Transcatheter Device Closure of Secundum Atrial Septal Defect in Adult Patient

Nabil Naser¹, Nura Hadziomerovic¹, Sevleta Avdíc²

¹Polyclinic “Dr. Nabil”, Sarajevo, Bosnia and Herzegovina
²Medical Institute Bayer, Tuzla, Bosnia and Herzegovina

Corresponding author: Ass. prof. Nabil Naser, MD, PhD. Polyclinic “Dr. Nabil”, Sarajevo, Bosnia and Herzegovina. ORCID ID: 0000-0002-1278-8574. E-mail: nabil@bih.net.ba.

doi: 10.5455/aim.2021.29.65-70

ABSTRACT

Background: Atrial septal abnormalities are common congenital lesions remaining asymptomatic until adulthood in a great number of patients. The most frequent atrial septal defects in adults are ostium secundum atrial septal defect (ASD). Complications from untreated, hemodynamically significant ASD are atrial arrhythmia, paradoxical embolization, Eisenmenger’s syndrome, pulmonary hypertension, and right ventricular failure. Objective: We present a case report of secundum ASD in adult female patient who underwent transcatheter device closure with Amplatzer occluder. Methods and Results: The case of female Bosnian patient 50 years old who lives in Belgium for 20 years ago and during her visit to Bosnia she came to our polyclinic for cardiological exam. Echocardiographic exam showed enlargement of left atrium (LAD 51mm), right atrium and ventricle (RAD 46mm, RVd 33mm), atrial septal defect 9mm with left right shunt Qp:Qs 2,3:1. Several months later transcatheter device closure with Amplatzer occluder was performed and subsequent symptomatic improvement reported after closure. Conclusion: Echocardiography has superior role for precise evaluation of ASD type secundum who are suitable for transcatheter device closure as primary treatment option. Transcatheter techniques has now become preferable to surgical repair and provide valid option of treatment for this type of CHD. Keywords: Atrial septal defect (ASD), echocardiography, Doppler echocardiography, transcatheter device closure, atrial septal occluder (ASO), Amplatzer occluder.

1. BACKGROUND

Atrial septal defect (ASD) is the most common type of congenital heart disease (CHD) in adults which cause shunting of blood between the systemic and pulmonary circulations (1, 2). The estimated birth prevalence of 1.6 per 1000 live births and a 97% probability of survival into adulthood. During the last decade, there has been remarkable change in the treatment strategy of ASD, shifting the therapeutic gold standard from surgery to transcatheter device closure, along with refinements and the evolution of device technology.

2. OBJECTIVE

We present a case report of secundum ASD in adult patient. Echocardiography as non-invasive imaging method and Transesophageal echocardiography has superior role for precise evaluation of ASD type secundum who are suitable for device closure with Amplatzer septal occluder as primary treatment option.

3. CASE REPORT

We present a case of female Bosnian patient 50 years old who lives in Belgium for 20 years ago and during her visit to Bosnia she came to our polyclinic for cardiological exam. In the last 4 years ago, she complained of cardiac arrhythmia, palpitations, anaemia and iron deficiency and high blood pressure. During physical exam she was acyanotic, BP 150/100 mmHg, HR 83/min, Spo2 96%, respiratory rate 15 breaths/min. and BMI 30. The cardiovascular examinations revealed regular heartbeat with rumbling middiastolic murmur at the lower left sternal border. ECG showed sinus rhythm, RBBB with
Transcatheter Device Closure of Secundum Atrial Septal Defect in Adult Patient

Transcatheter device closure of secundum atrial septal defect in adult patient

4. RESULTS AND DISCUSSION

ASD is one of the most common congenital heart lesions in adults that requires intervention. Many patients with ASDs are free of overt symptoms, although most will become symptomatic at some point in their lives (3, 4). Exercise intolerance in the form of exertional dyspnoea or fatigue is the most common initial presenting symptom (1, 2). Complications from untreated, hemodynamically significant ASD atrial arrhythmia, paradoxical embolization, Eisenmenger’s syndrome, pulmonary hypertension, and right ventricular failure. The mortality rate from untreated, hemodynamically significant ASD can approach 25% (3, 5, 6).

