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CASE REPORT

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 characterised by absence of the metatarsal bones and phalanges. It is commonly seen in children with ectrodactyly-ectodermal dysplasia-clefting syndrome 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. We report a one-year-old child who presented to the paediatric orthopaedic clinic at a medical college in New Delhi, India, in 2018 with type III cleft foot with four metatarsals. The patient was treated with a suture-button system using three transverse tunnels in the second and third metatarsal bones in order to bring them closer together. A satisfactory outcome was achieved with normal fitting footwear.

Keywords: Podiatry; Congenital Abnormality; Pediatrics; Case Report; India.

Dysplastic cleft feet are commonly seen as a main feature of the ectrodactyly-ectodermal dysplasia-clefting syndrome. It is usually characterised by the absence of the median rays of the feet, sparing the first and the fifth ray and 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 affected children.[1,2] The principal indications for surgery in affected children are cosmetic appearance and a better functional foot for footwear. This article reports a case where the deformity was managed surgically using a suture-button system and cleft closure using fish mouth incision.

Case Report

A one-year-old female child presented to the paediatric orthopaedic clinic at a medical college in New Delhi, India, in 2018 with complaints of abnormal looking hands and feet. On complete examination, there was right-side cleft foot with four toes and syndactyly of the first and second toes. The left foot had five toes without cleft but there was syndactyly of the second to fifth toes. The patient also had a bilateral cleft hand with four digits on the left hand and three digits on the right hand. Radiographic examination revealed a complete absence of the third metatarsal bone in the right foot and six metacarpal bones with one horizontal lying metacarpal on the left cleft hand [Figures 1 and 2]. There was no history of any such deformity in other family members. The indication of surgery for this patient was mainly cosmetic and due to her inability to wear shoes on her right foot.

A cleft closure surgery was planned for the right foot using a fish mouth incision and suture-button and fibre-wire technique to bring the two metatarsals closer together. 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 to accommodate 1.0 mm K-wires were made in the transverse plane at 3–5 mm distance in the second and third metatarsal bones to be able to insert the fibre-wire into the bone. Two 4 mm endobuttons were used to loop the fibre-wire, while one endobutton was stationary on a metatarsal; the fibre-wires were pulled gently through the other button to achieve closure of the gap [Figure 3].

On complete closure of the skin, the foot was aesthetically acceptable with closure of the cleft. Sterile dressing was used until suture removal (i.e. two weeks post-surgery). The patient was followed-up until one and a half years post-operatively with satisfactory outcome as per her parents and normal fitting footwear [Figure 4].

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

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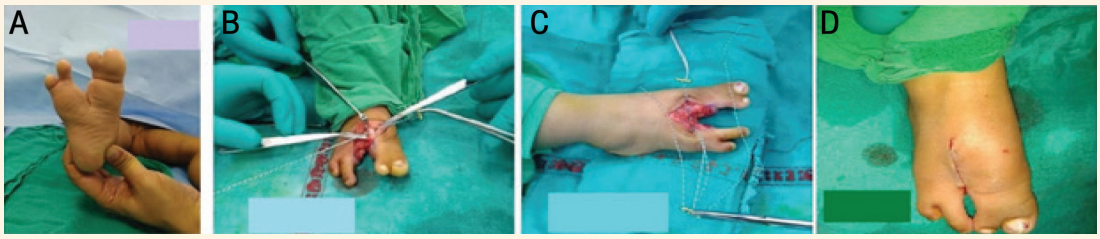

Figure 1: Photographs of the right foot of a one-year-old female child. **A:** Clinical photograph showing cleft foot. **B & C:** Intraoperative photographs showing suture-button loop being passed through the metatarsal tunnels. **D:** Post-procedure photograph showing closure of the cleft.

