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Scientific/Clinical Article

## Efficacy of 3 therapeutic taping configurations for children with brachial plexus birth palsy

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### ABSTRACT

**Study Design:** Cross-sectional clinical measurement study.**Introduction:** Scapular winging is a frequent complaint among children with brachial plexus birth palsy (BPBP). Therapeutic taping for scapular stabilization has been reported to decrease scapular winging.**Purpose of the Study:** This study aimed to determine which therapeutic taping construct was most effective for children with BPBP.**Methods:** Twenty-eight children with BPBP participated in motion capture assessment with 4 taping conditions: (1) no tape, (2) facilitation of rhomboid major and rhomboid minor, (3) facilitation of middle and lower trapezius, and (4) facilitation of rhomboid major, rhomboid minor, and middle and lower trapezius (combination of both 2 and 3, referred to as combined taping). The participants held their arms in 4 positions: (1) neutral with arms by their sides, (2) hand to mouth, (3) hand to belly, and (4) maximum crossbody adduction (CBA). The scapulothoracic, glenohumeral and humerothoracic (HT) joint angles and joint angular displacements were compared using multivariate analyses of variance with Bonferroni corrections.**Results:** Scapular winging was significantly decreased in both the trapezius and combined taping conditions in all positions compared with no tape. Rhomboids taping had no effect. Combined taping reduced HT CBA in the CBA position.**Conclusions:** Rhomboid taping cannot be recommended for treatment of children with BPBP. Both trapezius and combined taping approaches reduced scapular winging, but HT CBA was limited with combined taping. Therefore, therapeutic taping of middle and lower trapezius was the most effective configuration for scapular stabilization in children with BPBP. Resting posture improved, but performance of the positions was not significantly improved.**Level of Evidence:** Level II.

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### Introduction

Typical shoulder motion requires coordinated control of scapulothoracic (ST) and glenohumeral (GH) motion, referred to as scapulohumeral rhythm.<sup>1–3</sup> Altered ST function (ie, scapular dyskinesis) has been associated with a variety of shoulder pathologies,<sup>4–7</sup> including brachial plexus birth palsy (BPBP).<sup>8–12</sup>

Children with BPBP demonstrate complete spontaneous recovery approximately two-thirds of the time,<sup>13,14</sup> whereas roughly 1 in every 1000 live births results in BPBP with sustained deficits.<sup>15</sup> The long-term effects of BPBP include decreased limb length<sup>16–18</sup> and girth,<sup>16,17</sup> abnormal scapular morphology,<sup>8,19–25</sup> GH dysplasia,<sup>19–22,24–30</sup> muscle weakness, and reduced range of motion.<sup>16,22,31–34</sup> A common complaint among children with BPBP and their caretakers is the appearance and frustration associated with scapular winging (protrusion of the scapula away from the chest wall).<sup>9,11,35–37</sup> Scapular winging is a visible indication of the child's injury and also causes difficulty maintaining clothing, such as a bra

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strap or bathing suit top for female patients. The etiology of scapular winging in the BPBP population is unclear as the long thoracic and dorsal scapular nerves are expected to be intact in most children with C5-C6 or C5-C7 injuries.<sup>9,11,35,38</sup> Postganglionic upper trunk injuries typically occur distal to the long thoracic and dorsal scapular nerve branches. Preganglionic avulsion injuries of C5 and C6 are uncommon in children with C5-C6 and C5-C7 injuries.<sup>39-42</sup> Scapular winging in the BPBP population is thought to serve as a compensatory mechanism for lack of GH motion, including decreased GH crossbody adduction (CBA),<sup>11</sup> and it is typically managed conservatively.

Nonsurgical treatments for scapular winging include passive and active range of motion exercises, recreational activities that involve use of the upper extremities, electrical stimulation, and therapeutic taping.<sup>43</sup> The goals of these interventions are to strengthen muscles, alleviate muscle tightness, and prevent joint contracture formation or progression. Although these interventions are frequently used, objective evidence demonstrating their efficacy is lacking.

Previous studies investigating the effect of therapeutic taping of the scapula are inconsistent.<sup>12,44-55</sup> In addition, they encompass different types of tape and tape application methodology.<sup>49</sup> One





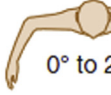













Modified Mallet classification (grade I = no function, Grade V = normal function)						
		Grade I	Grade II	Grade III	Grade IV	Grade V
Global abduction	Not testable	No function	 <30°	 30° to 90°	 >90°	Normal
Global external rotation	Not testable	No function	 <0°	 0° to 20°	 >20°	Normal
Hand to neck	Not testable	No function	 Not possible	 Difficult	 Easy	Normal
Hand on spine	Not testable	No function	 Not possible	 S1	 T12	Normal
Hand to mouth	Not testable	No function	 Marked trumpet sign	 Partial trumpet sign	 <40° of abduction	Normal
Internal rotation	Not testable	No function	 Cannot touch	 Can touch with wrist flexion	 Palm on belly, no wrist flexion	

Fig. 1. The modified mallet classification is a functional assessment used to evaluate overall upper extremity performance in children with brachial plexus birth palsy.<sup>29</sup>

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