Case report

Nellix stent graft migration after endovascular aneurysm sealing

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Key message: In the absence of a proximal fixation mechanism, migration of the Nellix device is an ominous sign indicating an endoleak and change in aneurysm sac diameter/morphology after endovascular aneurysm sealing. This report aims to alert the physicians undertaking endovascular aneurysm sealing procedures to this complication and its implications.

Key words: Endovascular aneurysm sealing, EVAS, migration, Nellix

Introduction

There is a significant risk of complications following endovascular aortic aneurysm repair (EVAR), including endoleak, graft migration, thrombosis, and infection. Therefore, lifelong imaging surveillance constitutes an integral part of the management of patients undergoing EVAR [1]. Surveillance modalities include plain radiography, computed tomography, magnetic resonance imaging, ultrasound, and conventional angiography, with inherent advantages and limitations to each [2].

In recent years, a novel technique, the endovascular aneurysm sealing (EVAS) technique, has emerged in an attempt to circumvent the afore-mentioned long-term deficiencies of EVAR, in particular migration and endoleak [3]. Even though EVAS applies the same procedural principle for the treatment of abdominal aortic aneurysms as EVAR, e.g. advancing a stent–graft through a remote access site to exclude the aneurysm, it is a conceptually distinct method. While EVAR devices mainly rely on graft apposition on the proximal (and distal) attachment area, EVAS addresses the principle of complete anatomic apposition to achieve sealing and mitigate the risk of complications and secondary interventions. Nevertheless, the technique is in its evolutionary phase and, in the absence of long-term experience, long-term imaging surveillance is recommended. The consensus document on imaging after EVAS with the Nellix device constitutes a guide for establishing EVAS surveillance protocols in an increasing number of vascular centres adopting this technique in their practices [4].

The imaging appearances of complications, mainly type I and II endoleaks, which may occur after EVAS, are discussed in detail in this document. However, migration of the Nellix device and its implications are largely unknown. Herein, we report a case of migration in a patient treated with the Nellix device in our department, to highlight the importance of adhering to surveillance and alert physicians involved in the management of patients undergoing EVAS to this complication.

Case report

A 73-year old man with an incidental finding of an abdominal aortic aneurysm (AAA), with a maximum diameter of 56 mm and a previous history of hypertension, underwent an elective EVAS procedure in February 2015. The aneurysm had a bilobed morphology and was suitable for a standard EVAR, with a proximal neck of a straight configuration and a length and diameter of 15 mm and 24 mm, respectively. All treatment options were discussed and considered at our multidisciplinary team (MDT) forum. With an expanding EVAS practice in our department and as the aneurysm's morphology was with-

Figure 1. Completion angiogram.

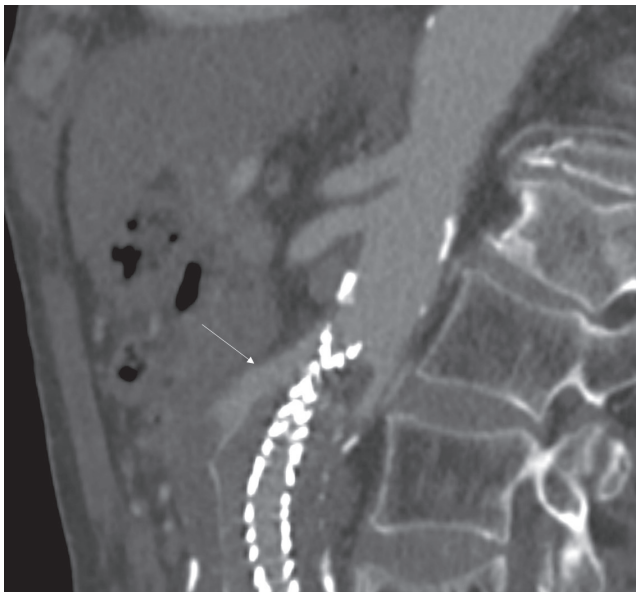

Figure 2. Sagittal plane of the computed tomography (CT) angiogram performed 10 months after the EVAS procedure demonstrating the type I endoleak (arrow).

in the instructions for use (IFU) for the for the Nellix device (Endologix Inc., Irvine, California, USA), we decided to treat the aneurysm with EVAS, and informed patient consent was obtained according to local standard of practice guidelines. The procedure, which was performed according to the IFU, was uneventful, and the completion angiogram demonstrated correct position of the device with no apparent endoleak (Figure 1). The patient was discharged home on the 1st postoperative day. The 1-month surveillance computed tomography (CT) angiogram identified a small proximal type I endoleak. No increase in aneurysm sac size was present. Repeat CT angiogram at 4 and 10 months demonstrated an increasing endoleak (Figure 2), with an increase in the sac diameter of the proximal lobe from 42 to 50 mm on the 3rd examination, even though the maximum diameter of the aneurysm remained unchanged. Interestingly, we noticed a 7 mm caudal migration of the device in relation to the lower end of the left renal artery, which was considered a reference anatomical point (Figure 3). In view of the expanding aneurysm sac, and after a detailed discussion with the patient, a decision has been made to explant the Nellix device and perform an open surgical repair of the AAA.

