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Rescue alcohol septal ablation in sepsis with multiorgan failure

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ABSTRACT

A 55 year old male patient with a diagnosis of hypertrophic cardiomyopathy was admitted with features of sepsis related to cholangitis. Initial management with intravenous (i.v.) fluids and antibiotics did not cause any change in his general condition mandating an emergency endoscopic retrograde cholangio-pancreatography (ERCP). After successful retrieval of CBD stone on ERCP, patient had massive upper gastrointestinal bleed leading to hypotension and shock. Addition of inotropes had led to further deterioration in his clinical status with a mean arterial BP falling to 44 mm of Hg. His echocardiography showed a resting left ventricular outflow tract (LVOT) gradient of 90 mm of Hg and thus was taken up for emergency alcohol septal ablation (ASA). Immediately after ASA, patient had significant decrease in LVOT obstruction and rise of systemic arterial pressures. After 10 days of antibiotic therapy patient was discharged with a residual LVOT obstruction of 28 mm of Hg.

A 55 year old male patient with a known diagnosis of hypertrophic cardiomyopathy for past 2 years and in stable condition on medical management with beta blocker (metoprolol 50 mg twice a day) was referred to our hospital with features of acute choledocholithiasis and cholangitis. At presentation he was febrile (39 °C), with heart rate of 100/min and BP of 146/88 mm of Hg. He was initially being managed conservatively under gastroenterology unit with intravenous (i.v) fluids and antibiotics (cefoperazone + sulbactam and ofloxacin).

He continued to remain febrile and his clinical status started deteriorating after 48 h of hospital stay with total leukocyte count rising up-to 31,400/μL and platelet counts had fallen to 57,000/μL. Patient started having features of sepsis

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with multi-organ dysfunction with blood urea of 92 mg/dL and creatinine 2.3 mg/dL (Table 1). Emergency endoscopic retrograde cholangio-pancreatography (ERCP) was carried out which retrieved 2 stones from the common bile duct. During the procedure, patient had massive gastrointestinal bleed with hemoglobin level falling to 6 gm/dL. He was given 3 units of whole blood transfusion to bring his hemoglobin level back to 9 gm/dL. But, his clinical status deteriorated further and started developing features of poor perfusion in the form of decreased urine output and his BP has fallen to 84 mm of Hg systolic and 42 mm of Hg diastolic with mean arterial BP of 54 mm of Hg. He was initially started on i.v dopamine (15 μg/kg/min) infusion and i.v nor-epinephrine (8 μg/min) was added as there was no signs of clinical improvement, but this led to further deterioration of his status and the inotropes had to be discontinued. Inspite of all supportive measures his general condition continued to deteriorate. Trans-thoracic echocardiography (TTE) done at this time was suggestive of asymmetrical septal hypertrophy with septal wall thickness of 23 mm and posterior wall thickness of 13 mm. He had an LVOT gradient of 90 mm of Hg peak and 50 mm of Hg mean with SAM of anterior mitral leaflet. Considering that, this systemic hypotension is related to sepsis and further deteriorating the hemodynamics of HCM and perpetuating the vicious cycle of hypotension, increasing the LVOT obstruction, leading again to hypotension, patient was considered for an urgent ASA and was shifted to catheterization laboratory.

