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Clinical case report based study

An unusual percutaneous transmitral commissurotomy: A collection of four rare occurrences!

Ravindranath K. Shankarappa, Navin Agrawal, Soumya Patra*, Satish Karur, Manjunath C. Nanjappa

Department of Cardiology, Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore 560069, Karnataka, India

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ABSTRACT

We are presenting an interesting case of a 30-year-old patient taken for percutaneous transvenous mitral commissurotomy (PTMC) for severe rheumatic mitral stenosis in which there was a collection of four unusual occurrences during the course of a procedure.

She had recurrent generalized tonic–clonic seizures immediately after femoral sheath insertion requiring the patient to be mechanically ventilated. Subsequently, the pressure tracings recorded with catheters in the aorta and the pulmonary artery showed transient unusually high supra-systemic pulmonary artery pressure. During inflation the Accura PTMC balloon which was used to dilate the mitral valve ruptured and the procedure subsequently had to be completed using another balloon catheter. During the procedure the presence of a distended stomach due to insufflations of air during positive pressure ventilation which subsided subsequently was another unusual documentation on fluoroscopy. The final outcome of the procedure was successful.

This case presents an interesting collection of unusual occurrences during a PTMC procedure which started on an unusual note but ended on a successful one. Careful assessment and appropriate management of complications can lead to successful outcome of procedures as in our case.

1. Introduction

Percutaneous transvenous mitral commissurotomy (PTMC) is a percutaneous procedure designed to open the mitral valve through transvenous access using a transseptal approach to enter the left atrium. The procedure is conventionally performed with a specially designed Inoue balloon or the double balloon technique which has rather become obsolete now. Several modifications of the Inoue balloon like the Accura balloon have also been introduced. Although usually assumed to be a relatively safe procedure but sometimes it too can have a complicated and stormy course as has happened in this case.

This case is unique in having a collection of four very unusual findings in a single case of (PTMC) each of which is sufficient in itself to confuse an interventionist and can also affect the final outcome. The occurrence of seizure possibly due to inadvertent injection of lignocaine into the microvasculature is a potential catastrophic and dangerous complication which needs to be kept in mind. Seizures causing supra-systemic pulmonary artery pressures is an entity rarely reported and of uncertain pathophysiology but still is an important documentation in this case. Rupture of PTMC balloon is an extremely uncommon occurrence in procedures as had also happened in this case. The observation of a transiently distended stomach due to positive pressure ventilation is an interesting fluoroscopic observation although it may not be clinically important.

2. Case report

A 30-year-old female was referred to us for PTMC for severe rheumatic mitral stenosis. The patient had New York Heart Association (NYHA) class IV symptoms predominantly orthopnoea and exertional dyspnoea. The transthoracic echocardiogram (TTE) revealed severe mitral stenosis with a mitral valve area of 0.7 cm^2 with severe pulmonary artery hypertension (PAH) with pulmonary artery (PA) systolic pressure of 78 mmHg and severe tricuspid regurgitation with the Wilkins score of 7.

The right femoral artery and vein were punctured using the standard modified Seldinger technique. After infiltration of local 10 ml of 2% lignocaine solution for local anaesthesia at the puncture site, the patient suddenly developed recurrent generalized tonic–clonic seizures. The episodes lasted for around one minute and

* Corresponding author.
E-mail address: dr_soumyapatra@rediffmail.com (S. Patra).

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subsided spontaneously before any anti-epileptic drug could have been administered. The patient was in sinus rhythm and there was a palpable carotid pulse. The saturation was around 92% at that time. The patient had no prior history of epilepsy and the possibility of incidental convulsions or neurotoxicity due to accidental intravascular infiltration of 2% lignocaine given for local anaesthesia was kept. The patient was electively intubated during the episode of seizures because she had developed altered sensorium and there was significant risk of aspiration during the procedure which was continued throughout the procedure. Nasogastric tube was not inserted. The patient was in altered sensorium being in postictal phase but was haemodynamically stable and so the procedure was started. At this point of time we observed yet another unusual finding that the Pulmonary artery (PA) pressures (135/26 mmHg) were supra-systemic and the aortic pressure was 91/68(80) mmHg (Fig. 1).

