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A Case report

Congenital Kyphosis with Rapid Progression In Adolescence: A Case Report

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ABSTRACT

Congenital kyphosis deformity represents a relatively infrequent spinal disorder in comparison to other types of spinal deformities. However, when left untreated and neglected, it can result in significant morbidity and associated complications. ***The objective:*** *To present a patient with congenital kyphosis who presented with severe hunchback and weakness in the lower extremities and to review the literature.*

Case presentation. *A 15-year-old patient, accompanied by their parents, presented to our outpatient clinic with a chief complaint of a recent increase in severe kyphotic deformity of the back. Additionally, the patient reported experiencing lower limb weakness and difficulty walking long distances. Following a thorough examination and radiographic evaluation, no intraspinal pathology or comorbidities were identified. Consequently, surgical intervention was planned, and a Schwab 4 osteotomy procedure was performed. Substantial clinical and radiological improvements were observed in the postoperative period.*

The preoperative angular measurements of the spinal curvature were as follows: thoracic kyphosis (TK) measured at 136º, local kyphosis at 145º, lumbar lordosis (LL) at 109º, sacral slope (SS) at 18.5º, and pelvic tilt (PT) at 39.3º. Notably, a significant postoperative correction was observed, resulting in improved alignment: TK 64º, LL 66º, SS 34º and PT 24º. No intraoperative or postoperative complications were observed.

Congenital kyphosis conditions have the potential to exhibit a rapid progression of deformity during adolescence. Therefore, timely surgical correction becomes crucial before the deformity attains advanced dimensions. Early-age surgical interventions for correcting the deformity hold significant importance in improving the overall quality of life for affected individuals.

Keywords*: Congenital kyphosis, posterior instrumentation, spinal osteotomy.*

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Introduction

Congenital kyphosis is a relatively uncommon congenital spinal deformity that can result in neurological and cardiopulmonary complications when left untreated (1). The condition arises from defects in spinal formation, segmentation, or a combination of both, similar to other congenital spinal disorders. As individuals with congenital kyphosis age, the severity of the kyphotic deformity in the sagittal plane of the spine increases, leading to a 25% incidence of neurological impairment (2, 3). Conservative approaches prove inadequate in addressing the needs of patients with congenital kyphosis, necessitating surgical intervention as the primary treatment modality. The selection of surgical treatment for congenital kyphosis relies on several factors, including the patient's age, the extent of the deformity, the flexibility of the spine, and the presence of any accompanying pathologies. For mild deformities, a conservative approach involving regular monitoring or temporary bracing is typically advised. Conversely, patients with congenital kyphosis exceeding 50° are usually recommended to undergo surgical correction. The specific surgical techniques employed depend on the severity of the deformity and may include epphyseodesis, osteotomies, and vertebral column resection procedures. In a study conducted by Yao et al. (4), congenital kyphosis was classified into five types based on the nature and magnitude of the deformity. This classification system facilitated the identification of appropriate osteotomy procedures corresponding to each specific type of deformity.

In this study, we present a case in which surgical intervention was conducted to address a severe congenital kyphosis deformity. Additionally, review the current literature on this topic.

Case presentation

A 15-year-old male patient with a congenital kyphotic deformity of the spine had initially deferred treatment due to the absence of severe symptoms. However, the patient's condition worsened over the past two years, prompting admission to our hospital. Clinical evaluation revealed a pronounced increase in the back hump and an inward fold in the abdomen. Neurological findings included heightened deep tendon reflexes in both lower extremities and a reduction in walking distance. To assess the extent and underlying pathology of the deformity, the patient underwent standing anteroposterior and lateral whole spine plain radiography, whole spine computed tomography (CT), and whole spine magnetic resonance imaging (MRI). No intraspinal pathology was observed, and the severe kyphosis was attributed to a T11 hemivertebra. Radiographic measurements demonstrated a local kyphosis angle of 134°, sagittal vertical opposite positive sagittal balance, sacral slope of 120°, and lumbar lordosis measuring 86° (Figure 1 and 2).

