Death recorded by Holter monitoring due to multiple traumatic injuries as a consequence of a car accident

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A 60-year-old woman underwent electrocardiography Holter monitoring in order to evaluate self-reported palpitations. She was treated for hypertension and had a negative family history of sudden cardiac death and ischemic heart disease. No other comorbidities were reported. Ethical committee approval was obtained for publishing the following case.

Within 2 hours after leaving the clinic, the patient was struck by a car on a pavement and sustained blunt cardiac injury. Her 2-hour Holter recording documented the electrical changes in a slowly dying heart (death occurred approximately 6 minutes following the incident). There were no signs of reanimation. She had died before the ambulance arrived. No massive blood loss or severe head injury were noted; the type of injury remains unknown.

Initially (time, 12:53–12:54 PM), the recording demonstrated sinus rhythm, followed by a pair of ventricular ectopic beats (FIGURE 1). The injury was recorded as a distinct disturbance that occurred at 12:54 PM. Right after that, the electrocardiographic trace showed a junctional rhythm with retrograde P waves evident after the 13th junctional beat, which lasted for approximately 2 minutes. Subsequently, the escape rhythm slowed down (12:56 PM) and was accompanied by substantial pauses and ventricular ectopic beats (single ventricular premature complexes and trigeminy). We could note 2 P waves (nonconducted) and narrow escape QRS complexes without retrograde conduction.

Surprisingly, later, at 12:57:31 PM, the tracing showed the return of what probably was sinus rhythm. During the following minutes, we observed the increase in the T-wave amplitude followed by progressive ST-segment elevation that occurred at the end of the first lead at 12:48:31 PM. This phenomenon directly precedes QRS widening (which may actually represent QRS–T wave fusion). Single ectopic beats appeared at 12:59:01 PM. From 12:59:31 PM, QRS complexes became very wide and some had single or double "hubs." Double "hubs" of ectopy may represent the ischemic myocardium showing delay after depolarizations from multiple exit sites, which reflects a large ischemic territory. From 1:01:01 PM, we observed second-degree atrioventricular block of increasing grade—from 2:1 to 6:1. Finally, at 1:01:01 PM, we noted the last conducted QRS complex, and then, nonconducted P waves without any escape beats.

Blunt cardiac injury has been characterized as a spectrum of myocardial injuries secondary to blunt trauma.[1] Few studies have described the heart rhythm at the time of death. The available reports were obtained from Holter monitoring and implanted devices: cardioverter-defibrillators or implantable loop recorders.[2] Ventricular tachyarrhythmia remains the most frequent cause of sudden cardiac arrhythmia.[3]

Most arrhythmias are considered to occur within the first hour of trauma (91% within 48 hours)[4]; however, blunt cardiac injury may lead to fatal cardiac arrhythmias even after several days. Nonetheless, the mechanism underlying arrhythmias remains unclear. Certain pathophysiological changes have been discussed so far, including electrical changes between damaged

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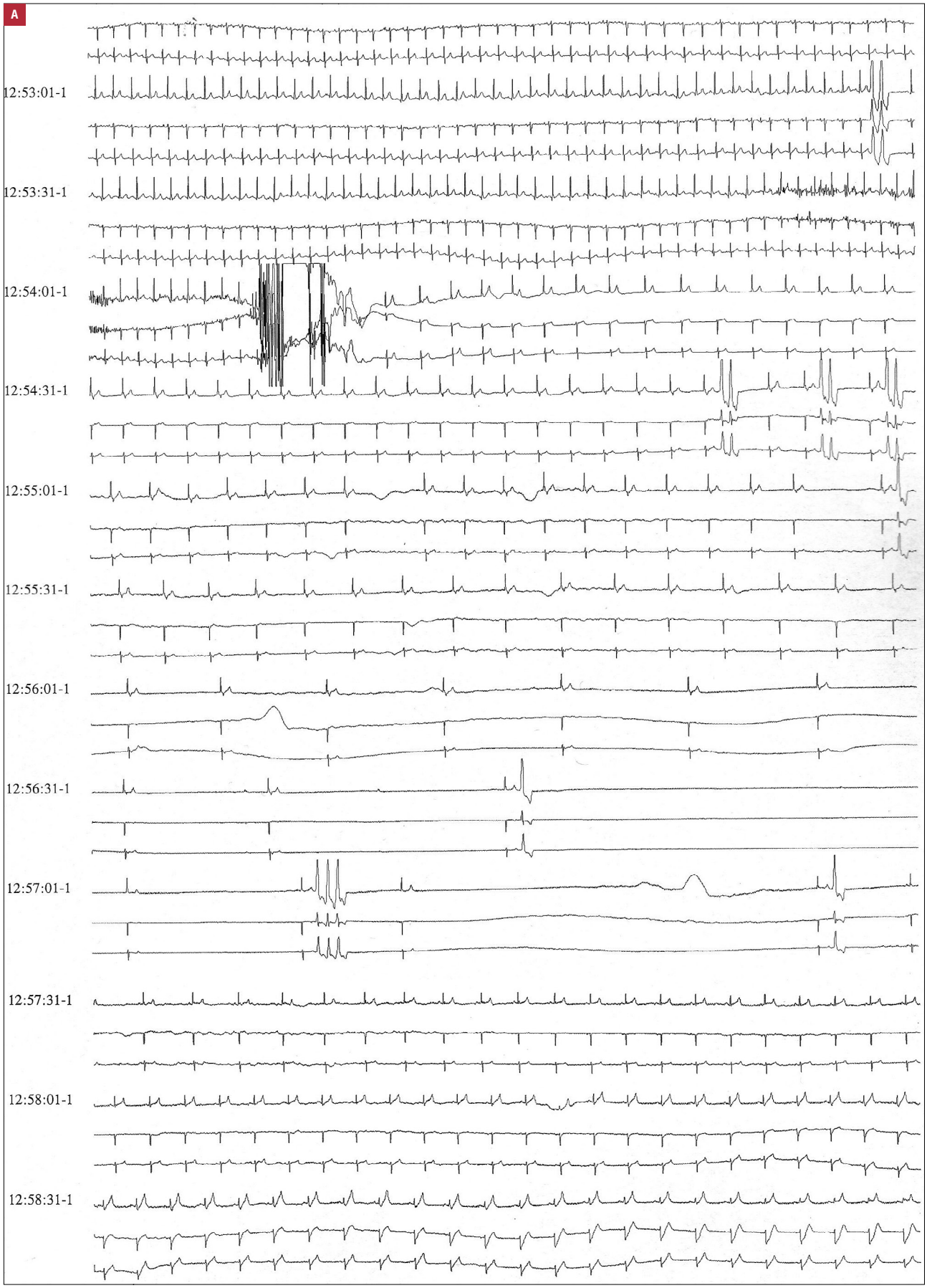

