Case report - Cardiac general

Oxidized regenerated cellulose in cardiac computer tomography imaging

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Abstract

Oxidized regenerated cellulose is widely used as a bioabsorbable topical hemostatic agent. Postoperative visualization of this material through routine chest imaging, such as conventional radiography, computer tomography (CT), magnetic resonance imaging as well as sonography, may prove difficult and, to our knowledge, is not described in the literature. We describe a case where the mediastinal packing with Surgicel® Nu-Knit® after a mitral valve repair procedure led to a delayed obstruction of the superior vena cava, necessitating a re-thoracotomy and curettage of the hemostatic material. The hemostatic agent was not prospectively interpreted as the cause of a severe upper inflow restriction, despite repeated imaging. Retrospectively, the hemostatic material as a cause of the upper inflow obstruction could have been identified earlier if its presence would have been known to the radiologist. We strongly recommend that the surgeon inform the radiologist that such materials were used to improve the diagnostic yield of CT interpretation.

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1. Introduction

Bioabsorbable topical hemostatic agents are widely used. Oxidized regenerated cellulose (Surgicel® Nu-Knit®; Johnson and Johnson Medical, Arlington, TX, USA) is one of the most commonly used agents supporting hemostatic efforts. It is a sterile gauze of thrombogenic material which is inert and bioabsorbable [1]. Once saturated with fluid, its volume increases about 20%. The kinetics of the volume increase varies depending on whether the gauze is dressed as a mono-layer or as a multi-layer conglomerate. It may cause acute organ dysfunction if it is packed too tightly, as well as delayed compression by first creating, then trapping a hematoma within its structure [2]. Surgicel® Nu-Knit® may be left in the surgical bed in certain cases [3]. The most common complication of packing with oxidized cellulose is spinal compression [4].

2. Case report

We report on a case of mediastinal packing with Surgicel® Nu-Knit® after a mitral valve repair procedure in an 82-year-old female patient, which led to a delayed obstruction of the superior vena cava, necessitating a re-thoracotomy on the fourth postoperative day, revision of the situs, and curettage of the hemostatic material. The hemostatic material was not obstructive on the first unenhanced computer tomography (CT)-scan (Fig. 1, arrows), which was performed in the first postoperative night due to progressive pulmonary failure. There was no evidence of superior vena cava compression at the time of the first CT-scan. At the time of the clinical onset of superior inflow obstruction, transesophageal echocardiography (TEE) as well as a second contrast-enhanced CT-scan (Fig. 2a–c) were performed.

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Fig. 2. Contrast-enhanced CT-scans of the same patient as in Fig. 1 that were performed at the fourth postoperative day when the patient presented with upper venous inflow obstruction. (a) Contrast-enhanced transaxial CT of the chest obtained at the level of the right pulmonary vein demonstrates a patent superior vena cava (arrow) with an intraluminal catheter. (b, c) Transaxial contrast-enhanced CT image obtained 2 cm below the image a (b) and coronal reformation (c) demonstrate an oval shaped mass containing air bubbles (arrows) is visible leading to compression the superior vena cava. CT, computed tomography.

Although compression of the superior caval vein was well visualized, its cause was prospectively not properly determined. The air-containing mass, which led to compression of the superior caval vein, proved intraoperatively to correspond to the Surgicel™ Nu-Knit™ conglomerate, which made a delayed volume expansion during the four days after the initial packing. After the re-thoracotomy, the patient could be transferred to the ward on the 21st postoperative day and was discharged from the hospital on the 45th postoperative day in good condition.

3. Comment

Surgicel™ Nu-Knit™ increases in volume when in contact with fluid. When used as a multi-layer conglomerate, this volume increase may be delayed for many days. A CT-scan as well as a TEE-study identified an obstruction of the superior caval vein, but missed the cause of the compression of the superior caval vein: the Surgicel™ Nu-Knit™ conglomerate. Retrospectively, the radiologist could have made the identification easily if the surgeon had provided information on its use in the operation and its location. We strongly recommend that the surgeon communicate the use of such materials, particularly when used as a conglomerate, to the radiologist or cardiologist to allow for an accurate interpretation of the imaging [2, 4–8]. This information may lead to an earlier and more precise diagnosis.

References