A 6-French Judkins left (JL, 3.5) guiding catheter (cordis) was inserted through the right femoral artery for engaging the left main coronary artery (Fig. 1a). The femoral artery pressure at the beginning of procedure was 90 mm of Hg systolic. With the help of 0.014 balanced middle weight (BMW, Abbott vascular) guide wire the first large septal branch of left anterior descending (LAD) was entered (Fig. 1b). A 2.0 × 15 mm over the wire (OTW, Boston Scientific. USA) balloon was used to occlude the first septal branch of LAD artery. The guide wire was removed and 3 ml of radiographic contrast medium was injected into the first septal branch which was seen as enhancement of basal septum on echocardiography. After confirming the perfusion territory of first septal artery and with the OTW balloon inflated in the septal artery, 2 ml of 95% alcohol was injected into septal artery (Fig. 1c). Second dose of 2 ml of 95% alcohol was repeated after a gap of 5 min (Fig. 1d). The procedure was being monitored by TTE intermittently. After the second dose of alcohol the TTE showed residual gradient of 40 mm of Hg peak across the LVOT with persistence of SAM of anterior mitral leaflet. Injection of contrast in the left main artery at the end of procedure showed no antegrade flow in the first septal artery (Fig. 1d). Patient developed transient complete heart block during the procedure for which he required temporary pacemaker support for next 48 h. Intra-procedure his femoral artery pressure increased to 110/64 mm of Hg. He was kept in intensive cardiac care unit for next 48 h where his TTE done after 48 h revealed residual LVOT gradient, 28 mm of Hg peak and 16 mm of Hg mean. He was continued with the treatment of cholangitis (i.v fluids and antibiotics) and was shifted back to gastroenterology unit after stabilization and removing the temporary pacemaker support. He was successfully discharged after 10 days of i.v antibiotics and underwent elective cholecystectomy after 6 weeks. Presently after 5 years of follow-up his TTE done shows LVOT gradient of 20 mm of Hg peak and 12 mm of Hg mean with an overall left ventricular ejection fraction of 55%.

Our patient is a young individual with a diagnosis of HCM who was initially stable on medical management with oral beta blockers. His clinical status deteriorated rapidly during an acute illness of chloedocholithiasis and cholangitis. Though he underwent a therapeutic procedure (ERCP) for his primary problem, his condition did not improve and on the contrary deteriorated because of the massive gastrointestinal bleed that occurred during the procedure. As the LVOT obstruction in HCM is dynamic in nature the initial compensated state of HCM rapidly decompensated because of systemic hypotension caused by sepsis, multiorgan dysfunction and acute gastrointestinal bleeding. Even replacing the intravascular volume and addition of inotropes did not show any significant response to his status. Moreover, the choice of inotrope (dopamine and nor-epinephrine) which the patient was receiving was also inappropriate. As the patient was already in a volume depleted state, adding these inotropes would have in-fact increased the LVOT obstruction and perpetuate the vicious cycle and thus, these inotropes were immediately discontinued. For a patient of obstructive HCM in refractory shock, the drug of choice should be i.v phenylephrine which is a pure vasoconstrictor with no significant inotropic effect.[1] The decision to take the patient for ASA at a mean arterial BP of 54 mm of Hg was probably the last therapeutic measure that could be tried to improve his hemodynamics and clinical status. Surgical myectomy was not considered as patient was in frank sepsis with multi-organ dysfunction and was at very high risk of surgical mortality. Rapid clinical improvement in his BP intra-procedure gives us an

Table 1 – Blood and biochemical parameters at baseline, day 3, day 5 (on the day of ASA) and at discharge of patient.

Parameters	Baseline	Day 3	Day 5 (day of ASA)	At discharge
Hb (gm/dL)	8.6	6.0	9.0	10
Total leukocyte count (/μL)	15,700	31,400	27,900	12,600
Platelet count ($\times 10^3$/μL)	86,000	57,000	52,000	154,000
Blood urea (mg %)	62	92	86	51
Creatinine (mg %)	1.6	2.3	2.2	1.4
Bilirubin (mg %)	6.7	7.8	8.0	2.0
Alkaline phosphatase (I.U)	1088	1198	1280	640

