

## Posture and PRMDs

When I was growing up, it seemed like posture was a big deal—to my parents, other (older) relatives, teachers, and other authority figures. Hardly a day passed (as I recall) without an adult telling me to stand up taller or sit up straighter. An informal survey of my peers suggests that I was not alone in this regard. Whatever effect those posture reminders had on me, I'm afraid I didn't make much of an attempt to imbue my children with a similar sense of urgency about posture. I don't think they have "bad posture"—I just don't remember telling them to sit or stand up straighter. On the other hand, I have suggested to a number of music students who have come in to see me about a performance-related musculoskeletal disorder (PRMD) that they should talk with their teacher and a physical therapist about their posture and the effect it may be having on their body and their performance. So how can we best understand the relationships among posture, performance, and injury in the performing arts?

The article by Ramella et al. in this issue of *MPPA* gives us some new information about the potential importance of posture for instrumental musicians.<sup>1</sup> In order to provide some context for this article, I will try to give a brief overview of what we know about posture and the health of performing artists.

The obvious posture experts in the performing arts have to be found in the world of dance. A Google search for the term "dance posture" yields 6.5 million website addresses, which includes books, videos, websites, and articles. The position of the body is almost everything that matters in dance, and

dancers spend hours perfecting their posture. No one argues about the importance of posture in dance, although there are often differences of opinion as to what constitutes optimal posture. The role of posture for musicians is a bit less clear. Vocalists pay a lot of attention to posture in order to achieve proper breath support—a Google search for "singer posture" yields over 1.9 million website addresses.

Searching for "musician posture" turns up only 1 million websites, despite the variety of musical instruments that each has its own postural requirements. Statements about posture by professional musicians reveal a range of opinions. For example, Eric Stern, a professional violinist and violist who is also a teacher and clinician, has stated in a web posting that while "(f)or many old time musicians, posture was everything," he believes that "the importance of posture is minimal" for nonwind instrumentalists.<sup>2</sup> On the other end of the spectrum, Dr. Jaume Rosset-Llobet devoted an entire chapter to posture in his 2007 book on musician health.<sup>3</sup>

The field of occupational medicine has long recognized the importance of posture in the development of work-related injuries. A major review article published by the National Institute of Occupational Safety and Health (NIOSH) in 1997 critically appraised and summarized the research that had been done up to that time on risk factors for occupational injury.<sup>4</sup> The authors of the article applied four criteria to determine the quality of evidence they were reviewing. It's worthwhile listing these criteria for those of us in performing arts healthcare to consider as we try to unravel the risk factors for PRMDs. The four criteria are:

- (1) a high participation rate (data were available on over 70% of eligible subjects);
- (2) use of both symptoms and physical findings to determine who had the condition of interest;
- (3) investigators had to be blinded to the exposure status and the health outcome that were being investigated; and
- (4) direct observation of the risk factor was preferred over self-report.

I'm not aware of any studies done in performing artists that meet all four criteria. For example, in order to do a study of the influence of practice time on the development of PRMDs by orchestral musicians, one would have to (1) get over 70% of the members of the orchestra to participate, (2) have each participant report his/her symptoms and undergo a physical examination (on more than one occasion), (3) hire a group of trained health care professionals to do the physical examinations according to a specific protocol, and (4) use some type of objective measurement of practice time.

However, the NIOSH reviewers, by using very strict criteria such as these, were able to draw some conclusions with a high degree of confidence. Here is a summary of their findings regarding posture as a risk factor for occupational injury:

- (a) There is strong evidence that working groups with high levels of ... extreme working postures involving the neck/shoulder muscles are at increased risk for neck/shoulder musculoskeletal disorders (MSDs). Consistently high odds ratios (ORs) were found (12 statistically significant studies with ORs > 3.0) providing evidence linking tension-neck syndrome with static postures or static loads.

- (b) There is evidence for a relationship between repeated or sustained shoulder postures with  $>60^\circ$  of flexion or abduction and shoulder MSDs. There is evidence for both shoulder tendinitis and nonspecific shoulder pain. The evidence for specific shoulder postures is strongest where there is combined exposure to several physical exposures.
- (c) There is evidence of an association between any single factor (e.g., posture) and hand/wrist tendinitis, based on currently available epidemiologic data.
- (d) The review provided evidence that work-related awkward postures are associated with low-back disorders. Results were consistent in showing positive associations, with several risk estimates above 3.<sup>4</sup>

So we have very convincing evidence that posture plays a role in the development of neck, shoulder, wrist, hand, and low back injuries in a variety of occupational settings. However, none of these studies involved musicians, dancers, or other performing artists. What have we learned from studies that have focused on performing artists?

Ten articles that focused on posture have appeared in *MPPA* since 1990; 3 were about dancers, 1 was about singers, and the remaining 6 were about instrumental musicians. Findings from 2 of them are related to the report by Ramella et al.<sup>1</sup> A study by Edling and Fjellman-Wiklund<sup>5</sup> showed that music teachers who played asymmetrical instruments reported having more musculoskeletal pain than those who played symmetrical instruments. However, they used a slightly different definition of

symmetry than Ramella et al. used. Baadjou et al.<sup>6</sup> measured energy expenditure in wind instrumentalists who were told to play in a “correct” and an “incorrect” posture; paradoxically, playing in the “incorrect” posture was associated with lower energy expenditure. Another 20 or so articles in *MPPA* have touched on posture as a peripheral or related issue. Of course, lots of articles have appeared in other journals as well. One worth mentioning appeared in the *American Journal of Industrial Medicine* in 2007.<sup>7</sup> Nyman et al. studied 225 orchestral musicians and found that those who played with an elevated arm position had a higher prevalence of neck-shoulder problems than those who played with a more neutral arm position. This is consistent with the findings reported in the NIOSH summary reviewed above.

With the new data reported by Ramella et al., we have more evidence that postural disorders are common among instrumental musicians (even young ones) and that playing an asymmetrical instrument seems to increase the likelihood that one will play with suboptimal posture. Of course, instrument symmetry is not the only risk factor for developing a PRMD. In our experience with college-level music students, pianists have consistently sought care for PRMDs more than any of the students who play asymmetrical instruments.<sup>8</sup> At some point in the future, we may be able to develop a model that includes all of the known risk factors for instrumentalists (gender, instrument, total time spent playing the instrument, break frequency, etc)

and weight them in proportion to their importance. A similar model for dancers could be developed that incorporates various physical characteristics, amount of time spent dancing per week, break frequency, etc. In the meantime, we can keep on advising performing artists who have suboptimal posture that they may perform better and longer if they sit up or stand up straighter.

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