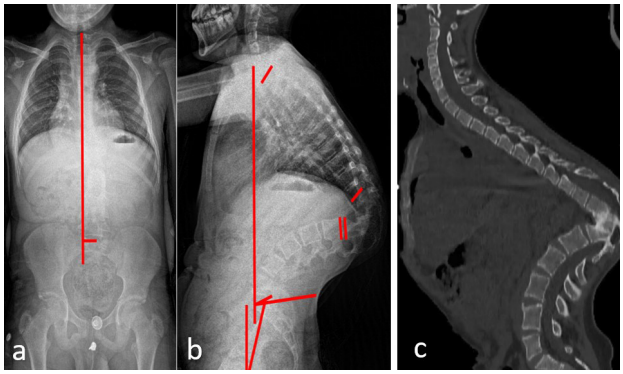

Figure 1 - Preoperative radiologic evaluations. Anterior posterior (a), lateral (b) plain radiographs and CT scan image of the whole spine, sagittal section (c)

He had recurrent bleeding due to esophageal varices as an additional disease. He had no other comorbidity.

Surgical procedure. The patient presented a substantial elevation in the local kyphosis angle associated with the deformity; however, the segments of the spine proximal and distal to the deformity exhibited flexibility. Consequently, a surgical plan was devised, involving a Schwab type 4 osteotomy and posterior instrumentation fusion extending from the T5 to L3 levels.

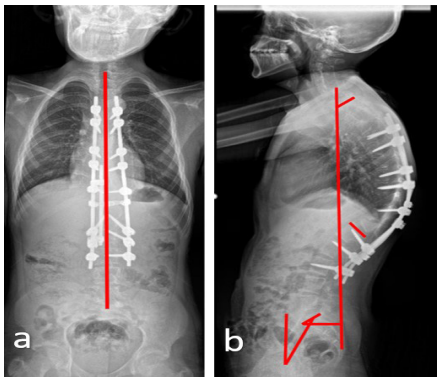

Figure 2 - Postoperative plain radiographs. Anterior posterior (a) and lateral (b) radiographs

The posterior approach was performed with a meticulous technique to minimize bleeding, and the paraspinal muscles were stripped subperiosteally and the posterior elements of the predetermined fusion levels were exposed.

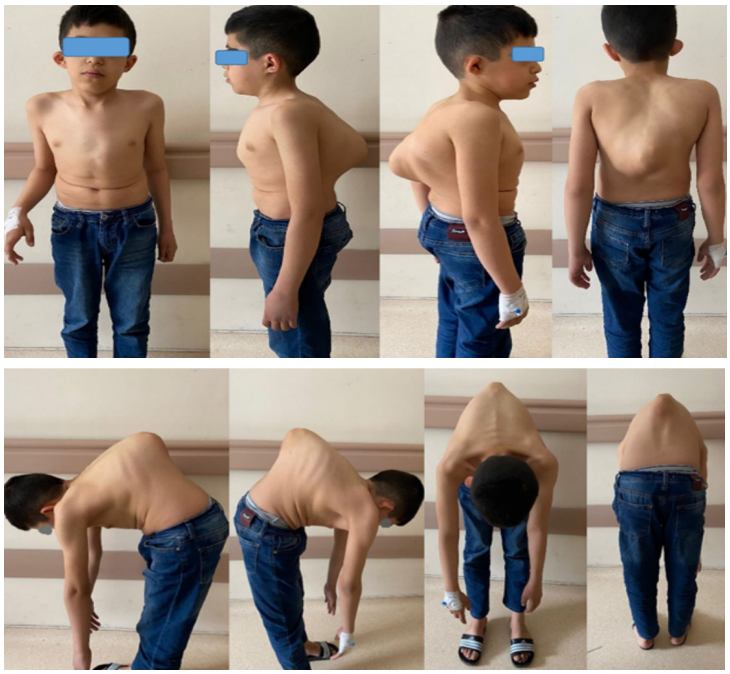

Figure 3 - Preoperative clinical photographs of the patient from different aspects

Bilateral placement of pedicle screws by free-hand technique was carried out at the T5-L3 levels (excluding T11 and T12) from a posterior approach. Subsequently, a total laminectomy was performed at the posterior aspect of the T10, T11, and T12 vertebrae. A Schwab type 4 osteotomy (closed wedge osteotomy) was executed at the T11-T12 level.

