

## 小児心エコー：断面と計測指標，基準値の実際

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### 抄 録

先天性心疾患の予後は，胎児診断の進歩や手術成績の向上などにより，飛躍的に改善した．そのため，今や成人先天性心疾患の患者数は40万人を超え（成人心疾患患者は約170万人），小児期の患者数を凌駕しようとしている．それに対して，現在の小児循環器学会専門医は約500人と，循環器学会専門医数約13,500人に比較して驚くほど少ない．そのため，成人先天性患者の成人循環器科診療への移行は否応なしに進んでいくであろう．そのような中，心エコー計測が小児科医と循環器内科で大きく異なることは診療上大きな弊害となるのは明らかである．実際，左室収縮能に関する計測を例に挙げてみると，小児ではいまだにMモード法それも左室短軸断面から求めたleft ventricular (LV) fractional shortening (FS) や Teichholz 等から計算したLV ejection fraction (EF) が一般的となっている．なぜ小児では，biplane EF が使用されないかといえば，まず真のapexを含んだ四腔断面をとるという意識が少なく正しい断面を撮り慣れていないため，四腔断面がうまくとれないこと，息止めができず肺が被ってしまい二腔断面をとることが難しいことなどが挙げられる．一方，右室の収縮能は，小児科医サイドも循環器医サイドも確定的な方法論がない．右室には形態の複雑さからbiplane EFを用いることはできないし，短軸断面のFSを使うこともできない．拡張能については，小児では発達段階で大きく変化し，E波，A波，拡張早期僧帽弁輪運動速度（E'）そのものの正常値が異なるため，成人と同じような拡張能指標を単純に使用することはできない．このような中で，発達段階における心室の形態変化，拡張能変化を考慮し，小児でも応用可能な簡便性，成人でも応用可能な正確性のある，収縮能，拡張能の標準的指標とはなにかを考えゆかねばならない．さらに，どのように標準化を啓蒙してゆくかも欠かせない問題点であろう．この章では，現状の問題点を具体的に提示し，どのような解決策があるかを探つてゆきたい．

## Pediatric echocardiography: views, measurements and references

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### Abstract

The prognosis of congenital heart disease has dramatically improved due to advances in fetal diagnosis and improvement of surgical outcomes. Therefore, the number of patients with adult congenital heart disease now exceeds 400,000 (There are approximately 1.7 million patients with adult cardiovascular diseases.), nearly surpassing the number of pediatric patients. In contrast, pediatric cardiology specialists certified by the Japanese Pediatric Cardiology and Cardiovascular Surgery Society number about 500 people, which is a surprisingly small number compared with the approximately 13,500 specialists certified by the Japanese Circulation Society. Therefore, transition of patients with adult congenital heart disease to adult cardiovascular medical care will proceed inevitably. Under such circumstances, it is obvious that it is greatly harmful in clinical practice that echocardiography measurement is quite different between the fields of pediatric cardiology and adult cardiology. For example, in the case of measurement of left ventricular systolic function, it is common for left ventricular (LV) fractional shortening (FS) to be obtained from M-mode of the left ventricular short axis view, and then the LV ejection fraction (EF) calculated from Teichholz, etc., in pediatric cases. The reason why the biplane EF method is not used in children is that, first, there is little thought given to obtaining a four-chamber view including a true apex, resulting in unfamiliarity with obtaining an accurate four-chamber view; second, it is sometimes impossible to obtain a two-chamber view covered by the lungs, because the children usually cannot stop breathing when instructed. On the other hand, neither the pediatrician nor the cardiovascular physician has the deterministic methodology for measurement of right ventricular systolic function. Biplane EF cannot be used in the right ventricle because of its morphological complexity, and right ventricular FS in the short axis section cannot be applied. With regard to diastolic function, in childhood it changes dramatically at the developmental stage. Normal values of E wave, A wave, and early diastolic mitral annulus velocity (E') itself are different, so it is not possible to simply use the same diastolic parameters for adults. Under these circumstances, taking into consideration changes in ventricular morphology and diastolic function at the developmental and aging stages, we should investigate standardized indices for systolic and diastolic function that can be used in both children and adults. Furthermore, how to spread awareness of standardization will be a crucial problem. In this chapter, we will present specific problems at present and explore what solutions are available.

### Keywords

standardization, congenital heart disease, child

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Received on May 21, 2018; Accepted on September 5, 2018 J-STAGE. Advanced published. date: November 2, 2018