A patient with a hyperechoic band-shaped structure in the right hepatic vein

Patient mit einer echogenen Struktur in der rechten Lebervene

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Zusammenfassung

Abstract
Cement (polymethylmethacrylat) is frequently and increasingly used in vertebral surgery. Complications can occur by spillage of this material; however the vast majority of the patients remain free of symptoms and do not require any specific therapy. Internists, gastroenterologists and radiologists regularly performing abdominal ultrasound and computed tomography should be aware of this complication. A case of spillage of cement in the right hepatic vein is presented.

Case presentation
An 82-year-old male was referred to our department for a routine abdominal ultrasound examination. The ultrasound study, among other investigations, was performed in the outpatient setting. Ten years ago, our patient underwent laparoscopic cholecystectomy and, thereafter, percutaneous coronary intervention due to acute myocardial infarction. He was on phenprocoumon because of atrial fibrillation. His medication included metoprolol, enalapril, pravastatin and a low dose of furosemide. Six months ago, the patient underwent minimal invasive spine surgery (cement augmented spondylodesis L4-S1 with hemi-laminectomy, cement volume injected: 12 ml, position during surgery: prone) because of acute L5-syndrome with underlying stenosis of the spinal canal. During his current outpatient visit, the patient felt generally well and physical examination did not reveal any new pathological findings. All lab investigations, including liver function tests, were within normal range. The international normalized ratio (INR) was within therapeutic range.

Ultrasound of the liver, however, showed an unexpected finding: a band-shaped 5 cm long hyperechoic structure beginning at the caval vein and extending into the right hepatic vein in an otherwise completely normal liver (Fig. 1–3). The incidentally detected structure was documented in both the sagittal and transverse planes and showed a dorsal acoustic shadow in the transverse plan (Fig. 1).

For further clarification, computed tomography of the abdomen was performed and showed cement in the vertebrae L5 and S1, as well as in the right hepatic vein draining into the caval vein (Fig. 4, 5) confirming our ultrasound finding and documenting spillage of cement used for augmentation during spine surgery.

Discussion
Cement (polymethylmethacrylat) is frequently and increasingly used in vertebroplasty and kyphoplasty to reinforce the hold of alloplastic material in bones. There is a risk of cement spillage – while still in a liquid form – if too much pressure is applied during the injection or by the presence of traumatic lesions of the vertebral veins [1].
Fig. 1 Abdominal Ultrasound showing echogenic material in the right hepatic vein.

Fig. 2 Abdominal ultrasound showing band like structure in the right hepatic vein.

Fig. 3 Duplex ultrasound with partial perfusion of the right hepatic vein.

Fig. 4 Computed tomography showing cement in the right hepatic vein.

Fig. 5 Computed tomography showing cement in the right hepatic vein as well as L5 and S1.
Spillage into the pulmonary vessels is the location one would expect as the vertebral veins drain into the caval vein and finally into the pulmonary arteries. In our patient, no cement material was observed in the pulmonary vessels, but surprisingly only in the right hepatic vein.

As shown in our case, the cement spout does not develop in the vertebral vein. Methylmethacrylat injected into the vertebrae is rapidly drained into the venous system where polymerisation occurs. The prone position of our patient during vertebroplasty might have caused partial compression of the inferior vena cava, making it more likely to get cement spilling in the hepatic vein with consecutive polymerisation. In addition, our patient suffered from mild cardiomyopathy following myocardial infarction. Pathological hemodynamics with sluggish flow in the caval vein would further explain stagnation of cement in the liver veins.

As data are still scarce, diagnostic ultrasound criteria are not well established. In our patient, cement material in the right liver vein was documented in two planes and showed posterior acoustic shadowing in the transverse plane. Yet, twinkling artefact – as expected behind calcifications – has not been observed in our case. CT findings confirmed the diagnosis of cement spillage in the right liver vein. The density of the vertebral cement was in the range of 1200–1400 Hounsfield units (HU), nicely correlating with the density of the foreign body in the right liver vein.

The vast majority of patients remain free of any symptoms. However, cases of pulmonary embolism have been described [2]. In a prospective study, CT scans documented cement spillage in pulmonary vessels in 23% of patients [3]. It is important to emphasize the fact that ultrasound represents a valuable diagnostic instrument. Nevertheless, incidental findings, as in our patient, are not uncommon and often require additional invasive investigations for further clarification. Yet, in the majority of cases, there are no clinical consequences. No specific therapy is required for cement spillage in the vascular system. Nevertheless, because of the increased use of cement in bone – and especially spine surgery – physicians should be aware of this possible complication.

References