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CASE REPORT

USE OF HANDHELD POCUS TO SPEED UP THE DIAGNOSIS OF AORTIC DISSECTION

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ABSTRACT

Si riporta il caso di una donna di 82 anni giunta in Pronto Soccorso presentando astenia, deficit di forza all'arto superiore sin e dolore toracico lieve.
La valutazione clinica della paziente ha incluso l'utilizzo di un device ecografico portatile dotato di sonda sector al fine di individuare possibili cause di shock ed ipotensione. L'esame ha permesso di evidenziare - mediante scansione al giugulo - la presenza di flapping intimale a livello dell'arco aortico, ponendo il sospetto diagnostico di dissezione aortica (AD) tipo A.
Il cardiochirurgo è stato immediatamente allertato, nell'attesa dell'esecuzione dell'angio-TAC toracica (la radiografia del torace non è stata eseguita) che ha confermato il sospetto diagnostico.
La diffusione dell'ultrasonografia "point-of-care" (POCUS) con device portatili può migliorare ed accelerare la diagnosi di condizioni critiche quali la AD, patologia caratterizzata da una mortalità tempo-dipendente e la cui terapia differisce totalmente da quella di altre condizioni cliniche che può mimare.

ENG: A 82-year-old woman presented to the Emergency Department (ED) with asthenia, neurological weakness of left arm and mild chest pain.
A portable ultrasound device equipped with a sector probe - used to assess possible causes of shock and hypotension - showed intimal flapping of aortic arc on suprasternal notch scan.
The diagnosis of type A aortic dissection (AD) was confirmed by CT scan, but in the meanwhile the cardiac surgery team had been already alerted.
The use of point-of-care ultrasonography (POCUS) with portable devices can improve and speed up the diagnosis of life threatening conditions as AD which has time related mortality and whose therapy differs from that of other conditions ti may mimics.

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Parole chiave: POCUS, device portatili, dissezione aortica

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BACKGROUND

Acute AD is estimated to range from 2.6 to 3.5 per 100,000 person-years [(1)]. Fifty percent of patients dye before reaching the hospital or during hospital admission [(2)] and without treatment the mortality rate increases at the rate of 1% to 2% per hour for 24-48 hours and the 2 weeks mortality is 80% without any treatment [(3)].
It is very important, therefore, to quickly recognize and treat the dissection, but the diagnosis may be challenging because AD may present as acute pain in the chest or back [(4,5)] but may also be painless, with only signs of congestive heart failure, cerebrovascular accident, and pulse loss [(6)].

Harris & coll. [(7)] showed that delays in diagnosis mostly occurred in female patients without pain or abrupt symptoms. To help the diagnosis, ECG and chest X-rays (CXR)

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are useful tools but not crucial: ECG could be altered if dissecting membrane involves coronary arteries, whereas 31% of patients with aortic dissection have a normal ECG [4]; CXR in 12–18% of patients with aortic dissection may be unremarkable [10,5].
Transthoracic echocardiography (TTE), at contrary, is a useful bedside tool that can assist in the rapid diagnosis and disposition in a patient with suspected AD. It has been reported to have a sensitivity of 59-83% and a specificity of 63-93% for all AD, and a sensitivity of 78-100% for type A dissection [3].

Ultrasound findings suggestive of an aortic dissection include visualization of an intimal flap, pericardial effusion, Doppler color flow only seen through the true lumen, and visualization of new onset aortic regurgitation [12,14].
Transesophageal ultrasonography has a sensitivity of 98-100% [13], but can't be performed at bedside.

CASE REPORT

A 82-year-old woman presented at the emergency department (ED) of Mestre (Venice) reporting that about 2 hours before, while opening the window, she had a weakness to the left arm, which persisted at the time of the visit. She reported also mild chest pain (NRS=1), general weakness (blood pressure wasn't measurable) and mild dyspnea.
She had a medical history of hypertension, severe bilateral coxarthrosis, chronic vascular leukoencephalopathy, hypothyroidism, and was on medication with L-Thyroxine, atenolol, aspirin, atorvastatin, lorazepam and mirtazapine.

