Calcified Masses in the Inferior Vena Cava

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Figure. Preoperative computed tomography (CT) showing (A, B) the inferior vena cava (IVC) filter and 2 calcified masses in the IVC, and representative photographs of the (C) extracted IVC filter and (D, E) phleboliths. (F–H) Perioperative CT at (F) 13 days after injury, (G) 16 days after injury (arrow, phlebolith), and (H) 3 months after surgery.
A healthy 25-year-old man was involved in a traffic accident while riding a motorcycle and was transported to Hikone Municipal Hospital by ambulance. Computed tomography (CT) showed a right femoral head fracture with dislocation, and 2 calcified masses in the inferior vena cava (IVC), which could not be ruled out as bone fragments (Figure A,B). Massive blood transfusion was performed for relief of hemorrhagic shock. Open surgery was thought to be necessary for removal of the calcified masses, but systemic heparinization was ruled out in view of the bleeding status. For investigation of the masses, therefore, an IVC filter was first placed in order to prevent further movement of the masses toward the heart. Femoral head replacement was performed on day 5 after injury, and the patient was then transferred to Nagahama City Hospital. Laboratory tests indicated no hematological disorders, including coagulopathy.

Removal of both calcified masses and the IVC filter was done on day 19 after injury. The IVC was exposed via a right anterior subcostal incision. An extracorporeal circuit was used during IVC clamping, and the calcified masses and IVC filter were completely removed (Figure C–E). The masses were mildly adhered to the IVC wall, and fresh thrombi were trapped in the IVC filter. The postoperative course was uneventful, and the patient was returned to Hikone Municipal Hospital on the 10th postoperative day for rehabilitation. On histology, both of the masses were phleboliths without bone components.

Phleboliths are calcified blood clots that arise in pelvic veins, and often require differential diagnosis from urinary tract calculi. The youngest reported patient with phleboliths was 16 years of age. A total of 50% of individuals in their 20s and 89% of those in 70s in the UK have phleboliths. Phleboliths are thus quite common, irrespective of age.

The mechanism of phlebolith formation has not been fully clarified. Various factors such as impairment of local venous circulation, congestion, absence of valves in the pelvic veins, changes in vessel walls due to advanced age, phlebitis, and inflammation in surrounding structures have been suggested. These factors can result in damage to the vessel walls and changes in blood flow. One theory to explain the apparently higher incidence of thrombus calcification in the pelvis is the high local concentration of phosphatase in the tissues surrounding the bladder, leading to deposition of calcium on the pelvic vein thrombi. A total of 98% of phleboliths are, in fact, located in the pelvis, and the remaining 2% are suprapelvic. To our knowledge, no previous report has documented phleboliths in the IVC. It is thought that, in the present case, the physical force of the traffic accident triggered the migration of pelvic phleboliths, which reached the IVC via the bloodstream. Moreover, preoperative CT indicated a new pelvic phlebolith in the left peripheral iliac vein at 16 days after injury (Figure G), which had not been present on CT at 13 days after injury (Figure F). This suggested that the phlebolith reached its observed size in a short period of time. This left-side phlebolith disappeared from its original location by 3 months after the operation without any evidence of migration to another site (Figure H), suggesting that it had dissolved. No similar phenomenon has been reported in the literature so far.

Migrated phleboliths tend to adhere to the IVC wall when patients are bed-bound, and therefore IVC filter placement to prevent their further migration may not be necessary. Such a strategy, however, may help to avoid pulmonary embolism during a long period of bed rest.

In conclusion, when CT shows a calcified mass in the IVC, the possibility of phlebolith should be considered, especially in patients with pelvic trauma.

Disclosures
The authors declare no conflicts of interest.

References