To prevent spinal translation, a transitional rod was strategically positioned on the contralateral side of the surgical site during the procedure. Following the completion of the osteotomy, gradual correction of the kyphosis angle was achieved utilizing temporary rods. During the correction process, contact was established with the anterior aspect of the vertebral body, and compression was applied from both rods in a posterior direction to rectify the kyphotic deformity. Intraoperative anteroposterior and lateral radiographs were obtained to assess the progress, and upon determining that satisfactory correction had been attained, permanent rods were implanted. Additional rods and transverse connectors were introduced at the osteotomy site to enhance stability All these processes were performed under continuous monitoring of sensorimotor and motor evoked potentials. A total intraoperative blood loss of approximately 640 ml was recorded during the surgical procedure. In response, one unit of erythrocyte suspension was administered in the operating room, followed by an additional unit on the subsequent day. Notably, no intraoperative complications were observed, and the patient remained free of complications in the postoperative period. Hemodynamic stability was achieved on the day following the surgery, enabling the patient to commence mobility with the aid of a thoracolumbosacral brace.

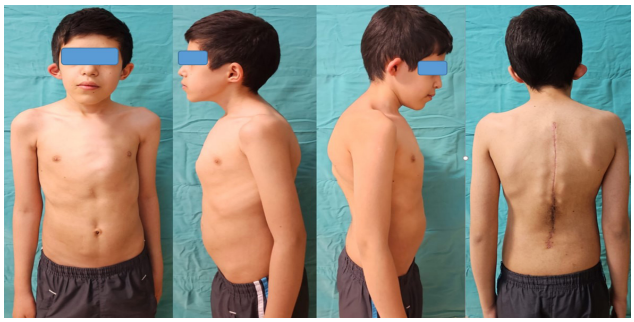

Figure 4 - Postoperative clinical photographs of the patient from different aspects

Postoperatively, favorable trunk and shoulder balance were observed clinically, indicating satisfactory alignment in the coronal plane. Radiologically, a significant improvement in spinal balance was noted in the sagittal plane (Figure 3 and 4).

Postoperative anteroposterior and lateral orthorontgenograms were obtained with the patient in a weight-bearing position to assess the overall spinal alignment. The initial angular measurements of spinal curvature prior to surgery were as follows: the thoracic kyphosis measured at 136º, the local kyphosis at 145º, the lumbar lordosis at 109º, the sacral slope at 18.5º, and the pelvic tilt at 39.3º.

Following the surgical intervention, a noteworthy amelioration in alignment was observed, with postoperative measurements revealing a reduction in thoracic kyphosis to 64º and in lumbar lordosis to 66º. The sacral slope changed to 34º and the pelvic slope to 24º.

Dıscussıon

This study focuses on reporting the preoperative and postoperative clinical and radiological outcomes of a male adolescent patient with a severe, neglected case of congenital kyphosis.

Various osteotomy techniques, such as Ponte, Smith-Petersen, pedicle subtraction osteotomy (PSO), and vertebral column resection osteotomies, have been developed to address spinal deformities. Osteotomy procedures typically result in a correction rate of 50-70% [6].

Schwab et al. introduced a classification system comprising six stages to categorize spinal osteotomies [7]. The Schwab classification system correlates an increasing stage with a greater degree of correction achievable through osteotomy procedures. The specific osteotomy technique employed varies depending on the extent of the deformity. Moreover, based on the kyphotic deformity classification proposed by Yao et al. [4], the presented case aligns with type 3 kyphosis. Yao emphasized the utilization of Schwab type 5 (vertebral column resection osteotomy) for type 3 kyphosis.

However, in our case, despite the advanced kyphosis, the patient exhibited a remarkably flexible spine, leading us to perform a Schwab type 4 osteotomy instead. Although the patient demonstrated residual kyphosis in the thoracolumbar region, there was a significant improvement in both the sagittal balance of the spine and the pelvic parameters (Figure 1, 2, 3, 4).

Spinal osteotomy surgery carries certain associated risks, including infection with a reported incidence of 10%, neurologic damage occurring in approximately 14% of cases, and nonunion leading to revision surgeries due to implant failure, which has been observed in 22% of patients [6].

Conclusions

The presented case did not experience any instances of infection or neurologic damage. The patient will undergo medium and long-term follow-up to monitor and assess the outcomes of the procedure.

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Жасөспірімдік шақта жылдам дамыған туа біткен кифоз: клиникалық жағдайды сипаттау

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Түйіндеме

Туа біткен кифотикалық деформация омыртқаның басқа түрлерімен салыстырғанда сирек кездесетін ауру болып табылады. Дегенмен, емделмеген және елеусіз қалдырылған жағдайда аурудың ағымының айтарлықтай нашарлауына және онымен байланысты асқынуларға әкелуі мүмкін.

