Vibrato retraining of a cellist suffering from musician’s dystonia: A collaborative approach

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Dystonia affects musicians in a variety of ways; in pianists fingers can curl or extend uncontrollably, fingers can curl on a violinist’s fingerboard, wind players can experience difficulties with forked fingering, and the cramping of lips in brass players can affect the embouchure. Less common is the effect of musician’s dystonia on the vibrato of string players. This case study describes a professional cellist whose difficulty in controlling the speed and amplitude of vibrato was affecting her sound and threatening her orchestral career. A systematic retraining protocol based on principles of instrumental technique and optimum biomechanics was introduced and her condition improved significantly so that she was able to continue playing professionally.

Keywords: musician; dystonia; cellist; biomechanics; retraining

Musician’s dystonia is a devastating condition that can result in the loss of an instrumental career. Rehabilitation is complex, and in spite of ongoing research a return to former playing ability is rare. Critchley has reported that violinists may experience what violinist Carl Flesch referred to as an “atrophy of the vibrato” (Critchley 1977), but there are no reports of focal dystonia affecting vibrato in a cellist. We have previously reported improvements in focal dystonia in pianists through a systematic retraining methodology at the instrument (de Lisle et al. 2006, de Lisle et al. 2010). The aim of this research was to see if a similar retraining protocol could alleviate the symptoms of focal dystonia in a cellist with the condition.
METHOD

Participants

The subject was a 42 year old professional orchestral cellist with a medically confirmed diagnosis of musician’s dystonia who had been playing for 33 years. There was no family history of movement disorder. She had difficulty controlling the speed of the vibrato, which was often erratic and inconsistent. Apart from cello playing, other motor movement patterns were unaffected. Although she was continuing professional orchestral playing, the irregularity of her vibrato was threatening her long term playing career.

Materials

The children’s vibrato book *Viva Vibrato!* by Fischbach and Frost, published in 1997, was used in the study.

Procedure

Prior to retraining, the subject recorded a series of chromatic notes in first, fourth, and thumb position on the A, D, and C strings. She also recorded a series of seven notes on the A string using a small box of sweets tied on the dorsum of the left hand with a rubber band. Retraining then began with eight hour-long sessions within two weeks, and after a five-week break a further ten sessions were completed within three weeks. The examples were then re-recorded. As the retrainer was a pianist, assistance was received from a respected cello pedagogue for five of these sessions. Four years after the initial retaining procedure the subject returned to be re-evaluated. The quality of the vibrato in the recorded examples (sound only) was assessed on a 4-point scale (see Table 1) by a professional string quartet, blinded as to whether the notes were recorded pre-, post-, or 4 years post-retraining.

<table>
<thead>
<tr>
<th>Vibrato quality evaluation</th>
<th>Score</th>
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<tbody>
<tr>
<td>The vibrato was not consistent in amplitude or regularity</td>
<td>1</td>
</tr>
<tr>
<td>The vibrato was sometimes consistent in amplitude or regularity</td>
<td>2</td>
</tr>
<tr>
<td>The vibrato was mostly consistent in amplitude or regularity</td>
<td>3</td>
</tr>
<tr>
<td>The vibrato was always consistent in amplitude or regularity</td>
<td>4</td>
</tr>
</tbody>
</table>
During the retraining period the subject took leave from her orchestral position in order to concentrate on retraining. The initial goal of retraining was to eliminate unnecessary tension in the shoulder and to optimize biomechanics. It was noted that the vibrato technique used by the subject involved a large amount of rotation involving significant shoulder abduction in the scapula plane combined with pronation/supination at the elbow. Retraining focused on replacing these movements with a simple flexion extension of the elbow with the forearm in a neutral position with respect to pronation/supination, with minimal movement of the scapulothoracic articulation or glenohumeral joint.

To avoid interference from past learning, initial retraining involved teaching vibrato to the right hand, reversing the position of the cello to sit over the right shoulder. No attempt was made to use the bow at first, but the procedure concentrated on developing a regular movement with the right hand and then transferring this learning to the left hand and arm.

