

1, 2

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 가
 : 7 21
 19 1-7 , 1 , 1
 , ,
 , 가
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 , 가 가
 . 가 가
 가
 :
 ,
 .
 (internal iliac artery)
 , 0.05% 4.9%
 (1, 2). ,
 (15).
 가
 , 가 가
 가 (3-14).
 (acquired arteriovenous malformation) (4-
 8), 가 (pseudoaneurysm) (3, 9-11), (arte-
 riovenous fistula) (3, 12),
 (13, 14)
 (4).

1
 2

21 - 39 가 , 가 가

가 13 , 6

12 1 - 7 , 1 가

가 가

8 7 1 - 5 , 1

가

가

(cross - filling) 가

가 가

가 24 , 1

1 3 , 2 1

(aliasing artifact)

가 13 가 가 8

5 , 21 가

(peak systolic velocity), (end - dias -

tolic velocity), (resistive index), 가 가

(pulsatility index)

118

가 (radial artery)

가 24 가

가

(Fig. 1A, 2A), 5

가

(Seldinger) 8 7 (Fig. 2A), 1

5F

가 (Fig.

가 1B, 2B). 가 가 8

가 (Fig. 2B).

가

(Fig. 1C, 2C). 가 13

(Gelfoam; Pharmacia & Upjohn, Kalamazoo, Mich) 11 - 95 cm/sec(39 cm/sec± 19,

Table 1. Comparison of Duplex Doppler Data between AVM Group and Control Group

Parameters	AVM(n=13)	AVM combined with a pseudoaneurysm(n=8)	Control Group(n=118)
PSV (cm/sec)	11 - 95 (39± 19)	11 - 68 (30± 15)	4 - 38 (11.6)
EDV (cm/sec)	6 - 67 (27± 15)	1 - 38 (18± 9)	
RI	0.17 - 0.52 (0.32± 0.09)	0.28 - 0.66 (0.40± 0.09)	0.53 - 0.98 (0.72)
PI	0.19 - 0.66 (0.37± 0.11)	0.34 - 0.76 (0.54± 0.18)	

AVM = arteriovenous malformation, PSV = peak systolic velocity, EDV = end-diastolic velocity, RI = resistive index, PI = pulsatility index

mean \pm standard deviation) , 0.17 - 0.52 (0.32 \pm 0.09, mean \pm standard deviation) . 가
 가 8
 11 - 68 cm/sec (30 cm/sec \pm 15, mean \pm standard deviation) , 0.28 - 0.66 (0.40 \pm 0.09, mean \pm standard deviation) . 118
 가

4 - 38 cm/sec (mean, 11.6 cm/sec) 0.53 - 0.98 (mean, 0.72) (Fig. 1D, 2D) 가
 가 8 (Fig. 2D). 21 11
 , 3 , 6
 , 1