FIGURE 1 **A** – Holter recording (part 1) in a 60-year-old woman who died after sustaining blunt cardiac injury in a car accident

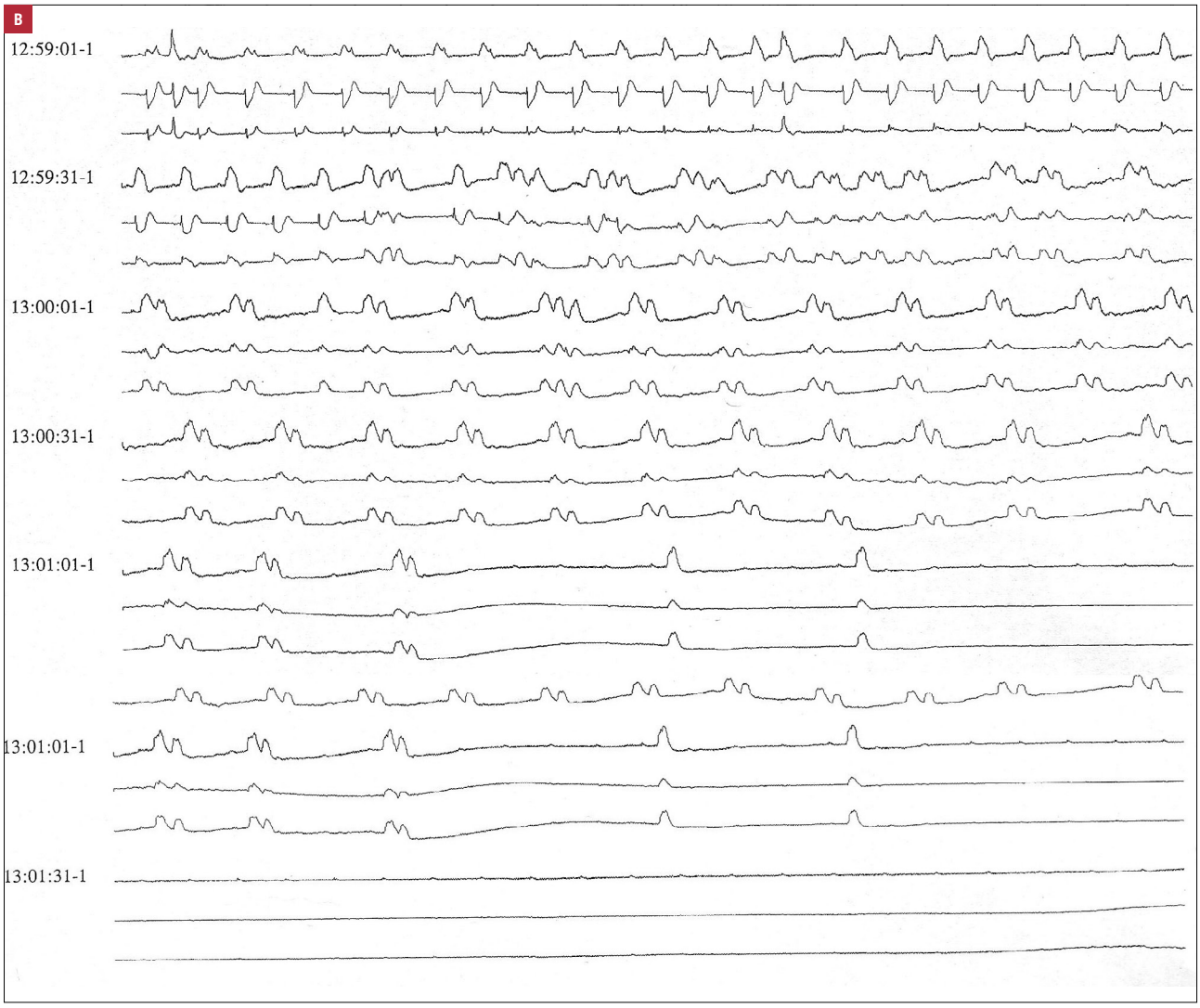

FIGURE 1 **B** – Holter recording (part 2) in a 60-year-old woman who died after sustaining blunt cardiac injury in a car accident

and unaffected tissues, local hypoxia, edema, ischemia, vagosympathetic stimulation, and the development of ectopic pacemakers from myocardial edema.[5]

This case study provides an insight into the progression of electrical changes that occur after sustaining blunt cardiac injury, highlighting electrocardiographic abnormalities in the setting of what is presumably noncardiac death.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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