



# Meningitis Complicating Infected Cephalohematoma Caused by *Klebsiella pneumoniae*- Case Report and Review of the Literature

Jui-Shan Ma<sup>1,2\*</sup>

### Abstract

Infected cephalohematoma associated with meningitis is rare in neonatal period. Herein we reported a case and the causative microorganism is *Klebsiella pneumoniae*. With intravenous ceftriaxone therapy and surgical drainage of the infected cephalohematoma, he was successfully treated and no sequel was reported. Early diagnosis of the association of meningitis is important and leads to a good prognosis. The reported cases of infected cephalohematoma with concurrent meningitis in literature are also reviewed.

### Keywords

Infected cephalohematoma; Meningitis; *Klebsiella pneumoniae*

### Case Presentation

A 21-day-old male infant was admitted to a regional hospital after 3 days of pyrexia. A 5×5×7 cm tender cephalohematoma with fluctuation was noted over his right parietal area. The overlying skin was erythematous but intact. His anterior fontanel was neither tense nor bulged. The other physical and neurological examinations were unremarkable. Laboratory evaluation revealed a WBC count of 11,400/ mm<sup>3</sup> with 44% segments, 5% bands, 35% lymphocytes, and 16% monocytes. The CRP level was 3.0 mg/dL and his skull X-ray is normal. Diagnostic tapping of cephalohematoma was done and the aspirate was sent for bacterial culture. Intravenous ampicillin (150 mg/kg/day) and gentamicin (5 mg/kg/day) therapy were started after initial septic work-up. However, his fever persisted despite of antibiotic therapy and surgical drainage. The bacterial culture of blood and the aspirate revealed *K. pneumoniae*, which were susceptible to cefazolin, gentamicin, and ceftriaxone. Lumbar puncture was performed on the third admission day and the CSF study revealed a WBC count of 1,720/ mm<sup>3</sup> (with 49% neutrophils and 51% lymphocytes), RBC count of 280/ mm<sup>3</sup>, sugar 45 mg/dL, and total protein 192 mg/dL. The antibiotic therapy was shifted to intravenous ceftriaxone (100/mg/kg/day) and kept for a total of 21 days. He became afebrile one day later

and his CSF culture was sterile. He remained well and no sequel was reported in the follow-up visits.

### Discussion

Infected cephalohematoma (IC) with concurrent meningitis in the newborn is rare but potentially life-threatening. Gram negative rods represent the predominant bacteria of IC with concurrent meningitis in several literature reviews [1-5]. In Taiwan, Chang et al. [6] reported 3 of 28 infants with IC to be associated with meningitis in a period of 25 years and all the 3 cases are caused by *Escherichia coli*. A recent literature review of IC reported 11 of 43 infants had concurrent meningitis. *Escherichia coli* represent 72.7% (8 out of 11) causative bacteria [3]. From a search of the literature on Medline, 14 reported cases of IC with concurrent meningitis and their clinical data were summarized in Table 1 [1-14]. The age of presentation is 2-21 days and a male preponderance is noted. *Escherichia coli* represent the most common causative bacteria and accounts for at least 84.6% of the reported pathogens. *Pseudomonas aeruginosa* and paracolon bacilli are less common pathogens which have ever been reported [4,11]. To our knowledge, the case we presented is the first case report of *K. pneumoniae* infected cephalohematoma associated with meningitis.

Delayed lumbar puncture and previous antibiotic exposure might account for sterile cerebrospinal fluid (CSF) in the current case. Early detection of the association of meningitis plays an important role in determining the choice of antibiotic and the duration of the therapy. If such association is ignored, serious complications, even mortality, may ensue [5,10,13]. The third generation cephalosporin is believed to be adequate for treatment of such association. Nakwan et al. [10] reported a case with IC, sepsis, and meningitis which was caused by extended spectrum beta-lactamase (ESBL) producing *E. coli* and successfully treated with meropenem therapy and surgical drainage. It highlights the importance of increasing incidence of resistant bacteria in the neonatal infection. The durations of antibiotic therapy for IC with concurrent meningitis ranges from 3-6 weeks in literature. Although there is no established guideline, it is believed to be adequate to keep antibiotic therapy for 3-4 weeks in the absence of osteomyelitis [10,15]. Surgical drainage plays an important role in the treatment of IC with or without complications and failure of treatment has been reported with antibiotic therapy alone [3,5,9,12-14].

A total of 5 mortality cases are found in literature [4,7,11-13] and the overall mortality rate of IC with concurrent meningitis is estimated as 35.7%. It is suggested that mortality is related to the delayed diagnosis of meningitis and lack of surgical drainage [3,5,9,12-14]. Blom et al. [13] described the last case died of IC with sepsis and meningitis in 1993. Before it, at least 4 mortality cases were reported in literature [4,7,11,12]. With these instructive experiences, clinicians tend to pay more attention to the associated complications of IC, including meningitis.

### Conclusion

In summary, meningitis is a rare but potentially life-threatening complication in the newborn with IC. With early detection of the associated meningitis, combined adequate antibiotic therapy and surgical drainage often lead to a favorable prognosis.

\*Corresponding author: Jui-Shan Ma, Department of Pediatrics, Feng-Yuan Hospital, Ministry of Health and Welfare, Executive Yuan, Number 100 An-Kan Rd., Fengyuan Dist, Taichung City 42055, Taiwan, Tel: (+886) 4-25271180 ext. 1590; Fax: +886-4-25284445; E-mail: jma052968@gmail.com

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**Table 1:** Reported cases of infected cephalohematoma with concurrent meningitis in neonates.

References (Year)	Age	Sex	Complications	Organism	Total course of antibiotics	Surgical drainage	Outcome
Cohen (1946)	7 days	Male	M, O, P	<i>P. aeruginosa</i>	NA	-	died
Kendall (1952)	NA	NA	M	NA	NA	NA	died
Gordon (1955)	5 days	Male	M	<i>E. coli</i>	6 weeks	+	recovery
Burry (1966)	4 days	Male	S, M	<i>E. coli</i>	20 days	+	recovery
Burry (1966)	3 days	Male	S, M	<i>E. coli</i>	20 days	-	died
Chiu (1972)	2 days	Male	M	<i>Paracolon bacilli</i>	NA	+	died
Meignier (1989)	18 days	Female	S, M	<i>E. coli</i>	NA	+	NA
Blom (1993)	5 days	Male	S, M	<i>E. coli</i>	>2 weeks	-	died
LaBlanc (1995)	14 days	NA	S, M	<i>E. coli</i>	3 weeks	+	recovery
Huang (2002)	19 days	Female	M	<i>E. coli</i>	3 weeks	+	recovery
Chang (2005)	NA	NA	M	<i>E. coli</i>	NA	NA	recovery
Chang (2005)	6 days	Male	S, M	<i>E. coli</i>	3 weeks	+	recovery
Chang (2005)	8 days	Male	S, M	<i>E. coli</i>	5 weeks	+	recovery
Nakwan (2011)	18 days	Male	S, M, O	<i>E.coli (ESBL)</i>	4 weeks	+	recovery
Current report	21 days	Male	S, M	<i>K. pneumoniae</i>	3 weeks	+	recovery

M: meningitis, O: osteomyelitis, P: pneumonia, S: sepsis, E: epidural abscess, NA: not available

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## Author Affiliations

Top

<sup>1</sup>Department of Pediatrics, Feng-Yuan Hospital, Ministry of Health and Welfare, Executive Yuan, Taichung, Taiwan

<sup>2</sup>College of General Education, HungKuang University, Taichung, Taiwan

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