Transesophageal echocardiography is a powerful method to confirm the type of ASD and to delineate the pulmonary venous return. TEE can show unique views of the entire anatomy of ASD and facilitates monitoring of transcatheter procedures for deployment of an Amplatzer septal occluder (7, 8, 9). Patients with isolated atrial septal defects have benefited from important recent advances in the diagnosis, evaluation, and management of this congenital lesion (7, 10). Current guidelines recommend that all patients with hemodynamically significant ASD should undergo ASD closure, regardless of symptoms, to prevent long-term complications such as atrial arrhythmias, pulmonary hypertension, and/or paradoxical embolism (6). The atrial septal occluder (ASO) was approved for transcatheter closure of secundum ASD in the United States in 2001 (13). Transcatheter closure of secundum ASD with a self-expanding Amplatzer septal occluder has become an alternative to surgical closure (7, 8, 9). Acute complications are rare but may include tears of the atrial septum from the sizing balloon, device embolization or entrapment, stroke, and cardiac tamponade (4, 10).

The transcatheter closure of the ASD has low incidence of morbidity and mortality, and an important advantage of the ASO is that it can be easily retrieved into the delivery sheath and re-deployed several times before final release. This greatly diminishes the risk of the malposition and embolization of the device (14). Transcatheter closure is much less invasive than surgery, also has fewer periprocedural complications, and is associated with a shorter length of stay. Approximately 80% of secundum ASD are suitable for closure using currently available devices (6-14). Transcatheter closure of secundum ASD has been shown to be safe and effective in patients with right heart volume overload, with similar success and compli-
culation rates compared with surgery (5, 13, 14, 15).

5. CONCLUSION

Atrial septal defect secundum is the most common CHD. It constitutes about 80% of these defects, has a female predominance of approximately 2:1, and is frequently discovered in adulthood. Patients with an isolated ASD secundum often remain asymptomatic during childhood and adolescence, the rates of exercise intolerance, supraventricular arrhythmias, right ventricular dysfunction, and pulmonary arterial hypertension increase with patient age, enlargement of the right heart chambers in ASD are subject to important age-related morbidity and reduced life-expectancy. Echocardiography as non-invasive imaging method and Transesophageal echocardiography (2 and 3D) remains valuable non-invasive diagnostic method for locating and assessing ASD. All hemodynamically significant secundum ASDs should be closed, regardless of age and symptoms. Transcatheter techniques has now become preferable to surgical repair and provide valid option of treatment for this type of CHD.

---

REFERENCES

1. Baumgartner H. et al. ESC Guidelines for the management of grown-up congenital heart disease (new version 2010). European Heart Journal. 2010; 31: 2915-2957. doi:10.1093/eurheartj/ehq249.
2. Stout KK, et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease. A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. August 2018. Jour. Amer Coll Cardiol - JJACC August 2018. doi: 10.1016/j.jacc.2018.08.1029.
3. Webb G, Gatzoulis MA. Atrial septal defects in adults; recent progress and Overview. Circulation. 2006; 114: 1645-1653. doi: 10.1161/CIRCULATIONAHA.105.592055.
4. Ben Zekry S. et al. Percutaneous Closure of Atrial Septal Defect. JACC. 2008; 1(4): 515-517. doi: 10.1016/j.jcme.2008.04.011.
5. Turner DR, Owada CY, Sang CJ Jr., Khan M, Lim DS. Closure of Secundum Atrial Septal Defects With the AMPLATZER Septal Occluder: A Prospective, Multicenter, Post-Approval Study. Circ Cardiovasc Interv. 2017; 10(8): 1-7.
6. Kotowycz AM, Thirrien J, Rahca Ionescu-Ittu R, Owens GC, Plote L, Martucci G, Tchervenkov C, Marelli JA. Long-Term Outcomes After Surgical Versus Transcatheter Closure of Atrial Septal Defects in Adults. JACC. 2013; 6(5): 497-503.
7. Ko et al. Amplatzer Septal Occluder Closure of Atrial Septal Defect: Evaluation of Transcatheter Echocardiography, Cardiac CT, and Transesophageal Echocardiography. AJR 2009; 193: 1522–1529. doi: 10.2214/AJR.09.2854.
8. Mazic U, Gavora P, Masura J. The role of transesophageal echocardiography in transcatheter closure of secundum atrial septal defects by the Amplatzer septal occluder. Am Heart J. 2001; 142: 482-488.
9. Zhu W, Cao QL, Rhodes J, Hijazi ZM. Measurement of atrial septal defect size: a comparative study between three-dimensional transesophageal echocardiography and the standard balloon sizing methods. Pediatr Cardiol. 2000; 21:465-469.
10. Vida VL, Barnoya J, O’Connell M, Leon-Wyss J, Larrazabal LA, Castaneda AR. Surgical versus percutaneous occlusion of ostium secundum atrial septal defects: results and cost-effective considerations in a low-income country. J Am Coll Cardiol. 2006; 47: 326–331.
11. Diller GP, Dimopoulos K, Okonko D, Li W, Babu-Narayan SV, Broberg CS, Johansson B, Bouzas B, Mullen MJ, Poole-Wilson PA, Francis DP, Gatzoulis MA. Exercise intolerance in adult
congenital heart disease: comparative severity, correlates, and prognostic implication. Circulation. 2005; 112: 828-835.

