

CONGENITAL HEART ABNORMALITIES:**The Importance to the Practising Clinician of Retained Post-mortem Hearts**

Eric D Silove MD, FRCP, FRCP (E), FRCPCH
Consultant Paediatric Cardiologist, Birmingham Children's Hospital

As a practising paediatric cardiologist, I wish to add to the evidence given by Professor Robert Anderson during the Inquiry Hearings.

From the time that I began my training in paediatric cardiology in 1963 I was deeply aware of the value of inspecting post-mortem hearts in order to get a proper understanding of congenital heart abnormalities. No matter how many photographs I saw of any particular heart abnormality, it was always impossible to get a proper 3 dimensional appreciation unless one actually inspected it. No two hearts are identical, nor are any two ventricular septal defects or atrioventricular septal defects or two cases of Tetralogy of Fallot or of any other congenital heart abnormality one may wish to name. There are variations from one to the other, some quite major, others minor, and the detailed inspection of any heart is invaluable to the Paediatric Cardiologist, not only during his formative training years, but throughout his career. At a very early stage I learned how to correlate the X-ray images that we obtained from angiocardiography with various heart abnormalities, almost entirely as a result of having the opportunity of studying post-mortem specimens. When I first attended the Congress of the American Heart Association in 1964, I became aware of the concept of "collections" of heart abnormalities. Professor Morris Lev of Chicago had an enclosed booth at the meeting, in which he demonstrated a variety of abnormalities in the actual hearts which he had brought with him. In every hospital in which I have trained in the United States and in this country, there was the ethos of learning from these hearts.

Not only were these hearts valuable in learning to recognise abnormalities using angiocardiography, but their study became mandatory if one were to understand ultrasound imaging of the heart (echocardiography). With this technique one was looking at slices of the heart from numerous different angles, which were quite unfamiliar, no matter how detailed was one's knowledge of the heart. In order to draw a parallel, we have all seen indentikit photographs of faces produced on computers. Imagine doing a computerised slice of one of those faces say from the right ear to the left side of the chin, and another slice to include a part of the nose and the left side of the chin. It would be impossible to build up a complete picture of that face without many additional slices at numerous different angles. As a result of looking at numerous hearts with similar or different abnormalities, from numerous different angles, it does become possible to visualise the appearance of an echocardiographic slice through a given plane of the heart and to recognise the abnormalities.

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These methods have enabled Paediatric Cardiologists to conceptualise 3 dimensional pictures of the heart where only 2 dimensional pictures are available to them. Consequently they have avoided invasive and dangerous investigations such as cardiac catheterisation and angiography in so many babies and children. This in itself has saved lives. The ability of the surgeon to learn about the heart in the same way and to plan reconstructive operations based on his expectation of the appearance of the inside of the heart when it comes to surgery, has indeed saved countless lives. The availability of retained hearts for the education of clinicians has been one of the most important factors in greatly reducing the mortality for many complicated operations; for example the mortality for repair of complete atrioventricular septal defect from around 25% in the mid 1980s to less than 10% today.

As a clinician, I regret that the Society of yesteryear did not have more enlightened attitudes on freedom of information and complete transparency. I believe that doctors were trying to protect patients and parents from the stress which might have been anticipated. As another example, it was taboo when I was in training, for patients to be told that they had cancer or to admit to patients, even when questioned, that they were dying. I am convinced that current guidelines will ensure that in the future, no questions will arise about retained hearts, and I do hope that what I have written will help with the understanding of some of the considerations of the past.

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Value of Retained Hearts Following Post Mortem Examination

The heart undergoes an extremely complex development from a straight tube in the early embryo to the complex dual pump of the new-born baby. Thus, there is the potential for a wide range of abnormalities or defects to occur during development. Furthermore, each abnormality is not an isolated defect which can be categorised, but rather part of a pathological spectrum.

Open heart surgery began in the early 1950s (the first successful use of a heart lung machine was in 1953). The lesions tackled in the early years were relatively simple reflecting the crudeness of both diagnostic and perfusion equipment. Furthermore, cardiologists and surgeons had a relatively basic understanding of cardiac anatomy and abnormal morphology – they had no source of material from which to learn.

The need for greater understanding of congenital heart abnormalities prompted the retention of hearts after post mortems of children dying after cardiac surgery – there was a high mortality rate in the early years. These hearts were gathered into “collections” and catalogued for further study and indeed re-study. This in turn prompted the development of cardiac morphology as a specialty. Professor Anderson in the UK, Professor A Becker in the Netherlands and Dr R van Praagh in Boston, USA were and still are among the leading professional figures. A large number of scientific papers have been published providing surgeons and cardiologists with a greatly enhanced understanding of cardiac abnormalities. Direct teaching has also been possible either by “hands on” study in the laboratory or by the use of television projection of dissected hearts to demonstrate cardiac anatomy “real time” at conferences.

Specific advances resulting from the retention of hearts:

- 1 echocardiography – echo works by displaying “slices” of the heart on a screen and this was a very difficult concept for cardiologists to get used to initially. The availability of real hearts has stimulated the rapid technical development of echo machines and allowed cardiologists to relate the pictures obtained by echo with real cardiac anatomy, particularly in the abnormal heart. This in turn has led to easier definitive diagnosis and the avoidance of invasive cardiac catheterisation requiring general anaesthesia.
- 1 surgery – reconstruction of many congenital cardiac defects requires a three dimensional understanding of cardiac anatomy. There is no doubt that the study of these heart collections has made a major contribution to cardiac surgery, not only in widening the range of defects tackled but also in the dramatic fall in mortality in a relatively short time frame (1953 to the present).