

## LETTERS TO THE EDITOR

**Emergent percutaneous intervention in submassive pulmonary embolism with contraindications for systemic thrombolysis***Tratamiento percutáneo urgente del embolismo pulmonar submasivo con contraindicaciones de trombolisis sistémica***To the editor:**

Pulmonary embolism (PE) has a broad spectrum of severity from asymptomatic cases to shock or cardiac arrest. Risk stratification is recommended using the Pulmonary Embolism Severity Index (PESI). In cases of massive or sub-massive PE with high-risk criteria, treatment with systemic thrombolysis (ST)<sup>1</sup> is recommended. However, about one-third of patients have relative or absolute contraindications for ST.

A 74 year-old man attended the ED for a presyncopal episode and dyspnea. He had been operated 40 days before for lumbar discectomy and arthrodesis and on the seventh day voluntarily interrupted the treatment with enoxaparin despite prolonged immobilization. Physical examination in the ED showed pallor and coldness, respiratory rate of 25 rpm, heart rate of 105 bpm, blood pressure 90/50 mmHg and 97% O<sub>2</sub> saturation (FiO<sub>2</sub> 28%). The electrocardiogram showed sinus tachycardia, right bundle branch block. Urgent computed tomography (CT) showed extensive PE with overloaded right cavities. Blood tests showed lactate 2.4 mg/dl; Troponin I 0.83 ng/ml (0.05 ng p99/ml), NTproBNP 4715 pg/ml and D-dimer 32,754 ng/ml. Emergency echocardiogram showed dilation and acute right ventricular dysfunction. It was classified as submassive PE with high intermediate risk criteria [troponin, NT-proBNP, right dysfunction, PESI class IV (114 points)]. He was admitted to the coronary care unit and sodium heparin infusion was initiated. The initial outcome was poor (oliguria, signs of low cardiac output, increased lactate), so reperfusion was considered. Although there were no absolute contraindications for thrombolysis (major surgery <3 weeks)<sup>1</sup>, we considered that the recent surgery was a relative contraindication for ST; so percutaneous treatment by aspiration and thrombus fragmentation was performed. Subsequently, two catheters were introduced, and an infusion of 6 mg rtPA was left 24 h in each lung branch. The patient remained 48 hours

in the coronary care unit and then five days in a ward, with good evolution. On the fifth day, control CT showed thrombus resolution and normalization of right ventricular function. At 3 months of follow-up the patient was asymptomatic and treated with oral anti-coagulation.

Percutaneous treatment is an alternative to ST in cases of massive and sub-massive PE with indications for reperfusion, but with absolute or relative contraindications for ST<sup>1</sup>. A purely mechanical, pharmacological approach (selective release thrombolytic), or both can be adopted. The procedure is successful in 86.5% (massive PE) and 97.3% (sub-massive PE), with rates of major bleeding greater than 3% (none intracranial) and 0% respectively<sup>2,3</sup>. Organizing teams of interventional cardiologists for primary angioplasty makes this technique available in a growing number of centers<sup>4</sup>.

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**Conflict of interest**

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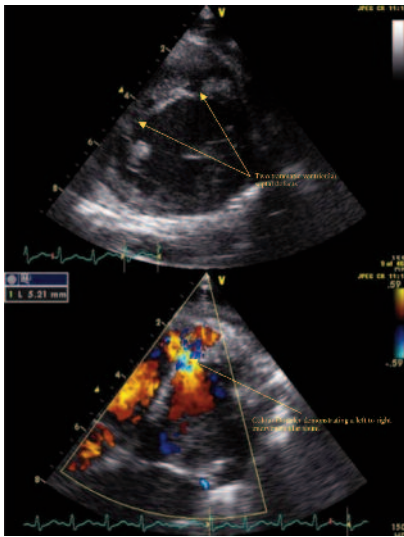
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**Pediatric chest injuries: take care on detecting a heart murmur***Traumatismo torácico en pediatría: atención a la aparición de un soplo***To the editor:**

A 6 year-old boy was taken to the ED after falling from the fifth floor. Glasgow Coma Scale score was 14 points (O3, V5, M6) and vital signs were stable. The pupils were symmetrical and reactive to light. He had bruises and abrasions on the anterior chest wall and extensive bone and soft tissue lesions on the chest. Cardiac auscultation indicated a rough pansystolic, grade 4/6 murmur that sounded stronger on the lower left sternal border. Cardiac enzymes were elevated, with a peak creatine kinase MB (CK-MB) >300.0 (normal range <3.4 ng/ml) and troponin I >50.0 (normal range < 0.1 ng/ml). The electrocardiogram showed persistent sinus tachycardia. Transthoracic echocardiography showed interventricular trabecular rupture with two traumatic ventricular septal defects (VSD), interventricular short circuit from left to right (Figure 1), and septal dyskinesia. According to the family and pediatric medical records, the child had no history of heart murmur. Two months after the initial event, scheduled open repair of the VSD was performed and today the patient is well.

