Dual fluid silhouette in X-ray of the abdomen: a diagnostic flag for neurogenic bladder with urinary ascites

Brajendra Singh,[1] Chinmay Chetan ,[1] Aisha Naaz,[2] Girish Gupta[3]

[1]Neonatology, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India
[2]Pediatric Surgery, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India
[3]Pediatrics, Graphic Era Deemed to be University, Dehradun, Uttarakhand, India

Correspondence to
Dr Girish Gupta;
dscnnf@gmail.com

Accepted 17 May 2024

To cite: Singh B, Chetan C, Naaz A, *et al*. *BMJ Case Rep* 2024;**17**:e259802. doi:10.1136/bcr-2024-259802

SUMMARY

A neonate presented with abdominal distension and decreased urinary output. X-ray revealed dual abdominal fluid condition—ascites with a distended bladder, along with vertebral anomalies. The possibility of urinary ascites and neurogenic bladder was kept, which was further confirmed on evaluation. Here, we emphasise the crucial role of abdominal X-ray as a diagnostic tool in uncovering this intricate medical puzzle. By detailing the clinical presentation, diagnostic approach and treatment strategy, the report contributes insights into the rare and complex abdominal condition.

BACKGROUND

Extravasation of urine into the intraperitoneal cavity from the urinary tract is a rare complication of obstruction of the urinary system in neonates.[1] Here, we present a case of a neonate who presented at day of life (DOL) 5 with spina bifida occulta, abdominal distension and decreased urine output. Abdominal X-ray was suggestive of ascites with another shadow of fluid in the pelvis extending into the abdomen, suggestive of a grossly distended urinary bladder. On re-evaluation, the distended bladder was palpable up to the umbilicus, which was initially missed on clinical examination, due to gross distension. The patient was managed conservatively and discharged on clean intermittent catheterisation.

CASE PRESENTATION

A term, female neonate with a birth weight of 2400 g was born to a mother with no antenatal risk factors. Three antenatal ultrasound scans done in each trimester were within normal limits. The neonate had respiratory distress since birth and was referred to our hospital at DOL 5 because of abdominal distension with feed intolerance since 30 hours of life, which was followed by inability to pass urine. On examination, the baby had respiratory distress, abdominal distension with ascites and occult spina bifida with tuft of hairs, soft dysmorphic markers (low-set ears, saddle foot deformity) and patulous anal opening (figure 1). Lower limb tone and power were normal. The abdominal X-ray was suggestive of ascites and overlapping fluid shadows in the pelvis extending into the abdomen, with sacral vertebral anomalies (figure 2). Bladder catheterisation led to a large volume of urine drainage with mild improvement of abdominal distension and respiratory distress. Investigations revealed serum creatinine of 6.37 mg/dL, urea of 69.2 mg/dL and potassium of 4.88 mmol/L (table 1). The possibility of post-renal acute kidney injury was kept. The patient also had a positive septic screen with thrombocytopenia and raised immature/total neutrophil ratio of 0.4, suggestive of sepsis, which was managed accordingly with antimicrobials. Ultrasound of the abdomen with pelvis was suggestive of gross ascites with a thickened bladder wall with echogenic shadows in the pelvicalyceal system. Ascitic tap revealed urinary ascites (ascitic fluid: serum creatinine ratio >1).[2] Ascitic fluid, urinary and blood cultures were sterile. Feeding was gradually introduced and graded up. On day 14 of life, the urinary catheter was removed and observed for self-micturition. However, the neonate did not pass urine and developed a palpable bladder, following which the baby was recatheterised. Micturating cystourethrogram (MCU) was suggestive of neurogenic bladder with no reflux/extravasation. The patient was started on terazosin on day 15 of life because of neurogenic flaccid bladder. MRI of the spine suggested sacral meningomyelocele (MMC) with tethered filum terminale and nerve roots. Given the persistent neurogenic bladder, clean intermittent cauterisation (CIC) was started. At discharge, parents were counselled and taught CIC and the need for detailed urodynamic evaluation and spinal surgery. In view of paucity of hard handles for dysmorphism, after discussing with parents, genetic evaluation was deferred for later evaluation and the need for appropriate follow-up for the same was explained.

