Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

Original research article

A study on short term results of correlation of CTEV with jess distractor

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Abstract

Background and objectives: Many individuals with ignored CTEV, residual CTEV, or recurrent CTEV visit the orthopaedic department. Typically, they start to show up about a year of age. Soft tissue release is frequently insufficient for complete correction in an older child. It is even harder for a patient who has a surgical scar from a prior procedure. In order to repair the deformity in such individuals, fractional distraction using Joshi's external stabilisation device is a useful alternative. We set out to examine the cosmetic, functional, and anatomical outcomes of the short-term follow-up of 45 patients with 16 bilateral instances who had received treatment using Joshi's external stabilisation device.

Methods: Joshi's external stabilisation method was applied to 45 patients, including 16 bilateral instances, at the Department of Orthopaedics, Government Medical College, Nizamabad, Telangana, India between October 2021 to September 2022. Patients were chosen without regard to their gender, but this research excluded those who had non-idiopathic club feet. Fractional distraction was the approach of correction used in this investigation.

Results: Within the investigation, 33.3% of the participants had already undergone various surgical procedures, included posteromedial surgical release. 66.1% had conservative treatment, that includes serial casting and neglecting CTEV in one kid. In these instances, 66.7% of the individuals had a severity rating of 5 or higher. Youngsters with less severe deformities spent less time distracted. 59.7% achieved excellent and favourable ratings.

Conclusion: JESS is a basic and straightforward tool that makes fractional distraction clear and understandable. The parents pick up the diversion strategy quickly and typically complain. For sustaining full correction, an adequate static period is required. Protection splints are essential for maintaining the correction after the external fixator has been taken off. Regardless of how severe the deformity is, the operation is less invasive and yields good outcomes.

Keywords: JESS, CTEV, Clinical assessment

Introduction

Talocalcaneal-navicular joint subluxation is the fundamental abnormality of clubfoot. The pathological rigidity of soft tissues, however, resists the repair of the aberrant tarsal connection. A durable correction is achieved when the correction is complete and reduction is sustained long sufficient for the tarsal bones to remould and create a stable articulation [1, 2, 3]. There have been numerous one- and two-staged surgeries documented to address every aspect of the malformation. Some surgical techniques are fragmentary operations designed to treat a single aspect of the malformation. Though they typically yield positive results, soft tissue release procedures might limit the mobility of the foot and ankle. The deformity has been overcorrected as a result of extensive soft tissue release surgeries [4, 5]. JESS operates under the tenets of soft tissue distraction, preservation of tarsal relationships, and simultaneous correction of all abnormalities. Acute rectification of the distortion and the lack of an incision make it less probable that the operation will result in the dreaded skin problems that are so frequent in other treatment options.

Material and Methods

In the years 2021–2022, 45 patients participated in a prospective research of fractional distraction utilising JESS distractors for idiopathic congenital club foot. Three categories can be used to group the cases.

1. A rigid foot that resists repeated casting and manipulation.
2. Cases that come back after previous surgical failures.
3. Cases that are late or are neglected.

This study did not cover non-idiopathic club feet. To rule out spina bifida and congenital hip dysplasia,

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

all the patients were clinically evaluated for related anomalies. If necessary, X-rays of the lumbosacral spine and pelvis were also taken. The technique was explained to the child and parents, providing them the chance to talk with other patients receiving the same treatment and look at pictures.
In the preoperative planning, emphasis is placed on the value of pin track care and stringent frequent follow-up.

Inclusion criteria

1. The severity of the club foot in each case was evaluated clinically prior to surgery.
2. A snapshot taken prior to surgery.
3. Antero-posterior and lateral views of a foot X-ray taken prior to surgery.
4. Check up before anaesthesia.

In the preoperative clinical examination (Caroll), the following information is assessed:

1. Calf atrophy
2. Posterior fibula displacement
3. Creases, either medial or posterior
4. The foot's lateral border is curved, and
5. The cavus
6. The fixed equinus
7. A navigational bone attached to the medial malleolus
8. Os calcis attached to the Tibia
9. Static pronation of the forefoot.

