



PAPILLOEDEMA – TO DO LUMBAR PUNCTURE OR NOT

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ABSTRACT

Papilloedema is not always an adequate predictor of potential complications from lumbar puncture, and many clinicians are using computed tomography (CT) before lumbar puncture in an effort to identify more accurately the patient at risk. The anatomical criteria defined by CT scanning that correlate with unequal pressures between intracranial compartments and predispose a patient to herniation following decompression of the spinal compartment, like lateral shift of midline structures, loss of the suprachiasmatic and basilar cisterns, obliteration of the fourth ventricle, or obliteration of the superior cerebellar and quadrigeminal plate cisterns with sparing of the ambient cisterns, should be considered to be contraindications to lumbar puncture.

Keywords: Papilloedema, Lumbar Puncture.

INTRODUCTION

Lumbar puncture was originally described by Quincke in 1891, and it has since proved to be a highly effective diagnostic procedure [1]. In 1909, Harvey Cushing recognized that patients with unequal pressures between intracranial compartments who underwent lumbar puncture were at risk for cerebral herniation and death [2]. This group of patients was best identified at that time by the presence of a “choked disk” (papilloedema), and his finding resulted in the axiom that papilloedema was a contraindication to lumbar puncture.

More recently, some authors have suggested that papilloedema is not always an adequate predictor of complications from lumbar puncture [3] and many clinicians now turn to computed tomography (CT) before performing lumbar puncture.

DISCUSSION

Papilloedema is one of the most important signs of raised intracranial pressure. The presence of papilloedema is considered to be a contraindication for performing lumbar puncture, since times immemorial. Raised intracranial pressure itself is not a contraindication to lumbar puncture provided that the raised pressure is

distributed equally throughout all the Cerebro spinal fluid (CSF) compartments. Thus, lumbar puncture can be performed safely in raised intracranial pressure due to a communicating hydrocephalus e.g. post subarachnoid haemorrhage or benign Intra cranial tension (ICT) when it is commonly used as a therapeutic measure. The present day neuroradiological scans, clinical history, level of consciousness and focal neurological signs are more important to decide as to do Lumbar Puncture (L.P) or not rather than papilloedema alone.

Lumbar puncture is a simple technique which requires little specialist skill to be performed safely. As a consequence of this, there is a tendency to assume that it is a safe investigation to be carried out in any undiagnosed Central Nervous System (CNS) illness. There are, however, extreme dangers in an inappropriate L.P., because in some circumstances removal of CSF can disturb intracranial dynamics and cause neurological deterioration or else sudden death.

Dangers of L.P

The three main pressure compartments within the subarachnoid space as shown in figure 1 are

- The supratentorial compartment above the tentorium cerebri (containing cerebral hemispheres).
- The infra tentorial compartment between the tentorium and Foramen Magnum (containing the cerebellum and brain stem).
- The spinal compartment below the Foramen Magnum.

In addition, a mass in spinal canal can produce a further pressure compartment and withdrawing the CSF below the mass may cause it to move downwards in the spinal canal, thereby increasing patient's physical signs and disability.

In normal circumstances, CSF circulates freely between the three compartments and there is no pressure gradient between them. Danger occurs when there is a mass within one of the intracranial compartments which allows a pressure differential to occur across the tentorium or Foramen Magnum. Removal of CSF from the spinal compartment will increase the pressure differential causing tentorial or Foramen Magnum Coning resulting in neurological deterioration. The rate of deterioration will depend on the pressure differential, the site of mass and the speed with which the intracranial pressure has built up. Posterior fossa tumours are notorious for causing death after lumbar puncture, sometimes within minutes of the procedure.

Raised intracranial pressure itself is not a contraindication to L.P., provided that the raised pressure is distributed equally in all the CSF compartments mentioned above. Thus L.P. can be performed safely in raised ICT due to a communicating hydrocephalus, but it is exceedingly dangerous in a non-communicating hydrocephalus, where the pressure is raised in supratentorial compartment but not in the posterior fossa or spinal compartment, e.g. posterior fossa mass, aqueduct stenosis or colloid cyst of third ventricle.

