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Research Article

The Frequency and positivity of lumbar punctures in Iraqi children

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ABSTRACT

Concern about a reduction in the number of lumbar punctures (LP) performed worldwide, this study was aimed to assess the frequency of lumbar punctures performed in the maternity and children teaching hospital in Diwaniyah, Iraq, with a focus on the rate of positive results. In a retrospective observational study, the results of CSF analysis in the lab of maternity and children teaching hospital were reviewed and the patient's records were traced over a period of one the year 2016 and compared with that of 2015, the number of emergencies and pediatric ward admissions during these 2 years was recorded and the results were compared. During the period from January 1st, 2016 to December 31st, 2016, 78 results of CSF analysis were found, the number of positive results defined by pleocytosis and elevated CSF protein was 35, constituting 34%. Although the precise positivity of CSF in suspected cases of meningitis and febrile seizures was difficult to be determined, the frequency of LPs in this hospital is not decreasing but done on the basis of strong suspicions of CNS infections.

Keywords: Lumbar punctures (LP); CSF analysis; pleocytosis

INTRODUCTION

The discovery, the application for diagnostic purposes and the introduction in clinical practice of lumbar puncture (LP) were done by Heinrich Iranus Quickie in 1891 (Anonymus, 1945; Bing, 1954). The number and indications of lumbar punctures performed nowadays are unknown (Moisset et al., 2016). Lumbar puncture is a commonly performed procedure in pediatrics. Cerebrospinal fluid (CSF) analysis is essential in the diagnosis and management of a variety of infectious and inflammatory conditions affecting the brain, meninges and spinal cord. It also provides useful diagnostic information in evaluating possible subarachnoid hemorrhage and demyelinating syndromes. Lumbar puncture aids in the diagnosis and management of pseudotumor cerebral. Therapeutic LPs are performed to administer certain medications intrathecally, particularly certain chemotherapeutic agents. There is a concern about a reduction in the number of lumbar punctures being performed worldwide not only because of the extremely rare complications but the effective vaccines to prevent invasive infections due to *Streptococcus pneumoniae* and *Hemophilus influenzae* type b have greatly reduced pediatric bacterial meningitis rates resulting from these pathogens (Bonadio, 2013).

The previous American Academy of Pediatrics recommendations about a lumbar puncture in infants and children with febrile seizures in 2008 has been revised in 2011 and 2013. The last one recommends that LP need not to be done for well-appearing, fully immunized children who present with a simple febrile seizure. It should be considered when meningeal signs and symptoms are present or when the history or examination findings suggest intracranial infection. LP is an option for a child aged 6 to 12 months with a simple febrile seizure if the immunization status is unknown or insufficient for Hib or *S. pneumoniae*. It is also an option for a child with a febrile seizure who has had previous antibiotic therapy, as such treatment may mask meningeal signs (AAP, 2013).

Traditionally, LP procedures were performed without imaging guidance in the outpatient and inpatient settings or in the emergency department. In recent years, radiology has been used to provide imaging guidance for LP procedures and radiologist now far exceed neurologists, neurosurgeons, emergency and primary care physicians as predominant providers of LPs. This trend raises important issues, in particular, the concern that traditional providers might lose LP technical expertise as the caseload will diminish, and this would result in a decreased opportunity for physician –trainees to perfect this important skill (Bonadio, 2013; Kroll et al., 2016).

In the USA, between 1991 and 2011, the overall number of LP procedures increased with a slight increase in diagnostic LP procedures (90, 460 vs 90,785) and a marked increase in the therapeutic LP procedures (2868 vs 6461), radiologists perform 48% of the diagnostic LPs and 26.9% of the therapeutic LPs in 2011 (Kroll et al., 2016).

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There is a concerning issue in the maternity and children teaching hospital in Diwaniyah, Iraq (the main pediatric hospital in this city, 180 km to the south of Baghdad, inhabited by 1.2 million population) about LPs which is parental refusal for the procedure, and the aim of this study was based on this observation to determine whether the frequency of LPs in this hospital is decreasing with a focus on the rate of positivity.

PATIENTS AND METHODS

In this retrospective observational study, the results CSF analysis results in the lab of the maternity and children teaching hospital were reviewed using the lab records. The medical records of the patients who had undergone LPs were studied. The data collected were age, gender, results of the CSF analysis and the final doctor diagnosis of the patient problem together with other available investigations. Positive results of the CSF was defined as pleocytosis ≥ 6 cells/ MI and protein more than 80

mg/dl (Kwang, 2014). The study covered a one-year period from January 1st to December 31st, 2016, a comparison with the number of LPs results in 2015 was done using the lab records. The number of patients admitted to the emergency unit and pediatric wards in these 2 years and the number of cases of febrile seizures in 2016 was also recorded using the hospital annual statistics. Data were analyzed using the Chi-square and a p-value of less than 0.01 was considered significant.

