

Kasuistik / Casuistry

Atrial Fibrillation Resulting from Cardiac Trauma

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Summary. Reports in the literature concerning isolated traumatic lesions of the conductive system of the heart following blunt injury to the thorax are rare.

A 69-year-old woman who was a front-seat passenger developed disturbances of conduction with atrial fibrillation after blunt injury to the thorax. She died 7 days later. Autopsy and subsequent histological investigation of the conductive system of the heart showed isolated contusion in the right atrium close to the atrio-ventricular node.

Key words: Atrial fibrillation, cardiac trauma – Cardiac trauma, atrial fibrillation

Zusammenfassung. Isolierte traumatische Läsionen des Leitungssystems des Herzens durch stumpfe Traumen werden in der Literatur selten beschrieben.

Eine 69jährige Beifahrerin entwickelte nach einem stumpfen Thorax-trauma Leitungsstörungen und Vorhofflimmern und starb eine Woche später. Die Sektion und histologische Untersuchungen des Leitungssystems des Herzens zeigten isolierte Kontusionen des rechten Atriums dicht beim Atrio-ventrikularknoten.

Schlüsselwörter: Vorhofflimmern, Kontusion des rechten Vorhofs – Traumatologie, Herzschädigung mit Vorhofflimmern

Traumatic lesion of the heart after blunt trauma is often seen in connection with simultaneous contusion of other thoracic organs. Isolated lesion of the heart is, on the contrary, rare, and lesion of the conduction system has only seldom been described in the literature to date [2, 3, 8–10]. This article reports a case of isolated contusion of the right atrium with resulting conduction disturbances.

Case History

A previously healthy 69-year-old woman was front-seat passenger in an automobile involved in a head-on collision. The patient injured bilateral rib fractures, sternal fracture, right-sided hemothorax, fracture of right femur, and fracture of left lower leg. Upon admission atrial fibrillation was diagnosed which was primarily treated with digoxin with good result, verified by ECG normalization. The period of normalization was followed by rhythm disturbances the next few days with periods of supraventricular arrhythmias altering with periods of functional atrio-ventricular (AV) block. The patient died seven days after admission while being operated upon for fracture of her femur, at which time serious conduction disturbances appeared ending with complete block and asystole. In addition to the previously mentioned fractures, autopsy revealed slight cardiac hypertrophy. Tightly adherent, thick, bloody fibrinous exudate was seen over the right auricle. This was easily loosened from the upper part of the auricle but tightly adherent around its apex. Easily loosened fibrinous membranes were found over the sinus node area. There was no macroscopic hemorrhage over the sinus node. Examination of the rest of the myocardium revealed slight fibrosis, and the coronary arteries were rather arteriosclerotic. In the right atrium a small rupture was seen penetrating the endocardium. The lesion began just in front of the orifice of the coronary sinus approximately 1 cm over the valves and measured 0.5×2.5 cm. A hemorrhage was seen in the underlying myocardium but was not fresh.

The heart was preserved with 4% formalin solution and the conduction system was examined by the methods described by Hudson [6].

The following histologic changes were found:

Sinus Node. The pericardium above the sinus node was covered with thick membranes containing leukocytes and lymphocytes which also infiltrated the superficial part of the sinus node itself. Most of the sinus node and the adjacent auricle showed degenerative changes. Many small arteries in the area were almost occluded with fibrin thrombi.

Right Atrium. The histologic examination demonstrated that the lesion was located between the coronary sinus and the AV-node and included the endocardium and the underlying myocardium where a large hemorrhage was seen as well as fibrin precipitation, degeneration, and necrosis. Moderate cellular infiltration, degeneration, and necrosis was seen in the surrounding atrial tissue and also in the so-called "nodal approaches" [7].

Local vacuolar degeneration was seen in the AV-node, the bundle of His and its branches but otherwise no pathologic changes were seen here except that the artery supplying the AV-node showed slight intimal thickening.

Histologic examination of the rest of the myocardium and the liver revealed nothing of interest.