Trauma is the leading cause of morbidity and mortality in children worldwide<sup>1</sup>. Cardiac injury in children after blunt chest trauma is 4.6%<sup>2</sup>. VSD of traumatic causes are extremely rare and easily missed but can be life-threatening. Clinical traumatic VSD findings are nonspecific, can be masked by other injuries, and clinical manifestations can often be delayed<sup>3</sup>. Furthermore, in a patient with multisystem traumatic injuries, persistent hypotension is usually attributed to blood loss. It is also easy to miss a heart murmur during auscultation in a noisy environment, typical during attention of a multiple injury emergency.

Currently, there is no a standard reference for the diagnosis of traumatic cardiac injury in children nor is there a management algorithm that is widely accepted. Most diagnostic tests are not specific, and few studies focus on the characteristics of the physical exam in children<sup>4</sup>. Moreover, advanced life support guidelines for multi trauma patients do not emphasize the importance of a new car-



**Figure 1.** Ultrasound showing rupture of the interventricular septum (arrows).

diac murmur<sup>5</sup> in the evaluation of chest injuries.

The trauma team leader should be alert to the possibility of a new heart murmur after chest trauma. Its appearance should be considered as a possible traumatic VSD. An the bedside, it is feasible to use a combination of diagnostic tools such as a 12-lead ECG, determination of cardiac enzymes and a 2D echocardiogram. In our case, traumatic VSD was diagnosed within the first 3 hours of arrival at hospital and was properly treated.

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## Terrorist attacks and emergency medical services: time for reflection

### Atentados terroristas y servicios médicos de emergencia: tiempo para la reflexión

#### To the editor:

For the field of emergency medical services (EMS), the recent terrorist attacks in Paris in November 2015 are reason to reflect on the scope and adequacy of planning our response to these incidents. Although medical health response to an incident with multiple victims has complex organizational and health-care peculiarities, terrorist attacks have added elements that should be especially considered<sup>1</sup>. The specifics are related with the following aspects: (i) clinical management of victims; (ii) safety at the scene; and (iii) prehospital and hospital coordination.

Recent epidemiology of terrorist attacks<sup>2</sup> show that the most common type is by a bomb or other explosive device as the mechanism of damage. This fact, and in the particular case of Spain since the Madrid bombings, has made EMS review and adapt their procedures to deal with these incidents based on the above peculiarities. On the other hand, some data has alerted us to new forms of terrorism in Europe, and the events in Paris have corroborated the growing trend in the frequency of hostage taking (4 times more in 2014 than the average for the period 1970- 2013), the average mortality and increased use of fire weapons<sup>3</sup>.

This scenario introduces new elements to consider. Firstly, regarding safety, a group of terrorists moving through a city impedes the deployment of advanced medical posts in the area for obvious safety reasons, which means rethinking the current predominant model of health response to terrorist attacks in Spain. Regarding the clinical management

of victims, the injury pattern produced by firearms for military use over short distances directed at grouped victims should make us reflect on the most suitable system of triage, pre-hospital and hospital care, as well as evacuation and transport of the wounded. These patients have a different pattern from those that have been wounded by a bomb<sup>4</sup> and are likely to benefit from rapid stabilization of life-threatening injuries, especially external bleeding in this case, and rapid transfer to a surgical treatment center. For the prehospital triage of these patients there are tools such as Advanced Triage out-of-hospital Model (ATEM), which allows rapid clinical assessment and early diagnosis of critical potentially surgical injuries<sup>5</sup>.

Terrorism is an increasing global phenomenon showing different epidemiological profiles according to geographical areas. Its global study should enable health system analysis of trends and planning health response adapted to changing patterns of impact because, in the future, terrorist attacks in Europe are likely to have a different profile than those currently observed in the more commonly affected areas, such as Central Asia, Middle East or Africa.