OUTCOME AND FOLLOW-UP

At present, the infant is thriving well, gaining weight appropriately with no signs of any nutritional deficiency, and developmentally normal. Repeat renal serum parameters and renal scan on ultrasound of the abdomen are within normal

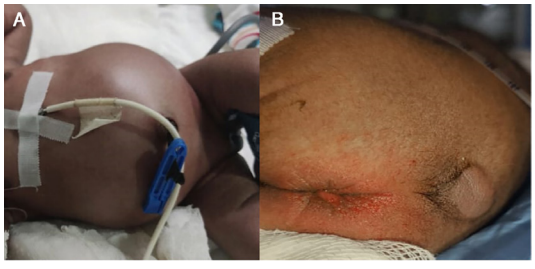

Figure 1 (A) Grossly distended abdomen and (B) spina bifida occulta with patulous anal opening.

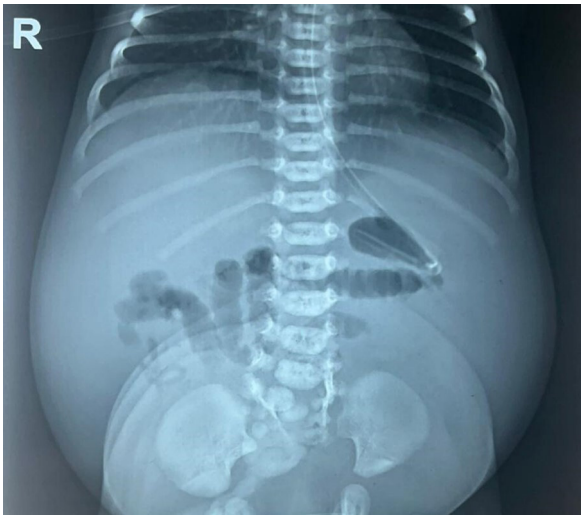

Figure 2 Abdominal X-ray: ascitis with distended bladder and sacral vertebral anomalies.

limits. Renal dimercapto succinic acid scan shows normal renal function. The infant has started passing urine spontaneously intermittently but still needs CIC. Terazocin dose has been titrated accordingly and is planned for MMC surgery in follow-up.

DISCUSSION

Urinary ascites in neonates is a rare condition and is associated with obstructive uropathy like posterior urethral valve in many cases.[3] Other risk factors include neurogenic bladder, asphyxial injury, abdominal trauma, iatrogenic injuries like umbilical catheterisation, forceful urethral catheterisation, poor perfusion, sepsis, etc.[4] Any functional or structural obstruction in the urinary tract may lead to high pressures in the upper urinary tract, leading to leakage of urine and urinary ascites. Rupture occurs most commonly from the calyceal fornixes or rarely at the urinary bladder.[5] These patients generally present with abdominal distension due to ascites, progressive renal failure and back pressure changes like hydroureteronephrosis.[6] Most of these cases are diagnosed with abdominal sonography suggesting ascites with hydroureteronephrosis. Abdominal ultrasonography with abdominocentesis remains the ideal modality for diagnosing such cases. Abdominal paracentesis reveals high ascitic fluid creatinine and urea compared with the serum values.[4] Blood parameters show deranged renal parameters, hyperkalaemia and hyponatraemia.

In our case, the index patient had abdominal distension, feed intolerance and decreased urine output. Abdominal X-ray showed central pooling of intestinal loops with peripheral opacities at the flank suggesting ascites with an overlapping shadow of the urinary bladder (figure 2). This finding was also confirmed on abdominal sonography. Surprisingly in our case, there was no hydroureteronephrosis which was expected given the high back pressure changes leading to the massive distended bladder. A similar absence of hydronephrosis was also observed by He *et al* in their case report of urinary ascites in a preterm newborn due to the anterior urethral valve.[7] Urinary ascites was confirmed with the diagnostic abdominal paracentesis and the correlation of ascitic fluid and serum markers. The cause of functional urinary obstruction in the index case was sacral meningomyelocele causing neurogenic bladder. Neural tube defects causing bladder bowel dysfunction are known.[8] We managed our case with continuous bladder drainage followed by CIC. There was no need for abdominal drainage as ascites gradually resolved, and MCU also did not show any active leak. Renal parameters improved with time. Subsequent X-rays of the abdomen revealed the disappearance of the bladder shadow. Given the non-availability of urodynamic studies, the patient was started on terazosin, an alpha blocker keeping the possibility of flaccid bladder, and discharged on CIC.

The long-term outcome of patients with neurogenic bladder depends on the age of presentation and the intervention done. Focus remains on preserving the renal functions. Early start of therapy gives better result.[9 10] In a case series, 45 children with spinal bifida were followed for at least 2 years. Of these, 78% showed evidence of neurogenic bladder. 36% of the patients with meningomyelocele developed renal impairment in the 5-year follow-up.[11] Neurogenic bladder is managed conservatively with CIC and medical therapy or may require bladder reconstructive surgery in follow-up. In a case series of 188 patients with spina bifida, 23.8% required bladder reconstruction surgery.[9]

This case report illustrates the clinical significance of employing an abdominal X-ray as a vital diagnostic tool to identify and manage this complex condition. Ascites with vesicomegaly and vertebral anomalies in X-ray initiated the timely diagnostic procedure and the management approach for the urinary ascites with neurogenic bladder secondary to spina bifida occulta.

