

**Short Research Article****Effectiveness of Lumbar Puncture in Elderly Patients Presented with Acute Confusional State****Abstract**

**Objective:** To evaluate the effectiveness of lumbar puncture (LP) as a diagnostic procedure in acute confusional state in elderly patients, in Al-Fallujah Teaching Hospital, Al-Anbar Governorate, Iraq.

**Patients and Methods:** This is an observational prospective study that enrolled 50 elderly patients with acute confusional state to assess lumbar puncture result in Al-Fallujah Teaching Hospital in Al-Anbar, Iraq, during the period between January 2011 to January 2013. All of the patients have been subjected to lumbar puncture (LP) and laboratory investigations performed.

**Results:** This study reveals slight female predominance that represented 54% of cases with acute confusional state. The mean age of patients was 68 years. Acute confusional state in 92% of our cases was due to systemic disease and meningitis represented only 8% of cases. So most lumbar puncture were negative (normal). 50% of meningitis were in cases with pre\_ lumbar puncture presenting systemic diseases. Meningitis in elderly mostly bacterial.

**Conclusions:** This study reveals that lumbar puncture positive results were low and more solid guideline for LP indication in acute confusional state in elderly is required.

**Key words:** Lumber puncture, Acute confusional state, Diagnosis, Elderly

**Introduction**

Acute confusional state (ACS) in elderly is a diagnostic dilemma that daily face the physician and neurologist in emergency unit & hospitalized patients. One of the most challenging questions is wither to proceed for Lumber puncture (LP) or not. Yet there is no clear guideline for LP indication. While delirium occurs in 33% to 41% of elderly patients [1], the overall incidence of meningitis is about 2 to 10 cases per 100,000 populations per year [2]. Approximately 20% of the cases were projected to involve individuals >60 years [3]. But in sense of atypical presentation of meningitis in elderly & because of high mortality, meningitis should effectively excluded. Some authors believe that older people more often presented with the triad of fever, neck stiffness, and altered mental status than younger adults [4]. While other believe that triad of: fever, nuchal rigidity, altered mental status: only seen in 40% of elderly patients with meningitis [5]. The geriatric patient also may have false-positive findings of meningitis. Signs and symptoms of meningeal irritation such as nuchal rigidity or a positive Kernig's sign or Brudzinski's sign may be found in healthy elderly people.

This false-positive finding is attributed to the presence of limited neck mobility and cervical spine disease. Thus, classic signs and symptoms of meningeal irritation are unreliable in the elderly and make the diagnosis of meningitis more difficult [2]. LP efficiency decreased dramatically according to patients' age [6]. LP is never mentioned as primary investigation and always left to the condition without firm guide. while being the most valuable diagnostic tool for meningitis, Lumbar puncture has a limited role in ACS due to its very low yield [7]. Some suggested that cerebrospinal fluid should be analyzed only in atypical cases of stroke, or when pyrexia develops without an apparent source of infection in an elderly patient with stroke

[8]. other believe that should be done for every patient with ACS [9] and other not believe in doing LP unless for typical cases of meningitis [10]. The causes of acute confusional state in elderly are mainly due to systemic infection 34%, stroke 11% & metabolic 10% [11]. While meningitis represent between 1% to 5 % of cases of ACS. These numbers give as an idea about the difficult decision regard LP. The aim of this study was to evaluate the effectiveness and safety of lumbar puncture (LP) as a diagnostic procedure in acute confusional state in elderly patients, in Al-Fallujah Teaching Hospital, Al-Anbar Governorate, Iraq.

## Patients and methods

This is a prospective observational study that has enrolled 50 elderly patients. The range of patients age was between 60 years to 85 years old. With the mean age was 68 years old with little female predominance. Patients present with A.C.S. at time of hospital admission who admitted Al-Falluga hospital Al-anbar \ Iraq, during the period between january,2011 to January ,2013. All of the patients had been examined by a neurologist with lumbar puncture. General medical and neurological examination was done for the patients whom presented with acute confusional state without clear causes that fully explain their presentation. This give a diagnostic difficulty and a decision of lumbar puncture was also difficult for both medical staff and patients relatives, when we should satisfy their worried about the procedure complications against its benefits. The patients had been fully assessed with clinical and laboratory investigations: Blood count, ESR, Glucose, urea, creatinine, Electrolyte, Liver function test, ECG, Cardiac echo-study, X-Ray, Ultrasound, Neuroimage; CT, MRI according to the patient condition.