She was awake, the lung sounds were normal as well as cardiac tones, the hands temperature was cold, saturation was 82% (it increased to 98% after administration of oxygen) and blood tension was unmeasurable on both sides. There was a left arm weakness. No other neurological abnormalities were found. The left hand was pale, and radial pulses couldn't be appreciated on both sides. Femoral pulses were normal and symmetrical. The physical examination of abdomen was normal without signs of pulsating mass. Blood tests were requested and ECG was performed: normal sinus rhythm.

An E-FAST was performed by means of a personally owned handheld device equipped with a sector probe (VSCAN, by GE): no pleural, peritoneal or pericardial effusion were found.

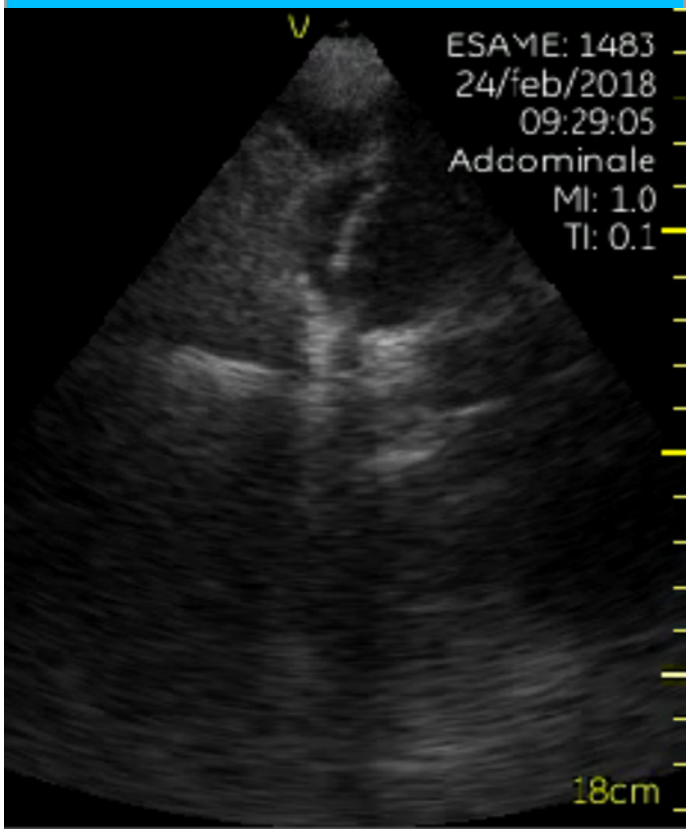
Abdominal aorta was normal. Further US examination was carried out by suprasternal notch view (SSNV) which showed intimal flapping of aortic arch (Fig.1).

No chest x-ray was performed, but a contrast-enhanced CT scan was requested to confirm the AD and evaluate the extension of the dissection.

While waiting for CT scan and for blood test results, the cardiac surgeon was alerted, 45' after first contact with the emergency physician.

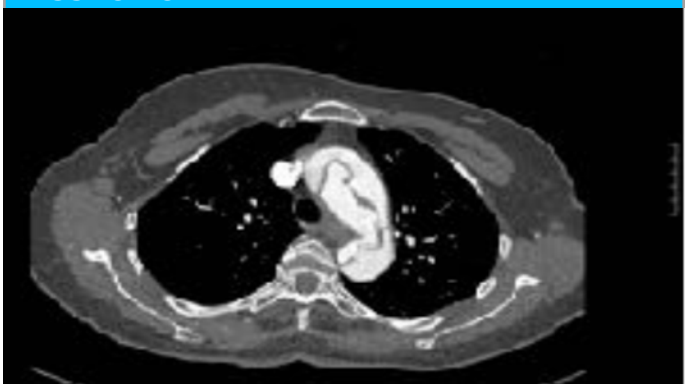
CT scan confirmed the dissection of ascending thoracic aorta, without valvular involvement, but with extension to brachiocephalic artery and to the origin of carotid and subclavian artery on the right, and to the origin of subclavian artery on the left.

