nominate vein and superior vena cava (figs 3, 4). The large accessory hemiazygos vein corresponded to the mass noted on the chest radiograph. There was no visualisation of the inferior vena cava. The patient remained afebrile with mild right upper quadrant pain of unknown aetiology.

Discussion

There is good surgical evidence that no left or right inferior vena cava was present. It might have been helpful to have performed a left femoral vein injection at the time of the inferior vena cavography.[2] However, because of clinical difficulty, this was not possible. The tortuous branch of the right renal vein probably explains the defect seen on the sonogram at the level of the liver.[3] It would be difficult to regard the absence of the inferior vena cava as congenital, since the embryological right hepatic vein, the right subcardinal vein, the right sub-supracardinal anastomosis, and the right supracardinal vein would have all had to regress.[4] Although this remains a possibility, inflammatory obstruction of the inferior vena cava from the previous pelvic staphylococcal infection seems more likely. Thus with occlusion of the entire inferior vena cava, the blood flow from the legs returns to the heart via a markedly dilated hemiazygos system which is apparent on the chest radiograph as a paraspinous mass.

We thank Ernest J Ferris MD for reviewing this manuscript.

References

1 Castellino RA, Blank N, Adams DF. Dilated azygos and hemiazygos veins presenting in paravertebral intrathoracic masses. *N Engl J Med* 1968; **278**:1087–91.
2 Abrams HL. The vertebral and azygos venous systems, and some variations in systemic venous return. *Radiology* 1957; **69**:508–26.
3 Ferris EJ, Vittimberga J, Byrne JJ, Nabseth DC, Shapiro JH. The inferior vena cava after ligation and plication. A study of collateral routes. *Radiology* 1967; **89**:1–10.
4 Chuang VP, Mena CE, Hoskins PA. Congenital anomalies of the inferior vena cava. Review of embryogenesis and presentation of a simplified classification. *Br J Rad* 1974; **47**:206–13.

Correspondence

Reproducibility of the flow-volume loop

Sir,—In their letter in your June issue, Shaw and Fisher comment generously on our study of flow-volume loop reproducibility.[1] They rightly draw attention to the effect of instrument error on within-subject reproducibility. However, it is virtually impossible to isolate instrument-based variance with human subjects as it is tangled up with the subjects' own variability. These two components combine vectorially—that is, the variances are added together. If within-subject variance is, say 10% for MEF_{50} and 15% for MEF_{75}, these values fall to 9·4% and 14·6% if the instrument variance (assumed to be 3·5%) is removed. Thus instrument variance represents only a small part of total within-subject variation. Shaw and Fisher show that instrument error is markedly higher at low flow rates. Despite this, MEF_{75} appears rather more reliable than MEF_{50} in our analysis. This again suggests that machine error may not be a large factor.

The measurement of helium isoflow volume is critically dependent on reliability at extremely low rates, especially in subjects with airflow obstruction. By extrapolating their table, it appears that instrument error is likely to be substantial at these extremely low flow rates. Thus machine error may play a sizable part in the very poor reproducibility of helium isoflow volume in our study, although it is unlikely to be a substantial factor for other flow-volume loop parameters.

J B MACDONALD
T J COLE
Ayrshire Central Hospital, Irvine and
Dunn Nutritional Laboratory, Cambridge

Reference

1 Macdonald JB, Cole TJ. The flow-volume loop: reproducibility of air and helium-based tests in normal subjects. *Thorax* 1980; **35**:64–9.