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Three-Dimensional Volume Rendering of Entrapped Malecot Nephrostomy Catheter by Granulation Tissue

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ABSTRACT

An 87-year-old man undergoing radical cystectomy and bilateral nephrostomy visited our hospital 19 days postoperatively because of a lack of urine flow from the left 14-Fr Malecot nephrostomy catheter. The catheter was apparently firmly anchored to the kidney, and an attempt to reposition the catheter failed. Three-dimensional computed tomography volume rendering indicated a deformity of the left catheter compared with the right, implying that something was lodged in the Malecot flanges. Surgical removal of the catheter 2 days later revealed granulation tissue overbridging the Malecot wings. We cut the tissue, and the catheter was successfully exchanged.

Introduction

A Malecot nephrostomy catheter is commonly placed in the renal pelvis to allow for percutaneous drainage. The inability to remove a Malecot catheter is a rarely reported complication. We herein describe an 87-year-old man whose Malecot catheter was entrapped by granulation tissue 3 weeks after placement. Three-dimensional computed tomography (CT) volume rendering was useful to visualize the abnormal form of the catheter.

Case presentation

An 87-year-old man was diagnosed as invasive squamous cell carcinoma of the bladder. Despite the extremely high age, after presented several therapeutic options including palliative radiation therapy and best supportive care, he desired radical cystectomy and it was performed. Because of his frailty and history of colostomy formation for colorectal cancer, bowel-use urinary diversion was relinquished, and bilateral nephrostomy was instead performed using 14-Fr Malecot nephrostomy catheters (Create Medic Co., Yokohama, Japan). He was discharged 12 days postoperatively with no apparent complications. One week later (postoperative day 19), he revisited our hospital because of a lack of urine flow from the left nephrostomy. Left pyelography and guidewire insertion to the left pelvis was successfully achieved under fluoroscopic guidance; however, the Malecot nephrostomy catheter was apparently firmly anchored to the kidney, and an attempt to reposition the catheter failed. We could not stretch the Malecot flanges by introducing a Malecot stylet and were unable to push or pull the catheter any further. A 5-mm-slice CT scan showed that the catheter was inserted not through the renal parenchyma but directly through the renal pelvis and was lodged at the rim of the renal pelvis (Fig. 1a). Three-dimensional volume rendering of the CT scan constructed by SYNAPSE VINCENT (Fujifilm Medical Co., Tokyo, Japan) revealed that the Malecot wings on the left side were not completely folded like those of the normal right side, implying that something was obstructed inside the space of the Malecot wings (Fig. 1b, c). Two days later (postoperative day 21), the lodged left Malecot catheter was surgically removed under general anesthesia, and dense granulation tissue was overbridging the Malecot wings (Fig. 1d). We cut the tissue and the catheter was successfully exchanged.

Discussion

With the advancement of imaging technology, three-dimensional volume rendering of CT images has become

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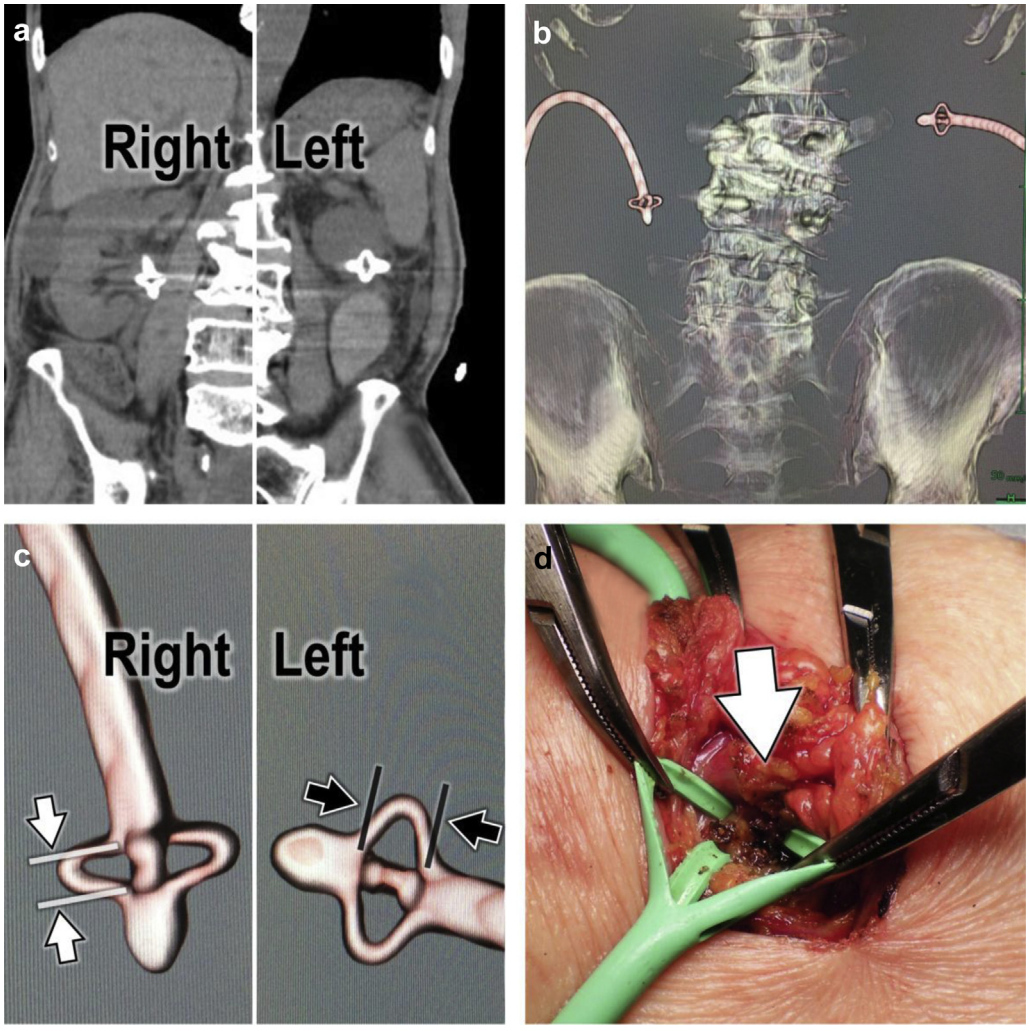

