

Cerebrospinal fluid lactate and lactate dehydrogenase levels as diagnostic aids in tuberculous meningitis

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Summary

The value of cerebrospinal fluid (CSF) lactate and lactate dehydrogenase (LD) values as aids in differentiating tuberculous meningitis (TBM) from aseptic meningitis has been investigated. Using an upper limit of normal for CSF lactate levels of 2,75 mmol/l resulted in detection of 24 out of 26 cases of TBM (a sensitivity of 92%). If, however, a level of 3,85 mmol/l was taken as the upper limit of normal, then 18 out of 26 cases were detected (a sensitivity of 69%). Using 40 U/l as the upper limit of normal for LD levels detected 21 out of 38 cases of TBM (a sensitivity of 55%). Both tests may give normal values in the presence of TBM, but this should not cause specific antituberculosis therapy to be withheld. Neither test appears to hold marked advantages over conventional chemical analysis of CSF in differentiating TBM from aseptic meningitis.

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The early diagnosis of tuberculous meningitis (TBM) remains a pressing problem for clinicians, particularly in under-developed countries. Any delay in diagnosis and the institution of therapy has an adverse effect on prognosis. A not uncommon problem is the differentiation of TBM from possible viral meningitis. Cerebrospinal fluid (CSF) lactate¹⁻⁴ and lactate dehydrogenase (LD)⁵⁻⁷ levels have been reported to be raised in cases of TBM, and determination of CSF lactate^{3,4} and CSF LD⁷ levels has been suggested as a means of distinguishing TBM from aseptic meningitis. We wish briefly to report on our experience with these two investigations in the diagnosis of TBM.

Patients and methods

Thirty-nine patients with TBM were investigated either before the initiation of therapy (21 cases) or shortly after the initiation of therapy (18 cases). In 38 patients the CSF LD level was determined. In 25 of these patients and in a further patient the CSF lactate level was determined. All CSF specimens were obtained for normal clinical indications. With two exceptions (adults aged 36 years and 17 years) the patients were children whose ages ranged from 4 months to 12 years and 4 months (mean age 28,87 months).

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In 16 cases (41%) the diagnosis of TBM was confirmed by the culture of *Mycobacterium tuberculosis* from the CSF. In the remaining 23 cases clinical diagnosis was supported by compatible conventional CSF findings and the clinical course in all cases, a chest radiograph with tuberculous features in 19 cases (83%), a positive tuberculin test in 11 cases (48%) and culture of *Mycob. tuberculosis* from gastric washing or sputum in 5 cases (22%).

CSF for lactate determination was collected in tubes containing Long's solution and assayed enzymatically (Boehringer Mannheim kit).⁸ CSF LD was determined by an optimized standard method (Boehringer Mannheim).

Results

The CSF lactate and LD values are set out in Fig. 1. They are compared with the CSF glucose and protein levels and the total cell count of these same specimens.

In Fig. 1 the suggested upper limits of normal for CSF lactate of 2,75 mmol/l and 3,85 mmol/l^{9,10} have been indicated, and the upper limit of normal for CSF LD is 40 U/l.⁵ In the case of CSF protein 1 g/l has been chosen as a 'decision point' beyond which a septic process in the CSF would be suspected,

