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Original Research Article

RELAPSING CLUB FOOT, CAUSES, PREVENTION AND TREATMENT

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Abstract:

Relapse of clubfoot is known as the recurrence of deformity after the treatment. There are a number of reasons because of which this problem occurs in the patients with previous history of club foot. The use of Ponseti method, which is used for decades ¹ and non-compliance of patients are the roots of the relapsing club foot. The relapsing can be avoided by using the feasible approaches. Treatment of relapse includes abduction and complete compliance with the treatment procedures. If the relapse is corrected earlier, there will be greater chances of quality treatment as compared to late treatment. The reason behind it is that earlier interventions can lead to the prevention of soft tissue surgeries.²

Introduction:

In spite of the effectiveness of treatments for club foot, the tendency of relapsing of this deformity is very high. The highest tendency to relapse is for "stiff, severe club feet and small calf sizes." In kids, the loose ligaments do not prone to relapse in most occasions.

There are **three grades of relapse patterns** which are identified till now. These are named as grade 1A, 1B, 2A, 2B, AND GRADE 3. In grade one, the feet were nimble, on grade two there was a fixed deformity in just one plane, it could be either coronal or sagittal, rigid abduction or rigid equinus in the "mid-feet" along with lateral curvature which is difficult to treat with stretching. In grade 3, there was more than one deformity in coronal, sagittal or horizontal planes. "A and B" suffix are used for planes.

It is reported that the relapse rate is lower after the age of four years. The Ponseti method is comprised of several manipulations along with a particular casting with or without "Achilles tenotomy." 3,4,5,6

Noncompliance with the protocols of Ponseti bracing is the major cause of relapsing. ⁷ The use of "foot abduction orthosis (FAO)" for a term of four years after treatment can help in the reduction of relapsing rates among the patients. ^{3,5,6,7,8,9}

Causes

The relapse occurs due to the incomplete therapy. The pathology behind the relapse can be the same as it occurred at first time. The club foot is an anomaly which starts in the last months of pregnancy and can last for about four years. The relapse of club foot after its

treatment occurs due to the growth of collagen. It occurs quickly in "premature infants" and gradually after that.

• Relapse Due to Noncompliance from Brace Treatment and After Full Correction

It is reported that the procedure for the correction of deformity consists of two parts. The first part is the treatment part and the second part is the maintenance. ^{5, 6, 10} In the maintenance phase, the abduction is the best way to maintain the posture of the foot. The abduction is best suitable for the "open-toed high-top shoes," best fitted and adjusted at 70 degree angle of rotation externally to the bar of approximately the length of in-between shoulders. The shoe shoes should be well molded for having a good result. The retraction fibrosis stress in the "ligament of medial aspect of the ankle and on the posterior aspect of the tibia and toe flexors" will tend to avoid the recurrence of club foot.

A survey reports that the patients with the complaints after therapy are less prone to relapsing as compared to the patients with no complaints. ^{5, 7, 8, 10, 11, 12, 13}

In case of non-adherence to the protocol, approximately 50% patients are reported. ¹³ The reports show that the children who rejected to wear the brace continuously or regularly were prone to the relapse of club foot. ⁵

Documentation

Documentation errors also come under the reasons of the problem. As it is a long procedure, the patients do not remember the exact timing and frequency of their treatment. Their duration of treatment can be disturbed due to this reason. ^{5, 14, 15}

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Lack of Knowledge

Inability to understand the reason of the child weeping is the other causes which can exaggerate the relapse indirectly. The physician cannot understand the reason of a child's cry. The Kid can cry due to habit or irritation and he may cry due to pain. The binding of brace can be loosened or tightened which is the factor for relapsing clubfoot.

Prevention

There are several causes due to which the relapse occurs. If we try to fix the reasons of relapse, we can prevent the. The knowledge of the occurrence of relapse can help in the prevention or treatment of that deformity.

