Case Report

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Valsalva's Maneuver for Removal of Intraventricular Cyst

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Abstract

The Valsalva's maneuver is a time-honored technique that is commonly used at the clinical practice for the evaluation of heart murmurs, left ventricular and autonomic dysfunction. Valsalva maneuver (VM) is commonly practiced in neurosurgical patients to check for CSF leak after closure of dura and to see venous oozing at the end of surgery. This VM method has also been used to facilitate removal of pituitary tumors in trans-sphenoidal approach. Though VM can result in marked hemodynamic changes, but if it is used judiciously and for brief duration, can result in improved outcomes of anaesthetised neurosurgical patients. We wish to share our experience of use of VM for the extrusion of intact fourth ventricle cyst which helped to minimize the dissection and thus helping to preserve neurological function

Keywords: Valsalva's Maneuver; 4th Ventricular Cyst; Neurocysticercosis.

Introduction

The Valsalva's maneuver (VM) is a time-honored technique that is commonly used at the clinical practice for the evaluation of heart murmurs, left ventricular and autonomic dysfunction [1]. Manual inspiratory hold of lung inflation for a short period in anesthetized and paralyzed patients, which mimics valsalva maneuver (VM) is commonly practiced in neurosurgical patients to check for CSF leak after closure of dura and to see venous oozing at the end of surgery [2,3]. This VM method has also been used to facilitate removal of pituitary tumors in trans-sphenoidal approach and in locating site of air entry during venous air embolism in sitting position [4] We wish to share our experience of use of VM for the extrusion of intact fourth ventricle cyst which helped to minimize the dissection and thus helping to preserve neurological function.

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Case Report

An eleven year old girl presented to us with a history of recurrent headaches of progressively increasing severity since three months. The episodes of headache were accompanied by nausea and visual blurring. On examination she was found to be having a visual acuity of 6/9 in right eye; 6/24 in left eye and there was bilateral papilloedema. Her MRI was suggestive of a thin walled cystic lesion inside the 4th ventricular cavity with a nodule inside it causing hydrocephalus **(Figure 1)**. As it was threatening her vision due to raised intracranial pressure (ICP) caused by CSF flow obstruction she was urgently operated for removal of the cyst. General anaesthesia with endotracheal intubation was introduced using fentanyl, propofol, and vecuronium. It was maintained with end tidal sevoflurane (2%) in oxygen and air (50%). The midline suboccipital craniotomy was performed in prone positioned patient. This cyst was visible at the obex and trans-vermian incision of about 7 mm was given on ventricular roof. Application of VM (20 cmH_2O for 10 to 15 s) given twice helped to extrude out the cyst from this small incision like a mushroom **(Figure 2)**. The aqueductal opening was checked and CSF flow was well established. There were no intraoperative or post operative complications and patient recovered completely. Her post operative CT showed resolution of hydrocephalus **(Figure 3)**. On most recent follow

up her vision has improved 6/6 both eyes and there was absence of papilloedema or any other deficit **(Figure 4)**.

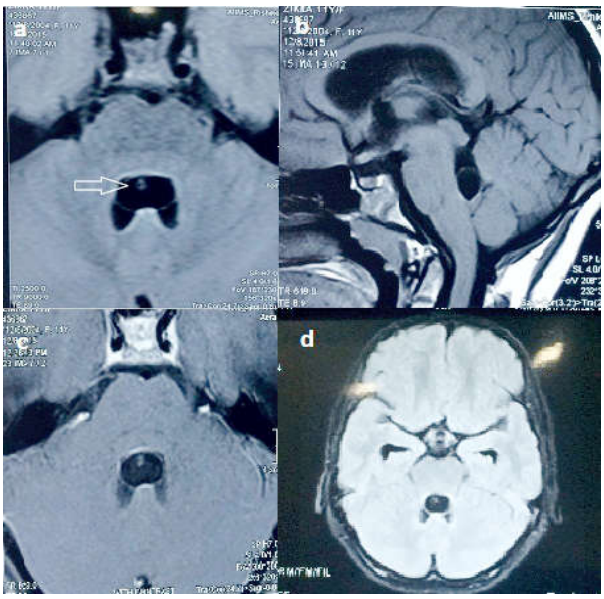

Fig. 1: (A-D) Pre operative MRI showing intra 4th ventricular cyst with a nodule inside it. **(A)** T1 axial image, the arrow points at intracystic nodule (scolex); **(B)** T1 saggital; **(C)** post Gd T1 showing no significant enhancement. The T2 images were essentially non contributory for the intraventric lesion, hence not shown.