Баяндаманың мақсаты: ауыр бүкірлік пен аяқтардың әлсіздігіне шағымданған туа біткен кифозы бар жасөспірім науқастың клиникалық жағдайын сипаттау және әдебиеттерге шолу жасау .

Клиникалық жағдайды сипаттау. Біздің емханаға 15 жастағы науқас ата-анасының сүйемелдеуімен соңғы кездегі омыртқаның ауыр кифоздық деформациясының күшеюіне деген негізгі шағыммен келді. Сонымен қатар, науқас төменгі аяқ-қолдың әлсіздігін және ұзақ қашықтыққа жүрудің қиындығын хабарлады. Жұлынішілік патологияны және қосымша ауруларды жан-жақты қарастырып, рентгендік зерттеу нәтижесінде омыртқаішілік патология анықталмады. Осыған байланысты хирургиялық ота жоспарланып, Schwab 4 остеотомия процедурасы жасалды. Отадан кейінгі кезеңде елеулі клиникалық және радиологиялық жақсартулар байқалды. Ота алдындағы бұрыштық қисықтық өлшемдері келесідей болды: кеуде кифозы (ТК) 136°, жергілікті кифоз 145°, бел лордозы (LL) 109°, сакральды қисаю (СС) 18,5° және жамбас қисаюы (ПТ) 39°. Ота кейін бүкірліктің айтарлықтай түзелуі байқалып, нәтижесі жақсарды: ТК 64°, LL 66°, SS 34° және PT 24°. Отаішілік және отадан кейінгі асқынулар байқалмады.

Туа біткен кифоз жасөспірім кезінде деформацияның жылдам дамуына әкелуі мүмкін. Деформация айтарлықтай мөлшерге жеткенге дейін дер кезінде хирургиялық түзету жасау шешуші рөл атқарады. Деформацияны түзету үшін ерте жаста хирургиялық ота науқастардың жалпы өмір сапасын жақсарту үшін маңызды.

Түйін сөздер: туа біткен кифоз, артқы аспаптық құрал, омыртқа остеотомиясы.

Врожденный кифоз с быстрым прогрессированием в подростковом возрасте: клинический случай

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Резюме

Врожденная кифозная деформация представляет собой относительно редкое заболевание позвоночника по сравнению с другими видами деформаций позвоночника. Однако, если его не лечить и игнорировать, это может привести к значительному ухудшению течения заболевания и связанным с ним осложнениям.

Цель сообщения: представить пациента с врожденным кифозом, у которого наблюдалась выраженная горбатость и слабость в нижних конечностях и изучить доступную литературу.

Презентация клинического случая. Больной 15 лет в сопровождении родителей обратился в нашу поликлинику с основной жалобой на недавнее нарастание выраженной кифотической деформации спины. Кроме того, пациент сообщил о слабости нижних конечностей и затруднениях при ходьбе на большие расстояния. После тщательного обследования и рентгенологического исследования интраспинальной патологии и сопутствующих заболеваний выявлено не было. В связи с этим было запланировано хирургическое вмешательство и выполнена процедура остеотомии Schwab 4.

В послеоперационном периоде отмечены значительные клинические и рентгенологические улучшения. Предоперационные угловые измерения искривления позвоночника были следующими: грудной кифоз (ТК) измерялся при 136°, локальный кифоз при 145°, поясничный лордоз (LL) при 109°, крестцовый наклон (SS) при 18,5° и наклон таза (PT) при 39,3º. Примечательно, что наблюдалась значительная послеоперационная коррекция, что привело к улучшению выравнивания: ТК 64°, LL 66°, SS 34° и PT 24°. Интраоперационных и послеоперационных осложнений не наблюдалось.

Врожденные кифозы могут проявлять быстрое прогрессирование деформации в подростковом возрасте. Своевременная хирургическая коррекция становится решающей до того, как деформация достигнет значительных размеров. Хирургические вмешательства в раннем возрасте по коррекции деформации имеют важное значение для улучшения общего качества жизни пострадавших.

Ключевые слова: врожденный кифоз, задний инструментарий, остеотомия позвоночника.