Although the pre-procedure echocardiogram did reveal high PA pressure but having supra-systemic PA pressures is a very unusual occurrence in any case of rheumatic valvular heart disease. The PA pressures continued to be high during the entire course of the procedure. The procedure was done using the standard technique for PTMC. We used a 26 mm Accura balloon to dilate the mitral valve but at this point of time we noticed that the balloon failed to dilate proximally due to a tear at the inner layer of the balloon at the proximal end (Video 1). The ruptured balloon was successfully retrieved without having caused any harm to the patient (Fig. 2). The procedure was thereafter completed using another 26 mm Accura balloon (Video 2). During the course of the procedure fluoroscopic observation was made that the stomach of the patient was grossly distended due to positive pressure ventilation and the stomach was occupying more than half of the abdominal cavity (Video 3). The procedure was completed successfully and the left atrial pressure decreased from 38 mmHg to 20 mmHg. The patient was extubated immediately after the procedure and the gaseous distension was documented to have subsided on fluoroscopy (Fig. 3, Video 4).

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.jcdr.2013.08.003.

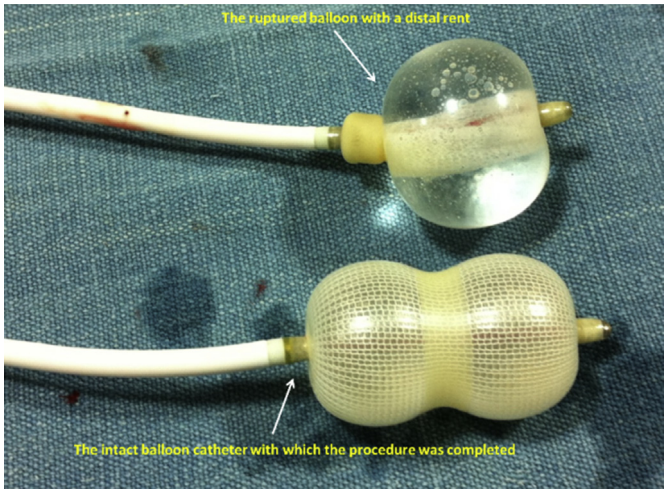

Fig. 2. Comparison of the Accura balloon catheter which ruptured during the procedure with the catheter used to complete the procedure. The figure demonstrates that the ruptured balloon catheter was not inflated in the proximal portion and also the rent in the distal portion of the balloon.

The post procedure PA pressures documented a fall from a mean of 71 mmHg–40 mmHg. The catheter tracings after the procedure showed a significant improvement in the aortic pressure and the PA pressure became lesser than systemic values (Fig. 4) although the absolute RV systolic pressure came down only by the second day of the procedure. The patient was shifted to intensive care unit for post procedure haemodynamic monitoring for one day. The post procedure PA systolic pressure was 52 mmHg as recorded after the procedure using a TTE done on the second day of the procedure. The mitral valve area was 1.7 cm^2 and there was trivial mitral regurgitation and there was complete splitting of the lateral commissure and the median commissure was split partially. There was also a decrease in the severity of tricuspid regurgitation and the mitral valve mean gradient had fallen from 13 mmHg to

Fig. 1. Pressure tracings obtained from the aorta (pink trace) and the pulmonary artery (green trace) showing supra-systemic pulmonary artery pressures with a value much higher than that obtained during pre-procedure echo.

