Use Of Peritoneal Dialysis As A Renal Replacement Therapy Prior To Bleeding Cerebral Artery Aneurysm Repair In A Patient With Polycystic Kidney Disease

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Abstract: A 44 year old male with ADPKD presented with a bleeding right anterior cerebral artery aneurism. He had CKD stage V and developed pulmonary edema which precluded surgery on an emergency basis. Peritoneal Dialysis was initiated after implanting a Swan Neck Tenckhoff catheter. Surgical clipping was done successfully and the patient continues on CAPD with no neurological sequele.

Key Words: Bleeding Cerebral aneurism, Peritoneal Dialysis, Polyeystic Kidney Disease.

Introduction
One or more aneurysms of the cerebral arteries have been reported to occur in as many as 4 - 50% of patients with autosomal dominant polycystic kidney disease (ADPKD) (1,2). However the rupture of these aneurysms may account for 7-13% of deaths in ADPKD (3). The threat of aneurysm rupture is increased when the size of the aneurysm is progressively increasing or when the blood pressure is uncontrolled. Surgical repair of the aneurysm is urgently indicated in situations when it is leaking or when it reaches a critical size. The devastating complications are subarachnoid hemorrhage with intracerebral bleed. When there is concomitant end stage renal disease (ESRD) institution of dialysis is mandatory to prevent uremic complications. The choice of dialysis is an emergency situations determined by the clinical condition of the patient with leaking aneurysm. As hemodialysis requires anticoagulation and can produce hemodynamic instability in a patient with stroke, peritoneal dialysis is the treatment of choice. This will facilitate the treatment of cerebral edema, maintain the fluid, electrolytes, acid-base balance, correct uremia and avoid systemic anticoagulation and can be used during prolonged intracranial surgery. Peritoneal dialysis is hence, a safer alternative for the treatment. In this paper, we describe our experience of efficaciously advocating peritoneal dialysis with a permanent swan neck Tenckhoff catheter in a case of ADPKD, with a bleeding right sided anterior cerebral artery aneurysm.

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Case
A 44 year old male, ADPKD, with hypertension on irregular treatment was admitted with a sudden onset of severe headache with neck pain and one episode of vomiting and a few minutes of loss of consciousness, on October 2, 2004 at 9:30 pm, while attending a party. He gave no history of seizures or weakness of limbs following the episode. Elsewhere his BP was 200/110 mmHg and was started on antihypertensive medications.

On admission to our facility, he was given anticonvulsants, steroids, and cerebral decongestants. His baseline hematological parameters showed: Hb - 10.6 gm/dL, Hct - 31.5, platelets - 3, 22,000 /cmm, bleeding time -2'30", clotting time -4'40", INR -0.99, CBG - 82 mg/dL, BUN - 60 mg/dL, Cr - 7.0 mg/dL, Na - 138 mmol/L, K - 3.6 mmol/L, Cl - 108 mmol/L, HCO3 - 17 mmol/L, inorganic phosphorous - 4.1 mg/dL, Ca - 7.9 mg/dL, bilirubin total - 0.3 mg/dL, SGPT - 34 IU, SGOT - 17 IU, total protein - 5.9 gm/dL, albumin - 2.9 gm/dL, ALP - 144 IU. His urine analysis showed albumin - ++, otherwise normal.

As he required neuro surgical intervention and as conservative therapy of renal failure failed due to recurring pulmonary edema with desaturation and metabolic acidosis, a swan neck Tenckhoff PD catheter was inserted on October 8, 2004. Patient was started on low volume (500 ml) supine dialysis with 1.5% dextrose dianele with a dwell time of half hour for a total of 12 hours. The volume of the dialysate was increased in the subsequent days to 750 ml - 800 ml with 1.5% dextrose for next 12 hours. This led to amelioration of pulmonary edema and metabolic acidosis. Patient underwent a DSA under general anesthesia on October 10, 2004, which showed a cerebral aneurysm 13 mm x 9 mm of the first part of the anterior cerebral artery on the right side. He was taken for urgent
surgery but he developed pulmonary edema, hypoxia and bradycardia. He was immediately restarted on PD and surgery was cancelled. He continued on PD. On October 13, 2004 just before taken up to the operation theater the peritoneum was emptied and the catheter was clamped. Under general anesthesia, the patient underwent a right parietal craniotomy and clipping of large cerebral aneurysm using a 11 mm straight standard titanium Asculelap clip. After returning from the operation theater, he was restarted on PD with 750 – 800 ml fill volume of 1.5% dextrose dianeal of 2 hourly exchange for 12 hours per day and gradually increased to 2.0 L, 3 – 4 times a day on an ambulatory basis before discharge on November 1, 2004. On discharge, his laboratory values showed: Hb – 9.8 gm/dL, WBC – 13, 800/cmm, platelets – 2, 47, 000 /cmm, INR – 0.99, BUN – 38 mg/dL, Cr – 4.3 mg/dL, Na - 129 mmol/L, K - 4.0 mmol/L, Cl - 102 mmol/L, HCO3 – 20 mmol/L and his urine output was 1.5 liters. He returned for a follow-up after a month and is doing well on CAPD.

Fig.1: Angiogram showing large aneurysm

Discussion: Leaking or ruptured aneurysms pose a great threat to the life of the patient. This is more so if a patient has uremia. The management of patients with chronic kidney disease (CKD) undergoing cerebral aneurysm surgery requires special expertise for maintaining appropriate cerebral perfusion pressure and for preventing re-hemorrhage from an aneurysm (4). Avoidance of systemic heparin is an absolute must as a safety measure. The use of dialysis may precipitate dialysis disequilibrium syndrome which may worsen the prognosis in the presence of a variety of intracranial diseases (5). People have used continuous veno-venous hemodialysis which did not result in elevations in intracranial pressure in a patient with life threatening posterior fossa hemorrhage (5) The options for the treatment of cerebral aneurysms are clipping or Guglielmi detachable coil embolisation (6). Peritoneal dialysis had been successfully used previously for ruptured basilar left superior cerebral artery aneurysm and ruptured anterior communicating artery aneurysm (7). The additional advantages of peritoneal dialysis compared to hemodialysis are hemodynamic stability, especially in a patient with increased intracranial pressure and uremia. It was decided to put a permanent PD access in this patient as an acute rigid stylet catheter has an increased risk of pericatheter leak, peritonitis and visceral injury. Hence a bedside implantation of a Tenckhoff PD catheter is advantageous as it is soft, flexible and can be used permanently with less risk of pericatheter leak.

In conclusion, we report successful outcome of a middle-aged man with ADPKD and ESRD who presented with an acutely leaking cerebral aneurysm which was managed successfully with surgical clipping while undergoing peritoneal dialysis.

References