Discussion

The Nellix EVAS system consists of balloon-expandable stents surrounded by endobags filled with polymer, which seal the aneurysm. In contrast to the exclusion mechanism employed by conventional EVAR with proximal and distal fixation, the sealing concept of aneurysm treatment has been proposed to have the theoretical advantage of diminishing the risk of endoleak and stent–graft migration [5]. In EVAR, the occurrence of migration indicates proximal aortic neck dilation and, probably, inefficacy of the anchoring mechanism in the proximal neck. In the absence of a proximal fixation mechanism in EVAS, migration of the Nellix system should represent a more ominous sign, which would complicate a persistent type I endoleak resulting in continued aneurysm growth and inferior translocation of the stents within the aneurysm sac.

EVAS has failed to obliterate the long-term complications seen with conventional endovascular treatment, which emphasizes the importance of adhering to imaging surveillance protocols. Proximal migration of the Nellix

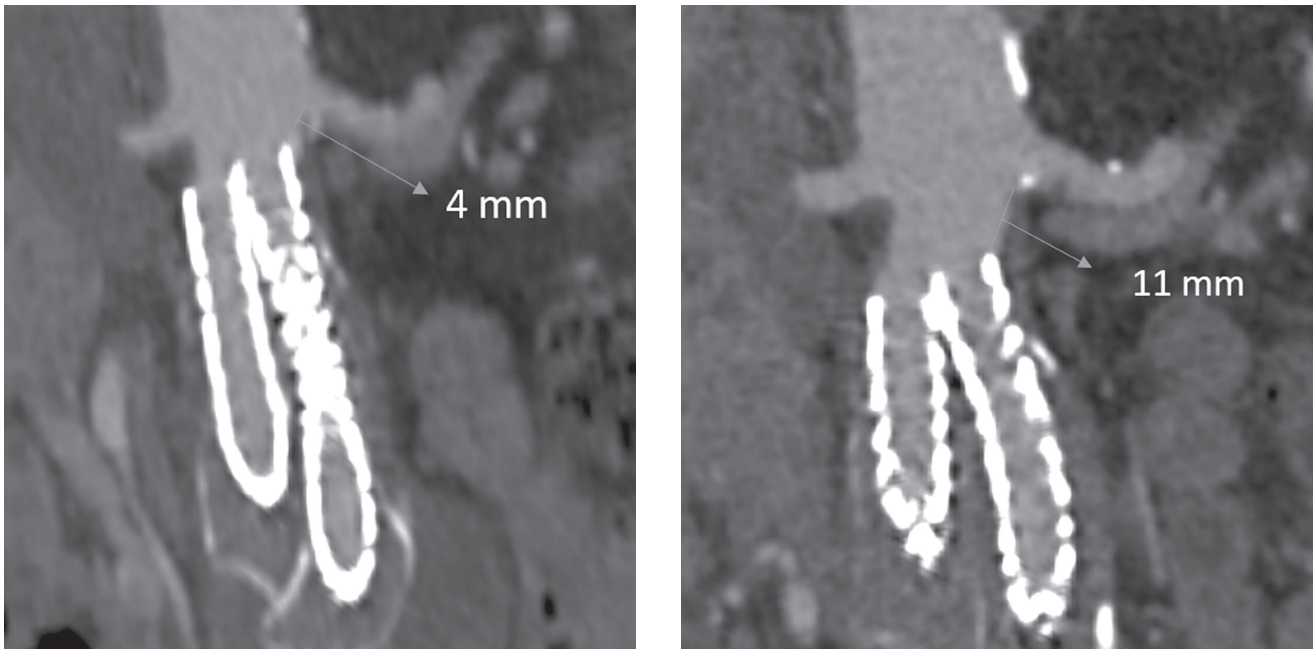

Figure 3. Coronal plane of the computed tomography (CT) angiogram at 1 month (a) and 10 months (b) showing the caudal migration of the Nellix system.

endoprosthesis has been reported to occur in 17 % of cases [6]. In our case, a small type Ia endoleak was initially identified on the 1-month surveillance CT. After discussion at our MDT meeting, we decided to deviate from our local surveillance protocol to closely monitor the endoleak. We, therefore, performed repeat CT scans at 4 and 10 months, which demonstrated an increasing endoleak, at which point a decision for an open conversion was decided. In retrospect, we think that earlier intervention should have been undertaken to mitigate the risk of a catastrophic event. It is recommended that patients developing a type I endoleak after EVAS should be closely monitored; those with endoleaks should be treated expeditiously if possible. A transcatheter embolization using Onyx with or without coils has been described as a feasible and effective method of treating a type Ia endoleak after EVAS [7]. In our case, we decided upon an open conversion because of the large size of the endoleak and the patient's preference. The mechanism of endograft migration in EVAS is different from that in standard EVAR, indicating a significant increase in the aneurysm sac that usually accompanies a persisting endoleak. The maximum diameter of the aneurysm may remain unchanged despite a persisting endoleak; however, physicians should assess the morphology and diameter of the proximal segment of the aortic sac, which may increase significantly in the presence of a type Ia endoleak. Although the optimal imaging surveillance algorithm after EVAS has not been established, adherence to a locally agreed surveillance protocol including CT imaging is recommended.

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