Table 1 Relevant investigations during hospital stay

	DOL 5	DOL 7	DOL 10	DOL 14
Hb (g/L)	175.4			
TLC (10^9/L)	16.14			
ANC (10^9/L)	5.6			
I/T ratio	0.4			
Platelet (10^9/L)	57.9	11.9	32	120
CRP (mg/L)	1.88			
Serum sodium (mmol/L)	144		140	
Serum potassium (mmol/L)	4.88	3.79	3.46	
Total serum calcium (mg/dL)	10.11		9.48	
Creatinine (mg/dL)	6.37	1.32	0.34	
Urea (mg/dL)	69.2		29	
Urine microscopy WBCs	40–50			
Ascitic fluid creatinine (mg/dL)	8.21			
Ascitic fluid urea (mg/dL)	76.4			
Blood culture	Sterile			
Urine culture	Sterile			
Ascitic fluid culture	Sterile			

ANC, absolute neutrophil count; CRP, C reactive protein; DOL, day of life; Hb, haemoglobin; I/T ratio, immature to total neutrophil ratio; TLC, total leucocyte count; WBCs, white blood cells.

Learning points

- Any neonate with meningomyelocele should be suspected for neurogenic bladder and associated complications.
- The abdomen should be carefully clinically examined for a distended urinary bladder, which was missed in the initial examination.
- The pivotal role of abdominal X-ray in diagnosing neurogenic urinary bladder with vesicomegaly and urinary ascites is emphasised.
- Urinary leak due to functional or structural urinary tract obstruction can occur without associated hydroureteronephrosis.

Contributors The following authors were responsible for drafting of the text, sourcing and editing of clinical images, investigation results, drawing original diagrams and algorithms, and critical revision for important intellectual content—BS, CC, AN and GG. The following authors gave final approval of the manuscript—BS, CC, AN and GG.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Consent obtained from parent(s)/guardian(s).

Provenance and peer review Not commissioned; externally peer reviewed.

Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

ORCID iD
Chinmay Chetan http://orcid.org/0000-0002-2060-4763

REFERENCES

1 Kay R, Brereton RJ, Johnson JH. Urinary ascites in the newborn. *Br J Urol* 1980;52:451–4.
2 Morrell P, Coulthard MG, Hey EN. Neonatal urinary ascites. *Arch Dis Child* 1985;60:676–8.
3 Qurram SM, Lakshmi CVS, Nazneen F, *et al*. Urinary ascites in a neonate with posterior urethral valve. *Int J Contemp Pediatr* 2021;8:1125.
4 Rattan KN, Singh J, Dalal P, *et al*. Urinary ascites in a preterm female neonate: a rare case report. *Ann Pediatr Surg* 2017;13:228–31.
5 Solarin A, Gajjar P, Nourse P. Neonatal urinary ascites: a report of three cases. *Case Rep Nephrol* 2015;2015:942501.
6 Basha M, Subhani M, Mersal A, *et al*. Urinary bladder perforation in a premature infant with down syndrome. *Pediatr Nephrol* 2003;18:1189–90.
7 He Y, Lin SB, Li W, *et al*. Case report: neonatal urinary ascites without hydronephrosis: a rare case of anterior urethral valve and diverticulum in preterm newborn. *Front Pediatr* 2022;10:920817.
8 Onesimo R, Agazzi C, Massimi L, *et al*. Bladder and bowel dysfunction in down syndrome with neural tube defect: case report and review of the literature. *Ital J Pediatr* 2023;49:89.
9 Al-Hazmi HH, Trbay MS, Gomha AB, *et al*. Uronephrological outcomes of patients with neural tube defects. does a Spina Bifida clinic make a difference *Saudi Med J* 2014;35 Suppl 1:S64–7.
10 Sager C, Barroso U Jr, Bastos JM Netto, *et al*. Management of neurogenic bladder dysfunction in children update and recommendations on medical treatment. *Int Braz J Urol* 2022;48:31–51.
11 Kanaheswari Y, Mohd Rizal AM. Renal scarring and chronic kidney disease in children with Spina Bifida in a multidisciplinary malaysian centre. *J Paediatr Child Health* 2015;51:1175–81.