Extension disturbance of the little finger in amateur piano players: two case reports

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Published online: 5 January 2013
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Introduction

Hand problems exist in all types of musicians, regardless of level of expertise, age, or type of musical instrument. Since the piano is one of the most popular instruments, disorders of the hand related to playing the piano typified by tendinitis or arthritis are quite common [3]. However, there have been no reports of atypical extension disturbance of the little finger. Here, we describe two instances of this unusual disorder in young piano players and offer an explanation of its causes. The patients were informed and consented that the data concerning their conditions would be submitted for publication.

Case Reports

Case 1, an 18-year-old healthy woman, presented with an extension disturbance of the proximal interphalangeal joint (PIPJ) of the little finger in the right hand (Fig. 1a, b). Although she had been aware of the condition since childhood, it had gradually deteriorated with slight dull pain of the PIPJ over the course of a year. She had practiced the piano 6 h every day without fail for 15 years. On examination, she could actively extend the PIPJ of the little finger in adduction, but about 30° of extension lag was presented in abduction (Fig. 1c–f). The extension lag of the PIPJ was compensated by hyperextension of the metacarpophalangeal joint (MPJ). The PIPJ of the little finger was not stiff, but rather somewhat lax. She had no history of any injury to the hands, and no abnormality was discernible on X-ray. A boutonnière posture of the little finger was identified when she simulated the motion of playing the octave

(Fig. 2d). It was thought that this poor finger posture was the underlying cause of her disorder, so we instructed her to wear a dynamic splint during piano practice (Fig. 2a–c). The structure of the splint was quite simple. Two bands on the wrist and the proximal phalanx of the little finger were connected on the volar side with an elastic string that pulls the proximal phalanx of the little finger toward adduction in flexion. After a year, the disorder had improved, and she was able to play with more dynamic tone and proper form (Fig. 2e).

Case 2, a 14-year-old girl, visited our clinic with a complaint similar to that of case 1. In this case, however, the complaint was bilateral. Extension lag of the right PIPJ was 20°, and that of the left was 5° (Fig. 3a–d). She had begun practicing the piano in childhood and had been playing the tuba for the past year in a brass band. She had no history of injury or congenital disease in the hands. Since the disorder of the left little finger was minimal, only the right little finger was treated with a dynamic splint (Fig. 3e, f). Although the disorder improved with administration of the dynamic splint for 1 year, it recurred after several months. As a result, the patient continues to wear the splint occasionally.

Discussion

This disorder showed no limitation of passive range of motion of the PIPJ and thus could be differentiated from camptodactyly, Dupuytren's contracture, or arthrogryposis. Since the disorders in our cases improved with a dynamic splint worn only during piano practice, it was obvious that the cause of the disorder was related to regular piano practice since childhood. Children's hands are too small to play difficult musical compositions requiring octave playing; their hands also lack sufficient strength to play with dynamic tone. Since the course of the flexor digitorum profundus (FDP) sharply turns for direction at the MPJ during motions (such as octave

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Fig. 1 **a, b** Case 1: an 18-year-old healthy lady complained extension lag of the PIPJ of the right little finger without joint contracture. **c–e** She could actively extend the PIPJ of the little finger in adduction, and 30° of extension lag was identified in abduction. **f** Neither flexion disorder nor joint contracture was seen

Fig. 2 **a–c** A dynamic splint which pulled the proximal phalanx of the little finger toward adduction in flexion during piano practice was administered for conservative therapy. **d** A typical posture of the little finger like “boutonnière deformity” was identified in replicated motion of playing the octave. **e** After a year, the disorder was improved, and she could play the piano with more dynamic tone than used to, with corrected striking motion

Fig. 3 **a–d** Case 2: extension disturbance of bilateral little finger was identified in a 14-year-old girl. Extension lag of the right PIPJ was 20°, and that of the left was 5°. **e, f** Conservative treatment with a splint similar to that of case 1 was administered

playing) that require hyperabduction of the little finger, the power of FDP does not easily transmit to the DIPJ. The DIPJ cannot withstand shock from the keys and then extend when a child attempts to strike a note forcefully. Hyperextension of the DIPJ secondarily provokes flexion of the PIPJ and extension of the MPJ in a boutonnière posture (Fig. 2d). Our success with the dynamic splint suggests that the unusual motion disorder present in the patients was due to residual improper form acquired while practicing in childhood (Fig. 2e).

It is well known that the flexor digitorum superficialis (FDS) of the little finger has functional variations [1, 2]. Austin et al. [1] reported that 21 % of variations showed an FDS-absent pattern in which the DIPJ and PIPJ interlock in the same direction and cannot express a boutonnière posture. In other words, the disorder presented here could potentially occur in the remaining 79 % of children who practice the piano.

Sports and music play very similar roles in the life of people, whether as a hobby, entertainment, a life calling, or a profession. However, they differ widely in their approaches to preventive medicine among their respective populations. Sports medicine focuses on educating young athletes to prevent injuries such as baseball elbow and jumper's knee. On the other hand, it is impossible to determine the prevalence of hand injuries in piano

players, whether amateur or professional, because there has never been a survey of this population. A concerted educational effort, similar to that employed with athletes, should be directed toward young musicians. Piano instructors should also be mindful that children may not be capable of playing with the dynamic tone and range that more mature players are capable of.

Acknowledgments We would like to thank Emma Boast, an outside consultant as the English language specialist, for her assistance in editing this paper.

Conflicts of interest The authors declare that they have no conflict of interest.

References

1. Austin GJ, Leslie BM, Ruby LK. Variations of the flexor digitorum superficialis of the small finger. *J Hand Surg.* 1989;14A:262–7.
2. Baker DS, Gaul Jr JS, Williams VK, Graves M. The little finger superficialis—clinical investigation of its anatomic and functional shortcomings. *J Hand Surg.* 1981;6A:374–8.
3. Grindea C. The interface: piano. In: Winspur I, Wynn Paryy CB, editors. *The musician's hand. A clinical guide.* London: Taylor & Francis; 1998. p. 26–32.