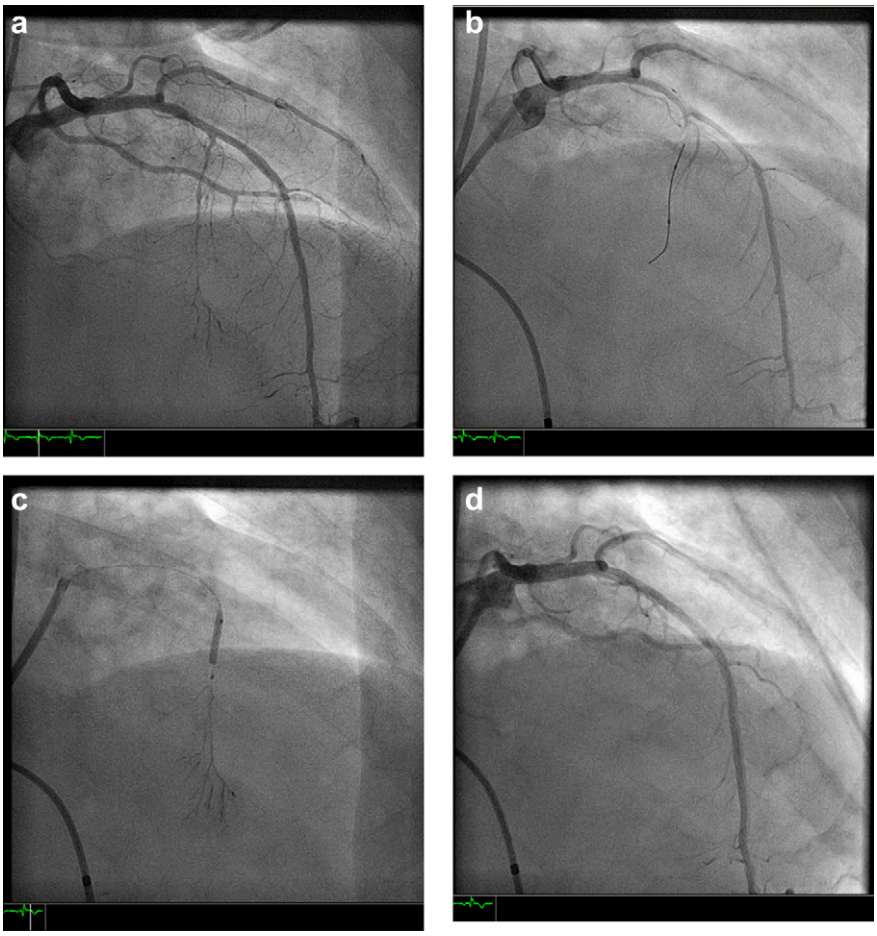

Fig. 1 – a. Injection of contrast media in the left main coronary artery shows normal left anterior descending artery with large first septal artery. b. Left main coronary artery engaged with 6-F, JL 3.5 catheter and BMW guide wire passed through the left anterior descending artery into the first large septal artery. Also shows the 2 × 15 OTW balloon passed over the BMW wire and placed in the first large septal artery and temporary pacemaker lead placed in the right ventricular cavity for prophylactic reason. c. OTW balloon is inflated in the proximal first septal branch of LAD artery and first dose of 2 ml 95% alcohol being pushed into the septal artery. d. No filling of septal coronary artery at the end of procedure.

indication that though the patient was in shock related to sepsis, there was a significant role of LVOT obstruction in precipitating his condition. This emphasizes the importance of understanding the hemodynamics of HCM and to have a thorough knowledge of factors tilting the narrow balance in patients of HCM towards deterioration by increasing the LVOT gradient.

Previous case reported by Galle et al has shown significant decrease in the LVOT peak gradient from 96 mm of Hg to 33 mm of Hg in a patient of shock related to unknown respiratory infection.[2] Similar improvement in clinical status after ASA was reported in the past by Rohatgi et al in an elderly patient of HCM who has pulmonary edema secondary to A-V dissociation and also required permanent dual chamber pacemaker implantation.[3] Thus, ASA is an important therapeutic modality in treatment of patients with HCM especially in emergency settings where surgical facilities are either not available or if the patient is at a high surgical risk.

Conflicts of interest

All authors have none to declare.

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