Interventional Catheterization in Congenital Heart Disease

Tuesday, April 01, 2003, 9:00 a.m.-11:00 a.m.
McCormick Place, Hall A
Presentation Hour: 9:00 a.m.-10:00 a.m.

1168-155 Systemic Dissemination of Nickel in Patients With Atrial Septal Defects Following the Implantation of the Amplatzer Septal Occluder

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Background: Transcatheter techniques to close atrial septal defects with the Amplatz™ Septal occluder or other devices have been used with increasing frequency during the last few years. Most of these devices contain a Nickel-titanium alloy (Nitinol). Several studies published in vitro and in vivo studies on a dog model could demonstrate a dissemination of Nickel into ambient tissue. However, there is no data available on the release and the time course of release of nickel due to patients degradation of Nitinol implants used for closure of atrial septal defect closure devices.

The purpose of this prospective in situ study was to investigate the systemic dissemination of nickel following transcatheter closure of atrial septal defects of the secundum type. Method: Blood samples were obtained from 10 patients before 1 week, 2 weeks, 4 weeks, 8 weeks and 24 weeks after the implantation. Results: Baseline concentrations of nickel in 9/10 patients were within the normal range (<2 g/l) and comparable between both groups: 1.62 ± 0.14 g/l in patients vs. 1.66 ± 0.14 g/l in the control group. Serum nickel levels raised continuously, showing a peak value at 1.5 ± 0.6 g/l within 4 weeks after the procedure. Nickel levels returned to normal serum concentrations after 24 weeks. During the follow-up, two patients with a residual shunt between left and right atrium were noted with elevated serum nickel levels compared to the other patients (p < 0.02) were observed. Conclusion: Systemic dissemination of Nickel after transcatheter closure of atrial septal defects of the secundum type can be measured in the blood serum samples. This observation may reflect the endothelialization process of the graft.


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Background: Transcatheter device closure of patent foramen ovale (PFO) has routinely been performed using transesophageal echocardiographic (TEE) guidance in addition to fluoroscopy. Echocardiographic guidance adds significant cost and potential risks to the procedure. Multiple studies allude to the fact that device closure can be performed without TEE guidance, none have compared the two approaches.

This report compares our experience of device PFO closure with and without TEE guidance, none have compared the two approaches. The purpose of this study was to investigate the systemic dissemination of nickel following transcatheter closure of atrial septal defects of the secundum type. Methods: Blood samples were obtained from 10 patients before, 1 week, 2 weeks, 4 weeks, 8 weeks, 12 weeks, and 24 weeks after the implantation. Results: Baseline concentrations of nickel in 9/10 patients were within the normal range (<2 g/l) and comparable between both groups: 1.62 ± 0.14 g/l in patients vs. 1.66 ± 0.14 g/l in the control group. Serum nickel levels raised continuously, showing a peak value of 1.5 ± 0.6 g/l within 4 weeks after the procedure. Nickel levels returned to normal serum concentrations after 24 weeks. During the follow-up, two patients with a residual shunt between left and right atrium were noted with elevated serum nickel levels compared to the other patients (p < 0.02) were observed. Conclusion: Systemic dissemination of Nickel after transcatheter closure of atrial septal defects of the secundum type can be measured in the blood serum samples. This observation may reflect the endothelialization process of the graft.

1168-157 Transcatheter 3-D Echocardiography Improves the Quantification of Atrial Septal Defect Size Before Amplatzer Closure

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Aim of the study was to compare transcatheter three-dimensional echocardiography (3D) with transesophageal 2-dimensional echo (TEE) for the evaluation of secundum atrial septal defect (ASD) before interventional closure with Amplatzer device Method. 16 children and young adults (3-20 years, 11±6) were studied with 3D and TEE prior to Amplatzer device implantation. 3D was performed with transonic rotational acquisition at 9 intervals (TomTec Echoscan 3.0). Diameters of defect and area were measured by TEE and 3D. Results were compared to stretched balloon diameter and final Amplatzer waist diameter. All patients underwent successful implantation procedure without residual leaks after 6 months.

Results. Quality of 3D was good in 11 pts and satisfactory in 7. Mean stretched/Amplatzer waist diameter was 20.0±2.25 mm and stretched/Amplatzer waist area 3.9±0.9 cm². Maximal diameters were severely underestimated by TEE and not by 3D: 14.4± vs 23.5± mm (p<0.001), with calculated areas of 1.2±0.6 vs 2.9±1.5 cm² resp. (p<0.001). 3D had good correlation and close agreement to stretch diameter (r=0.87) with small underestimation of true size of implanted device. TEE underestimated defect size markedly by >6 mm (r=0.59).

Conclusions. Transcatheter 3D, as opposed to TEE, allows accurate transonic measurements of ASD diameter and reliable prediction of Amplatzer size in young patients. 2-dimensional measurements significantly underestimate defect dimensions.