Treatment of Cleft Foot Deformity using Fish Mouth Incision and Suture-Button in Paediatric Foot

A case report

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Abstract

Cleft foot is a congenital anomaly characterized by absence of the metatarsal bones and phalanges. It is commonly seen in children with Ectrodactyly-ectrodermal dysplasia and clefting syndrome (EEC) ranging from a median cleft up to the mid metatarsals to a deep cleft up to the tarsal bones. Surgical treatment in the form of cleft closure, excision of the rudimentary metatarsal bone and cross K-wire fixation of metatarsal bones have been tried for the management of such cases. Here, we report a case of one year old child with Type III cleft foot having four metatarsals, who was treated with suture-endobutton system using three transverse tunnels in the 2nd and 3rd metatarsal bones in order to bring them closer. We were able to achieve a satisfactory outcome with a normal fitting shoe wear.

Keywords: Cleft foot; suture-button; fish mouth incision.

Introduction

Dysplastic cleft feet are commonly seen as a main feature of the Ectrodactyly-ectrodermal dysplasia and clefting syndrome (EEC). It is usually characterized by absence of the median rays of the feet, sparing the first and the fifth ray. It can range from complete absence of the
metatarsal to presence of a rudimentary metatarsal bone. Due to its characteristic appearance, it has been called “the lobster claw”. Associated cleft hand and syndactyly in the feet and hands are other common features seen in these children\(^\text{(1,2)}\). The principal indications for surgery in these children are cosmetic appearance and a better functional foot for shoe-wear. We would like to report one such case where we managed the deformity surgically using a suture-endobutton system and cleft closure using fish mouth incision.

**Case Report**

A 1 year old female child presented to us in our pediatric orthopedic clinic with complaints of abnormal looking hands and feet. On complete examination, there was right side cleft foot with four toes and syndactyly of 1\(^{\text{st}}\) and 2\(^{\text{nd}}\) toe. The left foot had five toes without cleft but there was syndactyly of the 2\(^{\text{nd}}\), 3\(^{\text{rd}}\) and 4\(^{\text{th}}\) and 5\(^{\text{th}}\) toes. The patient also had bilateral cleft hand with four digits in the left hand and three digits in the right hand. The radiographic examination revealed a complete absence of the 3\(^{\text{rd}}\) metatarsal bone in the right foot and six metacarpal bones with one horizontal metacarpal lying in the left cleft hand (Figure 1 & 2). There was no history of any such deformity in other family members. The indication of surgery in our patient was mainly cosmetic and inability to wear shoes in right foot.

We planned a cleft closure surgery for the right foot using a fish mouth incision and endobutton and fibre-wire technique to bring the two metatarsals closer.

**SURGICAL PROCEDURE:** A fish mouth incision was used in the cleft and after carefully preserving the digital vessels and nerves in the cleft, excess fatty tissue was removed. Three drill holes by 1.00 mm K-wires were made in the transverse plane at 3-5mm distance in the 2\(^{\text{nd}}\) and 3\(^{\text{rd}}\) metatarsal bones to pass the fibre-wire. Two 4 mm endobuttons were used to loop the fibre-wire, while one endobutton was stationary on a metatarsal, fibre-wires were pulled gently through the other button to achieve closure of the gap (Figure 3).

On complete closure of the skin, an esthetically acceptable foot was obtained with closure of the cleft. And the patient was kept in sterile dressing till suture removal i.e. 2 weeks. The child was
followed up till one and half years post operatively with satisfactory outcome as per parents and a normal fitting shoe-wear (Figure 4).

A full written informed consent was obtained from the parents of the patient for treatment and as well as for using data and pictures for the purpose of publication of the research.

**Discussion**

Cleft foot is rare anomaly which is usually syndromic and associated with other spectrum of deformities like cleft lip and cleft palate etc\(^3\). Clinical presentation can vary from a mere absence of toes to a deep cleft with absence of metatarsals. Radiographic classification commonly used to classify the deformity was given by Blauth and Borisch. According to this classification, our patient was a Type III with 4 metatarsal bones\(^4\).

Another attempt to classify the deformity clinically was done by Abraham’s classification\(^5\). Our patient was type I clinically with the cleft almost crossing the mid-metatarsal level.

The indications for surgery in these patients are a better foot for shoe-wear and a better cosmetic appearance. The treatment should be devised as per the patient’s demand and the magnitude of the deformity. The various techniques used for such repairs are simple cleft closure with z-plasty, application of double pedicled flap, cross K-wire fixation of the metatarsal bones to prevent splaying in the post-operative period, removing the horizontal metatarsal in order to bring the other metatarsals closer and decrease the width of the foot\(^6,7,8\). All the authors have emphasized the need for reconstruction of intermetatarsal ligament to prevent failure of correction. Insertion of silicone block has been used in cases with two or three ray deficiencies to fill the gap\(^6\). Some authors have used Ilizarov apparatus for correction of cleft foot at adult age, but this can’t be used in children owing to the cartilaginous nature of foot bones\(^9\). Suture-button mechanism to bring the two metatarsals closer is a recent modality being tried in these patients with the thought of restoration of the intermetatarsal ligament function. Although there are risks with this technique such as splintering of the metatarsal while tunnel drilling and tunnel blow out during the tightening of the suture, but if done carefully, it is an excellent technique to decrease the intermetatarsal space. It protects the cleft repair and restores the function of the intermetatarsal
ligament. It is also thought to maintain the alignment of the metatarsal bones during growth so that they don’t divert apart\(^\text{10}\). Instead of using single large drill hole to pass the fibre-wire, we used 3 transverse drill holes of 1mm diameter so as to decrease the chances of iatrogenic fracture and suture cut-out in such a young child.

The shorter duration of follow up can be considered as a limitation of this report precisely while looking for chances of recurrence of deformity at a later age.

**Conclusion**

Cleft foot is a complex deformity with poor cosmesis and the treatment procedure should be chosen judiciously to obtain good cosmetic and functional result for the patient. Cleft closure combined with a suture endobutton technique is a relatively new approach and is effective in protecting the soft tissue closure by decreasing the inter-metatarsal gap, keeping in the mind about the possibility of iatrogenic metatarsal fracture and suture cut-out.

**References**


**Figure 1:** A: Clinical picture showing cleft foot. B & C: Intraoperative images showing suture button loop being passed through metatarsal tunnels. D: Final image after closure of cleft.
Figure 2: A: Anteroposterior radiograph of the cleft hand. B: Anteroposterior view of bilateral feet showing Right cleftfoot. C: Immediate Post-operative radiograph. D: 18 months Post-operative radiograph
Figure 3: Illustration showing sequence of suture passing through metatarsal holes.

Figure 4: Clinical photographs of the foot at 18 months of follow up with footwear.