

## Case Report

# Role of High Intensity Laser Therapy on a Child with Atlantoaxial Rotatory Fixation-Case Report

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After wearing a hairpin for the entire evening during her sleep, 8-year-old girl experienced acute onset of torticollis and neck pain after walking up the next morning. She was brought to our outpatient department. Her head was tilted to the left, with tenderness over the left neck region. Imaging studies revealed atlantoaxial rotatory fixation. She initially received a combination of soft neck collar and medications with muscle relaxants as well as anti-inflammatory agents. However, these treatments had limited effects. Then, she received high-intensity laser therapy on the left posterior deep neck muscles, which greatly improved the range of motion of her neck. ( *Tw J Phys Med Rehabil* 2020; 48(2): 149 - 152 )

**Key Words:** atlantoaxial rotatory fixation, high-intensity laser therapy, torticollis

## INTRODUCTION

Atlantoaxial rotatory fixation (AARF) is a C1/C2 rotatory subluxation or dislocation that causes acute torticollis and neck pain. It develops from osseous or ligamentous abnormalities. The treatment of AARF included conservative and surgical management. To date, there have been well documented for lower level laser therapy (LLLT) in pain relief and functional improvement. However, no study in the literature has reported the use of high-intensity laser therapy (HILT) for cervical subluxation. Here, we presented a case of a young girl with AARF treated with HILT.

A 8-year-old girl experienced acute onset of torticollis and neck pain after sleeping while wearing a hairpin for the entire evening. She denied predisposing factors including trauma event and respiratory infections. She was brought to our orthopedic outpatient department and limited range of motion (ROM) was found. The results of a neurological examination were normal. Computed tomography revealed mild C1/C2 rotatory subluxation. Physical examination found head tilting to the left side (Figure 1) and mild tenderness over the left posterior deep neck muscles, without limited ROM of the upper limbs. Atlantoaxial rotatory fixation was implied. She was then referred to the rehabilitation clinic for further management. She first received soft neck collar and medications including anti-inflammatory agents (diclofenac

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37.5mg/day) and muscle relaxants (chlorzoxazone 375mg/day) for one month. No physical therapy, occupational therapy, or other treatment modalities was arranged. However, symptoms of torticollis and neck pain persisted. We therefore applied HILT at the left posterior deep neck muscles, from a “Trans” laser light therapy apparatus (816-12-830, Transverse industries CO.LTD., Taipei, Taiwan) once a week, totally for four weeks. The apparatus provided a Nd:YAG laser with pulsed emission(830nm), high peak powers (3W), short pulse duration (120-150  $\mu$ s), low frequency (10-40 Hz), a duty cycle of about 0.1%, 1.0-cm probe diameter, and 1-cm<sup>2</sup> spot size. The HILT (25J) was applied to a total twelve tender points for 10 seconds with a fluency of 510 mJ/cm<sup>2</sup> each; a total of 200J was administered in each treatment session. No medication was prescribed during the treatment period of HILT. The patient presented with gradually improved symptoms of torticollis and neck pain along with each session of HILT and the symptoms resolved fully after the fourth session (Figure 2).

## DISCUSSION

Usually, treatment of AARF included conservative and surgical management. Conservative treatment is the first choice of fixed AARF. Frequent analgesics, halter traction or closed reduction maneuvers will successfully correct the dislocation. Surgical reduction is indicated in the case of failure of conservative measures to reduce AARF, in the case of re-dislocation, in highly unstable injuries, and in patients not demonstrating appropriate compliance.<sup>[1]</sup> LLLT in such case, is based on the belief

that laser radiation is able to alter cellular and tissue functions in a manner that is dependent on the characteristics of the light itself (eg, wavelength and coherence).<sup>[2]</sup> The applications of LLLT include wound repair,<sup>[3]</sup> pain relief from musculoskeletal pain,<sup>[4]</sup> and improvement of disease activity of arthritis.<sup>[5]</sup> However, HILT for cervical subluxation was not recorded in previous studies.

In recent years, HILT was implemented as a new form of therapy, but is not a routinely used treatment modality. HILT takes place at higher radiation intensities with an output greater than 500 milliwat (mW). The benefit of HILT over LLLT is that HILT can stimulate deeper tissues, due to the higher output power. Moreover, HILT is recognized as a safe, painless, effective, and noninvasive treatment option.<sup>[6]</sup> Many researchers have shown the favorable impact of HILT in patients with different disorders such as knee osteoarthritis,<sup>[7]</sup> subacromial impingement syndrome,<sup>[8]</sup> frozen shoulder,<sup>[9]</sup> osteoporosis,<sup>[10]</sup> chronic back pain,<sup>[11]</sup> and postburn pruritus.<sup>[12]</sup>

In our case, the girl initially received soft neck collar and medications of anti-inflammatory agents. Nonetheless, these treatments had limited effects. Therefore, we conducted HILT at the tender point of the left posterior deep neck muscles. Our patient presented with ROM improvement and reduced tenderness thereafter. Since natural course is less likely to be accounted for in the recovery because the C1/C2 subluxation is in a fixed state, we consider HILT to have contributed to this case. Our findings with HILT may provide new therapeutic options for AARF.



Figure 1



Figure 2

## CONCLUSION

HILT for cervical subluxation has not been recorded in previous studies. This report presents a new treatment modality for AARF and suggests further applications of HILT for cervical subluxation and neck pain.

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## 高能量雷射治療對於兒童寰椎樞椎不完全脫臼治療中的角色之病例報告

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一名 8 歲女孩在睡覺時使用髮夾，醒來後出現了斜頸(torticollis)以及頸部疼痛的症狀，因此被帶來求診。理學檢查發現頭部向左傾斜、左頸區域壓痛，頭部活動受到限制，神經學檢查方面則無異常，安排影像學檢查後顯示寰椎樞椎不完全脫臼(atlantoaxial rotatory fixation)。她首先接受了藥物及頸圍治療，但成效有限，之後針對壓痛區域進行了高能量雷射治療(high-intensity laser therapy)，一星期後追蹤，發現斜頸症狀改善、壓痛情形減緩，且頸部活動範圍變大。此病例報告對於寰椎樞椎不完全脫臼提出了一項新的治療選項，同時也延伸了高能量雷射治療的應用範圍，如頸脫臼、頸部疼痛等。(台灣復健醫誌 2020；48(2)：149 - 152)

**關鍵詞：**寰椎樞椎不完全脫臼(atlantoaxial rotatory fixation)，高能量雷射治療(high-intensity laser therapy)，斜頸(torticollis)