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## Electrocardiography artifacts simulating ventricular tachycardia

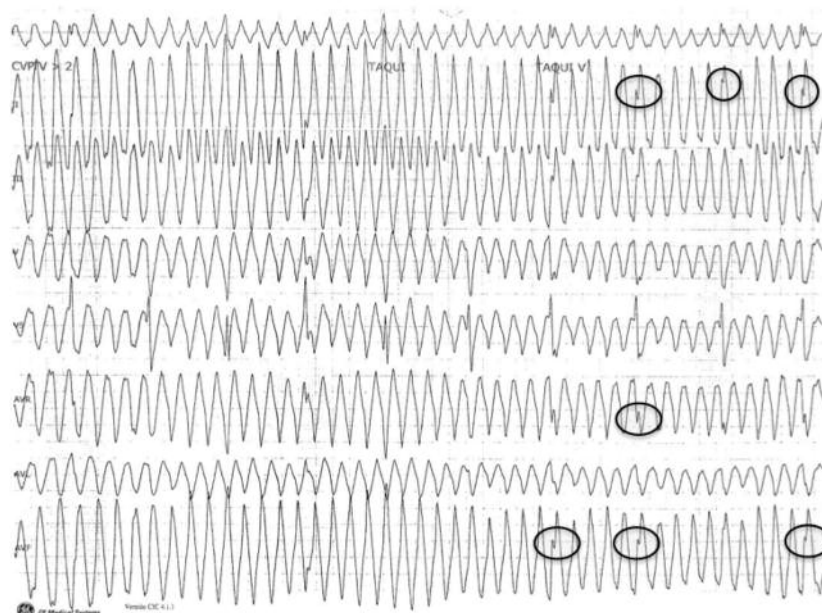
### Artefactos electrocardiográficos simulando una taquicardia ventricular

#### To the editor:

Electrocardiographic artifacts simulating ventricular tachycardia (EASVT) are limited to isolated cases and series of patients bearing a portable electrocardiograph monitor or pacemaker<sup>1-4</sup>. The error and confusion with ventricular tachycardia (VT) leads to diagnostic tests and unnecessary antiarrhythmic drugs as well as implantation of cardiac devices. We report the case of a patient admitted to the intensive care unit (ICU) after suffering an arrhythmia compatible with VT.

A 54 year-old man with a history of high cholesterol and smoking was admitted to the ICU after presenting acute coronary syndrome without ST segment elevation treated with 2 right coronary artery everolimus-coated stent implantations. At 48 hours of discharge from the ICU, with no symptoms, he presented, recorded by telemetry, ECG tracings compatible with unsustained VT that required re-admission and the administration of intravenous amiodarone. Blood tests, including cardiac enzymes, showed normal values. The electrocardiogram performed in the ICU showed sinus rhythm with no signs of acute ischemic heart disease. However, subsequent analysis of electrocardiographic telemetry revealed sharp spikes in lead I, II, III, AVF and V1, V5, some isolated and irregular and others regular in the QRS complex (Figure 1, circles). This pattern was consistent with EASVT, which allowed discontinuation of IV antiarrhythmic medication. Evolution was satisfactory, and the patient was transferred to the cardiology department.

Although EASVT is rare, most occur as a result of body movements, electromagnetic interference, or intermittent skin contact with electrodes<sup>2,3,5</sup>. In general the diagnosis is made by telemetry analysis and sometimes by exa-



**Figure 1.** Telemetry recording initially interpreted as VT. The spike sign indicated by circles is one of the 3 characteristic signs allowing a diagnosis of EASVT

mining the record of the pacemaker or Holter and, rarely, a stress test. The most important differential characteristics with true VT are the absence of hemodynamic deterioration (which can also rarely occur in a VT), an unstable electrocardiographic baseline before the episode, sometimes in relation to outside noise, and the presence of any of the following 3 signs: sinus sign, the sign of the spike and the sign of the notch<sup>5-7</sup>. The first occurs on recording sinus rhythm in the precordial leads; the second when sharp spikes are observed, with a regular cadence or not, and the third when notches within the artifact are observed, corresponding to native QRS complexes with a certain range that matches the length of the simultaneously recorded basal sinus cycle. In our case, the sign of the spike can be seen in various leads. We attributed the cause to movement and inadequate adhesion of the electrodes to the skin. In conclusion, a high index of suspicion and a certain expertise is needed to accurately rule out EASVT, thereby preventing and reducing diagnostic tests, invasive or not, therapeutic maneuvers and unnecessary consumption of health resources.