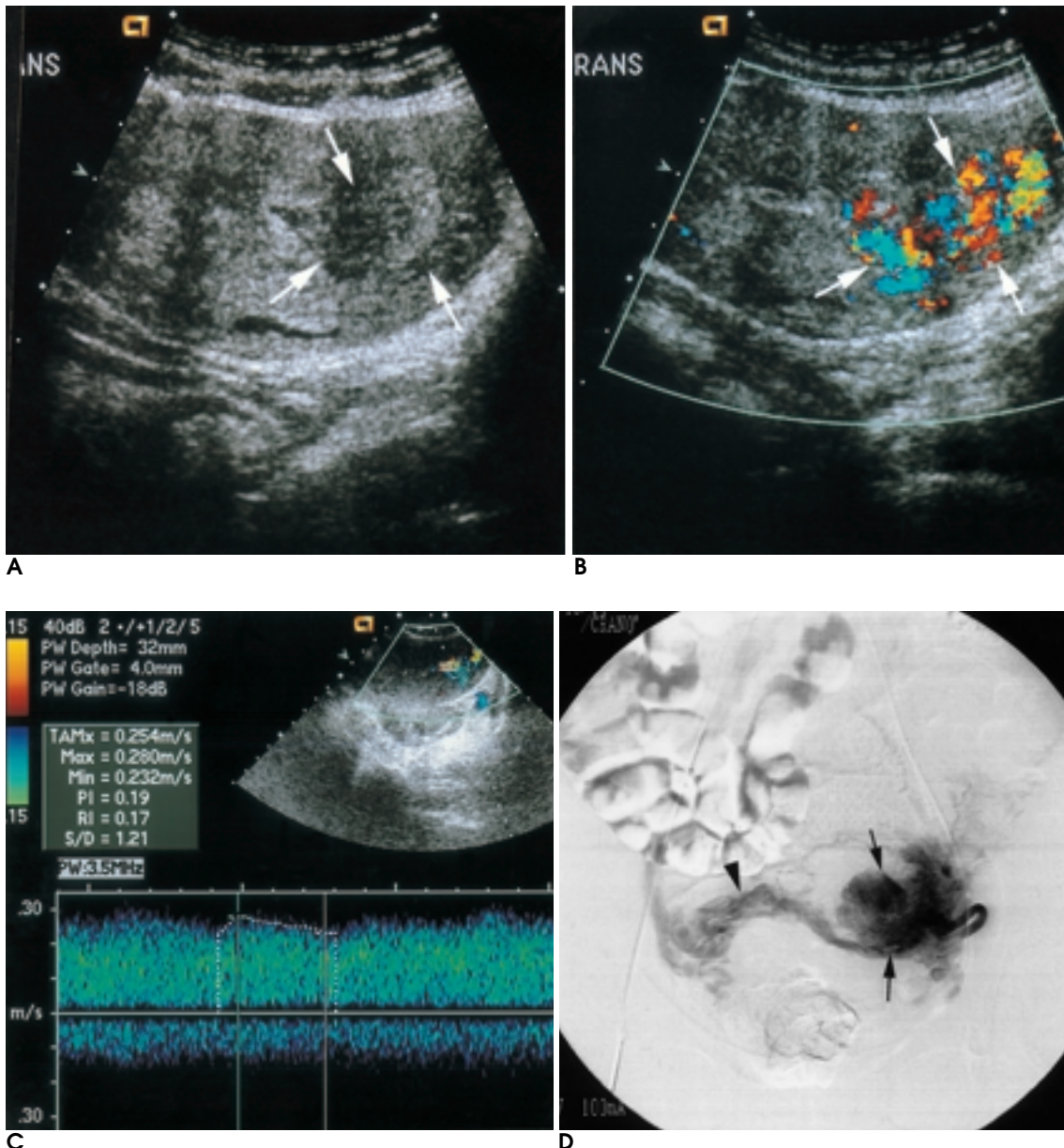


Fig. 1. Acquired AVM in a 33-year-old woman. This patients had intermittent vaginal bleeding after D&C for a therapeutic abortion 45 days earlier.
A. Transverse gray-scale US image shows subtle myometrial inhomogeneity (arrows) in the left lateral aspect of the uterus.
B. Transverse color Doppler US image shows a tangle of tortuous vessels (arrows) in the corresponding myometrium.
C. Transverse duplex Doppler US image shows little systolic-diastolic variation with low pulsatility of arterial waveform (peak systolic velocity, 28 cm/sec; pulsatility index, 0.19; resistive index, 0.17).
D. Selective angiogram of the left uterine artery shows a markedly opacified vascular tangle (arrows) and early venous drainage (arrowhead) at the arterial phase.

