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Non-Surgical Approach to Ventriculo-Peritoneal Shunt Failure and Pneumoventricle

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INTRODUCTION

The introduction of air into components of a ventriculo-Peritoneal Shunt (VPS) is a recognized cause of shunt obstruction and failure. Poor ventricular compliance potentiates pneumocephalus when ventricles fail to collapse at lower intracranial pressure and upon exposure to the atmosphere [1-3]. Surgery has been reported to reestablish the VPS fluid column to permit adequate Cerebrospinal Fluid (CSF) drainage [2,3]. Reconstitution of CSF flow, however, may also be achieved by repositioning the patient to mobilize the intra-ventricular air pocket away from the ventricular catheter tip.

CASE HISTORY

This 39 year old neurologically intact woman developed hydrocephalus secondary to neurocysticercosis and was known to have poorly compliant ventricles. She presented to the neurosurgical service with severe and positional headaches

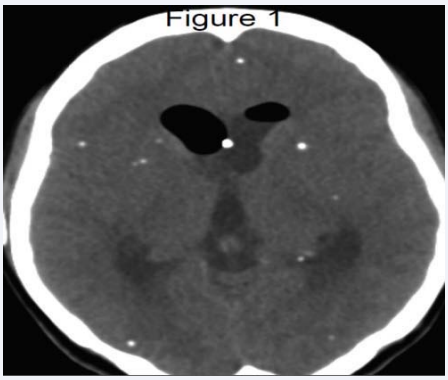

Figure 1 Axial head CT imaging demonstrating air introduced into lateral horn of lateral ventricle and correlating with decline in level of consciousness.

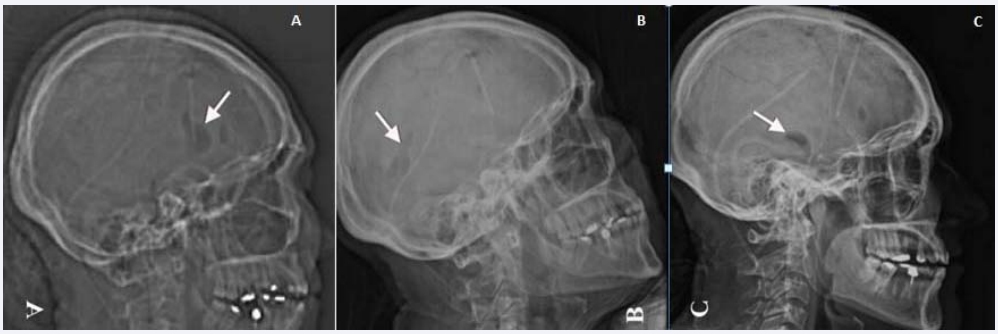

Figure 2 Lateral skull radiographs: (A) Air in anterior horn containing shunt catheter (this is scout image obtained at time of CT in Figure 1), (B) Patient prone with portable lateral skull radiograph demonstrating air in occipital horn (arrow) and CSF bathed catheter, (C) Patient supine with air in temporal horn (arrow) and ventricular catheter in CSF.

without clear evidence of shunt failure. In an attempt to correlate symptoms with Intracranial Pressure (ICP), an ICP monitoring system was placed. Upon removal of the monitor, air entered the ventricular system and caused acute shunt malfunction with an associated precipitous decline in consciousness. CT revealed increased ventricular dimension when compared to baseline imaging with air bathing the ventrcular catheter in the anterior horn of the lateral ventricle (Figure 1, Figure 2A). Restoration of the CSF column within the VPS system (i.e. resolution of air lock) was established without surgery by mobilizing patient to the prone position thereby allowing the air bubble to ascend to the occipital horn (Figure 2B). CSF re-entered the shunt components by manually pumping the valve approximately 10 times. Upon moving patient back to the supine position, a substantial volume of intra-ventricular air migrated to the temporal horn allowing the catheter to remain in CSF. This was documented by serial bedside lateral skull radiographs (Figure 2C). Within approximately 20 minutes of the onset of symptoms the patient improved significantly and imaging the following day demonstrated normal ventricular dimension.

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