G26 Histologic Variation in Cardiac Rupture Complicating Myocardial Infarction: A Forensic Experience

Brandy Shattuck, MD, Mary L. Anzalone, MD, Merrill O. Hines, MD, and Dwayne A. Wolf, MD, PhD, Harris County Medical Examiner, JAJ Forensic Center, 1885 Old Spanish Trail, Houston, TX 77054*

After attending this presentation, attendees will better understand the spectrum of histologic changes associated with cardiac rupture, particularly in those who do not have preceding medical intervention.

This presentation will impact the forensic science community by providing a range of histologic findings associated with cardiac rupture that presents as sudden and/or unexpected death.

Cardiac rupture as a complication of myocardial infarction is a rare but well known cause of mortality. Traditional thought has placed the danger period of this complication at five to seven days post infarct with up to 25 percent of the events occurring in the first 24 hours. The accompanying histologic findings of granulation tissue that one would expect at five to seven days after the initial event have been used to describe the most common background of rupture. This natural time course; however, has changed as medical intervention has altered the timing of rupture and did not fully describe the 25 percent who ruptured in the first day after infract.

Along with improved cardiac survival, there has been a revision of infarct complications due to medical intervention. Research has shown that thrombolytic therapy decreases the overall rate of rupture from four percent to less than one percent; however, it causes many of those who do experience a rupture to do so within the first 24 hours after the initial infarct. Similar research on direct percutaneous coronary intervention placed the danger period for rupture in the first two days. This research, while clarifying the clinical course of the treated infarct and incidence of associated complications, still does not address the spectrum of histologic findings associated with survival less than five days.

The acceleration of the natural time line will change the cellular milieu that can be seen upon histologic examination, making it similar to those patients who do not have medical intervention. Those patients who present with death due to cardiac rupture without intervening medical intervention are most frequently seen in the forensic pathology setting. An examination of the histology seen in this setting can help explain the lack of the classical presentation of fibroblasts, blood vessels, lymphocytes, and macrophages that histology teaching has classically associated with ruptures.

A review of all forensic autopsies performed in Harris County, Texas from January 2006 to July 2011 revealed 37 patients who were found to have cardiac rupture as a complication of myocardial infarction listed as cause of death. Of these 37 patients, nine had evidence of classical histology, i.e., granulation tissue with fibroblasts, macrophages, and blood vessel formation. The remainder did not have the same infiltration of fibroblasts and early blood vessel formation in the area of myocyte death. Signs of early myocyte death, including minimal to extensive neutrophilic infiltrate, dissecting hemorrhage, and varying amounts of lymphocytes and macrophages were present in those who had witnessed collapse, were found unresponsive, or had complaints of chest pain less than 48 hours before death. None of these patients had active medical intervention such as thrombolytic therapy or percutaneous intervention according to available medical records. Many patients, both with and without classic histology, did not have a reported history of chest pain.

These findings provide a histologic correlate to both the originally described 25 percent of patients who present with cardiac rupture in the first 24 hours after infract and to those who may have an accelerated time to rupture due to medical intervention. These results, even with a small sample size, can provide an explanation for the spectrum of histologic findings associated with cardiac rupture in patients who have no medical intervention and those who have an accelerated time course due to therapy.

Histology, Cardiac Rupture, Myocardial Infarct

 ** Presenting Author*