Lumbar puncture is often performed as an investigation of chronic neurological conditions such as multiple sclerosis and in myelography. In these circumstances, the lumbar puncture is part of a sequence of investigations in which intracranial masses are not anticipated and problems never arise.

Difficulties occur in the acutely ill patient, when encephalitis, meningitis and subarachnoid haemorrhage are among the differential diagnosis. In these patients, a CT scan should preferably be performed prior to L.P. We suggest the following CT criteria that are anatomical correlates to unequal intracranial pressures and should be considered contraindications to a proposed diagnostic lumbar tap.

(1) CT evidence of unequal pressures across the midline (falx cerebri)

The presence of unequal supratentorial pressures is easily identified by lateral shift of the midline structures (septum pellucidum, third ventricle) [7]. Asymmetry of

the lateral ventricles alone may not be an accurate sign, since ipsilateral ventricular dilatation may occur secondary to stroke, or coaptation of a frontal horn may represent a normal anatomical variant. Following lumbar puncture unequal supratentorial pressures would most likely lead to compression of the ipsilateral temporal lobe, leading to an uncal herniation.

(2) CT evidence of unequal pressures between the supratentorial and infratentorial compartments

Unequal pressures across the tentorium may be subdivided into an elevated pressure cephalad to the tentorium pushing structures into the posterior fossa or an elevated pressure caudad to the tentorium pushing structures upward as well as through the foramen magnum.

Symmetrical supratentorial pressures higher than infratentorial pressure are identified by loss of the suprachiasmatic and circummesencephalic cisterns (basilar cisterns). The ventricular system may be symmetrically small as in diffuse cerebral oedema, or the lateral ventricles including the temporal horns may be enlarged as in obstructive (noncommunicating) hydrocephalus. Decompression of the spinal and posterior fossa compartments from lumbar puncture may cause the medial temporal lobes to impact into the tentorial hiatus bilaterally (bilateral uncal herniation).

(3) The Strongest contraindication to lumbar puncture is a posterior fossa mass.

Papilloedema will be same whether it is a intracranial mass or inflammatory neurological conditions. But L.P. is contraindicated in intracranial mass lesion because of pressure differential in CSF compartments. L.P. is indicated in inflammatory neurological lesions, subarachnoid haemorrhage, benign ICT and G.B. syndrome and is of diagnostic and therapeutic value. However CT Scan is required to rule out mass lesions like Tuberculomas, Gummas, Cerebral abscesses and intracranial hematomas where LP is contraindicated. Hence, neuroradiological scans diagnosing intracranial mass lesions score above papilloedema in being contraindication to L.P.

In the absence of neuroradiologic scans, clinical examination such as history, level of consciousness and focal neurological signs may help indicate intracranial mass lesion in which L.P. is contraindicated.

History

Patient is too drowsy to give history, L.P. is deferred

- If history is of a sudden headache (subarachnoid haemorrhage) or one developing over a few hours without focal signs – safe to perform L.P.

- A H/o several weeks or months of progressive headache, worse in the morning and on coughing or straining indicate intracranial mass and L.P. is better deferred.

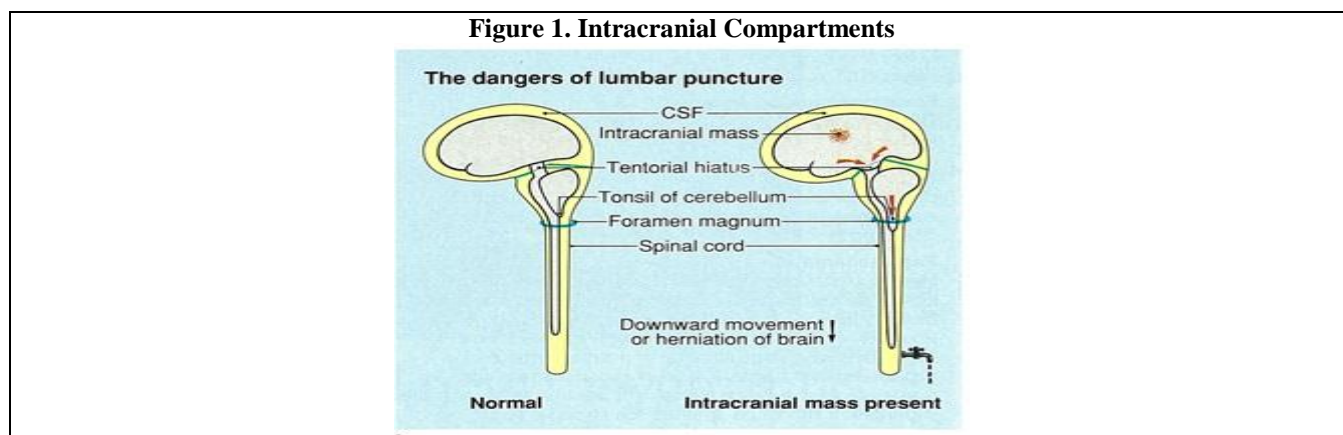
- Frontal sinusitis, middle ear discharge, congenital heart disease or prosthetic valvular heart disease may give rise to cerebral abscess or meningitis and careful thought must be given before L.P. is done.

