# Case report



DOI 10.18019/1028-4427-2020-26-4-576-578

## *Surgical repair of humerus fracture in a patient with central pontine myelinolysis*

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**Introduction** Central pontine myelinolysis (CPM) is a rare neurologic disorder involving severe damage to the myelin sheath of nerve cells in the pons. Clinical features usually include tetraparesis, pseudobulbar palsy and altered mental status. **Objective** To review a case of humerus fracture in a female with CPM. **Material and methods** A 65-year-old patient with CPM sustained humerus fracture that was first treated conservatively. With two neurological examinations and a clinical case conference the humerus fracture of the high-risk patient was nailed. **Results** No neurological deterioration was observed postoperatively. A satisfactory bone alignment was noted radiologically. The patient was discharged from the hospital with a satisfactory outcome. Discussion The favorable outcome suggests that patients with CPM can benefit from surgical treatment. **Conclusion** CPM cannot be considered an absolute contraindication for surgical treatment, however, further study is required.
**Keywords**: central pontine myelinolysis, CPM, humerus fractures, surgical management

## INTRODUCTION

Central pontine myelinolysis (CPM), which is a component of the osmotic demyelination syndrome (ODS), is a demyelinating disorder affecting the central pons of the brainstem supposedely associated with electrolyte abnormalities. ODS accounts for 0.4 % to 0.56 % of all neurological patients. MRI-based studies have revealed CPM in 40 % to 56 % of ODS cases [1]. The entity was originally described in 1959 by Adams, who reported "pontine myelinolysis" in the undernourished and chronic alcoholics [2]. As yet, there is no specific treatment of choice. A high dose therapy with glucocorticoids has been shown to provide a substantial improvement in the prognosis of CPM [3]. The nosologic entity is rare and does not appear to have been investigated with a handful of cases existing in the literature, absence of approaches to the preoperative preparation, surgical and anesthesiological risk calculators, surgical treatment and postoperative management of CPM patients.

**Objective** To review a case of humerus fracture in a female with CPM.

## MATERIAL AND METHODS

A 65-year-old patient sustained a home injury, was referred to the hospital № 1 and was seen at the admission department. She presented with severe pain at the right humeral mid third. Computed tomography of the right humerus revealed a closed midshaft fracture of the right humerus (Fig. 1).

The patient had been diagnosed as having dyscirculatory encephalopathy, complained of dizziness and had been seen by neurologist as an outpatient. She developed neurological symptoms caused by electrolyte abnormalities and was admitted to the intensive care unit of the hospital № 7 in August 2019. Infusion therapy was provided for the patient who developed deterioration with pseudobulbar palsy, tetraparesis and pelvic floor dysfunction. An MRI of the brain of 16.09.2019 revealed signs of the osmotic demyelination syndrome (CPM) and vascular changes in both cerebral hemispheres. She started rehabilitation course at the end of August. The neurological examination revealed slightly disturbed convergence, dysarthria, mild dysphonia, hypomimia, tendon reflexes elicited, leg reflexes S < D, the Babinski response on the right, the Romberg maneuver showing unsteadiness and somewhat ataxic gait. Considering the neurological history the patient was seen by neurologist who recommended conservative treatment of the fracture due to a high risk of CPM decompensation with a surgery. Within three inpatient days, the patient had two neurological examinations and surgical treatment was vehemently denied due to concerns regarding progression of neurological symptoms.

Mironov A.V., Ozden U.A. Surgical repair of humerus fracture in a patient with central pontine myelinolysis. *Genij Ortopedii*, 2020, vol. 26, no 4, pp. 576-578. DOI 10.18019/1028-4427-2020-26-4-576-578

However, a clinical case conference was convened to get an opinion on definitive surgical treatment from an orthopaedic surgeon, anesthesiologist and neurologist. The patient was evaluated as being in a satisfactory state, having no electrolyte abnormalities, and in need of definitive fixation of the humerus fracture. Neurological status was recognized as steady and no contraindications to surgical treatment were identified. The intravenous administration of crystalloid solutions was considered to be used for parenteral fluid therapy at a low rate. Closed bone reduction and interlocking intramedullary nailing of the humerus was produced the next day with use of combined endotracheal anesthesia. Continuous radiological control with C-arm image intensifier was used during the procedure. Bone reduction and position of the metal construct and screws are shown in Figure 2.

