Medical gas pipeline system disruption during tropical cyclone ‘Fani’ - a clear and present danger of tropical cyclones: Are we prepared?

Sir,

The sudden disruption of oxygen supplies due to damage to medical gas pipeline system (MGPS) during a natural disaster can adversely affect patient safety during anaesthesia. With the alarming climate change crisis, we are vulnerable to increasing frequency and severity of natural disasters such as tropical cyclones in recent years. Here, we present such a life-threatening disaster which occurred during the category five cyclonic storm Fani. On 3rd May 2019, it made landfall in the state of Odisha, India with a wind speed of more than 250 kmph creating huge devastation.1 Anticipating any untoward event during the cyclone, the routine surgeries were deferred. However, emergency surgeries were going on. Suddenly oxygen failure alarm started ringing in the panel and the central oxygen pipeline pressure decreased to zero. The type E oxygen cylinders which were present behind the workstation were opened and the surgeries were completed uneventfully. We were informed that all the medical gas pipelines (air, oxygen, nitrous, vacuum) were disrupted as part of the chimney of the boiler unit broke during strong wind and fell down on the MGPS at its outlet near the gas manifold [Figure 1].

The standards while installing the MGPS system was not properly followed as found post-disaster. As a lesson learnt, we would like to highlight the concerns and safety measures which should be taken to preventing damage to the MGPS during such a disaster.

1. Adequate experience and knowledge of medical administration and the involved department (anaesthesia and critical care) while installing the MGPS is one of the important factors which should be taken into account...
while installing the MGPS and liquid oxygen plant
2. Pipelines in exposed areas shall be protected from physical damage
3. Medical gas piping must be clearly identified using non-removable stickers that are colour coded according to the gas Figure 1]
4. Hangers should be installed as required for support of all exposed pipings
5. MM Kembla Kemlag sheaths are available to fit over and protect. There are 12.7 mm (1/2”) and 19.05 mm (3/4”) size copper tubes through which the pipelines pass as they traverse masonry walls, partitions or floors [2]
6. Pipelines are preferred to be buried in cyclone-prone areas. Buried gas pipelines are preferred to avoid physical damage to them due to high-speed winds
   a. If buried, then a sticker must be present over the ground to identify them
   b. Buried pipelines shall be protected adequately against frost, corrosion and physical damage
   c. Copper tubes may experience severe corrosion if buried in direct contact with extreme environments
   d. Medical gas pipelines may be placed in the same tunnel, trench or duct with fuel gas pipelines or steam lines, provided that these medical gas pipelines are a minimum of 50 mm from other pipeline systems and combustible material and there is good ventilation
   e. Medical gas pipelines should not be enclosed in reinforced concrete or placed under slab on ground floors.
7. Adequate stocks of oxygen cylinders should be available for two days in the manifold
8. Specifications must be followed and certified from competent authority or experts
9. Maintenance should be carried out at regular intervals and any damage should be repaired.[3]

Natural disasters are unavoidable. With climate change, such disasters are going to increase in future. We should take appropriate measures to protect MGPS to prevent damage during such disasters and be prepared to manage any unanticipated events.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Chitta R Mohanty, Ssuma R Ahmad[1],
Snigdha Bellapukonda[1], Sangeeta Sahoo

Departments of Trauma and Emergency and Anaesthesia and Critical Care, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India

Address for correspondence:
Dr. Chitta R Mohanty,
Department of Trauma and Emergency, All India Institute of Medical Sciences, Bhubaneswar - 751 019, Odisha, India. E-mail: tem_chitta@aiimsbhubaneswar.edu.in

Submitted: 19-Jan-2020
Revised: 13-Feb-2020
Accepted: 29-Feb-2020
Published: 01-May-2020

REFERENCES
1. Mohanty CR, Bellapukonda S, Ahmad SR, Sarkar S. Seconds from disaster-crisis in critical care unit during tropical cyclone ‘Fani’. J Clin Anesth 2019;60:72-3.
2. Installation and testing of medical gas pipeline systems-Kembla technical bulletin. Available form: https://www.google.com/url?q=https%3A%2F%2Fwww.aiimsbhubaneswar.edu.in%2Fassets%2FUploads%2FTech-Bulletin-Installation-and-testing-of-Medical-Gas-pipeline
Sir,

Hyperthermic intraperitoneal chemotherapy (HIPEC) in a patient with coarctation of the aorta (CoA) poses a challenge to the anaesthesiologist as it is a fixed cardiac output state associated with massive fluid shifts, blood loss, haemodynamic perturbations and temperature imbalance. Anaesthetic management for non-cardiac surgeries in patients with uncorrected coarctation of aorta has been described previously [1,2] but probably this is the first reported anaesthetic management of HIPEC associated with severe uncorrected CoA.

A 31-year-old, 65 kg male patient of obstructive left colonic adenocarcinoma was posted for open left hemicolectomy. He was a known case of CoA detected incidentally on 2-D transthoracic echocardiography done as a part of the evaluation for hypertension at such a young age. During preanaesthetic assessment, the recorded non-invasive blood pressure (NIBP) measurements were as follows: right arm 166/67 mmHg, right thigh 98/52 mmHg, left arm 168/72 mmHg and left thigh 100/54 mmHg. The femoral pulse was delayed and diminished and a systolic murmur was audible in the left interscapular region. His exercise tolerance was more than 4 metabolic equivalents. Preoperative investigations including prothrombin time, activated partial thromboplastin time and international normalised ratio were within normal limits. The latest transthoracic echocardiography revealed the presence of a bicuspid aortic valve, severe coarctation of aorta-post left subclavian artery with a coarctation gradient of 73/42 mm Hg (53 mmHg), normal resting left ventricular ejection fraction (LVEF 61%) and concentric left ventricular hypertrophy. Our in-house cardiologist advised for close perioperative haemodynamic monitoring. The consideration for preoperative correction of the coarctation was not considered in view of his malignant colonic disease, the urgency of the surgery and the limited success rate of the corrective surgery for coarctation. The patient was made completely aware of the possible major complications associated with severe proximal aortic hypertension include cerebral haemorrhage, aortic dissection and rupture, aortic valve failure and left ventricular failure [3] and the scope of management of those in our institution.

Inside the operation theatre, baseline NIBP recorded in all four limbs were: right arm-177/96 mmHg, right thigh- 103/63 mmHg, left arm-184/93 mmHg and left thigh-113/60 mmHg. Inj. midazolam 1 mg was given as premedication. The thoracic epidural was sited at the T9-T10 intervertebral level. The right radial artery was cannulated after infiltration with 2% lignocaine. NIBP monitoring in the right lower thigh was also continued at regular intervals. Inj. fentanyl 100 mcg, propofol 180 mg and rocuronium 50 mg were administered sequentially and the airway was secured with an 8.5 mm endotracheal tube. Endotracheal intubation...