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### RESEARCH ARTICLE

#### CASE REPORT OF CLUB FOOT CORRECTION IN CHILD WITH SPINA BIFIDA

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#### Abstract

Spina bifida is a partially preventable disease, previous studies in many regions of the world showed a decrease in the incidence after using folic acid supplements. However, there are several congenital deformities associated with spina bifida including kyphosis, hip dislocation, and clubfoot. The aim of this case report was to evaluate the deformity correction of the left foot after Taylor's spatial frame with the Ponseti technique in a 5 years old girl with spina bifida.

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#### Introduction:-

Spina bifida is a common congenital neural tube defect (NTD), which is characterized by incomplete closure of the spine.<sup>(1)</sup> There are many presentations of spina bifida, however, the common presentations are paralysis, hydrocephalus, urine or stool incontinence.<sup>(2)</sup>

Researchers from various studies estimated the prevalence of NTDs in the United States to be around 3,000 cases per year.<sup>(3)</sup> In Saudi Arabia, the prevalence of NTDs is different from a region to another, a recent study done in Riyadh in 2014 reported that the prevalence of NTDs was about 1.2 per 1000 live births.<sup>(2)</sup> Additionally, in the previous studies the highest prevalence was reported in the Eastern Province by Thaliji et al which was about 1.6 per 1000 live births and the lowest number of cases reported was in Asir region in 2011 about 0.78 per 100 live births.<sup>(4,5)</sup>

Moreover, spina bifida is known to have several attributing genetic or environmental factors and many studies showed that the most important factor is the folic acid deficiency during the first month of pregnancy.<sup>(5)</sup> In addition, the consanguineous marriage is considered to be another a risk factor, previous studies in Saudi Arabia showed that the congenital malformations including NTDs correlates with consanguineous marriages.<sup>(6,7)</sup>

Spina bifida is a partially preventable disease, previous studies in many regions of the world showed a decrease in the incidence after using folic acid supplements.<sup>(8,9)</sup> Currently, there is a recommendation from the U.S preventive services task force for all women who are planning or capable of pregnancy have to take a daily supplement containing 0.4 to 0.8 mg (400 to 800 µg) of folic acid.<sup>(10)</sup> Furthermore, there are several congenital deformities associated with spina bifida including: kyphosis, hip dislocation and clubfoot.<sup>(11,12)</sup>

The most common deformity associated with spina bifida is clubfoot which is defined as a foot deformity causing walking difficulty, and it should be treated not only for ambulation but also to avoid complication such as skin irritations, ulcers or fractures.<sup>(13)</sup>

There are many modalities involved in the treatment of the clubfoot. Depending on presentation, treatment can vary from non-surgical modalities as casting or bracing to surgical options like posteromedial release.<sup>(13)</sup> In some cases of neglected foot deformities can be corrected with Ponseti-Taylor method, which is a method of correction using

serial casting and Taylor spatial frame (TSF).<sup>(14)</sup> Nevertheless, regular follow up should be established to assess the progress and prevent recurrence.<sup>(15)</sup>

However, the TSF is an external fixator used in treating limb pathologies such as deformities or fractures.<sup>(14)</sup> While the Ponseti technique consists of serial casting. Initial cast aiming to correct cavus by supinating the forefoot and dorsiflexing the first ray. Consequent casting for correction of adduction and various, by applying the pressure on the distal talar head. Followed by Achilles lengthening for hind foot equinus. and after casting a brace applied.<sup>(16)</sup> On the other hand, using Ponseti alone for the purpose of treating clubfoot in spina bifida patients is associated with high recurrence rate.<sup>(13)</sup>

The aim of this case report was to evaluate the deformity correction of the left foot after Taylor spatial frame with Ponseti technique in a 5 years old girl with spina bifida.

### Report of the case:

A five years old Saudi girl presented to orthopedic outpatient clinic complaining of walking difficulty. She was born full term, the mother had antenatal follow up during her pregnancy, and she got folic acid supplements before pregnancy. The child had diagnosed during antenatal with spina bifida at L5, and at birth time it was associated with bilateral clubfoot. The deformity was worsening with time but there is no pain or other associated symptoms. The attempt of treatment was seeking before, she underwent posteromedial soft tissue release and bilateral derotational osteotomy of tibia at age one, but unfortunately the relapse has occurred. There is no history of spina bifida or congenital clubfoot in the family.

Foot examination revealed that she had bilateral foot deformities which were hindfoot in equinus and varus, and midfoot in cavus with rigid equinus and resistance to passive correction, and forefoot was adducted. There was bad scar associated with decreased skin elasticity because of multiple previous surgery. There was no foot sensation, and the reflexes were difficult to assess because of the deformity, and no motor function because of low level spina bifida.

Course of treatment has been started in the left foot after taking the informed consent and providing the proper counseling to the patient and her parents about the procedures. The patient underwent soft tissue release surgery for subtalar, talonavicular and calcaneocuboid. Then the frame was applied using olive wire on talar head connected to proximal frame of the tibia (Figure 1). After removal of the frame the Achilles tenotomy and dorsal talo tibial capsulotomy were done and below knee cast was applied for six to eight weeks (Figure 2).

Although, during the course of correction we faced pin strut collision that necessitates pin exchange, pin loosening and strut foot impingement at the end of the correction, the plantigrade corrected foot was achieved without reducing foot length. (Figure 3) compare the corrected left foot with the other foot.



**Figure 1:-** Taylor spatial frame at the 2<sup>nd</sup> week with anterior skin complication with two open wounds.



**Figure 2:-** Post-Taylor spatial frame, patient had cast to maintain the plantigrade correction.



**Figure 3:-** After removal of the cast, showing the plantigrade correction which improved compared to the right side.

### **Discussion:-**

The main aim of the treatment was to improve the mobility in congenital clubfoot in child with spina bifida using Taylor spatial frame with Ponseti technique.

However, the public knowledge about clubfoot is low, therefore late seeking of treatment is expected. A cross sectional study in Riyadh in 2018 showed that about 70% of participants had never heard about clubfoot. <sup>(15)</sup> Additionally, the same study revealed that 58% cases of clubfoot were due to hereditary and genetical causes.

Although the recommended treatment in 5 years old patients is surgery followed by Ponseti techniques, in our case we added TSF for the purpose of avoiding bone shortening. Fortunately, the aim was achieved as correction was done without reducing the bone length.

Moreover, the correction is not the only outcome that was accomplished, the range of motion had increased as well. In addition, the patient used to walk on lateral aspect which led to more skin complications, so the plantigrade correction will not only improve the mobility but hopefully will decrease further skin complications. Importantly, the overall satisfaction of the patient and her parents was reached.

Though some cases of spina bifida are due to genetic mutations, we can't underestimate the role of fortification with folic acid before pregnancy. A study in King Fahad University Hospital, Khobar 2019 reported 86.6% of 38 mothers who had spina bifida infants did not receive folic acid before pregnancy. <sup>(17)</sup> And that alarming us to increase the awareness of the importance of fortification with folic acid supplements before pregnancy and other risk factors associated with spina bifida.

Finally, improving the public awareness toward clubfoot is recommended, which would help in obtaining early correction, and hopefully better outcomes would be achieved.

#### **Ethical consideration:**

The patient and her parents were informed that data from the case would be submitted for publication, and they gave their consent.

#### **Conflicts of interest:**

None

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