G19 A Review of Pathologic Findings in Specimens Following Heart Valve Donation

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After attending this presentation, attendees will understand cardiopathologic examination of hearts following heart valve donation is beneficial and may yield important information in determining cause of death.

This presentation will impact the forensic community and/or humanity by increasing awareness of the forensic community in the nationwide shortage of cardiac tissue grafts and the role of the Medical Examiner in tissue donation.

The Cardiovascular Registry was founded in 1960 by Dr. Jesse E. Edwards in St. Paul, MN, for the purpose of studying, classifying, and categorizing heart disease. The Registry, under the direction of Dr. Edwards, was very involved in describing congenital and acquired heart disease. Since its formation, the Cardiovascular Registry has examined over 27,000 cardiac specimens and cardiovascular surgical specimens.

In 2001 the Cardiovascular Registry was approached by one of the nation's largest tissue donation procurement agencies for the purpose of performing cardiovascular pathologic examinations of post valve recovery hearts. This collaboration began in 2001.

The current study was undertaken to review the type of remnant hearts received and to tabulate the abnormalities identified. All remnant hearts received over the period of 33 months were included in the study, for a total of 492 cases.

The information received for each case includes the body height, weight and suspected cause of death. Comprising the 492 cases were 206 accidents, 75 suicides, 91 natural deaths, 5 homicides, and 116 cases in which the cause of death was undetermined at the time of heart valve procurement.

Of the suspected natural deaths, 13 were classified as non-cardiac related. The remaining 78 were suspected cardiac deaths. Seventy-seven of the 78 cases had significant cardiac findings; some had more than one major abnormality for a total of 83 significant cardiac findings. Only one heart was structurally normal.

Significant atherosclerotic coronary artery disease with a >75% stenotic lesion was identified in 59 cases. One decedent was less than 25 years of age. Thirty-six of the 59 did not have infarction; 22 had myocardial infarction. Other significant cardiac abnormalities in the natural group included: myocarditis (6), cardiomegaly (4), bicuspid aortic valve with stenosis (3), arrhythmogenic right ventricular cardiomyopathy (2), acute aortic dissection (2), anomalous origin of a coronary artery (1), aneurysmal coronary artery (1), hypertrophic cardiomyopathy (1), dysplastic intramyocardial arteries (1), mitral valve prolapse (1), coronary artery thrombo-emboli (1), and prior valvular disease with mechanical valve replacement (1). In the natural death group, 33 incidental cardiac findings were identified including: moderate atherosclerotic coronary artery disease, myocardial bridge, acute angle of origin of the coronary artery, cardiomegaly, myxomatous change of a valve, patent foramen ovale, and post inflammatory mitral valve disease.

Accidental death constituted the largest group, with 205 cases (42%). Fifty-one had significant cardiac abnormalities and 107 had incidental cardiac findings, including 9 congenital abnormalities. Twenty-three had traumatic injuries, which were either contusions or lacerations. Injuries were found only in this accidental group of cases. One hundred and three of the remnant hearts were normal.

Of the 75 suicides, 22 had significant cardiac abnormalities including two cases of arrhythmogenic right ventricular cardiomyopathy, an inheritable condition. A third case of possible arrhythmogenic right ventricular cardiomyopathy and one case with focal areas of myocyte disarray were present in this group. Twenty-three incidental cardiac abnormalities, including congenital abnormalities, were also identified.

Five remnant hearts were from homicides. Three cases had severe atherosclerotic coronary artery disease or cardiomegaly. One case had mitral valve prolapse. Only one heart was structurally normal.

The second largest group of cases, 116, were those in which the manner of death was undetermined at the time of heart valve procurement. Included in this group were cases in which only the mechanism of death was reported. In 93 of the cases the cause of death was listed as "pending." In this group were 63 with significant cardiac abnormalities including severe atherosclerotic coronary artery disease (33), myocarditis (12), cardiomegaly (11), and one case each of hypertrophic cardiomyopathy, bicuspid

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aortic valve with stenosis, non-infective endocarditis, severe coarctation of the aorta, acute angle of origin of a coronary artery, thromboembolus, and dysplastic intramyocardial arteries. Thirty-eight cases had normal hearts. In 58 cases, incidental cardiac findings were identified including 5 congenital abnormalities.

The study demonstrates that significant and/or incidental cardiac abnormalities may be identified following heart valve donation.

The study also demonstrates that potentially inheritable conditions such as hypertrophic cardiomyopathy and arrhythmogenic right ventricular cardiomyopathy may be present when death was due to other causes. The diagnosis of these conditions is critical, with significant implications for surviving family members.

In summary, due to the nation wide shortage of bioprosthetic materials, tissue donation is critically needed. A thorough cardiopathologic examination remains possible in remnant hearts and may be beneficial in determining the cause of death.

Tissue Donation, Heart Disease, Sudden Death

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