

Case - Urethral feeding tube knot in an extremely preterm infant requiring surgical management

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INTRODUCTION

Urethral catheterization is a common procedure in the pediatric age group for many diagnostic and therapeutic purposes, such as urine sample collection, VCUG, and output monitoring.^{1,2} Hematuria and urethral injury are associated complications of urinary catheterization.^{3,4} As the urethra of a neonate, especially when premature, is quite small, feeding tubes are often used instead of traditional Foley catheters. Catheter knotting is a rare complication with an incidence of 0.2 per 100,000 with an increased likelihood when using feeding tubes due to their increased length.⁵ Few cases have been reported in the literature of catheter knotting in premature infants and management was mainly non-invasive.^{6,7,8,9} Other cases in older children have been managed operatively. We present a 27-week-old male with a knotted catheter who failed nonoperative management. We closely monitored to ensure adequate bladder emptying around the catheter while the baby was medically stabilized followed by an open cystotomy for removal with no complications.

CASE REPORT

We present a 27-week-old male admitted to the neonatal intensive care unit (NICU) after delivery at 25 weeks for ongoing respiratory distress requiring ventilator support. A 3.5F 40cm feeding tube placed for urinalysis and urine culture was unable to be removed and abdominal x-ray confirmed coiling and knotting of the catheter in situ (Figure 1). The patient's weight at the time of initial assessment was 578 grams and ventilator supports

were ongoing. Gentle traction and wires were attempted to remove the catheter, but this was unsuccessful. Fortunately, the baby was voiding around the catheter and bladder scans were minimal. As such we elected to delay the procedure until the baby was more hemodynamically stable and better able to tolerate an operation. Ultrasound was done periodically to monitor for position of the foley catheter and rule out signs of bladder perforation and urine output was closely monitored. At 29 weeks, the baby weighed 849 grams and was more amenable to an operation. Intra-operatively, a 2 cm transverse incision midway between symphysis pubis and the umbilicus was made and the aponeurosis was opened with retraction of the rectus muscles exposing the bladder (Figure 2). Aspiration of urine confirmed bladder location, and a 0.5 cm incision was made in the bladder. The catheter was extracted, with a clear knot noted (Figure 3). Closure of the bladder was completed in a two-layer fashion with 5-0 PDS of the mucosal and detrusor layers respectively. Another catheter was then placed 5cm into the bladder and sutured to the glans penis with 5-0 prolene to ensure proper position. This catheter was removed after two weeks. There were no complications.

DISCUSSION

Catheter knotting has been described in different clinical scenarios however all of them follow the theory which is related to the length of the catheter in the bladder. Small calibre catheters are highly flexible and when an excessive length is inserted into the bladder, they form a loop that coils on itself, followed by the catheter tip looping through the coil when the bladder empties and finally the knot forms when trying to remove the catheter.¹⁰ Knotting occurs more frequently with feeding tubes in comparison to foley catheters.⁵ Abdominal X-ray with visualization of knot is the diagnostic test of choice. Identifying whether the knot is located within the bladder or the urethra changes management options. Length of the catheter has been linked with increased risk of knotting in low birth weight such as with our case of a 578 gram neonate. The catheter in our patient was advanced at least 7cm initially by the NICU team and migrated further during the admission and with manipulation. Given the increased risk, a maximum length of 5 cm in boys and 2.5 cm in girls has been recommended to mitigate the risk in babies less than 750 grams. Additional prevention strategies include securing catheters to prevent migration and catheter site care. Additionally, neonatal specific equipment such as clear urinary catheters that allow easy visualization of urine to confirm placement and urinary catheter rather than feeding tube use is helpful.¹¹ Gentle pulling on the catheter with or without using a wire is usually successful in resolving the knot however has been associated with complications such as full thickness urethral laceration.⁷ Long term data is unknown regarding possible urethral stricture or other consequences.¹² In terms of options when gentle pulling fails, others have tried cystoscopy, cystotomy and perineal urethrostomy depending on the location.^{6,13,14,15} This has all been in older babies with larger anatomy that could accommodate a cystoscope beside the catheter for cystoscopy

or in cases where the catheter was lodged in the urethra. Our case is unique in that it represents a case of knotting urethral catheter in extreme prematurity that required surgical management.

CONCLUSIONS

Catheter knotting is a rare complication of catheterization in low-birth-weight babies. Conservative management with gentle traction and wires should first be attempted and monitoring is often safe if the baby is able to void around the catheter until they are more stable. If required, surgical management with cystotomy is safe and effective. Increasing awareness of this complication of catheterization and proper catheterization technique using the recommended length may be an effective strategy of prevention.

