The relationship of muscle activity, contact pressure on the mouthpiece and volume level when playing the trombone - an exploratory cross-sectional study

Rationale

Playing the trombone can lead to playing-related musculoskeletal disorders (PRMD). Previous research suggests that professional trombonists predominantly struggle with PRMD on the left body side. An increasing volume leads to an increasing contact pressure on the mouthpiece of the trombone, but it is still unclear how the muscle activity relates to this and whether it differs in musicians with PRMD from those without PRMD.

Purpose

The purpose of this study was to investigate the relationship between the activity of different muscles of the left body side, the contact pressure on the mouthpiece and the volume level in healthy trombonists.

Methods

Six male healthy tenor trombonists were included in this study and run through a standardized protocol which consisted of playing a b-flat major scale with three different volume levels (pianissimo, mezzoforte, fortissimo). Analyzed parameters were (1) the activity of several muscles of the left body side (measured with surface electromyography), (2) the contact pressure on the mouthpiece (measured with a force sensor) and (3) the different volume levels.

Results

Analysis of variance reveals significant differences of the muscle activity for the three volume levels. Depending on the volume level and the selected muscle, results show very weak to moderate correlations between contact pressure on the mouthpiece and muscle activity (Spearman´s rho between .11 and .58). The strongest correlation across all muscles occurs during fortissimo playing.

Conclusions

These results show a relationship in healthy trombonists between volume level, contact pressure on the mouthpiece and muscle activity when playing a b-flat major scale. Future research should include trombonists with PRMD to enable comparison between PRMD and non-PRMD musicians.

Educational Objectives:

At the end of the presentation, the participants will be able to…

1. understand the relationship between muscle activity, contact pressure on the mouthpiece and volume when playing the trombone
2. recognize that there are different muscle activity patterns on the left body side when playing the trombone
3. understand that a comprehensive functional diagnosis is important in the management of musicians