G17 Traumatic Cardiovascular Complications of Catheter-Based Procedures: Relevance to Medicolegal Death Investigation

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After attending this presentation, attendees will be aware of potential traumatic cardiovascular complications of catheter-based procedures and will be able to recognize them at autopsy and determine their significance in the context of a medicolegal death investigation.

This presentation will impact the forensic community and/or humanity by underscoring the scope and utilization of catheter-based procedures. The forensic community must be aware of these uncommon but well-recognized adverse events because many of these deaths become medicolegal death investigations due to their often unexpected nature related to a medical procedure.

Using several case examples, the audience will become aware of potentially life-threatening traumatic cardiovascular complications that can result directly from a wide variety of catheter-based procedures.

There are a wide variety of procedures, both diagnostic and therapeutic, which involve catheterization of the heart and great vessels. These include standard, well-established procedures such as central venous catheterization for fluid, nutrition or medication administration, and pulmonary artery catheterization for pulmonary pressure monitoring. Specific cardiac interventions include endomyocardial biopsy, radiofrequency endocardial ablation for arrhythmia control, cardiac pacemaker and implanted defibrillator placement, diagnostic coronary angiography, and angioplasty procedures. These all carry with them a low but wellrecognized risk of traumatic perforation. In addition, more novel procedures, including intravascular ultrasound, and laser and rotational atherectomy, continue to be developed.

The following autopsy case examples will be presented: brachiocephalic vein perforation by a central venous catheter in a dialysis patient resulting in fatal hemothorax, right ventricular perforation by a pacemaker electrode in an elderly woman with heart failure, coronary artery dissection caused by diagnostic coronary angiography, and pulmonary artery perforation by a pulmonary artery catheter after open heart surgery.

When perforation occurs, the outcome may be fatal and–due to the nature of such deaths–many are investigated in a medicolegal context. The pathological findings at autopsy must be properly recognized and then interpreted. Factors impairing pathological recognition may include a delay from the time of intervention to the time of death, no prior clinical awareness of the adverse event, prior removal of the catheters, inadequate availability of clinical history, and medical examiner or pathologist unfamiliarity with the nature of the procedure. When such events are identified, it may be difficult to determine the relative contribution of the resultant hemorrhage or damage to the cause of death in the presence of other major co-morbid conditions. Furthermore, it may be difficult to decide upon the manner of death, whether accidental or natural, when other significant disease is present. Proper investigation requires careful review of the medical record and a complete autopsy. Care must be taken to leave catheters and lines in place so that they can be properly inspected in-situ.

Associated hemorrhage should be quantified, and photographs should be taken. Microscopy may aid in dating lesions if healing reaction has developed at the site of injury.

Medical examiners and pathologists who perform autopsies in a hospital-based setting should familiarize themselves with the everexpanding array of catheter-based endovascular procedures so that when adverse complications occur, they will be properly recognized. It is noted that potential complications are not limited to vascular perforations. As new procedures and equipment are introduced, vigilance for adverse events may assist in assessing their overall safety.

Cardiovascular, Catheter, Complications

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