



H70 A Case Report on the Death of a 20-Year-Old Female Due to Complications of Minimally Invasive Transcatheter Atrial Septal Defect (ASD) Closure

Jan Ynav T. Quiz*, University of Tennessee Health Science Center, Memphis, TN 38163; Marco Ross, MD, West Tennessee Regional Forensic Center, Memphis, TN 38105; Erica Curry, MD, Collierville, TN 38017

Learning Overview: After attending this presentation, attendees will better understand: (1) the fatal complication of cardiac erosion in transcatheter closure of ASDs, (2) corresponding risk factors, and (3) possible methods for its prevention.

Impact on the Forensic Science Community: The presentation will impact the forensic science community by raising awareness of sudden death following transcatheter closure of ASD in adults.

ASD is one of the most common congenital heart defects presenting in adulthood. Although small defects may be asymptomatic and not require therapy, closure is usually indicated for larger defects with significant shunts, evidence of volume overload, or in patients at high risk for life-threatening complications.¹ Among obstetric patients, it has been determined that those with unrepaired ASD had a higher risk for pre-eclampsia, small-for-gestational age birth weight, and fetal mortality compared to those with repaired ASDs.² The common closure procedures involve open-heart surgery and transcatheter closure. Transcatheter closure, now commonly performed with the AMPLATZER™ Septal Occluder (ASO), was determined to be as effective and yet safer than cardiopulmonary bypass and surgical repair as it avoids their associated risks (e.g., infection); however, this approach does carry a risk for a rare but serious and potentially fatal complication—cardiac erosion.^{3,4}

This study describes the case of a 20-year-old woman with a 2.1-cm ASD who underwent transcatheter closure of the ASD postpartum using the ASO and expired two weeks later. Postmortem examination revealed significant hemopericardium due to full-thickness right atrial erosion caused by the rim of the ASO.

A medical literature review indicates several relative risk factors associated with cardiac erosion, mainly deficiency of any rim, device >5mm larger than ASD diameter, and lesser weight:device-size ratio. Median onset of cardiac erosion was determined to be about two weeks.⁵ The case described here had a deficient anterior rim, and cardiac erosion occurred two weeks post-procedure. More frequent follow-up echocardiograms may allow for early clinical detection of erosion, which can be successfully repaired with no further complications.⁶

In conclusion, transcatheter closure of ASDs by the ASO is relatively safe and effective compared to open-heart surgical repair. However, cardiac erosion by the ASO is a rare but potentially fatal complication. Early clinical recognition of this complication, possibly using more frequent post-procedure follow-up echocardiography, is essential and can result in successful surgical repair.

Reference(s):

1. Keane J.F., Lock J.E., Fyler D.C. 2006. *Nadas' Pediatric Cardiology*. 2nd ed.
2. Yap, S.-C., F.J. Meijboom, J.W. Roos-Hesselink, W. Drenthen, P.G. Pieper, P. Moons, and E.A.P. Steegers, et al. 2009. Comparison of Pregnancy Outcomes in Women With Repaired Versus Unrepaired Atrial Septal Defect. *BJOG: An International Journal of Obstetrics and Gynaecology* 116, no. 12: 1593-1601.
3. Du, Z.-D., Z.M. Hijazi, C.S. Kleinman, N.H. Silverman, and K. Lartz. 2002. Comparison Between Transcatheter and Surgical Closure of Secundum Atrial Septal Defect in Children and Adults: Results of a Multicenter Nonrandomized Trial. *Journal of the American College of Cardiology*, 39, no. 11: 1836-1844.
4. Turner, D.R., C.Y. Owada, C.J. Sang, M. Khan, and D.S. Lim. 2017. Closure of Secundum Atrial Septal Defects With the AMPLATZER Septal Occluder: A Prospective, Multicenter, Post-Approval Study. *Circulation. Cardiovascular Interventions* 10, no. 8: .
5. McElhinney, Doff B., Michael D. Quartermain, Damien Kenny, Ernerio Alboliras, and Zahid Amin. n.d. Relative Risk Factors for Cardiac Erosion Following Transcatheter Closure of Atrial Septal Defects A Case-Control Study. *Circulation* 133, no. 18: 1738-+.
6. Kijima, Y., K. Nakagawa, N. Toh, K. Nakamura, H. Ito, T. Akagi, S. Sano, and W. Promphan. 2014. Cardiac Erosion After Catheter Closure of Atrial Septal Defect: Septal Malalignment May Be a Novel Risk Factor for Erosion. *Journal of Cardiology Cases*, 9, no. 4: 134-137.

ASD, Transcatheter Closure, Cardiac Erosion