Complications of transcatheter closure of atrial septal defects

M S Spence, S A Qureshi

Transcatheter device closure of atrial septal defects has proved to be remarkably successful, and is usually preferred by both patients and parents. But how does it compare with the gold standard of surgical closure?

Secundum type atrial septal defects (ASDs) are the fourth most common congenital heart defect, with an incidence of 3.78 per 10,000 live births and a diagnosed prevalence rate of around 6% in children. Although surgical closure of these defects has been the traditional method of treatment, as long ago as 1976, King et al first described successful transcatheter device closure. Subsequently, there was slow progress in developing a reliable method of device closure. It was not until the 1990s that the technique became a widely accepted and practiced procedure, such that it has now largely replaced surgical closure of secundum ASDs in most centres. This rapid growth in transcatheter device closure has been accompanied by publications from many centres reporting outcome data for this procedure, including its complications. Cognisance of these complications, as longer term follow up data emerges, is important in informing best practice. Although transcatheter closure of ASDs has been remarkably successful, the benchmark against which it should be measured is the traditional surgical method, given its proven efficacy compared with medical management.

COMPICATIONS AFTER SURGICAL CLOSURE OF SECUNDUM ATRIAL SEPTAL DEFECTS

There have been no large, truly randomised comparisons of surgery with transcatheter closure of ASDs as the design of such a study is problematic partly because, given a choice between surgery and device closure, parents and patients often prefer the latter method. Nevertheless, surgery is the gold standard against which transcatheter closure of ASDs has been and should be judged, not least because longer term follow up is available for surgical treatment.

A Dutch group have reported longitudinal follow up of 21–33 years (mean 27 years) after surgical closure of secundum ASDs in 135 patients. There was no cardiovascular mortality, stroke, heart failure, or pulmonary hypertension. However, symptomatic supraventricular tachyarrhythmias occurred in 6% of patients after 15 years and 5% needed pacemaker implantation. Thus arrhythmias appear to be the main long term complication after surgical closure of ASDs.

Early complications after surgery include wound infection, pericardial effusions causing tamponade, and the occasional need for repeat surgery. The median hospital stay is short (four days). A review published in 2003 of 100 consecutive children undergoing surgical closure reported no mortality, but the incidence of postpericardiotomy syndrome was 3% and of periectal effusions was 26%. Another review published in 2004 of 176 consecutive patients (47 adult and 129 children) undergoing surgical closure reported no mortality. However, serious perioperative complications included atrial fibrillation (10% of adults and in 1.2% of children) and postpericardiotomy syndrome (in 2% of adults and in 4.7% of children).

These recent surgical series show that surgical closure is still associated with significant morbidity and complications and therefore is not without risk.

COMPLICATIONS AFTER TRANSCATHETER DEVICE CLOSURE OF SECUNDUM ATRIAL SEPTAL DEFECTS

Since the launch of the transcatheter interventional era for the treatment of congenital heart defects, there have been many different devices available for transcatheter closure of secundum ASDs, some of which have been modifications of earlier models.

The efficacy of transcatheter closure of these defects has not been as comprehensively demonstrated as for closure of patent arterial ducts. However, the close scrutiny of the results and complications of transcatheter closure of patent arterial ducts is now occurring for ASDs and considerable literature has now been published examining the efficacy of the various closure devices.

Procedure related complications

Most centres around the world perform this procedure under general anaesthesia in children. This then adds the risks of general anaesthesia to the procedure. For adult patients, the practice with regard to general anaesthesia or sedation is more mixed, particularly with the advent of intracardiac echocardiography which obviates the need for transoesophageal echocardiography, although the cost of intracardiac echocardiography probes has limited its use.

Transcatheter closure is associated with all the general risks inherent in any interventional cardiac catheterisation procedure such as the risk of contrast reactions, vessel or cardiac perforation, and the introduction of infection. There are some complications of the procedure,...
Intermediate and longer term complications after transcatheter closure

A much more worrying complication of cardiac erosion by the Amplatzer septal occluder after catheter closure of ASDs has recently been reported by Amin et al. Erosions have been identified by the late development of pericardial effusion or even tamponade. Data were collected from 28 cases worldwide and all the erosions occurred near the aortic root. The paper cites an incidence of 0.1% for device erosion with the Amplatzer septal occluder in the USA. It is thought that an oversized device in a defect with a deficient aortic or superior rim may predispose to such a complication and these patients therefore merit closer and longer term follow up. Wire fractures are another reported complication of devices including the Helex and CardioSEAL/STARFlex but seem to be without significant sequelae.

CONCLUSIONS

While it would be nice to state that with increasing experience, complications will be reduced to a minimum, the reality is otherwise. The increasing experience with transcatheter techniques has resulted in interventional cardiologists increasingly attempting to treat patients with ASDs of more complex morphology. In this subset of patients with complex defects the risk of complications may well be higher than in the majority of other patients with less challenging defects. Realistically, once an equilibrium of expertise and patient selection has been achieved, complications could be reduced but not completely abolished.

Authors’ affiliations

M S Spence, S A Qureshi, Department of Congenital Heart Disease, Guy’s & St Thomas’ Hospital, London, UK

...
REFERENCES


IMAGES IN CARDIOLOGY

Asymptomatic inferior vena cava anomaly in an adult: three dimensional multislice CT image

A 52 year old male patient presented with an acute inferior myocardial infarction. His past medical history was unremarkable, and he was well up to 12 hours before presentation. He initially made an uneventful recovery during the first day, but on the second day postinfarction he developed symptomatic bradycardia necessitating temporary cardiac pacing, which was inserted via the right femoral vein under fluoroscopy. The pacing electrode catheter reached the right ventricular apex with an abnormal course (left panel), which forced us to consider an inferior vena cava (IVC) anomaly. On the seventh day of admission, three dimensional reconstructed multislice computed tomography of the whole thorax and abdomen delineated the complete absence of the right IVC trunk. The postrenal part of the IVC was present and transposed to the left side of the vertebral column, juxtaposing with the abdominal aorta (right panel). The other segments of the IVC—that is, the hepatic, prerenal, and renal parts—were also missing. The left renal vein drained directly into the left paravertebrally located IVC; by contrast, the right renal vein drained into the rightazygos vein. Because of the absence of the hepatic segment of the IVC, all hepatic veins entered the inferior part of the right atrium. The enlarged right azygos vein joined the right superior vena cava at the right paratracheal space. All venous blood flow except from the hepatic veins entered the heart through the azygos and superior vena cava. This anatomical variant associated with renal vein drainage anomalies was consistent with IVC interruption and azygos continuation.

We describe an unusual case of an adult patient with IVC interruption and azygos continuation, in whom any symptoms or signs of complications of this anomaly were absent. This disorder has been described mainly as an incidental finding associated with a number of congenital malformations, especially with polysplenia syndrome. This anomaly is encountered in at least 65% of these patients. The incidence of congenital anomalies of the IVC is, however, less than 1% in individuals who have no other congenital malformation.

H Kocaturk
M K Erol
O Onbas
mkeral@superonline.com

www.heartjnl.com