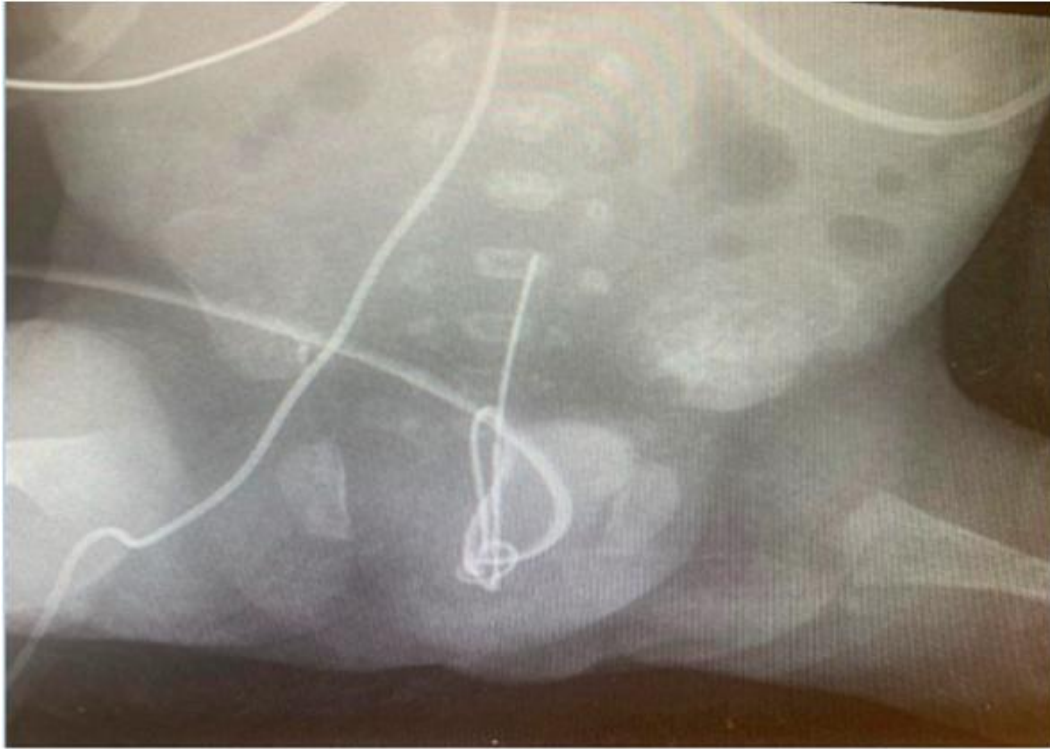
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FIGURES AND TABLES

Figure 1. Abdominal X-ray confirming coiled feeding tube within the bladder.



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Figure 2. Transverse incision and retraction intraoperatively prior to cystotomy for catheter removal.

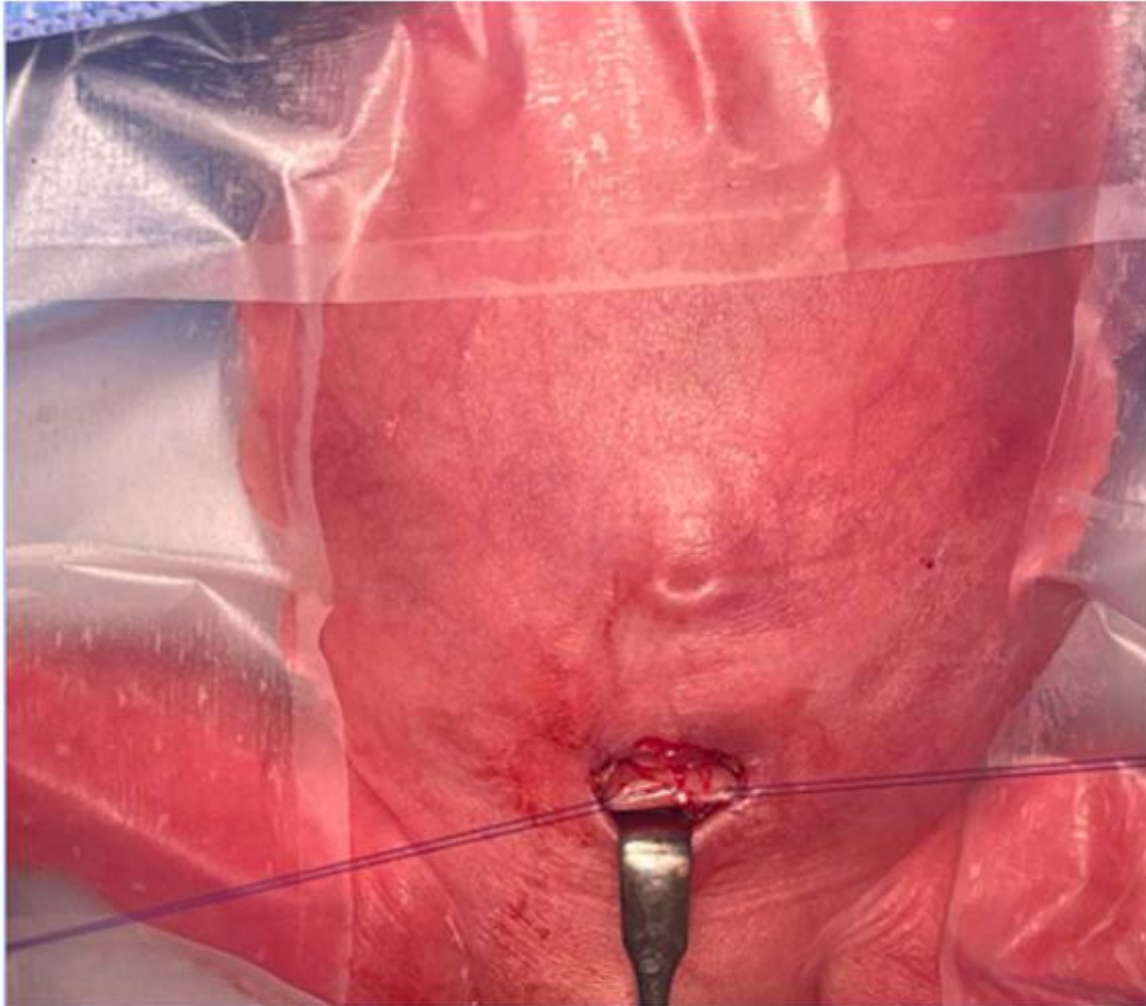


Figure 3. 3.5 F catheter removed from patient confirming knotting of catheter in bladder.

