DISCUSSION & CONSULTATION
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Foot deformities of any age are a problem to treat. The deformities produce undesirable morbidity and conventional treatment of these deformities require experience and skill. The end result of such foot in adult result in complete loss of ankle movements. Among the most common congenital deformities of foot is the club foot.

Treatment of congenital talipes equino varus has always been surrounded in controversies. The pathoanatomy of this deformity is complex, the etiology is not known and true disability in a foot is difficult to establish.

The aim of treatment is to obtain a pliable plantigrade and cosmetically acceptable foot.

Primary line of Management in correction of CTEV presenting early in life is largely dependent upon non-operative method in the form of gradual and corrective manipulation in casts or splints. (Kite, 1939 and S.A Thompson, 1942). Early months of life offer a golden opportunity for the manipulation and correction of CTEV (Ponseti et al, 1963). Proponents of surgical treatment believe that repeated plaster cast treatment if prolonged causes stiffness and interferes with growth of the foot. (Ponseti 1963, Kite 1939). Another criticism of serial casting is that casts are changed frequently and thus parents must travel long distances. Also effective casting is not a simple procedure as it is difficult to localise bony landmarks accurately, through layers of padding and plasters. (J Wedge and H. Allins, 1983). Ryoppy (1983) said that it is also difficult to predict the response of any particular patient with CTEV to conservative treatment and months or even years may be lost in the process during which important period of growth and remodelling is lost and possibilities of good results by operation are diminished.

In consideration of above problems and for relapsed or neglected CTEV that rarely respond to non-operative means, various surgical methods have been described.

Incidence of neglected CTEV is much higher in developing countries as compared to developed countries because of poor health care system, poverty.
and illiteracy. Patients continue to walk on the lateral border of foot making conditions still worse and their feet become increasingly deformed and rigid.


An interesting study of three most commonly performed surgeries for the correction of this deformity came up with unacceptably high proportion of unsatisfactory results.

Long term follow up has revealed the same problems as seen with older procedures such as stiffness of ankle, foot, muscle atrophy, extensive scarring, recurring deformity, in complete correction and over correction are reported.

Prof. Gavrill Abramovich Ilizarov devised an external ring in 1951 in Russia. Grill and Franke (1987) used the ring fixator devised by Prof. Gavrill Abramovich in correction of deformity in talipes equino varus. A similar study was conducted by Cantil et (1990) the management of severe relapsed congenital talipes equino varus. In all patients treated by ring fixator (except for two cases who developed severe lymphoedema and the treatment was discontinued) a plantigrade foot with satisfactory radiographic appearance was achieved.

Joshi et al. (1990) presented a method of treatment based on use of external fixation devised by him with controlled distraction of soft tissue for realignment of skeleton of foot in talipes equino varus.

In our study eight relapsed and neglected congenital club feet were treated by Joshi’s External stabilizing system, using principle of controlled fractional differential distraction. All patients but one were able to heel walk with valgus heel, There was a significant increase in foot length, the difference in pre operative length between medial and the lateral border being -0.6 while post operative length between medial and lateral border being + 1.6 cm. This indicates a gain of 2.2 cm. The medial border which is smaller than the lateral border in the deformed feet achieved a
near normal relationship with the lateral border after correction.

Functionally the mobility at the ankle joint improved significantly. All cases pre-operatively were fixed is equinus. Pre-operatively the mean dorsiflexion score (according to the joint disease orthopaedic Institute functional rating system for club foot surgery) rates about 14. i.e. ankle dorsiflexion above 90.

Radiologically the Talo calcaneal index mean after correction was 46.5 degree as compared to the mean value of 28 degree before correction. Talo calcaneal angle (AP) mean after correction was 28.5 degrees after correction as compared to 13 degrees before correction similarly Talo 1st metatarsal angle from mean of 30 degrees was restored to mean of 6.6 degrees.

In a study conducted by Ponseti et al (1990), they compared the radiological results in patients of club feet treated by Kite by serial plaster castings and by Evans who did the conservative treatment followed by surgical repair. They found marked disagreement in the functional and radiological results. As many clinically corrected feet treated by above measures had abnormal anatomical relationship as observed radiologically. In these studies on an average, only 37% of feet had satisfactory radiological correction in comparison to 74% good functional results in a group of patients. The overall average Talo calcaneal index was 31 degree as compared to 46.6 degree in our series. Thus the radiological correction in our series has been better the earlier works.