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## Acute traumatic abdominal wall hernia and aortic dissection

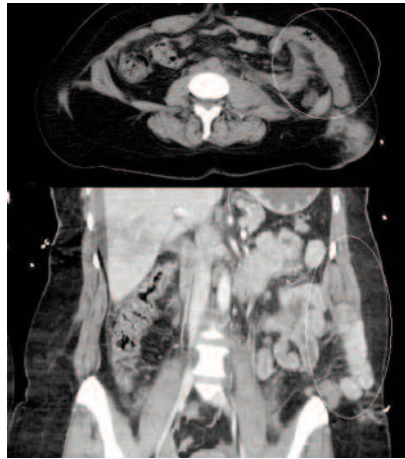
### *Hernia traumática aguda de la pared abdominal asociada a disección aórtica*

#### To the editor:

Traumatic abdominal wall hernias are defined as fascial-muscle rupture caused by trauma or skin lesion without prior hernia. They are a rare complication, but their incidence has been increasing in recent years due to traffic accidents, with high-energy trauma estimated frequency of 1%. Its management is currently not well defined and highly complex<sup>1</sup>.

A 38 year-old woman was brought to the ED after a high-energy frontal-lateral car accident in which one of several passengers died, all wearing seat belts. During helicopter transfer and on arrival at the hospital the lady was hemodynamically stable, but had pain in the lower abdomen. Physical examination revealed the "seat belt sign" and a slight left flank deformity that appeared to be a hematoma. Full body CT revealed focal left aorta-iliac dissection in the abdominal region, fracture of the upper plate of the L4 vertebra, fracture of the 1st left rib, sternoclavicular dislocation, hemoperitoneum with possible subcapsular splenic hematoma and herniation of left flank with visceration of small bowel loops (Figure 1). Despite hemodynamic stability, surgery was required. After placing a stent in the aorta-iliac bifurcation, we proceeded to perform laparotomy, where a hemoperitoneum was identified in addition to the complete rupture of the left abdominal muscle, which included internal, external, transverse and part of left rectus oblique muscles. An entire section of the descending colon was seen, with a complete disruption of the mesentery in about 50 cm of distal ileum and an entire section of jejunal loop with involvement of about 20 cm (Figure 2). The affected segments were removed and two anastomoses were performed, and a descending colon stoma was left with a closed distal end. Finally, we proceeded to close the defect of the abdominal wall in several planes with loose points. She remained hospitalized for 28 days in the ICU with good evolution and was discharged after a week.

The use of seat belts reduces mortality, but may increase the presence of intra-abdominal injuries, possibly by wrong positioning<sup>2,3</sup>. Traumatic hernias by high-energy accidents are most often located along the side of the rectus muscles in the lower abdomen or groin. Sometimes they are associated with other abdominal injuries, so that CT is a very useful and mandatory test for early diagnosis<sup>4</sup>.



**Figure 1.** Computed tomography showing a post-traumatic hernia.

In this case, CT identified the lesion in the abdominal wall and the aortic dissection, although no intestinal lesions were detected. Therefore, the association of a traumatic hernia of the abdominal wall and aortic dissection in a patient with severe blunt abdominal trauma could be indicative of other intra-abdominal injuries that cannot be seen on imaging tests. This raises the possibility of a laparotomy in a patient with multiple abdominal injuries and a history of such severe trauma<sup>5</sup>.

Conservative management of traumatic hernia may be appropriate in selected cases, with low risk of complications (strangulation, etc.) without other intra-abdominal injuries. If one opts for the deferred treatment, the hernia size may increase and the surrounding muscles atrophy, which can hinder surgical repair<sup>6</sup>. Urgent repair of the hernia defect in a primary anatomical way is recommended, without placing prosthetic material, if there is contamination, due to the high risk of infection<sup>7</sup>.