Relaxation of the hand was established by various tapping exercises on the fingerboard in a variety of rhythms. At first this was done between the strings, as any string depression could cause tension. Gradually it was possible for the fingers to make contact with the string without cramping and various tapping and sliding techniques were developed, beginning with a large movement and then refining the movement as had been found beneficial in our studies with pianists (de Lisle et al. 2006, de Lisle et al. 2010). Transferring enough weight to depress the string was at first practiced by dropping the finger to push the string down with a single impulse, and then releasing the pressure and allowing the hand to rebound several times. The number of impulses was then increased until an even vibrato was established. Playing with the bow was only introduced when the vibrato movement was perfected, progressively checking breathing, tension in the arm, shoulder, the flexibility of the finger, and the weight on the string. Without this systematic checklist, the speed of vibrato could suddenly increase at the end of the bow.

RESULTS

Scores were analyzed using generalized linear methods using *Proc GLM* in SAS v9.1 (SAS Institute, Cary, North Carolina) with the VQE score used as a continuous outcome and time (pre-, post-, and 4 years post-), scorer, note, and position modeled as categorical variables. Statistical significance was defined at the 5% level.

The examples recorded with the box of sweets on the back of the hand showed that there was a statistically significant improvement (p<0.01) from
pre-intervention to post-intervention with the mean VQE score increasing from 1.14 (SD=0.52) to 2.82 (SD=0.86). Re-testing at 4 years post-intervention showed that this improvement had been maintained with a mean score of 2.75 (SD=0.89, p<0.01). There were no significant effects of scorer or the note being played. The chromatic long-note examples in three different positions on three different strings which were recorded pre- and 4 years post-retraining again showed that there was a statistically significant (p<0.01) improvement from pre to 4 years post-intervention with mean scores increasing from 1.41 (SD=0.61) to 3.31 (SD=0.64; see Figure 1). Again there was no significant effect related to scorers or position on the cello.

**DISCUSSION**

Unlike other reported cases of musician’s dystonia in string players, this subject displayed no visible cramping in the hand, although depressing the string would often cause the vibrato oscillation to be erratic and uncontrolled. Since regularity of vibrato is a key requirement for accomplished string playing (Rolland 1974), rehabilitation was essential if the subject were to continue playing professionally. As our previous studies have shown (de Lisle et al. 2006, de Lisle et al. 2010) retraining essentially involves reducing the technique to its most basic components, perfecting every movement slowly before attempting repertoire playing. It was important to first establish controlled arm freedom without the cello, using gross muscle movements and sometimes using the other arm as a mock cello. As the dystonic reaction seemed to come primarily from the shoulder, retraining involved changing the subject’s approach to vibrato playing to focus on elbow flexion, with minimum rotation

![Figure 1. Improvement in vibrato quality (VQE score on the vertical axis).](image-url)
from the shoulder and minimal pronation/supination. Extraneous wrist flexion and extension was reduced, so that the vibrato movement was generated from the elbow using a coordinated movement. When progressing to the string, the vibrato movement was obliquely downwards, without pronation/supination at the elbow. Only once the essential elements of an even vibrato were established did the subject begin to use the bow.

The sensory component that had been noted in the previous studies with pianists was also evident in the cellist. Merely touching the string would cause lack of control in the vibrato, and so at first the vibrato movement was learned by tapping and sliding up and down the fingerboard between the strings without settling the finger in one place on the string. When progressing to vibrating in one place on the string, the finger had to be given permission to transfer some arm weight to the string; in a similar way as with the pianists the dystonic finger had to learn to take the weight of the arm (de Lisle et al. 2006, de Lisle et al. 2010). Further complications were evident when the thumb was allowed to touch the fingerboard, where it was important to avoid any unnecessary pressure.

In a similar way that lateral transfer of learning had assisted the retraining of the pianists (de Lisle et al. 2006, de Lisle et al. 2010), vibrato was learned with the right arm first while holding the cello over the right shoulder. This enabled the subject to learn the movements as if she was a complete beginner, and her awareness of the contrast in movement freedom between the two arms proved to be an important learning tool.

The initial retraining sessions were close together, which ensured sustained motivation and helped to reinforce changes in movement patterns. Like the other successful subjects in our previous studies, she ceased all other playing during the intense retraining period and focused on establishing new movement patterns slowly and systematically. Because she took leave from her orchestral playing in order to undertake the retraining, the technical modifications implemented were internalized and she was able to continue to apply these principles once she returned to the orchestra. Therefore, when she was reassessed four years after the initial retraining period, her condition had remained constant; she was more satisfied with her own playing, and she was continuing to maintain her status as a professional cellist. By applying the principles of learning previously shown to be successful with pianists and perfecting each element of technique, it was possible to substantially improve the condition of musician’s dystonia in another instrument: the cello.
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References