RESULTS

During 2016, 78 LPs results were found in the records of the maternity and children teaching hospital lab, 19 results were found in the records of the main lab (i.e. done in the morning) and 59 results in the emergency lab (done in the afternoon and night). From these only 69 patient's files were identified in the department of patients files (probably done in the emergency unit and patients were not admitted or discharged against medical

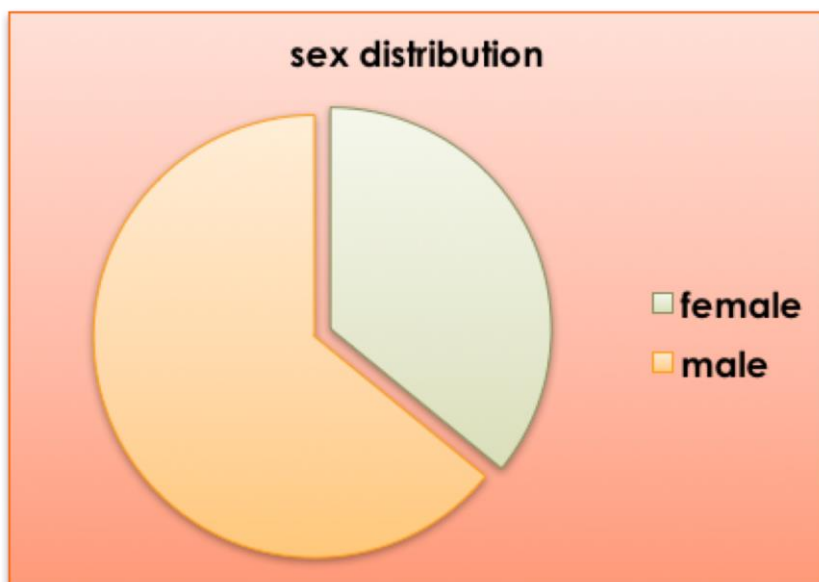


Figure 1: Sex distribution of patients

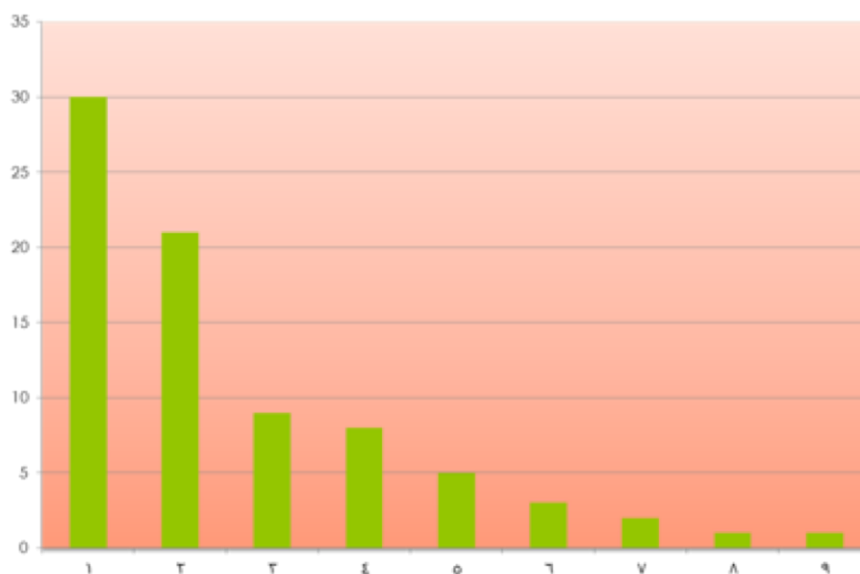


Figure 2: The age distribution of Patients

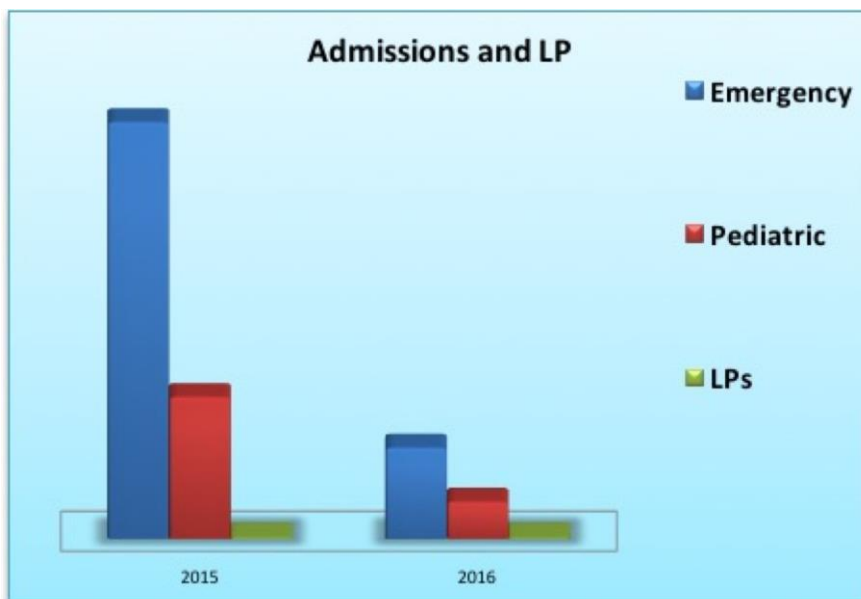


Figure 3: The number of patients admitted and LP

Table 1: The doctor diagnosis of the patient’s problem

Diagnosis	Number	%
Febrile seizures	34	43.6
Bacterial meningitis	25	32
Viral meningitis	2	2.6
Guillain-Barré syndrome	2	2.6
Sepsis	2	2.6
Viral encephalitis	1	1.3
unidentified	12	15.4

Table 2: The number of LPs and Admissions

Patients	Year 2015		Year 2016		P
	n	LP/100	n	LP/100	
Emergency	26561	0.35	5793	1.3	<0.001
Ward	9035	1	2355	3.3	
LP	93	--	78	--	

advice), 28 patients were females and 50 were males (Figure 1). The ages of the patients range from 55 days to 9 years (Figure 2). The number of patients admitted to the emergency unit was 26561 and 5793 in 2015 and 2016 respectively, while the admission to the pediatric wards was 9035 in 2015 and 2355 in 2016 (Figure 3). The number of positive CSF results found was 35 constituting 45% of the total, but only 32 patient’s files were found for those. The doctor diagnosis of the patient’s problems was mostly febrile seizures 32 (40%), bacterial meningitis 25 (32%) (Table 1)

Seventy-eight LPs were done in the maternity and children teaching hospital during 2016, all of them were diagnostic LPs, during this period 2355 patients beyond the neonatal period were admitted to the pediatric wards and 5793 to the emergency unit, this represents 3.3 per 100 hospital admissions and 1.3 per 100 emergency admissions. In 2015, 93 LPs were done and the number of admissions to the pediatric wards was 9034, and the number of admission to the emergency unit was

