CASE REPORT

Bilateral multifocal acute lobar nephronia caused by *Enterococcus faecalis*

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SUMMARY

An 8-year-old boy presented to our hospital with complaints of fever, epigastric pain and headache. *Enterococcus faecalis* were isolated from urine and blood culture, bacteraemic urinary tract infection was clinically diagnosed. Although vancomycin and ampicillin were administered, fever did not subside. Contrast-enhanced CT (CECT) revealed bilateral and multiple wedge-shaped defects, thus prompting a diagnosis of acute lobar nephronia (ALN). After 7 days of antibiotic treatment, the patient's fever subsided. ALN can be classified into two subgroups based on features of CECT; simple and complicated ALN. The treatment response to antibiotics tends to be delayed in complicated ALN, it is important that we understand the natural course of complicated ALN and should not escalate antibiotics hastily. According to previous studies, ALN has a wide regional variety of causative organisms. Therefore, the physician should recognise a local pattern of microbiological aetiology of ALN.

BACKGROUND

Acute lobar nephronia (ALN), which is also called 'acute focal bacterial nephritis', was first reported by Rosenfield *et al.*¹ The disease was considered as an intermediate stage between acute pyelonephritis and renal abscess.² A previous report recommended 3 weeks of antibiotic treatment because 2 weeks of treatment was related to clinical treatment failure.³ We report a rare case of a patient with enterococcal ALN who had fever for 7 days despite the administration of appropriate antibiotics. We describe the characteristics of severe ALN and try to suggest the reasonable examination and treatment of ALN. Further, as a novel investigation, we hypothesise that a geographical difference in the prevalence of enterococcal ALN may exist.

CASE PRESENTATION

An 8-year-old boy presented to our hospital with complaints of fever, epigastric pain and headache. The patient had no medical history, including urinary tract infections. No obvious history of phimosis, constipation and deviant urination habits. Physical examination revealed a temperature of 40.2°C, heart rate of 147 bpm, respiratory rate of 30 per min and peripheral oxygen saturation of 98%. The patient's abdomen was soft and flat; meningeal sign and costovertebral angle tenderness were not apparent. The patient was hospitalised because of his unwellness. Complete blood counts

and biochemical examination revealed white cell count of $1.4 \times 10^9/L$ and serum C reactive protein level of 132 mg/L. Urinalysis revealed positive of leucocyte and negative of nitrites. After obtaining urine and blood culture, parenteral cefmetazole was initiated as an empirical therapy. Gram-positive cocci were isolated in both urine and blood culture on the second day of admission; bacteraemic urinary tract infection was clinically diagnosed. Enterococcal infection was suspected based on Gram staining; hence, cefmetazole was changed to parenteral vancomycin. Ultrasonography revealed unilateral enlargement of the left kidney. On the fourth day of admission, the bacteria were identified as *Enterococcus faecalis*. As the minimum inhibitory concentration of the bacteria for ampicillin was estimated to be 2 µg/mL and the sensitivity was interpreted as sensitive, vancomycin was changed to parenteral ampicillin. Although appropriate antibiotic therapy, which means total duration of vancomycin and ampicillin administration, was continued for 5 days, the patient's fever did not subside. Therefore, a complicated disease, such as renal abscess or ALN, was suspected. Consequently, contrast-enhanced CT (CECT) was performed, which demonstrated bilateral and multiple wedge-shaped defects (figure 1), thus prompting a diagnosis of ALN. After 7 days of appropriate antibiotic treatment, the patient's fever subsided.

OUTCOME AND FOLLOW-UP

The patient was discharged after 3 weeks of antibiotic treatment, and no recurrence occurred 3 months after discharge. On the 12th day of admission, voiding cystourethrogram was performed, which revealed a left side grade 3 vesicoureteral reflux (VUR) (figure 2). To undergo a surgical treatment, the patient was referred to a specialist in paediatric urology.

DISCUSSION

In this case, it took 7 days for the fever to subside despite administration of appropriate antibiotics. Cheng *et al* analysed 127 cases of ALN. ALN can be classified into two subgroups based on features of CECT. One type is simple ALN, which has a homogeneously decreased nephrographic density, and another type is complicated ALN, which has a heterogeneously decreased nephrographic density with small extremely low attenuation region. They reported that the treatment response to antibiotics tends to be delayed in complicated ALN.⁴ This case

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Figure 1 Contrast-enhanced CT demonstrated bilateral and multiple wedge-shaped defects; the right kidney has heterogeneously decreased nephrographic density with a small, extremely low-attenuation region.

was suspected to be complicated ALN based on radiographic features (figure 1). A poor treatment response is considered the natural course of the disease. It is important that we understand the natural course of complicated ALN and should not escalate antibiotics hastily. Furthermore, in the same report, the authors concluded that a 2-week treatment did not result in treatment failure among simple ALN patients, in contrast to 33.3% of treatment failure among complicated ALN. Because of the same treatment duration needs, it is not important to

Figure 2 Voiding cystourethrogram revealed left side grade 3 vesicoureteral reflux.

distinguish simple ALN from simple pyelonephritis, although it may be important to distinguish simple ALN from complicated ALN. From a clinical viewpoint, it may be reasonable that ALN is regarded as ‘an invisible renal abscess’ rather than ‘an intermediate stage between acute pyelonephritis and renal abscess’. To distinguish ALN from pyelonephritis, ultrasonography can be a useful screening examination. Cheng *et al* reported that the sensitivity of severe nephromegaly was about 90%.⁵ Unilateral nephromegaly was revealed by ultrasonography in this case. Additionally, when urinary tract infection does not respond to antibiotics or relapses despite antibiotic treatment, ‘red flags’ such as dilated VUR or dilated VUR or genitourinary malformations may be opportunity of making diagnosis. Therefore, physicians should confirm the possibility of ALN if red flags exist in such patients.

According to previous reports, *Escherichia coli* is the most common causative organism of ALN, and *E. faecalis* is rare.² However, *Enterococcus faecalis* caused ALN in this case. In Japan, some reports have shown a high prevalence of enterococcal ALN. Saito *et al* analysed 11 cases of ALN at a single hospital, 5 cases of culture-negative bacteria, 4 cases of *E. faecalis* and only 1 case of *E. coli*.⁶ Additionally, Shinoda *et al* reviewed 34 cases of ALN, 18 cases of culture-negative bacteria, 5 cases of *E. coli* and 4 cases of *E. faecalis*.⁷ In other countries, single-centre studies have reported enterococcal ALN in 4 of the 25 cases in Germany,⁸ although none of the 21 cases in Greece⁹ and none of the 127 cases in Taiwan⁴ have reported such. These results suggest that a geographical difference may exist in causative organisms of ALN. Therefore, the physician should recognise a local pattern of microbiological aetiology of ALN; adding ampicillin may be needed if culture-negative ALN is diagnosed in an area with high prevalence of enterococcal ALN.

Learning points

- ▶ Acute lobar nephronia (ALN) can be classified into two subgroups based on features of contrast-enhanced CT; simple and complicated ALN.
- ▶ The treatment response to antibiotics tends to be delayed in complicated ALN; it is important that we understand the natural course of complicated ALN and should not escalate antibiotics hastily.
- ▶ Physicians should confirm the possibility of ALN if red flags, such as dilated vesicoureteral reflux or history of recurrent urinary tract infections exist in patients who do not respond to antibiotic treatment or recurrence occurs despite of antibiotic administration.
- ▶ Physician should recognise a local pattern of microbiological aetiology of ALN; adding ampicillin may be needed if culture-negative ALN is diagnosed in an area with high prevalence of enterococcal ALN.

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