initial embolization, repeated treatment successfully improved the clinical status of such patients. The complications developing after embolization were fever ($n=3$) and pain ($n=3$), but these were relieved by conservative care.

Conclusion: Percutaneous transarterial embolization is a safe and effective therapeutic method for the treatment of AVM. In a case of inoperable complex AVM, repeated embolization is the only method for symptomatic relief and the maintenance of life.

Index words : Arteriovenous malformations, therapeutic embolization
Interventional procedures, technology

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