Pulse wave velocity, blood pressure and bicycle tyres

Detlef Bockenhauer

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Sirs,

I read with interest the recent article by Yu et al., as well as the accompanying editorial by Doyon and Schaefer, regarding increased pulse wave velocity (PWV) in patients with acute post-streptococcal glomerulonephritis (PSGN) [1, 2]. Yu et al. demonstrated a significant increase in PWV during the acute nephritic phase, which normalised subsequently in all but two patients who showed evidence of persistent kidney injury. PWV reflects arterial stiffness, and so the authors concluded that PSGN not only involves the kidney, but also arterials outside the kidney.

As a keen cyclist, I do wonder about this conclusion. When riding my bicycle, I rely on the fact that the tyres are sufficiently stiff due to being filled with air. If the tyres become too compliant, I increase their stiffness by inflating them with more air. Thus, there are different ways to increase the stiffness of a vessel, such as an artery: one is the insertion of rigid material in the vessel wall, which occurs in vascular calcification; another is to increase the filling pressure, which occurs with sodium and concomitant fluid retention. Examination of the clinical findings reported by Yu et al. reveals that the most striking difference between the PSGN group and the two control groups is the blood pressure which, as expected, was markedly elevated in the group with PSGN. Returning to my example

of bicycle tyres: I question whether the increased PWV in the acute phase of PSGN truly reflects a primary involvement of the arterials—or rather just the increased expansion of the arterial tree by the salt and fluid retention inherent in the pathophysiology of PSGN. In the latter case, Yu et al. would have discovered a rather fancy way of measuring blood pressure. However, intriguingly, it would also suggest that PWV could be used as a tool to assess acute changes in arterial filling. Indeed, there is evidence for this: Di Iorio et al. recently assessed PWV in haemodialysis (HD) patients and noticed a significant decrease in PWV during and after HD. They concluded that “...the major determinant of changes in PWV during HD appears to be the alterations in hydration status” [3].

I would suggest that the current exuberance that greets the development of exciting new tools, such as PWV, should not lead to the basic principles of physics being forgotten. PWV depends on many variables, not only inflammation and calcification.

References

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D. Bockenhauer (✉)
Department of Pediatric Nephrology,
Great Ormond Street Hospital for Children NHS Trust,
Great Ormond Street,
London WC1N 3JH, UK
e-mail: BockeD@gosh.nhs.uk