## Results

The range of patients age was between 60 years to 85 years old. With the mean age was 68 years old with little female predominance as 54% of our patients were female. Table (1)

Table (1) Age & Sex distribution of cases

Age(years)	male	Female	total	percentage
60-69	11	14	25	50
70-80	6	9	15	30
>80	6	4	10	20
Total	23	27	50	
Percentage	46	54	100	100

Most common causes of ACS being systemic infection as they represent 50% of cases, electrolyte 20%, idiopathic 12%, meningitis 8%, other causes 8% & involve; drugs. heart failure & liver diseases. Regard systemic infection, chest infection represent 20% of cases as well as UTI. Regard electrolyte, dehydration represent the most common electrolyte disturbance. Meningitis represent only 8% of cases of ACS in elderly. Table (2)

Table (2) Causes of ACS in elderly patients

Causes	Number of patients	Percentage
Meningitis	4	8
Systemic infection	25	50
Electrolyte disturbance	10	20
Other	4	8
Unkown causes	6	12

Pre LP systemic disease doesn't eliminate the need for LP. 50% of our cases were in patients with systemic diseases. Table (3)

Table (3) LP result in ACS cases in elderly patient presenting with systemic disease.

Diseases	Positive LP For meningitis	Negative LP
Systemic infection	1	24
Electrolyte disturbance	1	9
other	0	4

Meningitis present in cases of ACS with fever & in cases of ACS without fever.

We have 35 patients (70% of our sample) who present with ACS with fever & among them two patients proved to have meningitis. The other 15 patients (30% of our sample) present with ACS without fever also two patients of proved meningitis. This means 50% of our patients with meningitis have fever & other 50% have meningitis without fever. Table(4)

Table (4) meningitis in patients with & those without fever

Presentation	Percentage
ACS with fever	30
ACS without fever	70

Meningitis is mostly bacterial in elderly. Table (5)

Table (5) Causes of meningitis in elderly patients

Causative organism	Number of patients	Percentage
bacterial	2	50
viral	1	25
Tuberculosis	1	25
Total	4	100

## Discussion

The mean age was 68 years in this study & it was less than that of JAMES GEORGE who point to being 81 years while female predominance is comparable to his results who points to 78 men and 93 women [12]. Half of our sample lie between the age 60-69 years old & the other older age group represent the smaller sample due to their decreasing number by death with aging. The difference in mean age between our sample & that of JAMES GEORGE mostly due to hard life conditions in our country. Most of the cases of ACS are systemic diseases while 8% are due to meningitis in our study. While in other studies the percent of meningitis cases have some conflicting results. In study of Bilal Majed [6], he point to 11%. While Warshaw G [10] who point that it is only around 1% so conclude that LP unnecessary in case of ACS in elderly unless there are clear classical signs of central nervous system infection. When LP done for confused elderly patient with pre LP systemic disease, we diagnose 50% of our meningitis cases. And this is very risky result because it may mandate LP for every patient. This is comparable to J. D'Amore who point to 46% of his cases of meningitis were having systemic diseases [13]. The presence of fever not make great different in diagnosis of meningitis as appear in our study. This comparable to Shah K who points that meningitis present in both cases that present with or without fever [14]. And even he give higher rate to those without fever as he point that meningitis occur in 12% of them compared to those with fever in whom meningitis represent 7%. Meningitis in elderly commonly is bacterial infection. This is comparable to Delorme S [15] & this mean more mortality so more urgency to do LP. If we take into our account the percent of unknown causes of ACS which reach 12% for patient who are subjected to unnecessary LP with normal result, we conclude that deficit investigations were play major role for LP decision. This because many common causes of ACS can be easily missed if there is no available investigation like blood gas measures, electrolytes, serology & hormonal test.

## Conclusion

This study reveals that lumbar puncture positive results were low. While some authors see that LP must be done for all patient to not miss even a single case, other see that it unnecessary to subject all those patient to LP to detect few cases & preserve LP for clear cases. In the absence

of clear guideline with such non consistent result the decision of LP look philosophical and more subjective then being on solid clinical base. Full availability of investigation is mandatory to reduce unnecessary LP.