Fig. 1. ECG showing atrial fibrillation. Taken upon admission to the hospital

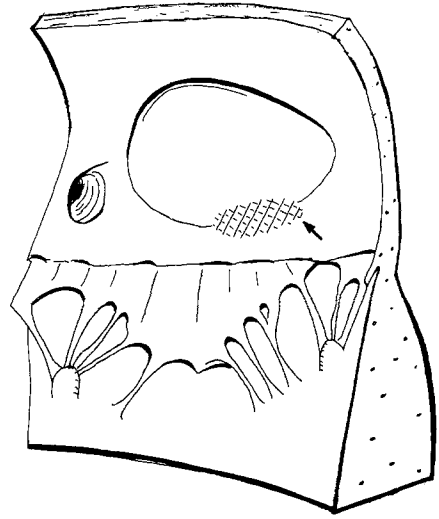


Fig. 2. The atrial septum with rupture near the anterior border of the fossa ovalis. Drawings seen from the right side of the atrium

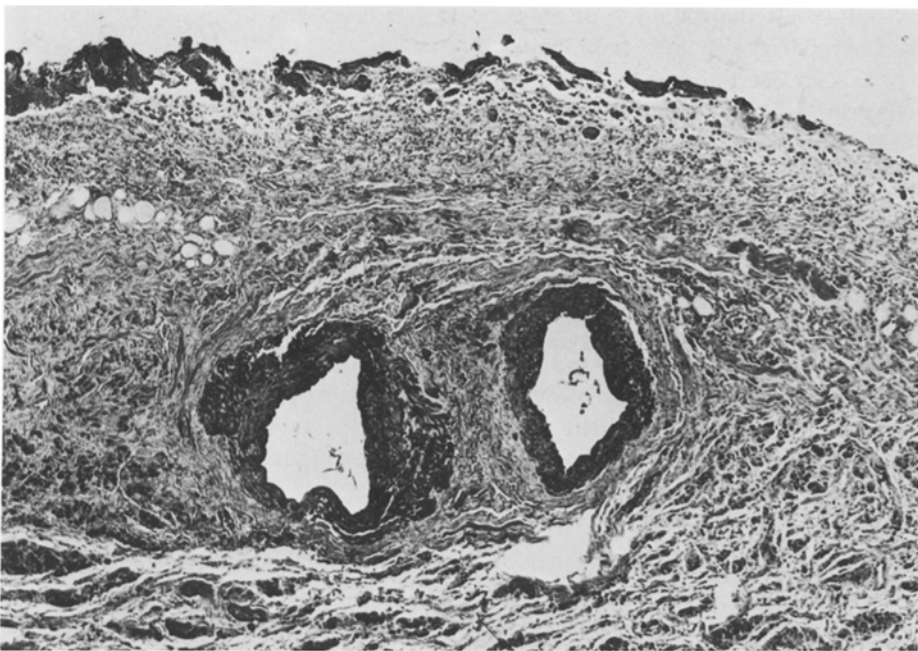


Fig. 3. Section from the sinus node and sinus node artery with pericarditis. Hematoxylin-eosin (H.E.) $\times 60$

Discussion

Lesions resulting from heart contusion due to thorax trauma are often located in the right atrium [12] where a part of the heart conduction system is situated.

Sims and Geddes [11] described a case of AV-block resulting from a non-penetrating trauma caused by a fall from a high elevation. The patient died a few

hours later because of conduction disturbances. An approximately 2 cm long irregular lesion was found in the right atrium extending from just in front of the fossa ovalis down to the upper part of the right ventricle. Histologic study showed hemorrhage in the AV-node. The bundle of His was injured and hemorrhage was evident. It was completely divided in one place.

Heart commotion or contusion is wellknown in forensic medicine [5] resulting from serious blunt trauma to the front of the thorax. Death after a few hours to several days is the usual result. Autopsy findings are often uninformative probably because study of the heart conduction system, in which lesions can occur, is not usually included in the routine histologic examination.

Isolated traumatic lesion of the heart conduction system is, as stated earlier, well-known but rare. Transitional conduction disturbances in connection with even slight blunt thorax trauma are, on the contrary, not at all uncommon [4] and are the result of bleeding and edema in or around the heart conduction system without real involvement of it. The well documented, most often transitional, conduction disturbances due to surgical procedures near the conduction pathways have identical etiologies. Persistent conduction disturbances, most often AV-block after installation of aortic valve prostheses, are due to direct injury to the bundle of His and its branches.

In the case referred to here a contusion was found in the interatrial septum near the AV-node which could without doubt explain the patient's atrial fibrillation with irregular ventricular action and periodic complete AV-block. The pathological changes in the sinus node and the pericardium were secondary but, nevertheless, so significant that they could, in themselves, cause a fatal irregular heart action.

Heart contusion is a diagnosis clinically difficult to establish [1]. On the other hand, the diagnosis heart contusion with lesions of the conduction system is easily established if persisting conduction disturbances, as in the referred case, result immediately following the traumatic event. If the diagnosis is made early enough, it is theoretically possible to save the patient if appropriate therapy is initiated. Routine ECG is recommended after all non-penetrating thoracic traumas. In the case described here, however, several other lesions than those in the interatrial septum contributed to the fatal outcome.

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