12. Majunke N, Bialkowski J, Wilson N, Szakun M, Kusa J, Baranowski A, Heinisch C, Ostermayer S, Wunderlich N, Sievert H. Closure of atrial septal defect with the Amplatzer septal occluder in adults. Am J Cardiol. 2009; 103: 550-554.

13. Du ZD, Hijazi ZM, Kleinman CS, Silverman NH, Lantzi K; Amplatzer Investigators. Comparison between transcatheter and surgical closure of secundum atrial septal defect in children and adults: results of a multi-center nonrandomized trial. J Am Coll Cardiol. 2002; 39: 1836-1844. doi: 10.1016/S0735-1097(02)01862-4.

14. Behjati M, Rafiei M, Soltani MH, Emami M, Dehghani M. Transcatheter closure of atrial septal defect with amplatzer septal occluder in adults: immediate, short, and intermediate-term results. J Tehran Heart Cent. 2011 Spring; 6(2): 79-84.

15. Butera G, Biondi-Zoccai G, Sangiorgi G, Abella R, Giamberti A, Bussadori C, Sheiban I, Saliba Z, Santoro T, Pelissero G, Carminati M, Frigiola A. Percutaneous versus surgical closure of secundum atrial septal defects: a systematic review and meta-analysis of currently available clinical evidence. EuroIntervention. 2011; 7: 377-385. doi: 10.4244/EIJV7I3A63.

16. Schussler JM, Anwar A, Phillips SD, Roberts BJ, Vallabhan RC, Grayburn PA. Effect on right ventricular volume of percutaneous Amplatzer closure of atrial septal defect in adults. Am J Cardiol. 2005; 95: 993-995.

17. O’Byrne ML, Gillespie MJ, Kennedy KF, Dori Y, Rome JJ, Glatz AC. The influence of deficient retro-aortic rim on technical success and early adverse events following device closure of secundum atrial septal defects: An Analysis of the IMPACT Registry. Catheter Cardiovasc Interv. 2017; 89: 102-111. doi: 10.1002/ccd.26585.

18. Fischer G, Stieh J, Uebing A, Hoffmann U, Morf G, Kramer HH. Experience with transcatheter closure of secundum atrial septal defects using the Amplatzer septal occluder: a single centre study in 236 consecutive patients. Heart. 2003; 89: 199-204.

19. Vriend JW, van der Velde ET, Bresser P, Mulder BJ. Pulmonary arterial hypertension in congenital heart disease: an epidemiologic perspective from a Dutch registry. Int J Cardiol. 2007; 120: 198-204.

20. Butera G, Romagnoli E, Carminati M, et al. Treatment of isolated secundum atrial septal defects: impact of age and defect morphology in 1,013 consecutive patients. Am Heart J. 2008; 156: 706-712.

21. Butera G, Biondi-Zoccai G, Sangiorgi G, Abella R, Giamberti A, Bussadori C, Sheiban I, Saliba Z, Santoro T, Pelissero G, Carminati M, Frigiola A. Percutaneous versus surgical closure of secundum atrial septal defects: a systematic review and meta-analysis of currently available clinical evidence. EuroIntervention. 2011; 7: 377-385. doi: 10.4244/EIJV7I3A63.