Level of Consciousness

Any clouding of consciousness should be a contraindication to lumbar puncture. There is no place for L.P. before scanning in the investigation of undiagnosed coma.

Focal Neurological Signs

The presence of focal neurological signs is a relative contraindication to L.P. before scanning. Hemiparesis, hemiplegia, cranial nerve palsy or cerebellar signs are absolute contraindications, whereas a questionable upgoing plantar as the only sign in an otherwise alert patient complaining of a sudden headache and neck stiffness is of less importance.



CONCLUSIONS

1. The presence of papilloedema is a contraindication for L.P. may not be true in all cases
2. Papilloedema helps in the diagnosis of ICT and status of neurologic disease
3. Papilloedema cannot distinguish ICT due to intracranial mass and due to inflammatory neurological lesions.
4. Neuroradiological scans, clinical examinations such as history, level of consciousness and focal neurological signs better indicate intracranial mass lesions and L.P. is contraindicated

5. In the presence of papilloedema, L.P. should be done and is indicated as a diagnostic and therapeutic measure in benign ICT, meningitis and L.G.B. syndrome. However CT Scan is required to rule out mass lesions like Tuberculomas, Gummas, Cerebral abscesses and intracranial hematomas where LP is contraindicated.
6. L.P. can be safely performed in raised ICT due to communicating hydrocephalus and is contraindicated in non-communicating hydrocephalus.
7. The Anatomical criteria defined by CT Scanning mentioned above should be considered more as a contraindication to lumbar puncture.

REFERENCES

1. Wood JH. Cerebrospinal fluid, techniques of access and analytical interpretation. In, Wilkins RH, Rengachary SS, eds. Neurosurgery Vol.1. New York, McGraw-Hill Book Company, 1985, 161-74.
2. Cushing H. Some aspects of the pathological physiology of intracranial tumors. *Boston Med Surg J*, 161, 1909, 71-80.
3. Korein J, Cravioto H, Leicach M. Reevaluation of lumbar puncture. A study of 129 patients with papilloedema or intracranial Hypertension, *Neurology*, 9, 1959, 290-7.
4. Lafforgue JL, de Coninck L, Cales J, Bagot M, Sabathie M. A propos de la ponction lombaire, indications et limites. *Cah Anestgh*, 32, 1984, 113-7.
5. Humphreys RP. Computed tomography and the early diagnostic lumbar puncture. *Can Med Assoc J*, 121, 1979, 150-1.
6. Plum F, Posner JB. The diagnosis of stupor and coma, 3rd ed. (Contemporary neurology series, 19) Philadelphia, F.A Davis Company, 1980, 114-6.
7. Sadhu VK, Sampson J, Haahr FL, Pinto Rs, Handel Sf. Correlation between computed tomography and intracranial pressure monitoring in acute head trauma patients. *Radiology*, 133, 1979, 507-9.
8. DJ Gower, AL Baker, WO Bell, MR Ball. Contraindications to lumbar puncture as defined by computed cranial tomography. *Journal of Neurology, Neurosurgery and Psychiatry*, 50, 1987, 1071-1074.
9. Peter Richards, lumbar puncture and normal values of CSF, February, 1992 *Medicine International*, Middle East Edition, Neurology Part 1 of 3, 4106.