To comment on complication we have found that out of eight patients two (Raja Babu and Dinesh) had a recurrence of fore foot adduction deformity with their Talo 1st metatarsal angle showing a mean of 13 degrees post operatively. One patients, Dinesh also had heel varus with Talo calcaneal (Ap) view showing 24 degree. These were seen after one year of follow up. Both of them patients did not comply with the post operative protocol. They therefore missed the post operative B/K POP Boot twice and did not turn up for the orthotic shoes. Therefore though this system almost always restores normalcy, yet post operative management to ensure the maintenance is very important and can not be over emphasised. One patient Pushpendra with Bilateral deformity developed temporary flexion contractures. These flexion contractures were abolished once the frame was realigned under anaesthesia. Realignment of the frame look about 15-20 minutes.
Apart from these complications, the only other were minor one such as superficial pin tract infections, loosening of link joints, oedema and superficial linear necrosis.

From the above discussion it is evident that it is desirable to have a clinical indicator which could decide whether the foot could be treated conservatively or operatively. This would save much precious time and prevent the accentuation of the deformity. As we know this is not possible at least until the present time. Here probably this system has its role to play. Since being a semi invasive technique this system may be visualized a process some thing between conservative and operative treatment. There for if should tried without wasting any time once conservative treatment appears not delivering the expected results.

We therefore conclude that the semi invasive procedure of controlled differential fractional distraction for the treatment of club foot deformities is cheap, technically less demanding and an effective procedure for correction of various foot deformities. This procedure not only corrects the deformity but at the same time keeps the joint surface apart there by avoiding any crushing force on bone cartilage. By this process not only the bones but also the muscle, nerve and soft tissue grow simultaneously. Also this being semi invasive procedure it does not require bony and soft resection. It corrects the deformity fully, gains foot length, improves mobility and stretches soft tissue contractures. Also the operating time is about 1 hour as compared to postero medial release which takes anywhere between 1.5 to 2.5 hour. In this system Ketamine is used as the aesthetic agent in comparison to postero medial release where muscle relaxants are must for obtaining complete muscle relaxation.

Feet corrected by this procedure are plantigrade, mobile, cosmetically acceptable and with better anatomical alignment. In case desired results are not achieved then subsequent procedure in form of soft tissue release or bony procedures are easier to perform leading to desired results.

Hand plays a vital role in a human being in carrying out his profession and daily activities. Deformity in hand may be said to exist at a joint due to dislocation and subluxation, tethering of muscle or tendons or contractions of the soft tissue. Deformity exists in the bone when it is out of its normal anatomical alignment. Of all the causes, fractures and hand injuries are by far the most common cause.
Simple and compound injuries of the hand are challenge to the surgeon because stable and accurate fixation of small bones has to be combined with proper drainage, debridement and control of infection with early mobilization of joints, and careful restoration of soft tissue. Rigidly fixing small bones without too much of periosteal stripping, maintainence of length, keeping adjacent joints free, avoiding too much of metal inside are highly demanding constraints into which external fixator makes the best if not the ideal fit. POP immobilization immobilizes extensively and inadequately. Intra medullary K- wires immobilize too loosely. Plates are cumbersome, increase periosteal stripping and infection, promote bone absorption and fix rigidly only in transverse or short oblique diaphyseal fractures.

Costs and exact time consuming techniques requiring special skill to tailor make operative techniques for the need of the specific case has prevented the popularization of these devices. Nothing is standard, no two operations are alike. On the other hand optimal solutions have to be found and practised. The load of crush injuries, the economic restraint, the limited hospital opportunites and operations time has prompted the evalulation of external fixator in our country.

The fixators considered external stabilisation offer the best solution an unstable injuries in the hand. JESS is an external stabilization system quite capable of coping with the distinctive demands of the injured hand. With the use of thin and smooth wires placed away from the site of injury, in a stable configuration created by an exoskeleton of connecting system and link joints. JESS provides a stable skeletal environment aiding rapid healing of soft tissues.

Limiting the frame configuration to the involved bone alone allows immediate mobilization of the adjacent Joint. Thus restoring circulation and prevents lymph or venous stasis leading to lessor incidence of infections. Since mobilization keeps the gliding structures moving, functional restoration is expedient. In the injured hands restoration of skeletal stability would permit a better opportunity to examine and deal with the associated soft tissue injuries. As we all know absolute is detrimental to fracture healing, this system gives stability rather than rigidity to the site of fracture.

When the hand suffers a crushing injury tissues are affected in a variety of
ways. Some tissues are crushed and devitalised, some are severed, yet others are affected by friction or avulsion and some tissues by shear resilience on due to cessation of the crushing force, remain viable. The process and transportation of the patient if done properly minimize the insult. But if this procedure is rough the viable tissue are allowed to kink thus further jeopardising the already precarious blood supply.