Figure 1. **a**. Coronal computed tomography images of both Malecot nephrostomy catheters on both sides. The left catheter was passed directly through the renal pelvis and was lodged at the rim of the renal pelvis. **b**. Three-dimensional volume rendering of the computed tomography scan constructed by SYNAPSE VINCENT. **c**. Magnified views of the Malecot wings on both sides. A deformity of the left Malecot wings (black arrow) compared with the right (white arrow) was noted. **d**. A photograph taken during open surgery for removal of the catheter revealed dense granulation tissue bridging over the multiple Malecot wings.

common. We used the three-dimensional volume rendering software SYNAPSE VINCENT to visualize a deformation of an entrapped Malecot catheter, which might normally go unnoticed by usual two-dimensional CT images. This imaging technology was easy to perform and time-saving for three-dimensional volume rendering and deepened our topologic understanding by showing a life-like three-dimensional model. The patient had undergone bilateral nephrostomy, and comparison of both sides using the three-dimensional model was also helpful to recognize the left-side abnormality.

The inability to remove a nephrostomy tube is a rare complication. To date, five cases from four publications have been reported.[1-4] Four cases involved percutaneous nephrostomy and one involved hydronephrosis due to bladder cancer. Symptom onset ranged from 1 month to 1 year after insertion of the catheter. The symptom onset of 19 days after catheter insertion in the current case is the shortest reported interval.

Notably, forcefully pulling out the catheter could cause tearing of the head of the catheter. In two cases reported by Stewart et al.,[1] attempts to remove the catheter by pulling led to eventual breakage of the flanges, and the fragments of the wings were consequently left behind in the renal pelvis. Fortunately, the authors reported that no symptomatic complications occurred in association with the uncollectible fragments. However, incomplete retrieval should be avoided because excessive force could lead to severe renal injury, or bleeding and the presence of remnant fragments could be sources of infection or new stone formation.[2]

All three other reported cases were treated via a percutaneous nephrostomy approach using various techniques. Tasca and Cacciola[3] created another nephrostomy near the Malecot tube, while Koolpe and Lord[4] constructed an eccentric nephrostomy tract at the side of the Malecot tube and incised fibrous tissue by grasping forceps. Sardina et al.[2] passed a 9-Fr pediatric cystoscope with pinpoint electrocautery through an 18-Fr Malecot catheter. In the current case, we did not use an endoscopic approach but instead performed open surgery because of the possibility of catheter dropout from the renal pelvis and the risk associated with the prone position (the patient was frail and had severe kyphosis). The risk of perioperative pyelonephritis due to an endoscopic maneuver was also of concern when his vulnerability was taken into consideration.

With respect to the cause of the overbridging granulation tissue, we considered that the chronic inflammation had developed secondary to contact between the tissue and the wings, which accelerated the migration of macrophages as a typical reaction against a foreign body. Fibrosis around the wings then progressed in the presence of macrophage-produced fibroblastic growth factors.[3] In Japan, traditionally still Malecot catheter was widely used. However, to avoid this kind of trouble, other type of catheter such as a Cope-loop nephrostomy tube could be another favorable option.

Conclusion

This case illustrates the following points. First, the Malecot wings should be expanded within the wide space in the pelvis if possible without touching the wall of the pelvis. Second, clinicians must pay attention to the form of the wings without indwelling the stylet. Third, we should remember that overbridging granulation tissue may develop even within 3 weeks after nephrostomy placement. Finally, CT may help to visualize the tissue surrounding the catheter.

Consent

The ethics committee approval and patient informed consent for the publication was obtained at Japanese Red Cross Medical Center, Tokyo, Japan.

Conflict of interest

None.

Acknowledgments

None declared.

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