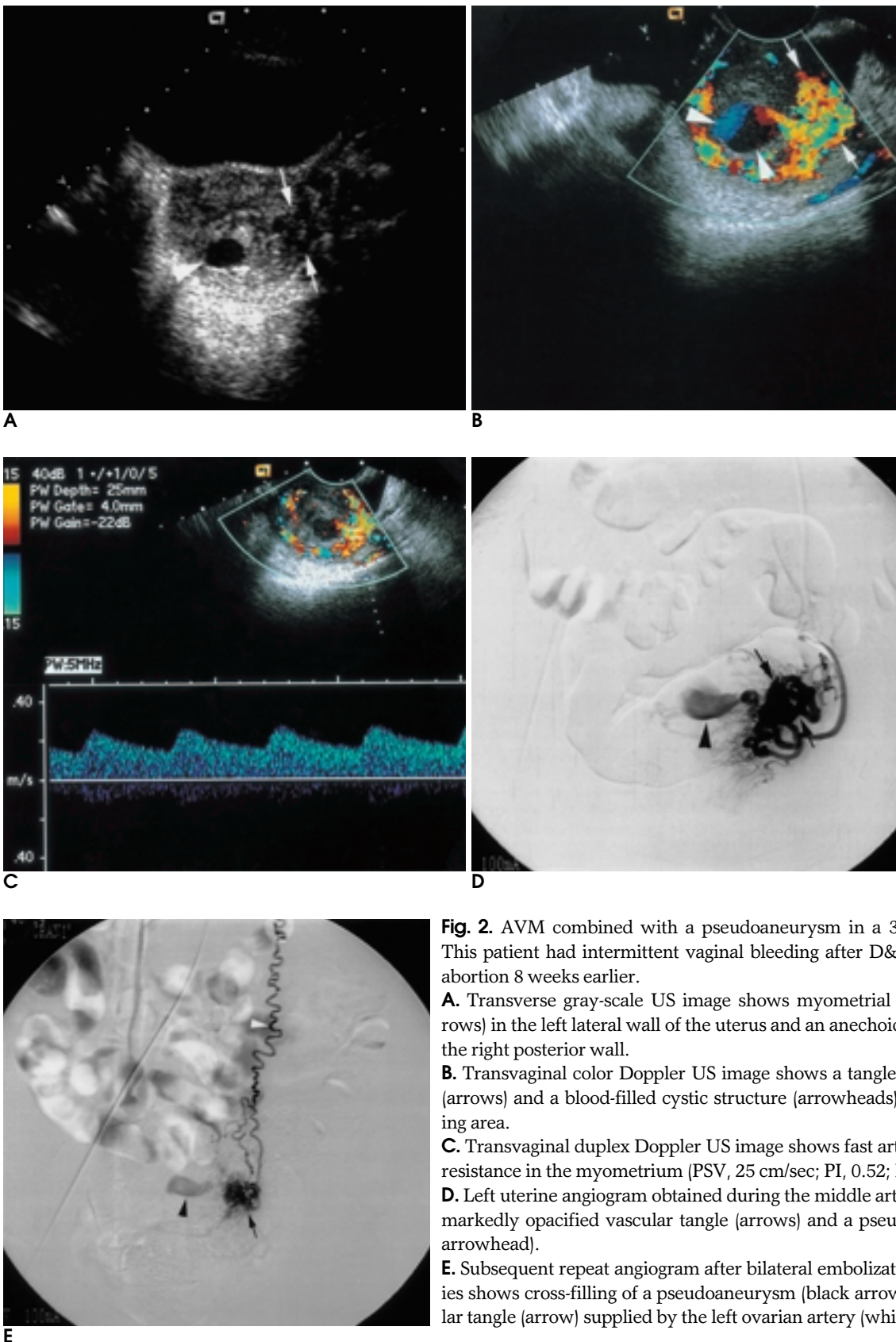


Fig. 2. AVM combined with a pseudoaneurysm in a 33-year-old woman. This patient had intermittent vaginal bleeding after D&C for a therapeutic abortion 8 weeks earlier.

A. Transverse gray-scale US image shows myometrial inhomogeneity (arrows) in the left lateral wall of the uterus and an anechoic sac (arrowhead) in the right posterior wall.

B. Transvaginal color Doppler US image shows a tangle of tortuous vessels (arrows) and a blood-filled cystic structure (arrowheads) in the corresponding area.

C. Transvaginal duplex Doppler US image shows fast arterial flow with low resistance in the myometrium (PSV, 25 cm/sec; PI, 0.52; RI, 0.40).

D. Left uterine angiogram obtained during the middle arterial phase shows a markedly opacified vascular tangle (arrows) and a pseudoaneurysm (black arrowhead).

E. Subsequent repeat angiogram after bilateral embolization of uterine arteries shows cross-filling of a pseudoaneurysm (black arrowhead) and a vascular tangle (arrow) supplied by the left ovarian artery (white arrowhead).

24
가
가 1 , 24
(Fig. 2E) 가 3
21). (20).
(6).
(6).
(arcuate artery)
(spiral artery)
(6).
(16, 17).
(17).
(6).
(18).
(6).
(6).
(high flow volume) (6).
(19, 20).
(24).
(gestational trophoblastic tumor),
(diethylstilbestrol)
(4, 23 - 25),
(4 - 7).
(15).
(19, 20).
(15).
(21, 24, 26).
(24).
2 - cyanoacrylate),
- 2 -
(isobutyl -

(3, 15).

가

가 , 가 ,
가 가 ,
가 가 .

3-5

가
가

(27).

가 가
가 .

(28).

3

가

가 ,
가 .
가 , 가
가 가 , 가
가 가 가

(,) ,

가 ,
가 가 가
가 가 (29). (retained

products of conception)

(30). (placenta accreta)

(31).

- (serum beta - human
chorionic gonadotropin) 가

가

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Radiologic Diagnosis and Treatment of Iatrogenic Acquired Uterine Arteriovenous Malformation^{1,2}

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Purpose: To analyze gray-scale US, color and duplex Doppler US, and angiographic findings in patients with acquired uterine arteriovenous malformations (AVMs), and to evaluate the usefulness of these modalities in the diagnosis of this disease and the effect of transcatheter arterial embolization in its treatment.

Materials and Methods: During a recent seven-year period, we diagnosed 21 cases of acquired uterine AVM. Nineteen of these patients had a history of causative D&C (between one and seven D&C procedures per patient), one had a history of causative cesarean section, and one had cervical conization. All patients underwent transabdominal and endovaginal gray-scale, color Doppler, and duplex Doppler US and angiography, with therapeutic embolization of bilateral uterine arteries. The majority underwent follow-up Doppler US after embolization.

Results: The gray-scale US morphology of uterine AVMs included subtle myometrial inhomogeneity and multiple distinct, small anechoic spaces in the thickened myometrium or endometrium. Color Doppler US showed a tangle of tortuous vessels with multidirectional, high-velocity arterial flow, which was focally or asymmetrically distributed. Duplex Doppler US depicted a waveform of fast arterial flow with low resistance, while angiography demonstrated a complex tangle of vessels supplied by enlarged uterine arteries, in association with early venous drainage during the arterial phase, and stasis of contrast medium within abnormal vasculature. Where AVMs were combined with a pseudoaneurysm, this finding was observed. Transcatheter arterial embolization provided a complete cure, without recurrence.

Conclusion: Color and duplex Doppler US is an appropriate modality for the detection and diagnosis of uterine AVMs and for follow-up after embolization. Transcatheter arterial embolization is a safe and effective method of treating this disease.

Index words : Arteriovenous malformations, uterine
Arteries, uterine
Arteries, interventional procedure

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