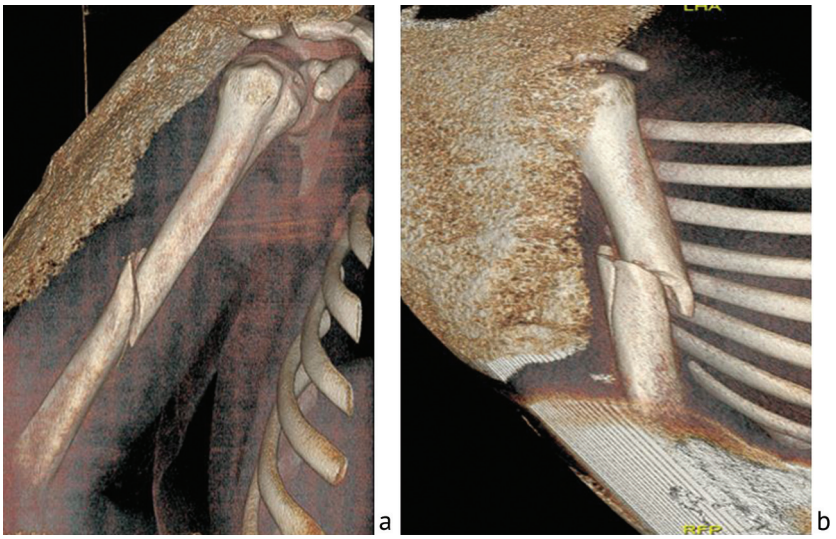


**Fig. 1** 3D reconstructions of CT scans of the right humerus of patient K. showing (*a*) AP view, (*b*) oblique view

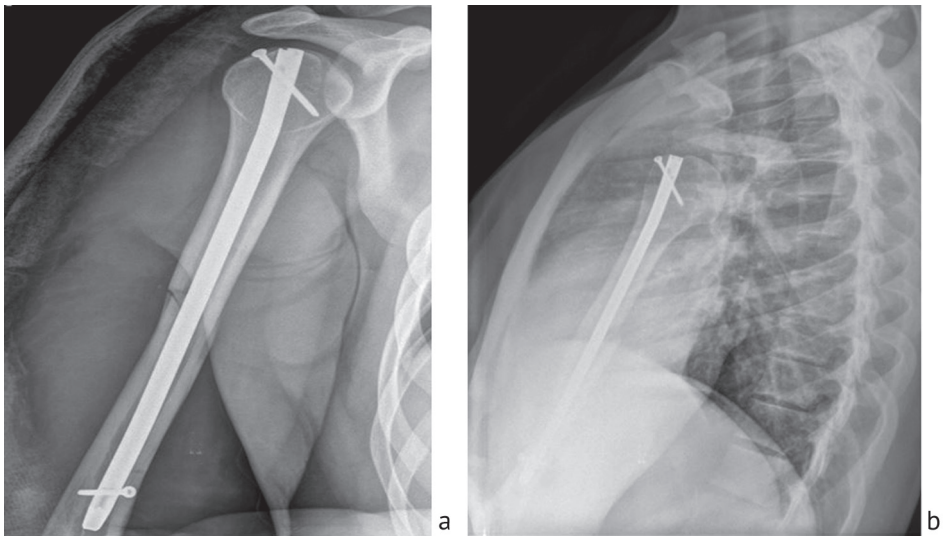


**Fig. 2** Bone reduction and fixation of the right humerus with interlocking nail shown on postoperative (*a*) AP view and (*b*) transthoracic view

## RESULTS

The standard treatment protocol was employed postoperatively with daily control of electrolyte balance showing no abnormalities. No progression of neurological symptoms was observed postsurgery and pain relief ensured at the time of discharge. Being in a satisfactory state and having a satisfactory humerus alignment on the check radiograph the patient was discharged from the hospital after four days.

## DISCUSSION

Recent studies have demonstrated the predisposing factors that have been linked to the development CPM including electrolyte abnormalities (hyponatraemia and hypokalaemia) [1] associated with chronic liver

disease and liver transplantation [4], chronic renal failure, diabetes mellitus [5] and other disorders of ionic metabolism [6]. During hyponatraemia correction, rapid osmotic shifts of fluid cause a loss of oligodendrocytes, disruption of the myelin sheath, monocytic infiltration, and, ultimately, extensive myelinolysis with no inflammation mechanism involved [3]. Clinical manifestations of CPM include pseudobulbar palsy, spastic tetraparesis, and altered mental status. CPM can present with seizures, hyperkinesis, cerebellar ataxia, oculomotor, pupillary dysfunction [3]. Patients with most severe cases may become locked-in syndrome [6]. We were confronted with uncertainty and ambiguity in the clinical scenario due to unavailable reports on preoperative preparation and best surgical practices for CPM patients. However, the favorable outcome obtained in the case suggests that CPM patients can be successfully treated surgically having a satisfactory neurological status, with proper preoperative preparation and a straightforward procedure secured for the patient.

## CONCLUSION

Having reviewed the case we can conclude that preoperative and postoperative care of CPM patients involves control of electrolyte balance, neurological status and the general state of the patient. Nevertheless, the findings suggest that CPM cannot be considered an absolute contraindication for surgical treatment. Further study and guidelines incorporating preoperative preparation, surgical treatment and postoperative care are required for CPM patients.

***Declaration of Conflicting Interests*** *The authors declared no potential conflicts of interest with respect to the authorship and/or publication of this article.*

***Funding*** *The authors received no financial support for the research and/or authorship of this article.*

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Received: 20.12.2019

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