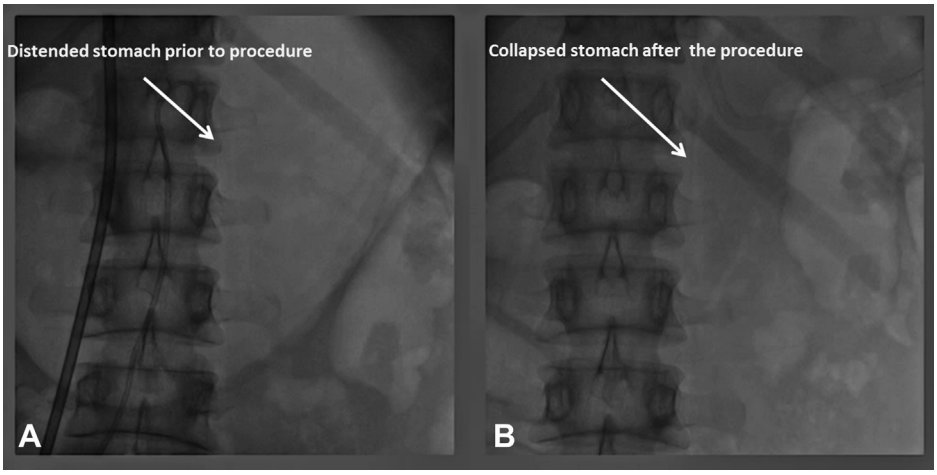

Fig. 3. A still image from the fluoroscopy comparing the distended stomach during the procedure to the stomach after the procedure after having regained its normal size.

6 mmHg. The post procedure stay of the patient was uneventful and subsequently she was discharged on the fourth day.

3. Discussion

Epilepsy in a case of PTMC is extremely uncommon. It could have been due to one of the several causes which includes a transient ischemic attack, cerebrovascular accident or it could be due to neurotoxicity caused by accidental infiltration of lignocaine into the microvasculature which is the most likely explanation in this case. Increase of pulmonary artery pressures after epilepsy has been reported[1] and ascribed to the release of angiotensin II after epilepsy as might have been the cause in this case as the PA pressures came down immediately after a few minutes.[2] The increased muscular activity during tonic-clonic seizures can be a cause of increased systemic and pulmonary artery pressures. Lignocaine has been previously reported to cause neurotoxicity and cardiotoxicity previously which may include seizures and transient bradycardia and conduction deficits.[3–5]

Rupture of PTMC balloon is a rare complication having a strong association with reused balloons. Till date very few cases with a similar complication have been reported in literature, out of the many PTMC's performed worldwide. The balloon catheter assembly used in this case was a new one and was thoroughly checked for integrity pre-procedurally.[6,7] Recently it has been shown that the efficacy of Accura and the Inoue balloon is similar.[8] The incidence of balloon rupture is significantly higher in cases with calcified valve which could have been the primary cause of this mishap during the course of our procedure in this patient. The occurrence of balloon assembly malfunction or rupture of balloon is an extremely rare occurrence in a new balloon catheter.

Fig. 4. The catheter tracings after the procedure showed a significant improvement in the aortic pressure and the PA pressure became lesser than systemic values.

In previous studies the incidence of balloon malfunction has been reported to be higher (20%) with reused balloons as compared to new balloons (<0.5%), as in our case.[9,10] In a study by Ho et al. the incidence of Inoue balloon deformity was observed in 1.6% while rupture in 0.4% (1 out of 245 cases).[11] Abdominal distension during mechanical ventilation is a common occurrence due to insufflation of air in the course of positive pressure ventilation during ambulatory mask and bag unit (AMBU) ventilation or during endotracheal intubation if accidently the tube enters the oesophagus but having documented that on fluoroscopy during a percutaneous cardiac is an unusual finding. The importance of this sign is that the clinicians and the interventionists should be aware of this as a benign occurrence during mechanical ventilation and should not be viewed as a complication or otherwise when incidentally picked during fluoroscopy.

4. Conclusion

The importance of this case is to create awareness of the possible rare complications and unusual occurrences in a given case of PTMC to get the interventionist prepared for them and also to enable him to continue with his procedure to obtain a successful outcome without getting baffled. This case presents an interesting collection of unusual occurrences during a PTMC procedure which started on an unusual note but ended on a successful one. Careful assessment and appropriate management of complications can lead to successful outcome of procedures as in our case.

Conflicts of interest

All authors have none to declare.

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