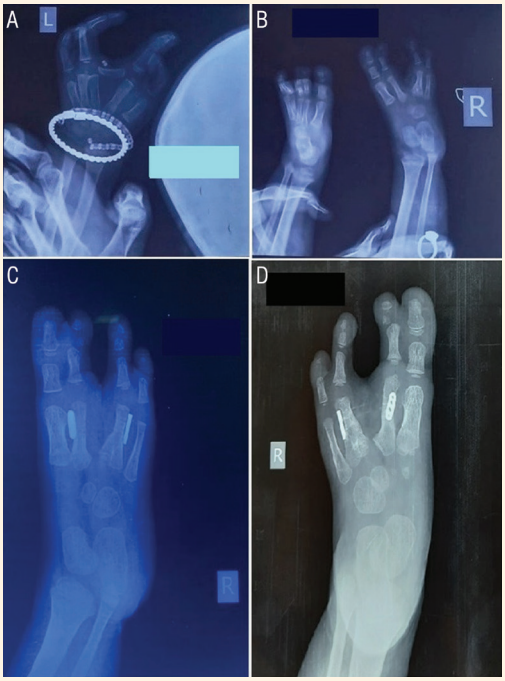

Figure 2: X-ray images of the limbs of a one-year-old female child. **A:** Anteroposterior view of the left cleft hand. **B:** Anteroposterior view of both feet showing right cleft foot. **C:** Immediate post-operative X-ray of the right foot **D:** Post-operative X-ray of the right foot at 18-month-follow-up.

Discussion

Cleft foot is a rare anomaly which is usually syndromic and associated with other spectrum of deformities such as cleft lip and cleft palate, etc.[3] Clinical presentation can vary from an absence of toes to a deep cleft with absence of metatarsals. Blauth and Borisch's radiographic classification is commonly used to classify the deformity. According to this classification, the current patient was a Type III with four metatarsal bones.[4] In addition, Abraham *et al.*'s classification was used to classify the deformity clinically; the patient was type I clinically with the cleft almost crossing the mid-metatarsal level.[5]

The indications for surgery in these patients are an improved foot shape for footwear and a better cosmetic appearance. 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 and removing the horizontal metatarsal in order to bring the other metatarsals closer and decrease the width of the foot.[6–8] All the authors in the literature have emphasised the need for reconstruction of intermetatarsal ligament to prevent failure of correction. Insertion of a silicone block has been used in cases with two or three ray deficiencies to fill the gap.[6] Some authors have used the Ilizarov apparatus for correction of cleft foot at an adult age, but this can't be used in children owing to the cartilaginous nature of foot bones.[9] The suture-button mechanism is used to bring the two metatarsals closer and is a recent modality being tried in these patients with the purpose 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, 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 do not divert.[10] Instead of using a single large drill hole to pass the fibre-wire, in the current patient three

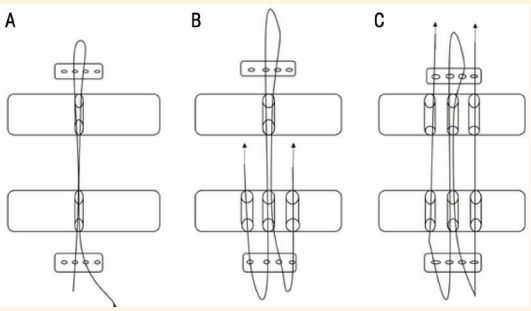

Figure 3: Illustration showing the sequence of sutures passing through metatarsal holes.

Figure 4: Photographs of the feet at 18 months of follow-up with footwear.

transverse drill holes of 1 mm diameter were used so as to decrease the chances of iatrogenic fracture and suture cut-out in such a young child.

It should be noted that the shorter duration of follow-up can be considered as a limitation of this report considering the chance 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 a good cosmetic and functional result for the patient. Cleft closure combined with a suture-button technique is a relatively new approach and is effective in protecting the soft tissue closure by decreasing the inter-metatarsal gap, keeping in mind the possibility of iatrogenic metatarsal fracture and suture cut-out.

AUTHORS' CONTRIBUTION

AC collected the data and provided the pictures. AS and SG followed-up the case. AN drafted the manuscript. AN, AS and SG revised the manuscript. All authors approved the final version of the manuscript.

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