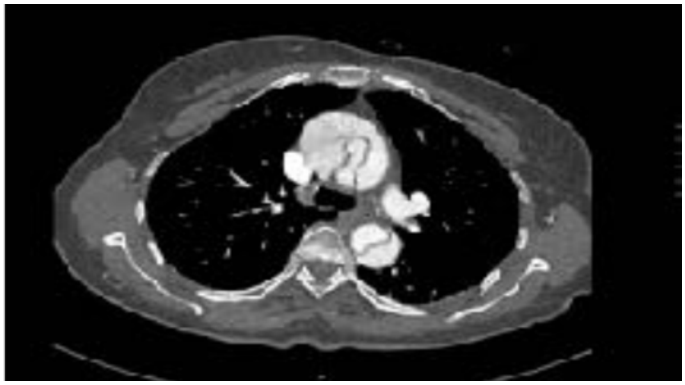
FIG.1 SUPRASTERNAL NOTCH VIEW OF INTIMAL FLAPPING OF AORTIC ARCH



Patient initially refused intervention, but after an exhaustive explanation about advantages and risks she accepted the procedure and underwent successful intervention of ascending aorta substitution.
After the intervention she hadn't major complications, with the exception of an episode of psychological decompensation before a full recovery.

FIG.2-3 CT SCAN CONFIRMING AORTIC DISSECTION





DISCUSSION

This case reports a 82-year old woman presenting with different confounding symptoms that could mimics ACS with cardiac failure, pulmonary embolism or stroke. Despite advances in diagnostic methods, misdiagnosis occurs in 25% to 50% of patients on initial evaluation [8,9]. Between the different available tools, in our centre, for the definitive diagnosis, CT scan is the one which is most often used.
Physical examination, including blood pressure, pulse check and neurological examination, may help by providing important clues
to diagnose aortic dissection, as well as biochemical markers: D-dimer, troponin, ABG.

Differentiating an acute STEMI from an aortic dissection can be extremely difficult in the ED.
It is important not to delay reperfusion therapy for patients with a true STEMI; however, the same treatment can be lethal for patients with aortic dissection. [16]
In this case aortic dissection was the first suspicion of the emergency team, but the availability of point of care handheld ultrasonography allowed a faster confirmation of the clinical hypothesis, leading to an earlier activation of the cardio surgery team while still waiting for CT scan and blood test results.

CXR was even not requested to avoid loss of time.

The rapid ultrasound for shock and hypotension protocol [18,19] was developed to facilitate rapid assessment of potentially critically ill patients presenting to the ED by means of an ultrasound examination aimed to identify a variety of possible medical causes of a patient's poor clinical status.

The ultrasound study is performed according to the acronym HI-MAP [11]: (H)eart: cardiac motion, contractility and pericardial effusion; (I)nferior Vena Cava(IVC): collapsable, plethoric; (M)orrison's: FAST examination for intraperitoneal fluid;

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(A)orta: assess for AAA; (P)ulmonary: assess for pneumothorax. Additional diagnoses can be pursued such as pulmonary edema, pneumonia, pleural effusions, and secondary findings of pulmonary embolism [(11)].

With supra-sternal notch view it is possible to obtain a view of the thoracic aorta that can be obtained by emergency physicians (EPs) in the majority of ED patients [(17)], and visualization of an intimal flap by ultrasound may carry a sensitivity of 67–80% and specificity of 99–100% for dissection [(12)].

POCUS, performed with a smaller format device at the bedside by the provider actively managing a patient, offers the potential for timely, repeatable, non-ionizing diagnostic information and procedural guidance [(15)].

EPs playing with ultrasounds should of course be aware of the pitfalls: this is a specific but insensitive test [(15)], operator dependent, and quality of images may be low on extremely portable devices.

CONCLUSIONS

Emergency POCUS has already been reported to be a fast and accessible test with high specificity for the diagnosis of aortic dissection in the ED [(16)], and the use of new, portable devices allow EPs to broaden ultrasound examination to virtually all patients as an extension of physical examination.

A training is necessary, as well as awareness of the limits of such approach, but the possibility to quickly recognize life threatening lesions can increase the effectiveness of clinical interventions in EDs.

CONFLICTS OF INTEREST

None

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