26561 representing 1 per 100 hospital admissions and 0.35 per 100 emergency admissions (Table 2).

DISCUSSION

The figures in 2016 are significantly higher than that in 2015 and also higher than that reported by Moisset et al (2016) in France, they report a figure of 1.4 per 100 hospital admissions and 0.8 per 100 emergency admissions. There was no similar study focusing on the overall positivity of LPs to make a further comparison. The number of cases of febrile seizures admitted to this hospital in 2016 was 170, for whom only 34 LPs were done (20 %) which is less than that mentioned in several studies (Guedj et al., 2015; Ghotbi et al., 2105; Stephanet al., 2016; Shrestha, 2010; SK, 2010; Tavasoli, 2014; Kimia et al., 2010; Tinsa et al., 2010), the design of these studies was different from this study where they focused on the frequency of bacterial meningitis in infants and children with febrile seizures.

The high positive rate of LPs in our study is mostly due to the fact that they were done for patients strongly suspected of having CNS infections and not following the AAP guidelines. If these guidelines were followed, then more patients with febrile seizures should be subjected to LPs as the vaccination coverage for Hib and streptococcus in our country is not optimal (figure 3) and most our patients are antibiotics pretreated. Hib vaccine had been introduced in 191 countries by the end of 2015. Global coverage with 3 doses of Hib vaccine is estimated at 64%. There is great variation between regions. In the Americas, coverage is estimated at 90%, while it is only 25% and 56% in the Western Pacific and South-East Asia Regions respectively. The pneumococcal vaccine had been introduced in 129 countries by the end of 2015, and global coverage was estimated at 37% (WHO, 2016).

The reduction in the number of hospital admissions in 2016 in comparison with 2015 is attributed to the change of MOH policy in charging hospital services and a shortage of drugs.

CONCLUSION

The frequency of LPs in this hospital was not reduced, but done in situations where CNS infections are strongly suspected.

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