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Case Series on Veno - venous extracorporeal membrane oxygenation (VV-ECMO) as a bridge to complete recovery in influenza type A related refractory ARDS

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Case series on Veno - venous extracorporeal membrane oxygenation (VV-ECMO) as a bridge to complete recovery in influenza A induced ventilator refractory ARDS

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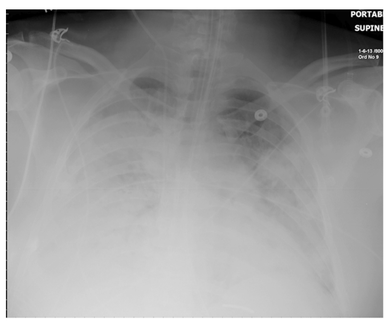
Introduction

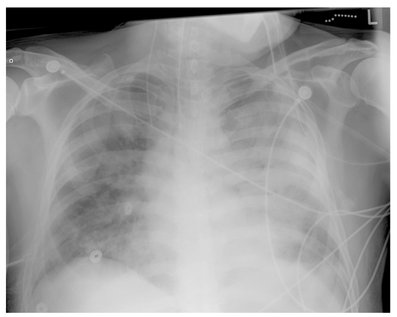
Influenza A sequelae range from mild symptoms to acute respiratory distress syndrome (ARDS), which can be refractory to conventional ventilator therapy. We present a case series of three non-H1N1 Influenza patients with ARDS, who completely recovered after VV-ECMO.

Pre ECMO Chest X-Rays

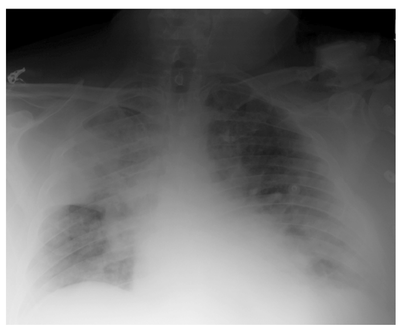
Case 1



Case 2



Case 3



Case Presentation

In January and February 2013, we experienced three cases of Influenza A induced ARDS that failed conventional ARDS ventilator therapy. All three patients presented with typical flu-like symptoms, which deteriorated over several days, requiring intubation. They were all treated with oseltamivir. They had bilateral chest infiltrates on chest x-rays. After a few days of failing conventional treatment these patients were placed on VV-ECMO using Avalon Dual Lumen catheters.

Pre ECMO Data

Age, Sex	47, m
Rapid influenza screening	Negative
PCR influenza assay	Positive
Days on vent (days)	1
Vent mode	Oscillator
Vent FiO_2	100
Peep	NA
PIP (mm H_2O)	34
Mean airway pressure (cm H_2O)	22
Arterial pH/$PaCO_2$/PaO_2	7.49/32/144

Age, Sex	46, M
Rapid influenza screening	Negative
PCR influenza assay	Positive
Days on vent (days)	7
Vent mode	Bi-Level
Vent FiO_2	100
Peep	30/0
PIP (mm H_2O)	29
Mean airway pressure (cm H_2O)	16
Arterial pH/$PaCO_2$/PaO_2	7.25/54/93

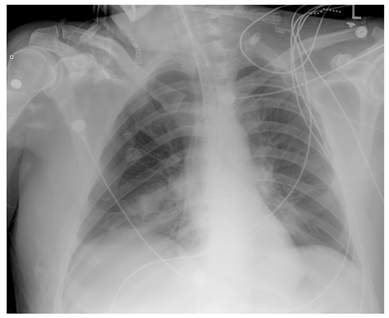
Age, Sex	46, m
Rapid influenza screening	Positive
PCR influenza assay	NA
Days on vent (days)	4
Vent mode	Bi-Level
Vent FiO_2	100
Peep	28/0
PIP(mm H_2O)	33
Mean airway pressure (cm H_2O)	28
Arterial pH/$PaCO_2$/PaO_2	7.36/44/76

Case Presentation (2)

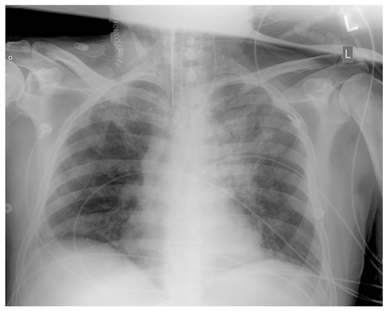
The patients' oxygenation improved dramatically at the instillation of adequate ECMO flow. ECMO was continued until improvement of chest x-ray findings, fluid status and end organ functions. All three patients were weaned off and decannulated from VV-ECMO within 10 days and achieved complete recovery of lung functions. The post ECMO decannulation chest x-rays show improvement of bilateral lung infiltrates in all three patients.

Post ECMO Decannulation Chest X-Rays

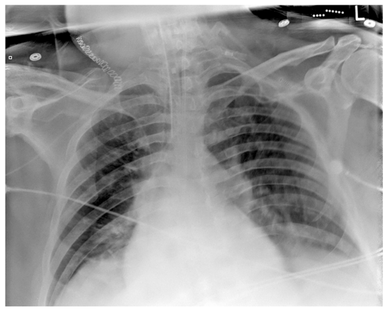
Case 1



Case 2



Case 3



Conclusion.

Although the survival benefit of the ECMO support for ARDS caused by H1N1 influenza was previously reported to be questionable, we were able to cure all ARDS directly related to non-H1N1 influenza with VV-ECMO support. We postulate that our difference in outcome compared to that published in the literature is due to the combination of the seasonal flu being treated appropriately and early intervention of VV-ECMO.

Post ECMO Data

Days on ECMO	10
Vent Mode	AC
Vent FiO_2(%), ECMO FiO_2	50, 50
Peep	5
PIP (mm H_2O)	25
Mean airway pressure (cm H_2O)	15
Arterial pH/$PaCO_2$/PaO_2	7.39/41/144

Days on ECMO	7
Vent Mode	AC
Vent FiO_2(%), ECMO FiO_2	50, 50
Peep	8
PIP (mm H_2O)	22
Mean airway pressure (cm H_2O)	12
Arterial pH/$PaCO_2$/PaO_2	7.38/47/160

Days on ECMO	10
Vent Mode	AC
Vent FiO_2(%), ECMO FiO_2	50, 50
Peep	8
PIP (mm H_2O)	21
Mean airway pressure (cm H_2O)	9
Arterial pH/$PaCO_2$/PaO_2	7.46/37/86