Wood units · m^2 or Wood units/m^2: does it matter?

*Serdar Kula, Tayfun Göktaş**

Departments of Pediatric Cardiology, *Physiology, Faculty of Medicine, Gazi University; Ankara-*Turkey*

As we know that, the Fick principle involves many limitations. Most important concern is measuring oxygen consumption (VO_2) for Fick calculation. However, direct measurement of VO_2 is difficult and expensive. Therefore, it has been generally accepted that, predicted VO_2 values can be use in practice (1).

A table has been published in European Society of Cardiology (ESC) Guideline which is pointed out operability, inoperability and controversial values for both pulmonary vascular resistance (PVR) and PVR index (PVRI) in patients with pulmonary arterial hypertension (PAH) (2). Additionally, a new pediatric guideline has been released by American Heart Association (AHA) at the end of the 2015 (1). PVRI and PVR to systemic vascular resistance (SVR) ratio had been pointed out to operability in that guideline. Both ESC and AHA guidelines use Wood Units.m^2 (WU.m^2) as an unit for PVRI.

However, in some published articles Wood Units/m^2 has been given instead of WU.m^2 (3, 4). A corrective text related to the units was published after the publication of the article which is written by Simonneau et al. (3). However, in our opinion, the new unit given in the correction text as Wood Units index = mm Hg/L/min/m^2 , instead of WU.m^2 will lead to confusion.

An important detail is the unit of VO_2. If the unit of VO_2 is (mL/min)/m^2 the obtained value will be cardiac index, not cardiac output. In this case, the calculated value will be the PVRI, not the PVR.

Because of this kind of concern, we need some more special definitions for surgical treatment of pediatric PAH patients. The defined operability limits are controversial for pediatric patients in ESC Guideline (2). For a child with PVRI value of 3 WU.m^2, with a body surface area of 0.5 the PVR value will be 6 Wood units (WU). In this case, when checked as PVRI, it is within operability limits (<4 WU.m^2), but when checked as PVR it is inoperable (>4.6 WU). As a result, PVR-PVRI correlation in the table in ESC Guideline is not valid for pediatric patients. Repair of congenital heart disease in patients with PAH recommended if PVRI <6 WU.m^2 or PVR/SVR <0.3 according to the AHA guideline (1). This definition seems to be more acceptable as we discuss in the example above. However, there is some confusion in AHA guideline about PVR and PVRI abbreviations. In that text the 6 WU.m^2 definition used both PVR and PVRI in various section (1).

We should keep in mind that the unit of VO_2 tables is (mL/min)/m^2 (5). Hereby, we should not forget that, the calculations with using that VO_2 tables resulted as PVRI not PVR. This condition is important in considering the result as WU.m^2 or WU.

Because of these possible risks for calculation of PVRI we do agree with AHA guideline. The AHA guideline point out the importance of PVR / SVR ratio rather then PVRI value (1) . So, we strongly recommend that pediatric cardiologists should use the PVR / SVR ratio instead of PVRI for decision of operability.

Conflict of interest: None declared.

Peer-review: Externally peer-reviewed.

Authorship contributions: Concept - S.K.; Design – T.G.; Supervision – S.K.; Analysis and/or Interpretation – T.G.; Literature search – S.K.; Writing – S.K., T.G.; Critical review – S.K.

References

1. Abman SH, Hansmann G, Archer SL, Ivy DD, Adatia I, Chung WK, et al. Pediatric Pulmonary Hypertension: Guidelines from the American Heart Association and American Thoracic Society. Circulation 2015; 132: 2037-99. [Crossref]
2. Galiè N, Humbert M, Vachiery JL, Gibbs S, Lang I, Torbicki A, et al. 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension: The Joint Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): Endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT). Eur Respir J. 2015; 46: 903-75. Erratum in: Eur Respir J 2015; 46: 1855-6. [Crossref]
3. Simonneau G, Gatzoulis MA, Adatia I, Celermajer D, Denton C, Ghofrani A, et al. Updated clinical classification of pulmonary hypertension. J Am Coll Cardiol 2013; 62: D34-41. Erratum in: J Am Coll Cardiol 2014; 63: 746. [Crossref]
4. Lopes A, Alnajashi K. Saudi Guidelines on the Diagnosis and Treatment of Pulmonary Hypertension: Pulmonary arterial hypertension associated with congenital heart disease. Ann Thorac Med 2014; 9: S21-5.
5. LaFarge CG, Miettinen OS. The estimation of oxygen consumption. Cardiovasc Res 1970; 4: 23-30. [Crossref]

Address for correspondence: Dr. Serdar Kula, Gazi Üniversitesi Tıp Fakültesi, Pediyatrik Kardiyoloji Bölümü, Ankara-*Türkiye*
E-mail: kula@gazi.edu.tr

Accepted Date: 22.02.2016

DOI:10.14744/AnatolJCardiol.2016.6966