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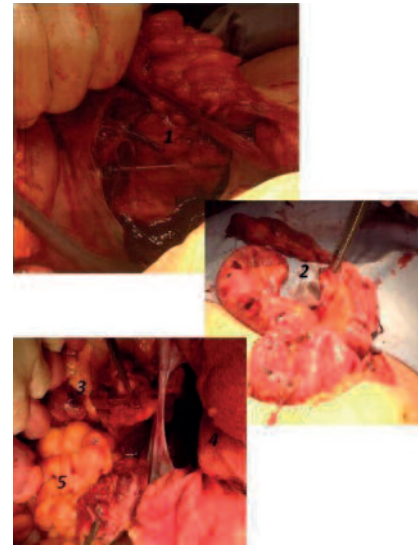
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#### Conflict of interest

The authors declare no conflict of interest related to this article.

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**Figure 2.** Intraoperative findings: 1. complete rupture of abdominal muscles with dissected epigastric artery. 2. Small bowel lesions. 3. Closure next to the descending colon. 4. Complete rupture of the peritoneum and abdominal muscles. 5. Distal closure of the descending colon.

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## Noninvasive mechanical ventilation in a polytrauma patient with acute respiratory failure secondary to massive atelectasis

### *Ventilación mecánica no invasiva en un paciente politraumatizado con insuficiencia respiratoria aguda secundaria a una atelectasia masiva*

#### To the editor:

Regarding polytrauma patients, few studies focus on the use of noninvasive mechanical ventilation

(NIMV). Some studies highlight the importance of NIMV in the management of patients with severe trauma and acute respiratory failure (ARF), with a decrease in the need for intubation of ventilator-associated pneumonia, and probably mortality<sup>1</sup>. In multiple trauma, rib fractures can be associated with multiple complications such as hemothorax, pneumothorax or secondary complications or severe pain that interferes with lung mechanics, hindering ventilation and favoring accumulation of secretions or the appearance of atelectasis. Each can generate a picture of hypoxemic ARF, and compromise the patient's life. The application of positive pressure in the airway is effective in preventing postoperative atelectasis, alone or combined with other physiotherapy respiratory techniques<sup>2,3</sup>. Once atelectasis is diagnosed, bronchoscopy is the procedure of choice for resolution, but with ARF it is contraindicated. NIMV to treat lung atelectasis in patients with ARF would therefore constitute an alternative<sup>4</sup>.

A 37 year-old man, smoker, attended the ED of a local hospital due to left chest pain secondary to trauma. Upon arrival he was hemodynamically stable and eupneic. Chest x-ray and CT scan revealed posterior left fractures from the 4th to the 9th costal arch with a non-occlusive subcarinal block of dense mucosa. Medical treatment was initiated with analgesia and expectorant. During his ED stay, he presented acute pain in the left hemithorax and dyspnea with tachypnea (32 bpm) with 88% SpO<sub>2</sub> (PaO<sub>2</sub> 55 mmHg) despite O<sub>2</sub> with a mask, and FiO<sub>2</sub> 50%. Chest x-ray showed opacification of the left lung (Figure 1). A chest drain was placed in the 5th intercostal space on suspected hemopneumothorax with respiratory compromise, with partial clinical



**Figure 1.** Chest radiograph showing the opacification of the left lung and subsequent resolution with chest drainage and non-invasive ventilation.

improvement after the extraction of 500 cc of serohematic liquid. Control x-ray showed exclusion of the left lung and air in the pleural space (Figure 1). Massive atelectasis of the left lung was suspected and VMNI was initiated to resolve the ARF with BiPAP at low pressure given the risk of barotrauma (IPAP 10 cm H<sub>2</sub>O, EPAP 5 cm H<sub>2</sub>O), adding nebulization and antibiotic coverage. With these pressures the patient achieved a tidal volume of approximately 350 ml, which maintained proper ventilation with SpO<sub>2</sub> 94% and improved breathing without asynchrony. After 20 minutes of VMNI the patient showed decreased respiratory rate (RR) below 20 rpm, as well as improved breathing and comfort. X-ray 4 hours after NIMV showed resolved atelectasis (Figure 1). The patient required sedation with midazolam and morphine chloride for pain control, achieving excellent adaptation to NIMV. He improved and was transferred to the department of thoracic surgery at the referral hospital for evolutionary control.

This case shows that the NIMV is an effective alternative for the treatment of massive atelectasis in patients with severe trauma who develop ARF. Chest drainage allowed NIMV treatment of the massive atelectasis more safely, controlling for the possibility of developing tension pneumothorax.

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