On presentation at the hospital rough handling and contact with cleansing chemical irritants like hydrogen peroxide, further damages the hand. Commonly used methods of treatment are stabilization of the fractures with "K" wires and supporting the limb with plaster slab or wire splints or limited internal fixation with plates.

Each of these procedures has inherent difficulties as devitalisation may take place and adequate stability may not be provided.

The JESS extended hand frame offers stabilization by fixation of available intact skeleton without further devitalization. It provides tissues a breathing time and allows revascularisation of the tissue at the cellular level. The simplicity of the procedure, the immense versatility and the possibility of readjustment at a subsequent date confers in this system the unique possibility of achieving good results even in average hands.

So in our series of nine cases of JESS fixator were applied. Maximum population was above the age of thirty five years.

Mode of injury in our cases were mainly fall of heavy objects. Most of the patients presented within 15th day of the injury presentation. In cases of crush injuries wound debridement was done earliest possible before applying fixator.

We dealt with one case of volar dislocation of proximal interphalangeal joint of middle finger two weeks old. We could achieve the reduction beautifully but moderate amount of terminal restrain of movement in flexion was present. One case (Dhanvanti) had flexion contracture at the proximal and distal interphalangeal due to old chronic osteomyelitis. Cosmetic correction was possible although functional end result could not be restored to normal.

(45)
The most common type of assembly used in our series were basic hand frame and extended hand frame.

Majority of our fixator were removed with in 45 days. Two cases had their fixator for about two months with gradual removal of assembly before the final removal.

Most common complication observed at the time of fixator removal was presence of deformity due to restriction of movements. Pin tract infection was seen in two cases. One patient had delayed union. We evaluated the movements of different small joints at the time of fixator removal at four weeks and later at six weeks. Most of the movements were severely restricted at the time of removal of fixator. The problem was dealt with active and passive physiotherapy.

At the final follow up about 56% of metacarpo-phalangeal joint had difference of movements of over twenty degrees. One case had difference of movements of eighty degrees.

Recovery of movements of proximal interphalangial joint is poorer as compared to metacarpo-phalangeal joint. 55% of the patients had difference in movements of about 40°. In distal interphalangial joint about 56% of the patients had difference of movements of about 20° from the normal.

Thus it was observed that the joint stiffness was of severe grade after removal of fixator which gradually improved in few cases up to the final follow up. After evaluating the final results of movements we reached to conclusion that like any other system this system is also not without fallacy. The major draw back of this system is the stiffness. After three weeks of fixator application the joints in their functional position become very stiff. This is specifically true for the metacarpo-phalangeal joints and the proximal interphalangeal joints of third and fourth finger.

In the comminuted periarticular fractures of the metacarpo-phalangeal joints of third, fourth finger, it becomes quite difficult to perform ligamentotaxis with the help of distracters. This is also true that absence of proper flouroscopic facility and inexperience of the surgeon also make the end result unsatisfactory.
Thus from the over all study conducted by us, we conclude that JESS is a simple, versatile light fixator with a vast modularity and with tremendous potential. It is a very good system for web space maintenance especially the first web space. It is also very effective in reducing fresh as well as old neglected dislocations of hand joints since soft tissue trauma is negligible. It is also very effective in providing soft tissue stabilization in severe crush injuries of the hand. This makes soft tissue handling easier and more physiological. In these injuries on a later date split skin grafts and flaps can be performed and maintained. In comminuted fracture of the base of metacarpals, periarticular fracture around interphalangeal joints, maintenance of bone length, better stabilization of bone segments and better cosmetic results can be expected from this system.

In cases of bone loss better maintenance of length was achieved. The patient's hand is immobilized in functional position so chances of stiffness in non-functional position is much less as compared to immobilization in a plaster of paris slab.

This system also helps in regular cleaning and dressing of wounds much easily and without disturbing the stability of the bony architecture as compared to plaster of paris slab, which are to be removed again and again prior to dressing.

As with any other system we posed few problems with this one. Firstly there is a good amount of difficulty in inserting a K-wire, especially in a metacarpal by a hand drill. This problem becomes manyfolds if this fixator is being applied by an inexperienced person in a grossly crushed hand. Being a procedure using K-wire chances of pin tract infection, tethering of tendons and soft tissues are very much possible. If the frame construction is loose as it quite, commonly happens due to loosening of the link joints malunions of the small bones may occur. This may lead to a deformed hand.

All said and done, with the experience of our studies we found that this system has a long learning curve. If applied properly and judiciously and with the expertise it is of great value in salvaging and restoring hand functions.