22. Kutty S, Hazeem AA, Brown K, Danford CJ, Worley SE, Delaney JW, Danford DA, Latson LA. Long-term (5- to 20-year) outcomes after trans-catheter or surgical treatment of hemodynamically significant isolated secundum atrial septal defect. Am J Cardiol. 2012; 109: 1348-1352. doi: 10.1016/j.amjcard.2011.12.031.
Dear Editor,

just recently an article has been published about values of bibliometric indices of medical and health sciences fellows of the African Academy of Sciences, which in the Discussion section compared average values of indices achieved by members of this, and some other Academies with average values of indices achieved by members of Academy of Medical Sciences of Bosnia & Herzegovina (AMSBiH). The authors concluded that there are great differences between the academies, and AMSBiH was used as an example of an academy with low bibliometric indices of its members (1). Behind this conclusion lies an insinuation that members of AMSBiH contributed less to the medical science than members of other academies. However, is this the truth, or distorted picture due to use of insensitive and insufficiently specific indices and resulting figures?

In order to answer to this question, a study is needed that would go into the depth of scientific contribution of an author, and take into account number of authors per published paper and amount of work an author actually invested in obtaining the results. It is not the same thing if a researcher performed hundreds of in vitro/in vivo experiments or examined hundreds of patients within the framework of a clinical trial, reporting it finally in a publication (primary research), as if some other researcher collected publicly available data from web pages of national institutions involved in healthcare, re-arranged them, combined, processed or compared with data from other nations (secondary research). As well, there is enormous difference in scientific contribution of an author, if his/her publication has only 2-3 authors, or more than 100 (there are some examples with more than 1000 authors!), but current bibliometric indices (H-index, total number of citations, etc.) do not make a difference, assigning all citations of an article to each of its authors, regardless of their number (2).

Just as an example how far the things may go, let us consider a case of randomly chosen author (the name will remain hidden in order to avoid violating interests of this author) who published together with other collaborators of the Global Burden of Disease Study (3). At Google Scholar profile of that researcher there is a number of publications listed, cited a couple of thousands times, and H-index is high; however, about one-third of the published papers are reports on global burden of certain diseases, that compiled data from many nations within the framework of the Global Burden of Disease Study. Each of these publications has more than 100 authors (some more than 700 authors), they are highly cited, but sum of citations of these publications make 87% of that author’s total citations, and they make 82% of publications accounted for his/her H-index! Therefore, because all citations of these publications were assigned to this author, his/her total number of citations and H-index are very high, making unrealistic picture of that
Low Sensitivity and Specificity of Existing Bibliometric Indices Gives Unrealistic Picture of an Author’s Contribution to Science

author’s scientific contribution. True contribution is reflected by number of the articles citations divided by the number of authors, which would reduce number of citations of that author for about 10 times.

In the light of the abovementioned facts, low ranking of the AMSBiH among similar academies by values of currently used bibliometric indices does not necessarily reflect its true rank, and true scientific contribution of its members (4-6). There is urgent need to modify currently used bibliometric indices, and make them more sensitive and specific for measuring scientific contribution of an author, academy or nation.

• Authors contribution: Authors was involved in all steps of preparation of this Letter to Editor including final proofreading.
• Conflict of interest: The authors declare no conflict of interest.
• Financial support and sponsorship: None.

REFERENCES
1. Balogun J, Mamuzo E, Okonofua F, Balogun A, Oyeyemi A. Bibliometric profile of the African Academy of Sciences medical and health sciences fellows. PAMJ. 2021; 38(60), doi: 10.11604/pamj.2021.38.60.21004.
2. Ioannidis JP. Measuring co-authorship and networking-adjusted scientific impact. PLoS One. 2008; 3(7): e2778.
3. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1204-1222.
4. Masic I. Evaluation of the Medical Academic Community of Bosnia and Herzegovina Based on Scopus Parameters. Med Arch. 2017 Jun; 71(3): 164-168. doi: 10.5455/medarh.2017.71.164-168.
5. Masic I. Evaluation of Founding Members of the International Academy of Health Sciences Informatics (IAHSI) Based on Google Scholar and Scopus Parameters. Acta Inform Med. 2017 Dec; 25(4): 220-224. doi: 10.5455/aim.2017.25.220-224.
6. Masic I, Begic E. Scientometric Dilemma: Is H-index Adequate for Scientific Validity of Academic’s Work? Acta Inform Med. 2016 Jul 16; 24(4): 228-232. doi: 10.5455/aim.2016.24.228-232.