

Effectiveness of lumbar puncture in elderly patients presented with acute confusional state

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Abstract

Objective: To evaluate the effectiveness of lumbar puncture (LP) as a diagnostic procedure in acute confusional state in elderly patients.

Patients and Methods: This is an observational prospective study as short research article 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 and January 2013. All of the patients have been subjected to lumbar puncture (LP) as well as laboratory investigations.

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 central nervous system infection (Meningitis and encephalitis) represented only 8% of cases. So most lumbar puncture were negative (normal). 50% of CNS infections were in cases with pre_ lumbar puncture presenting systemic diseases. Central nervous system infection in elderly is mostly bacterial meningitis.

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:

Abbreviation

LP; lumbar puncture

CNS; central nervous system

ACS; acute confusional state

TB; Tuberculosis

Introduction

Acute confusional state (ACS) in elderly is a diagnostic dilemma that daily faces the physician and neurologist in emergency unit & hospitalized patients. One of the most challenging questions is whether to proceed for Lumbar puncture (LP) or not. Yet there is no clear guideline for LP indication in elderly patients. 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 CNS infection in elderly & because of high mortality, meningitis should effectively be 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 CNS infection, 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]. CNS infection represents 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 as short research article that has enrolled 50 elderly patients. The range of patient's 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-Fallujah 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.

We apply the Confessional Assessment Method (C.A.M.). It includes the following criteria:

1-Acute change in mental state with fluctuating course.

2- Inattention

3- Disorganized thinking: it involves any of; orientation, content of thinking or illogical ideas

4- Altered level of consciousness and psychomotor activity: alert or drowsy.

Diagnosis involve; 1+2+either 3 or 4

We exclude;

1- cases of typical presentation in which patient present with classical triad of fever headache and neck stiffness who have intact consciousness and proved later by lumbar puncture to have central nervous system infection.

2- cases of acute confusional state with clear systemic disease (like renal failure) which explain their presentation.

Selection of the sample include elderly patients whom presented with acute confusional state without clear causes that fully explain their presentation as purely medical cause or it is central nervous system infection.

This occurs with elderly patients whom present with clinical and laboratory finding that could point to more than causes for their acute confusional state presentation.

In addition to the well known causes of difficulty in diagnosis in elderly, our sample include delayed presentation to hospital as one of the important cause for the vague presentation because patient kept at home specially in rural area waiting for spontaneous improvement with poor oral intake and without intravenous fluid and began to deteriorate with dehydration and disturbed consciousness than after few days brought to the hospital when we receive the patient with complicating presentation with dehydration disturbed consciousness generalized spasticity and fever . At this point physician and neurologist face the problem of could we wait for general supportive measure or should proceed for immediate lumbar puncture.

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 for the age of the patients 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

Regard ACS as the presenting picture of our sample, the most common causes of ACS being systemic infection as they represent 50% of cases, electrolyte 20%, idiopathic 12%, meningitis 8%, other causes 8% which involve; drugs, heart failure & liver diseases.

Regard systemic infection, chest infection represent 20% of cases as well as UTI also 20%.

Regard electrolyte disturbance as a cause of ACS, dehydration represent the most common electrolyte disturbance.

CNS infection (Meningitis and encephalitis) represent only 8% of cases of ACS in elderly.

The cases of unknown causes of ACS represent 14% of our sample.

Table (2) Causes of ACS in elderly patients

Causes	Number of patients	Percentage
CNS infection	4	8 %
Systemic infection	25	50 %
Pneumonia	5	
UTI	5	
Typhoid fever	3	
Bedsore	3	
GIT	2	
Septicemia	2	
Influenza	2	
Cellulites	2	
Brucellosis	1	
Electrolyte disturbance	10	20 %
Dehydration	7	
Hyopnatremia	2	
Hypocalcemia	1	
Other	4	8 %
Drug; anicholenergic	2	
Heart failure	1	
Liver failure	1	
Unknown causes	7	14 %

Pre LP systemic disease doesn't eliminate the need for LP.

