Is Computed Tomography of the Head Useful Before Lumbar Puncture?

Sir—Tunkel et al. [1] should be congratulated for their Practice Guidelines for the Management of Bacterial Meningitis, which admirably tackle several controversial aspects of the management of this disease. However, one controversial strategy may merit further debate: the role of CT of the head before lumbar puncture. The practice guidelines and standard community practice make a major assumption that I believe is not supported by peer-reviewed data. The overriding assumption is that head CT can reliably predict who will and who will not experience brain herniation after lumbar puncture. In fact, there is considerable published data indicating just the opposite.

In a recent prospective investigation by Hasbun et al. [2], none of the 7 patients with mild-to-moderate mass effect on head CT scan experienced brain herniation after undergoing lumbar puncture. Furthermore, 4 patients had mass effect on head CTs that caused their treating clinicians not to perform lumbar punctures. Two of those 4 patients experienced brain herniation despite not undergoing lumbar puncture. The conclusion? Having mass effect on a CT did not predict post–lumbar puncture herniation, and not performing a lumbar puncture for patients with mass effect did not prevent herniation.

The results of numerous other studies are concordant. For example, 10 of 75 patients with Streptococcus pneumonia meningitis experienced brain herniation after lumbar puncture, and only 2 of those patients had abnormal CT findings before lumbar puncture [3]. Furthermore, 26 of the 65 patients who did not experience brain herniation after lumbar puncture had had abnormal CT findings [3]. In a different study [4], 36 patients underwent lumbar puncture despite having mass effect on the CT, and only 1 patient experienced brain herniation after lumbar puncture. In a review of the literature, a total of 4 (1.3%) of 296 patients with focal mass effect were found to have experienced brain herniation after lumbar puncture [4]. A prospective description of 38 patients with focal mass lesions on CT who underwent lumbar puncture found that only 1 patient (2.6%) experienced brain herniation after lumbar puncture [5]. Similarly, in older studies, of 495 patients with brain tumors who underwent lumbar puncture, only 1 (0.2%) developed a complication from the lumbar puncture [5]. The conclusion from these studies, including several performed prospectively, is that CT cannot reliably be used to predict who will or will not experience brain herniation after lumbar puncture.

Why do we persist in using the CT scan for this purpose, despite the lack of supportive data? I am as guilty of this practice as anyone else, and the reason is simple: I am a chicken. No one wants to get sued, and as long as it is felt that performing the CT is the standard of care, lawyers will force us to perform this test, despite the fact that the currently available medical evidence indicates that the test is not useful in these situations. We desperately need a large, definitive, prospective evaluation of the utility of head CT to predict post–lumbar puncture herniation. Failing this, perhaps it is time for an open dialogue in the infectious diseases community on whether we should continue to promote use of CT before lumbar puncture as the standard of care for any patients.

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References


The Use of Dexamethasone in Bacterial Meningitis

Sir—The Infectious Diseases Society of America (IDSA) Practice Guidelines for Bacterial Meningitis state, “Dexamethasone should only be continued if the CSF Gram stain reveals gram-positive diplococci, or if blood or CSF cultures are positive for S. pneumoniae” [1, p. 1278]. A similar statement—“if the meningitis is found not to be caused by S. pneumoniae, dexamethasone therapy should be discontinued”—was made by Tunkel and Scheld...
in the pneumococcal meningitis subgroup, which had substantially higher mortality in the control group (34%), compared to that in the meningococcal subgroup (2%), supports this concept. In addition, de Gans and van de Beek study [3] reported that steroid therapy had a larger beneficial effect for patients with moderate-to-severe disease. Nonetheless, dexamethasone therapy should not be delayed while the severity of illness is assessed, because its beneficial effects would be very unlikely to occur if administered after the initiation of antimicrobial therapy. Moreover, recently published studies suggest that steroids are beneficial for septic shock independent of the microbial etiology [6, 7]. Of note, the IDSA guidelines recognize the benefit of steroid treatment for meningitis caused by microorganisms other than gram-positive diplococci, such as *Haemophilus influenza* type b in children [1].

In conclusion, (1) the absence of a biological explanation for a beneficial effect of steroid therapy on infections due to gram-positive organisms exclusively, (2) the established benefit of steroid therapy on meningitis due to gram-negative organisms (e.g., *H. influenza* type b), (3) the absence of a significant effect of *S. pneumoniae* on the magnitude of the steroid effect in the de Gans and van de Beek study [3], (4) the recent finding that the baseline risk of death affects the extent of the treatment effect from anti-inflammatory agents, and (5) the evidence from septic shock studies that the benefit of steroid therapy is independent of the infectious agent all do not support the IDSA guidelines’ recommendations for the use of dexamethasone in adults with pneumococcal meningitis only.

Alternatively, the benefits of steroid therapy for bacterial meningitis may depend on the baseline risk of death, as seen in sepsis trials [5]. The larger effect seen

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### Reply to Spellberg and to Kalil

Sir—Many aspects of treatment of patients with bacterial meningitis continue to engender significant controversy. Spellberg [1] raises the question of whether CT is necessary before performance of lumbar puncture in patients with suspected bacterial meningitis. He points to several studies that have demonstrated that evidence of mass effect on CT did not predict post–lumbar puncture brain herniation and that patients with mass effect have experienced brain herniation even though they did not undergo lumbar puncture,