At first, it is reported that the brace should be worn on a 24 hour basis for at least 60 to 90 days followed by night and nap time usage for further 4 years. This can prevent the recurrence of relapse of club foot. ^{3, 6}

Different researchers reported the non-compliance as the major factor for relapsing deformity. There is variation in the frequency and duration of therapy. One researcher believed that the total discontinuation of FAO can be the reason behind it. If a patient complies with the protocols, he can prevent it as non-compliance is regarded as a form of discontinuation of therapy. ¹⁵

The relapsing can be prevented by maintenance of records. The documentation and record keeping can help in the reduction of human errors. These errors if fixed can reduce the rates of relapse. Relapse sometimes occurs due to inappropriate timing and duration of therapy. The therapy protocol can only be targeted by well documented. The exact time of bracing can be changed due to the negligence of the doctor or patient which can cause relapse. Now-adays new pressure and stress sensitive devices are introduced. These can help in finding out the exact timing of brace wearing. ¹⁶

Provision of leaflets or information books along with timely interviews and phone calls can help in the evaluation of the patient and disease time to time. You can recommend the appropriate protocol to the patients by using handouts. 14

Treatment

- Prevention of Relapse with the Help of Brace
- > Duration of "Brace Wearing" in Patients

The **wearing time of brace** should be converted from 2 years to 4 years. The lesser time of wearing led to the relapsing of club foot. It is reported that the conversion of timing from 2 to 4 years have drastically affected the rate of relapse. ¹⁷ All the patients with club foot should wear the brace of amount 16 hours a day. In most recommendations, 12 hours are suggested at night and four hours at evening time. However, the age of stopping

the use of a brace is not recommended. However, there is variation from individual to individual. Some patients have reported relapse after two years of treatment, while others have not.

Articulated FAO and Brace Protocol

Hyper-abduction in the last cast and brace wearing can improve the treatment and decrease the relapse. ^{3, 8, 10, 14}

A lot of bracing has resulted in the increased compliance to the "post corrective bracing." Use of original "Denis Brownie Splint" has high effectiveness in the correction of club foot along with reduction of relapsing. These are the high toe shoes having an adjustable length. These have foot plates made up of aluminum metal which are attached with steel bolts. The bolts are attached to a disc which allows the rotation of the adjustable foot plate. ¹⁸ There is another brace known as Mitchell-Ponseti brace, it has an advantage of attractiveness. It is quite comfortable, but its effectiveness is not clear and definite.

Chen et al. ⁹ explained an "articulated design" which helps in the relaxation and flexion of every leg along with maintenance of necessary support. This "articulating FAO" is suitable for kids. Children tolerate it easily which results in a high adherence rate. Higher adherence rate results in greater therapeutic effectiveness. It is reported that this technique is more liked by people as compared to FAO technique. The new FAO has a good result and it allows approximately 60-70 degrees of external rotation and 10-15 degrees of dorsal flexion.

The Working of "Foot Abduction" Brace/Splint

Ponseti believes that relapse occurs due to "retracting fibrosis" of tendons and ligaments. So, at the last stages of casting, the foot is braced to such an extent that the movement of the foot remains controlled. Bar-connected FAO is very helpful in the correction of relapsing.

Generally the relapse is released by cast and braces for 1 to 2 months. It is changed after every two weeks. After this, if the "dorsiflexion" of an ankle is less than 15 degrees, the lengthening of "tendo Achilles" is done. The limit of percutaneous tenotomy is less than one year. After the removal of the cast the shoes are worn to the kid having an external rotation at night time or at the time of naps until four years of age.

• Adjustment of Tibialis Tendon

To stop further relapse, "tibialis anterior muscle's tendon" is adjusted to the third "cuneiform" in kids of the age of 2.5 years, if the muscle is forced the foot outwards. The problem of supination occurs due to "medial navicular displacement" or if the angle of "talocalcaneal angel is less than 20 degrees. The adjustment of tibialis muscle results in reduction of relapse. It also corrects the posture and

corrects the "heel varus." The need of operation and surgery is also reduced because of this method. The method for tibia tendon is less dangerous as compared to tarsal's joint release. It is also easy to perform.

If a deformity occurs, the joint is released in place of transfer if tibialis tendon. Precautions should be taken so that the tibialis anterior tendon does not split. It should also be not moved to the "fifth metatarsal" or to the "cuboid" otherwise the foot will be severe. This can result in excessive heel valgus and pronation.

Conclusion

The problem of relapse occurs mainly due to noncompliance with the FAO protocol. The use of the right method and duration can help in the prevention of relapse. The treatment of relapse includes its prevention as adjustment of tendons and muscles, according to the grade of relapse.

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