Each feature earns one point when present and none when missing. Thus, the worst foot with all attributes scores 10 points and a normal and corrected foot scores 0.
The method requires very basic equipment. Kirschner Wires are introduced via hand drill or T-Handle. JESS's connection joint is its core. Link joint connects bone-drilled kwire to connecting rod system. Right-angle link joint connects K wire with connecting rod. Recessed hexagonal nuts secure the link junction.
3.0 mm and 4.0 mm smooth and angled connecting rods are utilised in younger and older youngsters, respectively. The Tibial segment's Z rods come in predefined diameters for different age groups. Metatarsal and calcaneal frame segments need two-sized L-shaped rods.
JESS is the usual distraction device. Static and translating blocks are placed on a threaded rod. Each block contains two K-wire or connecting rod holes. Measure the foot's outside border to determine distractor length. The Tibiocalcaneal distractor and Tibio-metatarsal connecting rod are sized by leg length [6, 7].
Tibial K wires go first. The Z rod length determines the distance between two parallel K wires. T handle metatarsal K wires provide continual feedback on foot position. One transfixing wire connects the fifth and first metatarsals at the neck from the firth. No metatarsals are impaled to flatten the foot's transverse arch. Two parallel and proximal medial and lateral wires are inserted. These two wires engage two or three metatrsals on their side at the proximal shaft. T-handle introduces calcaneal K wires. The posterior Tibial Artery is palpated and two transfixing K wires are introduced into the Calcaneum from the medial side without injuring it. Wires are perpendicular to the Calcaneum's long axis. The distractror blocks' holes should match the wires' distance. Posterior-to-anterior axial calcaneal wire. Abducting the hip externally rotates the leg to expose the heel. Entry is distal to the Achilles tendon insertion. The wire faces the Calcaneum's varus and equinus medially and distally. Calcaneum wires should be in the long axis [7].
Assemble connecting rods and distractors. L rod plantar limbs have foot plate slots. Due to flexor tendon flexibility, this plate supports the foot and toes and prevents toe flexion contractures during distraction phase.

Results

Table 1: Side involved

Side involved	Number of cases	Percentage
Right	15	33.3
Left	13	28.88
Bilateral	17	37.77

Table 2: Sex Distribution

Sex	Number of cases	Percentage
Male	30	66.67
Female	15	33.33

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

Table 3: Age Distribution

Age	Number of cases	Percentage
>1 year	11	24.44
1-5 year	25	55.55
5-10 year	9	20

Table 4: Previous treatment

Treatment	Number of cases	Percentage
Conservative	41	66.1
Surgical	21	33.87

Table 5: Preoperative assessment

Score	Number of feet	Percentage
5 to 6	20	32.78
7 to 8	33	54.09
9 to 10	9	14.75

Table 6: Preoperative assessment

Clinical feature	Number of feet	Percentage
Calf atrophy	20	44.4
Post displacement of fibula	20	44.4
Medial/ post crease	36	80
Curved lateral border	35	77.7
Cavus	34	75.5
Fixed equinus	34	75.5
Navicular to med malleolus	5	11.11
Os Calcis to tibia	4	8.88
No midtarsal mobility	24	53.34
Fixed forefoot supination	31	68.87

Table 7: Post-operative assessment

Category	No. of Feet
Dorsiflexion 90 or above	40
Subtalar motion possible	41
Heel neutral/ valgus	29
Forefoot neutral/ abduction	40
Gait normal Heel/ toe gait	27
Talocalcaneal index>40	37
Talus lst MT angle <10	17
Shoe Regular, without complaints	45
Functions not limited Occasionally limited	32
	18
Pain- never	45
Occasional	13
Flexor tendon function	
Full	44
Partial	15

Table 8: Result

	No. of cases	Percentage
Excellent	22	48.8
Good	15	33.33
Fair	14	31.11
Poor	11	24.44

Discussion

In this prospective cohort study, 45 patients were treated for idiopathic club foot using the Jess distractor, 16 of them had bilateral deformity. In this research group, 33.3% of the kids underwent various surgical procedures, such as Tendoachillis lengthening, posterior release, and posteromedial release. The 66.7% of other youngsters had only received conservative care. One 9-year-old child has never received treatment previously. In these occurrences, the Caroll severity rating was 5 or above. 66.7% of the kids scored higher than 7.

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All of the youngsters have experienced the same surgical procedure and postoperative care regardless of severity or age group. Youngsters with less severe deformities had less distraction time, whereas kids with moderate deformities required more distraction time [7, 8].
The majority of instances involved toe flexion deformity, which was treated by passive stretching by the parents. In 49.1% of cases, link joints show signs of loosening.
Skin necrosis was observed in 4 cases; the issue was resolved by reversing the distraction for a few days. This evolved as a result of the initial correction that the equipment' application process attempted to achieve. Initial treatment was attempted in this case because the rigid club foot's severe deformity made it impossible to align the distractor. Swivel distractors would be a better choice in these circumstances, but we haven't utilised them yet.
Functional, aesthetic, and radiological criteria were employed to evaluate the results, which demonstrated excellent and good results in 59.7% of cases [9, 10].
The difference was in the static period even though all the kids had reached full clinical correction at the time the apparatus was removed. Due to pin track infections and the parents' lack of compliance, we were unable to maintain a static period of twice the distraction time in the majority of instances [10, 11].
The severity of the clubfoot and the outcome did not correlate, however there was a significant association between the outcome and children who rigorously followed the distraction-static phase regimen.

Conclusion

The JESS apparatus is a simple tool that doesn't need any image intensification or complicated instrumentation for functional distraction. Parents quickly pick up the distraction method and follow protocol. Pin traces need to be carefully maintained. Before removing the appartment, an enough static phase is required. Strict follow-up and postoperative management are required.
The process does not entail open surgery, thus there is extremely little danger of skin complications like scarring. For all age groups, surgery is feasible, and fixators are tolerated equally. No matter how severe the malformation, the distraction system produces good outcomes.

Funding support

Nil

Conflict of interest

None

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