In our sample, we have four patients who are proved to have CNS infection. Two patients (50% of our positive lumbar puncture result) where in patients with apparent systemic diseases at time of presentation. The other two patients were with ACS without specific apparent cause in their initial presentation. Table (3)

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

Diseases	Positive LP for CNS infection in systemic disease	Negative LP
Systemic infection	One case of Chest infection (pneumonia) that was apparent at time of presentation	24 negative LP of 25 patients with systemic infection at time of presentation
Electrolyte disturbance	One case of dehydration that was apparent at time of presentation	9 negative LP of 10 patients with electrolyte disturbance
Other patient involve; drugs, heart failure & liver failure	No case give Positive LP result	4 negative LP of 4 patients

In our sample, we face two types of patients according to the inclusion criteria

1. Patients whom present with apparent disease at initial evaluation but the picture were atypical for the systemic disease. Like the presence of neck resistance and fever or disturbed consciousness in case of mild dehydration and mild renal impairment. This group represents 40% of the sample. It involve most of patients with electrolytes disturbance (10 patients), less than one third (8 patients) of those with systemic infection and the two patients of heart and liver failure.

2. Those with ACS but without specific apparent disease and are atypical for CNS infection. No fever and no neck stiffness. This group represents 60% of the sample. Systemic infection represents the major part as it takes more time for diagnosis. The primary investigation of complete blood picture and ESR cannot differentiate between the types of the systemic infection or the CNS infection. And while we wait for the culture or serology, LP is mandatory. The other two cases of drug poisoning are difficult to be diagnosed even if there is a history of drug ingestion. This because there is no toxicology centre in our city and we must send the sample for Baghdad.

Regarding the presentation of our patients, ACS was the main clinical presentation.

CNS infection (Meningitis and encephalitis) 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 CNS infection. The other 15 patients (30% of our sample) present with ACS without fever also have two patients of proved CNS infection. This means that 50% of our patients with CNS infection have fever & other 50% have CNS infection without fever. Table (4)

Table (4) CNS infection (Meningitis and encephalitis) in patients with & those without fever

Presentation of our patients related to fever	Percentage	Number of patients with positive LP
ACS with fever	30 % of the patients	2 patients
ACS without fever	70 % of the patients	2 patients

The most difficult cases come from the presence of neck flexion resistance. This is hardly evaluated in elderly especially in those with generalized spasticity. Most commonly this occurs in dehydrated patients and in those with previous history of multiple stroke or parkinsonism or even merely cervical spondylosis. It is specially common among the older age group of our sample. Half of our cases have neck stiffness but only two patients of them have CNS infection.

CNS infection (Meningitis and encephalitis) is mostly bacterial in elderly and both cases in our sample were due to *S. pneumoniae*. We have one case of viral encephalitis and one case of TB meningitis. These results were proved by CSF culture, DNA test with PCR as with clinical response to treatment.

Table (5) Causes of CNS infection in elderly patients

Causative organism	Number of patients	Percentage of positive LP	Diagnostic difficulty
Bacterial <i>S. pneumoniae</i>	2	50%	One patient with initial chest infection Other patient with ACS without fever with Normal initial routine investigation
Viral Herpes	1	25%	Dehydrated patient with Mild renal impairment After delayed presentation
Tuberculosis	1	25%	ACS without fever with Normal initial routine investigation
Total positive LP cases	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 CNS infection in our study. In other studies the percent of CNS infection 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. In our sample, we diagnose 50% of our central nervous system infection cases in patients whom already present with apparent specific diseases at initial evaluation. 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 CNS infection 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%. CNS infection in elderly commonly is bacterial infection. This is comparable to Delorme S [15] & this means more mortality so more urgency to do LP.

If we take into our account the percent of unknown causes of ACS which reach 14% for patient who are subjected to unnecessary LP with normal result, we conclude that deficit investigations were play major role for LP decision in Iraq. This because many common causes of ACS can be easily missed if there is no available investigation like blood gas measures, serology, immunological markers, hormonal test and toxicology.

Conclusion

This study reveals that lumbar puncture positive results were low. While some authors see that LP must be done for all patients to not miss even a single case, other see that it unnecessary to subject all those patients for 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.

Recommendation

1. More studies are needed to reach a solid guide for LP in elderly.
2. Geriatric need attention and people need education about their elderly patients to be brought for hospital as early as possible.
3. In developing countries like Iraq, full availability of investigation is mandatory to reduce unnecessary LP.

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