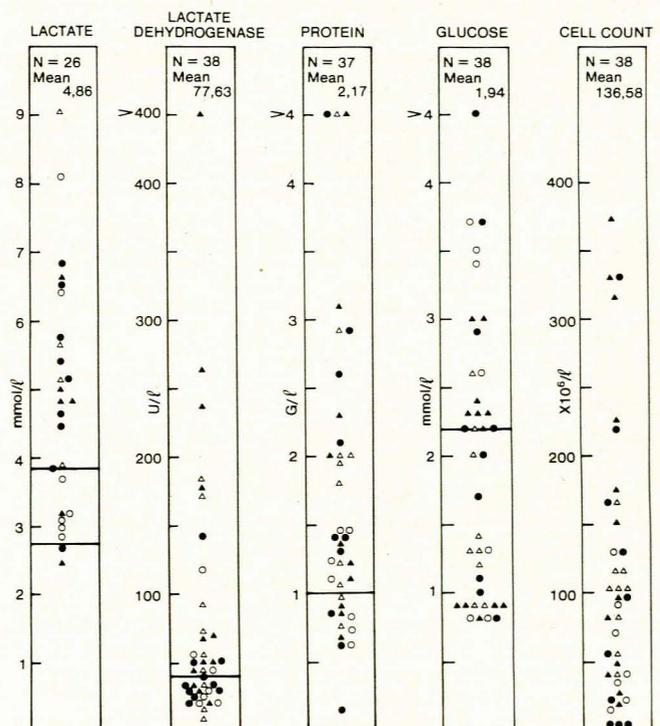


Fig. 1. CSF lactate, LD, protein and glucose levels and cell count in patients with TBM (Δ = confirmed TBM before therapy; \circ = confirmed TBM after therapy; \blacktriangle = clinical TBM before therapy; \bullet = clinical TBM after therapy).

while the lower limit of a normal CSF glucose level is indicated (2,2 mmol/l).

If the above values are taken as indicating levels above or below which a septic process (such as TBM) should be suspected, then a CSF lactate level of 2,75 mmol/l achieved a sensitivity of 92%, detecting 24 out of 26 cases. Raising the upper limit of normal to 3,85 mmol/l reduced the sensitivity to 69% (18 out of 26 cases detected). An upper limit of normal for CSF LD of 40 U/l achieved a sensitivity of 55%, 21 out of 38 cases being detected, while an upper limit of 1 g/l for CSF protein detected 26 out of 37 cases (protein values not available in 2 patients), giving a sensitivity of 70%. In 21 out of 38 cases the CSF glucose level was below 2,2 mmol/l (glucose values not available in 1 patient), a sensitivity of 55%.

Of the 25 patients in whom both CSF lactate and LD levels were determined, there were 3 with a total cell count of < 100, a protein level < 1 g/l and a glucose level > 2,2 mmol/l. In all these 3 cases the CSF LD level was < 40 U/l while the CSF lactate level fell within the equivocal range of between 2,75 mmol/l and 3,85 mmol/l. A review of all those patients with CSF LD levels in excess of 40 U/l revealed only 1 in which neither CSF protein nor CSF glucose levels might have indicated the true nature of the process. A chest radiograph revealed miliary tuberculosis in this patient.

Discussion

Our results confirm that both CSF lactate and CSF LD levels are often raised in cases of TBM. It may, however, be questioned whether their use holds any great advantages over conventional CSF investigations in differentiating TBM from aseptic meningitis.

In the case of CSF lactate levels, a relatively low value, 2,75 mmol/l, must be taken as the upper limit of normal to increase the sensitivity of the test. However, in a number of viral meningitides values may be above this level.¹⁰ When the upper limit of normal is set at 3,85 mmol/l the sensitivity of the test

in detecting TBM falls (from 92% to 69%) and is slightly lower than that associated with using a CSF protein level of 1 g/l (70%), and the test does not appear to hold any advantages over conventional CSF chemistry.

Using the CSF LD level proved to be even more disappointing — only 21 out of 38 cases of TBM were detected. In this respect our results differ from those of previous authors,⁵⁻⁷ and we can only speculate that our patients were perhaps seen at an earlier stage in the disease process.

In conclusion, both CSF lactate and CSF LD levels may be raised in TBM and may occasionally help in clinical decision-making. However, normal values do not exclude the disease and should not lead to a decision to withhold antituberculosis treatment.

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Simple ureteroceles — ultrasonographic recognition and diagnosis of complications

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Summary

Ultrasound scans were performed on 6 adult males with simple ureteroceles, 2 of which were detected on primary scanning of patients in renal failure and 4

after excretory urography. Two complications were also detected — obstruction with hydro-ureter formation and tumour formation in a ureterocele. A scheme is proposed for differentiating ureteroceles from other causes of bladder filling defects using ultrasound examination.

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Ureteroceles are congenital or acquired dilatations of the lower end of the ureter;¹ simple ureteroceles involve a normally implanted ureter, whereas ectopic ones implant extravasically. Ultrasound scans have been used in the diagnosis of several reported cases, both simple and ectopic.²⁻⁴ We present a series