## References

1- Diagnosis and Management of Delirium in the Elderly. Case Study and Commentary: Constantine G. Lyketsos, MD, MHS. Series Editor: Bryan A. Liang, MD, PhD, JD. Hospital Physician June 1999 page 37- 58.

2-, Acute Bacterial Meningitis. Sharon E. Mace, MD, FACEP, FAAP. Emerg Med Clin N Am 38 (2008) 281–317.

3-Bacterial Meningitis in Aging Adults. Chester Choi . Departments of Medicine, St. Mary Medical Center, Long Beach, and the UCLA School of Medicine, Los Angeles, California. Oxford journal, Clin Infect Dis. (2001) volume 33 (8): 1380-1385.

4-Community-Acquired Bacterial Meningitis in Older People

Martijn Weisfelt MD, Diederik Van De Beek PhD, Lodewijk Spanjaard PhD, Johannes B. Reitsma PhD, Jan De Gans PhD. Article first published online: 8 SEP 2006. Journal of the American Geriatrics Society. Volume 54, Issue 10, pages 1500–1507, October 2006

5-Meningitis and Encephalitis in the Older Patient Debra Bynum, MD. Division of Geriatric Medicine. University of North Carolina Chapel Hill. April, 2007.

6- Lumbar punctures: use and diagnostic efficiency in emergency medical departments. Bilal Majed88. Int J Emerg Med. 2009 December; 2(4): 227–235. Published online 2009 November 19. doi: 10.1007/s12245-009-0128-5. PMID: PMC2840591

7-Delirium in the Hospitalised Elderly. Juli A Moran, Michael I Dorevitch. Australian Journal of Hospital Pharmacy, 2001.

8-Are we missing atypical bacterial meningitis in the elderly? K.K. Chakravarty, A.H. Al-Hillawi, C. Scholes, C.J. Durkin, Department of Geriatric Medicine, Stoke Mandeville Hospital, Aylesbury, UK. Postgraduate Medical Journal (impact factor: 1.94). 07/1990; 66(776):493, Source: PubMed

9-Emergency Department Management of Delirium in the Elderly, Lynn E.J. Gower, DO, Medley O'Keefe Gatewood, MD, Christopher S. Kang, MDDisclosures. Western J Emerg Med. 2012;13(2):194-201.

10-The effectiveness of lumbar puncture in the evaluation of delirium and fever in the hospitalized elderly. Warshaw G, Tanzer F. Source Department of Family Medicine, University of Cincinnati Ohio Medical Center. Arch Fam Med. 1993 Mar;2(3):293-7.

11- Causes and prognosis of delirium in elderly patients admitted to a district general hospital. JAMES GEORGE, SHEENA BLEASDALE, STEVEN J. SINGLETON  
Department of Medicine for the Elderly, Cumberland Infirmary, Carlisle, CA2 7HY UK. Age and Ageing 1997; 26: 423-427

12-Causes and prognosis of delirium in elderly patients admitted to a district

general hospital. JAMES GEORGE, SHEENA BLEASDALE, STEVEN J. SINGLETON. *Age and Ageing* 1997; 26: 423-427

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13-Assessing the diagnostic contribution of lumbar puncture in geriatric patients presenting with fever and altered mental status: Does source obviate lumbar puncture?

J. D'Amore, M. Nelson. North Shore University Hospital, Manhasset, NY. *Annals of Emergency Medicine*. Volume 44, Issue 4, Supplement , Page S69, October 2004

14- Utility of lumbar puncture in the afebrile vs. febrile elderly patient with altered mental status: a pilot study.. Shah K, Richard K, Edlow JA.

Source. Department of Emergency Medicine, St. Luke's-Roosevelt Hospital, New York, New York 10025, USA. *J Emerg Med*. 2007 Jan;32(1):15-8.

15-Meningitis in elderly patients. Delerme S, Castro S, Viallon A, Boutoille D, Bendahou M, Riou B, Ray P. Source: Departments of Emergency Medicine and Surgery, Centre Hospitalo-Universitaire Pitie-Salpetriere, Assistance-Publique Hopitaux de Paris, UPMC-Paris 6, Paris, France. *Eur J Emerg Med*. 2009 Oct;16(5):273-6.