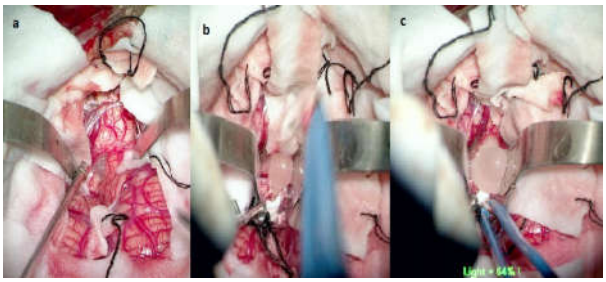

Fig. 2: (A-C) Intraoperative photographs. **(A)** The cystic lesion is visble at obex even prior to vermian dissection the visible vessel is PICA of right side. **(B)** After a small incision on vermis the cyst is more exposed and Valsalva maneuver was started at this point. **(C)** Cyst is pouting out with application of valsalvamaneouvre without requiring any furher dissection

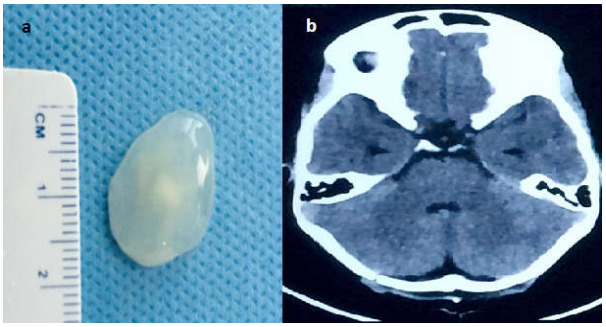

Fig. 3: (A) Intact Cyst after removal **(B)** post op CT of patient

Fig. 4: Post operative photograph of patient

Discussion

The VM has been used since many years for checking venous hemostasis in anaesthetized patients undergoing neurosurgical procedures as well as in transphenoidal procedures to facilitate tumor removal. We have utiliized the transient increase in ICP resulting from VM to successfully evacuate a 4th ventricular parasitic cyst.

The intracranial cysticercal cysts require surgery whenever they cause symptomatic obstruction to CSF flow either inside the ventricular system of brain or in the subarachnoid space [5]. The goal of surgery is to relieve the obstructive pathology with minimal morbidity. This requires taking utmost care to avoid rupture of the cyst as well as to minimse the neural dissection. For the former, a surgeon needs to perform minimal & gentle handling of cyst along with careful removal of adhesions, while the latter is achievable by choosing the correct trajectory. The achievement of both of these goals can be helped by the anesthetic colleagues by a careful application of simple VM. This maneuver raises the intrathoracic pressure which causes a rise in central venous pressure (CVP) and the ICP. There were no significant adhesions present between the ventricular cyst and the surrounding tissues in our case and the VM helped in expelling the cyst from the cavity of ventricle to exterior from a very small surgically created window and at the same time without much of direct handling of cyst. Vigorous handling of a cysticercal cyst should be avoided as

any rupture can result in dissemination of the disease and also may result in incomplete removal of the cyst [5]. If there are significant adhesions present between the cyst and surrounding ventricular walls then one can also use saline irrigation with thin cathter for adhesiolysis while at the same time employing the VM [3]. Thus VM can also be helpful in removal of long standing adherent cysts. A common complication of incision of 4th ventricular roof (vermis/medullary velum) is truncal ataxia [6]. A small vermian incision helped to avoid the truncal ataxia in post operative period thus shortening her convalescence period.

Though there has been studies warning the cautious use of VM due to possible effects of decreasing cerebral perfusion, but the effects have usually been without any serious clinical effects. Two studies [7,8] on VM in anesthetized neurosurgical patients have shown that brief VM increased CVP and markedly decreased Mean arterial pressure (MAP). Cerebral perfusion pressure (CPP) significantly decreases during phases 2 and 3 of the VM. Cortical blood flow closely paralleles (CPP); CBF decreased to 59% of control during phase 2 and to 57% of control during phase 3 of the VM. The MAP, CPP, and CBF all returned to baseline levels during phase 4 (the overshoot phase) of the VM, and were not significantly greater than control. No autoregulatory change in cerebrovascular resistance occurred throughout the VM. It is recommended that brief VMs, as employed during neurosurgical procedures, must be used cautiously due to the marked haemodynamic changes. There is a case report where application of VM for 4th ventric cyst resulted in symptomatic ventricular arrhythmia requiring lignocaine and phenylepenephrine administration intraoperatively. However the final outcome was good [9]. To conclude, VM is a simple technique, which if used judiciously and for brief duration can help in improving outcomes of anesthetized neurosurgical patients.

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